



14th Edition SPEX® SamplePrep
HANDBOOK
OF SAMPLE PREPARATION & HANDLING

Grinding & Pulverizing

Tissue Homogenization & Cell Lysis

Mixing & Blending

Electric Borate Fusion

Pressing & Pelletizing

SPEX® SamplePrep 


Katanax®
A SPEX® SamplePrep Company

TISSUE HOMOGENIZERS

Our range of tissue homogenizers are designed with a unique, vigorous pulverizing motion and an adjustable clamp that handles various sizes of titer plates and vials. They are specifically designed for rapid cell disruption, cell lysis, and homogenization of plant and animal tissue through bead beating. This enables fast and efficient extraction of nucleic acids, DNA, proteins and other molecules. A full range of Kryotech® accessories are available to preserve temperature sensitive samples such as proteins and RNA. Our homogenizers are also ideal for the QuEChERS method used for extracting pesticide residues and other organic compounds.

Our homogenizers enable increased extraction efficiency and reproducibility over traditional sample preparation methods. Sample preparation is usually complete in two minutes or less. Samples are processed in sealed vials or plates, so no cleanup is required and cross contamination is minimized.

The **2010 Geno/Grinder®** is an automated high-throughput homogenizer that accommodates a full range of sample vials and deep-well titer plates.

The **1600 MiniG®** is a smaller homogenizer for labs that process fewer samples. It accommodates a full range of sample vials or deep-well titer plates.

The **1200 GenoLyte®** is a compact homogenizer that processes samples in a range of vials.

The **2030 Geno/Grinder®** is a fully automated homogenizer that integrates with most automated robotic systems and platforms.

APPLICATIONS	SAMPLE TYPES
DNA/RNA extraction	Animal & Plant tissue
Cell Lysis	Cell cultures
Pesticide & other residue extraction	Fruit/Vegetables
QuEChERS	Cannabis
Protein extraction	Seeds
Biofuels	Yeast
Food Safety	Bacteria
	Cereals

2010 GENO/GRINDER®

The 2010 Geno/Grinder® is a high-throughput homogenizer with an adjustable clamp that accommodates a full range of sample vials from 2 to 50 mL, jars up to 750 mL, or up to six deep-well titer plates. It is specifically designed for rapid cell disruption, lysis and tissue homogenization. Kryotech® accessories are available to preserve temperature sensitive samples during the grinding process.

Window in lid allows you to see the grinding process as it happens.



CE

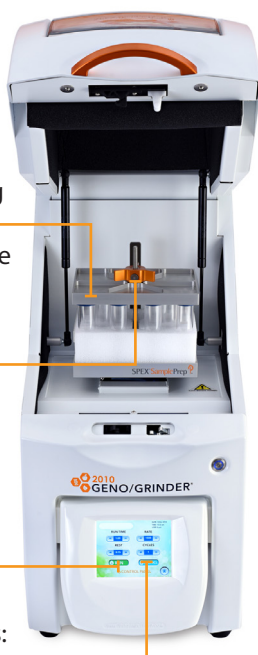
Safety lock prevents lid from being opened during grinding process.

Ambient status light.

Vertically moving clamp ensures consistent sample processing.

Clamp has quick-release button to adjust for vials or titer plates.

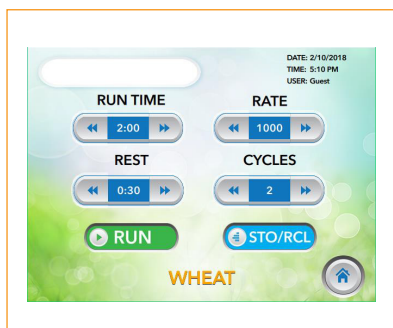
LCD control panel run times in minutes: seconds format.



Rate/timer controls and start/stop buttons.

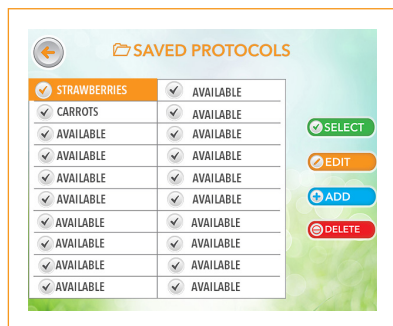
TOUCH SCREEN CONTROL PANEL

The fully programmable control panel can be tilted to give the user an optimal viewing angle. Programmable parameters include run time, rate, cycles, and pause time. Administrative lockout features (password protected) allows lab manager to restrict user access to specific protocols. Run history is recorded and can be exported via USB. The Geno/Grinder records information for service.



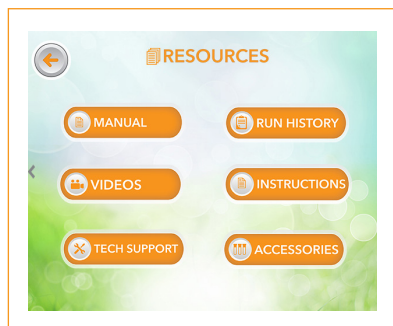
CONTROL PANEL

- Time can increase and decrease by 5 second increments
- Rate can be adjusted by increments of 5



SAVED PROTOCOLS

Up to 500 protocols can be saved for fast, simple recall, increasing productivity and reducing operator error.



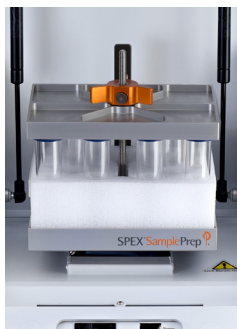
RESOURCES

Resources screen includes training videos and instructions, operating manual, a catalog of accessories and tech support information.

SPECIFICATIONS

VOLTAGE	100–120 V, 60 / 50 Hz 200–240 V, 50 / 60 Hz
CLAMP MOVEMENT	1.25 in (3.2 cm) vertical
MOTOR	1/3 hp
WEIGHT (LBS)	106 lbs. (48 kg)
TIMER/ CONTROLS	Digital display in minutes: seconds (max 20:00)
CLAMP SPEED	Adjustable from 500 to 1,750 strokes/minute
POWER CORD	Supplied with a 3-prong grounded cord 115 V, 60 Hz, or a 2-prong grounded European cord for 230 V, 50 Hz.

MIXING & GRINDING OPTIONS



- Up to 96 x 2 mL or 5 mL vials
- 24 x 15 mL vials
- 16 x 50 mL vials
- 2 x 750 mL jars
- Jars up to 750 mL



- Up to 6 deep well titer plates.



- Cryoblocks available for all vials.

1600 MINIG®

The 1600 MiniG® is ideal for labs that need a small yet powerful tissue homogenizer. It has an adjustable clamp that accommodates sample vials or titer plates. Specifically designed for rapid cell disruption, lysis and tissue homogenization. Kryotech® accessories are available to preserve temperature sensitive samples during the grinding process.

Window in lid allows you to see the grinding process as it happens.

Safety interlock switch stops motor if lid is opened during grinding process.

Rate and timer controls.



Start/stop buttons.

Vertically moving clamp ensures constant sample processing.

Adjustable clamp allows stacking to hold up to two layers of vials or titer plates.



LCD display screen shows run times in minute:second format.



SPECIFICATIONS

VOLTAGE	100–240 V, 60 / 50 Hz
CLAMP MOVEMENT	1.25 in. (3.2 cm) vertical
MOTOR	1/7 HP
WEIGHT (LBS)	44 lbs. (20 kg)
TIMER/ CONTROLS	Digital display in minutes: seconds (max 10:00)
CLAMP SPEED	Adjustable from 500 to 1,500 strokes/minute
POWER CORD	Supplied with a 3-prong grounded cord 115 V, 60 Hz, or a 2-prong grounded European cord for 230 V, 50 Hz.

MIXING & GRINDING OPTIONS



- Holds up to 48 x 2 mL or 5 mL vials
- 12 x 15 mL vials
- 6 x 50 mL vials
- 2 x 75 mL jars



- Up to 2 deep well titer plates



- Cryoblocks available for all vials.

1200 GENOLYTE®

The 1200 GenoLyte® is the ideal solution for labs that need a compact yet powerful tissue homogenizer and cell lyser. It is equipped with interchangeable sample vial holders allowing a variety of vial types from 2 to 12 mL. It is designed for rapid cell disruption, lysis and tissue homogenization enabling fast and efficient extraction of nucleic acids, proteins and other molecules of interest. The powerful grinding motion of the GenoLyte is also able to grind hard materials such as rocks and minerals.

Digital display screen shows run times in minute : second format.



SPECIFICATIONS

VOLTAGE	100–240 V, 60 / 50 Hz
DIMENSIONS	15 in. (38 cm) long x 8 in. (20.5 cm) wide x 11 in. (30 cm) high.
MOTOR	1/7 HP
WEIGHT (LBS)	24 lbs. (11 kg)
CLAMP SPEED	750, 2000, 3000, 4000 RPM
POWER CORD	Supplied with a 3-prong grounded cord 115 V, 60 Hz, or a 2-prong grounded European cord for 230 V, 50 Hz.

MIXING & GRINDING OPTIONS

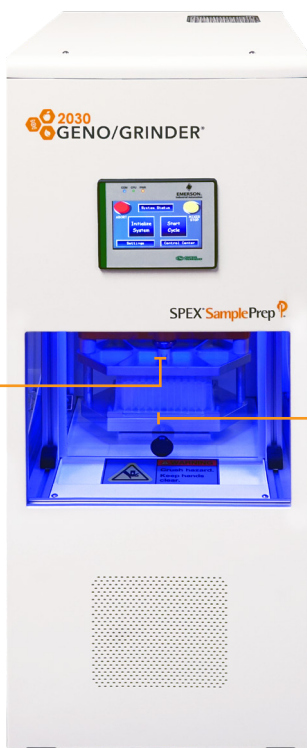


- 6 x 2 mL vials
- 4 x 5 mL vials
- 2 x 7 mL or 12 mL vials
- 1 x stainless steel or tungsten carbide 5 mL vial
- 1 x 3.5 mL agate vial

2030 GENO/GRINDER®

The 2030 Geno/Grinder® is an automated plant and tissue homogenizer that integrates with most robotic systems and platforms. Its vertical grinding motion prepares plant and animal tissue for extractions of DNA. The average processing time for each cycle is two minutes or less. It has a versatile clamp that accommodates most standard titer plates and vials.

Clamp is automatically secured before the grinding process and accommodates most standard titer plates and vials.

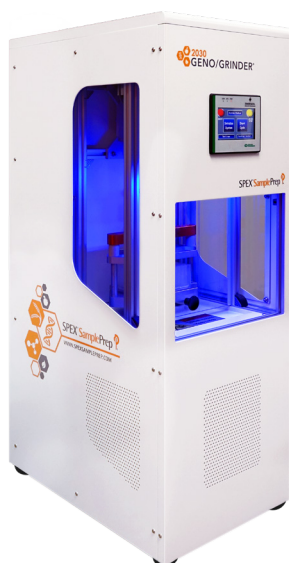


Unique vertical grinding motion that consistently processes samples.



SPECIFICATIONS

VOLTAGE	100–240 V, 60 / 50 Hz
DIMENSIONS	12.9 in. (32.7 cm) x 18.9 in. (48.0 cm) x 35.9 in. (91.0 cm)
CLAMP MOVEMENT	1.25 in. (3.2 cm) vertical
MOTOR	3-phase servo motors
WEIGHT (LBS)	129 lbs (58.5 kg)
CLAMP SPEED	500-1,750 strokes per minute
POWER CORD	Supplied with a 3-prong grounded cord 115 V, 60 Hz, or a 2-prong grounded European cord for 230 V, 50 Hz.



Auto Geno/Grinder® integrated with the Thermo Scientific Spinnaker™

ACCESSORIES



2011 ADJUSTABLE CLAMP FOR 2010 GENO/GRINDER®

The 2010 Geno/Grinder is supplied with the 2011 Adjustable Clamp. It holds up to three layers of deep-well titer plates and other titer plates, tubes and vials of equal or lesser height. The clamp has a hand-knob with a quick-release button to move it up or down a central threaded rod.

PLATES & TRAYS



2189T NESTING TRAY SET GENO/GRINDER®

Nesting trays used to stack titer plates vertically in the 2011 adjustable clamp. Set comes with two nesting mid-plates and one bottom plate.

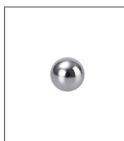


1690T NESTING TRAY FOR MiniG®

Nesting trays used to stack titer plates vertically in the MiniG 1690 adjustable clamp.

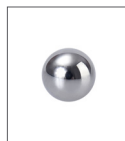
GRINDING BALLS, DISPENSERS AND EXTRACTORS

Stainless steel balls are useful for grinding large or tough samples. The choice of ball size should be determined based on the sample material and the size of the grinding vial or titer plate. After use, the grinding balls can be discarded or cleaned for re-use.



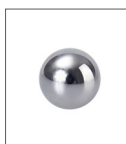
2150 GRINDING BALLS, 5/32 IN. (4 MM)

Made of 440C stainless steel. Used with 2100 grinding Ball Dispenser and all 96-well titer plates. Sold in bags of 5,000.



2151 GRINDING BALLS, 4/32 IN. (3 MM)

Made of 440C stainless steel. For use in 2230 titer plate with 3116PC, 2241-PC and 2241-PEF vials. Sold in bags of 100.



2155 GRINDING BALLS, 3/8 IN. (9.5 MM)

Made of 440C stainless steel. For use in 2230 titer plate with 3116PC, 2241-PC and 2241-PEF vials. Sold in bags of 100.



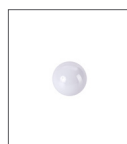
2156 GRINDING BALLS, 7/16 IN. (11 MM)

Made of 440C stainless steel. For grinding large or tough samples in 2230 titer plates and 2250 vial sets. Sold in bags of 100.



2157 GRINDING BALLS, 1/2 IN. (12.7 MM)

Made of 440C stainless steel. For grinding large or tough samples in 2230 titer plates and 2250 vial sets. Sold in bags of 100.



2186 ZIRCONIA GRINDING BALLS

6 mm zirconia grinding beads. Sold in bags of 1,000.



2100 GRINDING BALL DISPENSER

Simultaneously dispenses one 5/32 in. (4 mm) steel grinding ball 2150 into each well of a standard 96-well titer plate, 2200 and 2210 titer plates.



2110M-12 MAGNETIC TIPS

Converts micropipette dispensers into pin magnets for removing grinding balls from deep-well titer plates. Sold in packs of 12 or 96 2110M-96.

GRINDING BEADS

Molecular Biology Grade Grinding Beads are treated to inactivate contaminating enzymes and have been tested accordingly. Low Binding Grinding Beads are coated to reduce non-specific binding of nucleic acids and proteins and are used for lysing dilute samples of cells. Acid Washed Grinding Beads are treated to remove fine particles and contaminants. Contact us for detailed instructions.



SILICA GRINDING BEADS

Acid washed silica grinding beads. 200 gram bottle. Available in bead sizes 800-1000 μm 2160 and 400-660 μm 2165.



LOW BINDING SILICA BEADS

Acid washed and chemically treated to keep samples from binding to titer plate wells. Available in sizes 800 μm 2162, 400 μm 2167, 100 μm 2168.



2166 SILICA GRINDING BEADSMOLECULAR BIOLOGY GRADE, 400-600 μm

Acid washed RNase/DNase-free treated silica beads. 200 gram bottle.



2180 ZIRCONIA GRINDING BEADS, MOLECULAR BIOLOGY GRADE, 200-400 μm

Acid washed RNase/DNase-free treated zirconia beads. 250 gram bottle.



2181 LOW BINDING ZIRCONIA BEADS

Acid washed and chemically treated to keep samples from binding to titer plate wells. 250 gram bottle. Available in 100 μm 2181 and 200 μm 2182.



2302-30 ZIRCONIUM BEADS, 3 MM

Acid washed zirconium beads, 300 g bottle.

GRINDING CYLINDERS

Our chemically inert ceramic cylinders are specifically designed for the QuEChERS method which is used to extract pesticide residues or other organic contaminants from fruits, vegetables, meat or seafood. The angle-cut ends help the cylinders to shear the sample matrix and break up salt agglomerates during processing, reducing extraction time and resulting in a thorough extraction of analytes into the solvent. Typically, 2 cylinders are used per sample vial.



CERAMIC GRINDING CYLINDER

Ceramic grinding cylinder with angle-cut ends. Sold in bags of 100. Available in large 3/8 in. x 7/8 in. 2183 for use with standard 50 mL centrifuge tubes, medium 5/16 in. x 5/8 in. 2184 for use with standard 15 mL centrifuge tubes and small 5/32 in x 5/16 in. 2185 for use with standard 5 or 15 mL centrifuge tubes.

TITER PLATES AND CAP-MATS

While most titer plates can be used in the Geno/Grinder, we carry sturdy titer plates that have been tested extensively with various samples and resist perforation by steel grinding balls even at high clamp speeds. They can be used for many applications including sample libraries, mother-to-daughter automated plate pipetting, large sample dilutions and cell suspensions. Suitable for RNA extraction when used with 2600 Cryo-Station. Titer plates are made of polypropylene, with alphanumeric marks for well identification. Cap-Mats seal titer plate wells, preventing spills and well-to-well contamination. Rugged, silicone rubber Cap-Mats may be sterilized and re-used.



2200-100 96-WELL TITER PLATE, SQUARE WELLS

Square 2.4 mL wells with a working capacity of 2.0 mL. Sold as a case of 100 titer plates or single 2200.



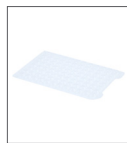
2201-10 CAP-MAT

For 2200 titer plates. Sealing mats for the 2200 titer plates, above. Sold in packs of 10 Cap-Mats or single 2201.



2210-100 96-WELL TITER PLATE, ROUND WELLS

Round 1.0 mL wells, rugged polypropylene, alphanumeric marks for well identification. Sold in packs of 100 or single 2210.



2211-10 CAP-MAT

For 2210 titer plate. Sealing mats for 2210 Titer Plates. Tough silicone rubber, prevents leaks and cross-well contamination. Sold in packs of 10 or single 2211.



2220-100 48-WELL TITER PLATE

For 2221 Cap-Mat. Rectangular 5 mL wells with a working capacity of 2 mL per well. Use with steel grinding balls 2150. Sold as case of 100 titer plates or single 2220.



2221-10 CAP-MAT

For 2220 titer plate. Cap-Mats seal 2220 48-Well Titer Plates. Sold as case of 10 Cap-Mats or single 2221.



2230-100 24-WELL TITER PLATE

Square 10 mL wells with a working capacity of 4 mL per well. Use with 2231 Cap-Mat, and one 3/8 in. (9.5 mm) steel grinding ball 2155. Sold as case of 100 or single 2230.



2231-10 CAP-MAT

For 2230 titer plate. Cap-Mats seal 2230 24-Well Titer Plates. Sold as case of 10 Cap-Mats or single 2231.

VIALS AND VIAL SETS

Vial sets are an alternative to titer plates. Vials can be filled and sealed individually, and the larger vials can hold bigger samples than titer plates. Replacement vials and steel balls can be purchased separately.



2240-PC 4 ML POLYCARBONATE VIAL SET

Each set includes 24 pre-cleaned 2241-PC vials, each with a 3/8 in. (9.5 mm) steel grinding ball 2155. Grinding load per vial 1.5 mL. Sold as case of 10.



2240-PEF 4 ML PRE-CLEANED FROSTED POLYETHYLENE VIAL SET

Set of 24 vials, each with one 3/8 in. (9.5 mm) steel grinding ball 2155. Grinding load per vial 1.5 mL. Sold as case of 10.


**2241-PC 4 ML
POLYCARBONATE
VIAL**

Polycarbonate vial with screw-on polyethylene cap. 1/2 in. diameter x 2 in. long (12.7 x 50.8 mm). Grinding load per vial 1.5 mL. Sold as case of 240.


**2241-PEF-200
5 ML FROSTED
POLYETHYLENE VIAL**

1/2 in. diameter x 2 in. long (12.7 x 50.8 mm). Grinding load per vial 1.5 mL. Sold in units of 200.


**2250 15 ML
PRE-CLEANED
POLYCARBONATE
VIAL SET**

Includes 5 pre-cleaned 2251PC vials pre-loaded with two 7/16 in. (11 mm) steel grinding balls 2156. Reinforced caps available 2250R. Sold as case of 10.


**2251-PC 15 ML,
SHORT VIAL
POLYCARBONATE**

Polycarbonate vial with screw-on cap, 1 1/8 x 1 2/3 in. (2.9 cm x 4.2 cm). Pre-cleaned with grinding load per vial 6 mL. Sold as bag of 100.


**2252-PC-30 15 ML
TALL VIAL
POLYCARBONATE**

Polycarbonate vial with screw-on cap, 5/8 in. x 4 3/4 in. (1.6 cm x 12.1 cm). Grinding load 6 mL. Sold as a pack of 30 vials.


**2253-PC-48 50 ML
POLYCARBONATE
VIAL**

Polycarbonate vial with screw-on cap, 1 1/8 in. x 4 1/2 in. (2.9 cm x 11.4 cm). Grinding load 20 mL. Sold as a pack of 48 2253C-48.


**2310 2 ML
REINFORCED TUBE**

Reinforced, Self-standing 2mL microfuge tube with screw-cap. Sold in packs of 200.


**2254 75 ML JAR SET
POLYCARBONATE**

75 mL polycarbonate vial with with screw-on cap and rubber gasket. Supplied with two half inch steel balls. Sold in pairs.

**2248 12 OZ. JAR**

12 oz. (355 mL) PET jar. Sold in packs of 8.

**2256 16 OZ. JAR**

16 oz. (480 mL) PET jar with aluminum lined plastic cap. Sold in packs of 12.

**2258 25 OZ. JAR**

25 oz. (750 mL) PET jar. Sold in packs of 4.

PRE-LOADED 2 ML DISRUPTION TUBES

Ideal for fast and simple setup—add samples and you're ready to go. Vials are self-standing, making it easier to add samples, and are prefilled with your choice of molecular biology grade silica beads, acid washed silica or zirconia beads, silica beads or steel balls. Approx. grinding load per vial is 0.5–1.0 mL.

**2301-100MB**

2 mL microfuge tube with screw-cap, prefilled with 100 µm molecular biology grade silica beads. Sold in packs of 100.

**2302-100AW2**

2 mL microfuge tube with screw-cap, prefilled with 600 mg of 100 µm acid washed zirconia beads. Available as 200 µm 2302-200AW. Sold in packs of 100.

**2302-1700AW**

2 mL microfuge tube with screw-cap, prefilled with 1.7 mm acid washed zirconia beads. Sold in packs of 50.

**2302-3000AW**

2 mL microfuge tube with screw-cap, prefilled with 3 mm acid washed zirconia beads. Sold in packs of 50.

**2302-1000AW**

2 mL microfuge tube with screw-cap, prefilled with 1.0 mm acid washed zirconia beads. Sold in packs of 100.

**2302-1400AW**

2 mL microfuge tube with screw-cap, prefilled with 1.4 mm acid washed zirconia beads. Sold in packs of 100.

**2303-MM1**

2 mL microfuge tube with screw-cap, prefilled with 800 μ m and 1.4 mm acid washed zirconia beads. Sold in packs of 100.

**2303-MM2**

2 mL microfuge tube with screw-cap, prefilled with 800 μ m and 1.4 mm acid washed zirconia beads. Sold in packs of 100.

**2303-MM3**

2 mL microfuge tube with screw-cap, prefilled with 100 μ m silica beads, 1.4 mm zirconia beads and a 4 mm acid washed silica bead. Sold in packs of 100.

**2304-100AW**

2 mL microfuge tube with screw-cap, prefilled with 100 μ m acid washed silica beads. Sold in packs of 100.

**2304-400AW**

2 mL microfuge tube with screw-cap, prefilled with 400 μ m acid washed silica beads. Sold in packs of 100.

**2304-800AW**

2 mL microfuge tube with screw-cap, prefilled with 800 μ m acid washed silica beads. Sold in packs of 100.

**2305-2800SS**

2 mL microfuge tube with screw-cap, prefilled with 2.8 mm stainless steel grinding balls. Sold in packs of 50.

**2302-6000AW**

2 mL microfuge tube with 6 mm Ceria Stabilized Zirconia beads. For grinding tough plant samples. Sold as a pack of 100.

**2300-500E**

2 mL Polypropylene microfuge tube. Sold as a pack of 500.

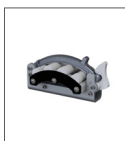
SamplePrep

HOLDERS AVAILABLE FOR GENOLYTE



1210 GENOLYTE HOLDER FOR 2 ML VIALS

Holds six standard
2mL vials.



1211 GENOLYTE HOLDER FOR 5 ML VIALS

Holds four 2241-PEF
polyethylene vials.



1212 GENOLYTE HOLDER FOR 7 ML VIALS

Holds two 2142
polyethylene vials.



1215 GENOLYTE HOLDER FOR METAL 5 ML VIALS

Holds one steel
capped 5005 vial
or one Tungsten
Carbide capped
5006 vial.



1216 GENOLYTE HOLDER FOR 12 ML VIALS

Holds two 6133PC-T
polycarbonate vials.



1217 GENOLYTE HOLDER FOR AGATE 3.5 ML VIALS

Holds one 3120
agate vial.

METAL VIALS FOR GENOLYTE



5005 STEEL CAPPED 5ML VIAL

Steel capped 5mL vial
with one 5/16 in.
(7.9 mm) steel ball.



5006 TUNGSTEN CARBIDE VIAL SET

Tungsten carbide
capped vial set
5 mL, with one
tungsten carbide
ball

METAL BALLS FOR GENOLYTE



5005B STEEL GRINDING BALL 5/16 IN. (7.9 MM)

Steel grinding ball for
5005 vial.



5006B TUNGSTEN CARBIDE BALL 5/16 IN. (7.9 MM)

Tungsten carbide
ball for 5006 vial.

TISSUE HOMOGENIZER ACCESSORIES

PRE-LOADED DISRUPTION TUBES REFERENCE TABLE

PART NUMBER	2 ML VIAL SET	DETAILS
2301-100MB	100 µm Silica Beads	Economical bead for disrupting bacteria.
2302-1400AW	1.4 mm Zirconia Beads	Suitable for small tissue samples and biomass.
2303-MM1	Garnet & ZrO ₂ Satellites	General Sample Shredding.
2303-MM2	800 micron & 1.4 mm Zirconia Beads	Mycelium & Soft Leaves.
2303-MM3	100 micron Si, 1.4 mm Zr, & 4 mm Si	Biofilms & Plant Tissues.
2304-100AW	100 µm Silica Beads (600mg)	Suitable for Bacteria.

2302-100AW2	100 µm Zirconia Beads	Zirconium beads are of higher density; excellent for bacterial disruption.
2304-400AW	400 µm Silica Beads	Size is ideal for yeasts such as <i>Saccharomyces</i> .
2304-800AW	800 µm Silica Beads	Size is suitable for molds and pollen.
2302-1000AW	1.0 mm Zirconia Beads	Beads are suitable to disrupt finer soils.
2302-1700AW	1.7 mm Zirconia Beads	Effective for larger tissue samples and fine plant materials.
2305-2800SS	2.8 mm Stainless Steel Grinding Balls	Most dense of all the grinding media, popular for their moderate cost. Good for tissues.
2302-3000AW	3.0 mm Zirconia Beads	Good for larger tissue samples. Excellent chemical resistance to organics.
2302-6000AW	6 mm Ceria Stabilized Zirconia Beads	Ideal for grinding tough plant samples.

RACKS AND HOLDERS

These Racks and Holders are designed to hold vials securely in place on the 2010 Geno/Grinder or MiniG during processing. They are lightweight and can also be used on the benchtop and to transport samples within the laboratory.

MiniG® ACCESSORIES



1680 2 ML FOAM HOLDER FOR MiniG®

Rugged foam block holds 24 standard 2 mL tubes. Sold as a pair.



1681 5 ML BLOCK RUGGED FOAM BLOCK

Holds 24 standard 5 mL tubes. Sold in pairs.



1685 15 ML FOAM HOLDER FOR MiniG®

Rugged foam block holds 12 standard 15 mL tubes.



1686 50 ML FOAM HOLDER FOR MiniG®

Rugged foam block holds six standard 50 mL tubes.



1688 FOAM HOLDER

Foam holder for 75 mL polycarbonate jars, holds 2 jars.

GENO/GRINDER ACCESSORIES



2191 5 ML VIAL HOLDER

Thick, rugged foam block holds 48 standard 5 mL centrifuge tubes.



2193 15 ML VIAL HOLDER

Holds up to 12 x 15 mL vials 2251-PC.



2196-16-PE HOLDER FOR 50 ML CENTRIFUGE TUBES

Thick, rugged foam block holds 16 standard 50 mL centrifuge tubes.



2197 HOLDER FOR 15 ML CENTRIFUGE TUBES

Thick, rugged foam block holds 24 standard 15 mL centrifuge tubes.



2300 HOLDER FOR 2 ML MICRO- CENTRIFUGE TUBES

Thick, rugged foam block holds 48 microfuge tubes.



2198 FOAM HOLDER FOR 75ML POLYCARBONATE JARS

Thick, foam block holds six 75 mL 2254 jars.



2257 FOAM HOLDER FOR 2255 VIALS

Thick, rugged polyethylene foam block holds up to sixteen 2255 vials.



2259 HOLDER FOR 2258 JARS

Foam holder for two 25 oz. (750 mL) jars.

KRYO-TECH® ACCESSORIES

These accessories are used to chill samples to cryogenic temperature and to maintain temperature during grinding in the Geno/Grinder®. Additional products for liquid nitrogen handling, such as protective gloves and portable Dewars, can be found in the Freezer/Mill® section.



2600 CRYO-STATION

The Cryo-Station holds temperature sensitive samples that must be kept chilled for cryogenic grinding or to preserve pesticides, RNA, or proteins for extraction. It has an insulated jacket and can be filled manually or automatically with liquid nitrogen. The well of the Cryo-Station reaches liquid nitrogen temperatures quickly. Up to two Cryo-Blocks can be placed in the well to be chilled and kept cold prior to grinding. The well can also hold a chilled cutting board to prepare temperature sensitive samples.



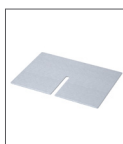
2255 CRYOGENIC GRINDING VIAL PACK

Used to grind tough materials (e.g. bone) at cryogenic temperatures. Package includes four sets of cryogenic vials, each with 1 cylinder, 2 end plugs, and 2 tungsten carbide balls. For use with the 2257 holder or the 2260 Cryo-Block. Sold in a pack of 4.



2650 CRYO-ADAPTER FOR TITER PLATES

Extruded aluminum insert for 2210 Titer Plate. Keeps samples in titer plate cold during grinding. Sold in pairs.



2189C CRYOPLATE THE 2189C

CRYOPLATE keeps sample lids cold during the grinding process. Used with Cryo-Block or 2650 titer plates.

CRYO-BLOCKS

Aluminum Cryo-Blocks are designed to keep sample tubes or vials cold during processing. They can be pre-cooled in liquid nitrogen, dry ice or a freezer. Cryo-Blocks should always be used two at a time to balance the load in Geno/Grinder Clamps.

Speed restrictions may apply for heavier loads, please see the technical info on page 36.

MiniG® CRYO-BLOCKS



1660 2 ML CRYO-BLOCK

Lightweight cryo-block for 2 ml vials with a hollow base and a lid to help the samples maintain cold temperature during processing.



1665 5 ML CRYO-BLOCK

Lightweight cryo-block for 5 ml vials with a hollow base and a lid to help the samples maintain cold temperature during processing.



1666 CRYO-BLOCK FOR 15 ML CENTRIFUGE TUBES

Aluminum block that holds fifteen 15 mL round-bottom centrifuge tubes.



1667 CRYO-BLOCK FOR 50 ML CENTRIFUGE TUBES

Aluminum block that holds six 50 mL round-bottom centrifuge tubes.



1668 CRYO-BLOCK FOR 15 ML POLYCARBONATE VIALS

Aluminum block that holds six 2251PC vials.

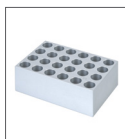
GENO/GRINDER® CRYO-BLOCKS


2661 CRYO-BLOCK FOR 15 ML CENTRIFUGE TUBES

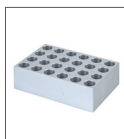
Aluminum block that holds fifteen 15 mL round-bottom centrifuge tubes. Sold in pairs.


2660 CRYO-BLOCK FOR 15 ML POLYCARBONATE VIALS

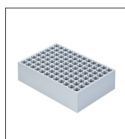
Aluminum block that holds six 2251PC vials. Sold in pairs.


2663 CRYO-BLOCK FOR 5 ML POLYETHYLENE VIALS

Aluminum block that holds twenty-four 2241-PEF vials, as used in 2240-PEF Vial Set. Sold in pairs.


2662 CRYO-BLOCK FOR 5 ML POLYCARBONATE VIALS

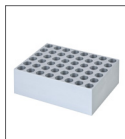
Aluminum block that holds twenty-four 2241-PC vials, as used in 2240-PC Vial Set. Sold in pairs.


2665 CRYO-BLOCK FOR MICRO-CENTRIFUGE OR PCR TUBES

Aluminum block that holds 96 standard (0.6 mL) micro-centrifuge tubes. Sold in pairs.


2664 CRYO-BLOCK FOR 50 ML CENTRIFUGE TUBES

Aluminum block that holds six standard conical-bottom 50 mL centrifuge tubes for cryogenic milling. Sold in pairs.


2666 CRYO-BLOCK FOR 48 MICRO-CENTRIFUGE OR PCR TUBES

Aluminum block that holds 48 standard (1.5 - 2.0 mL) micro-centrifuge tubes. Sold in pairs.


2260 CRYO-BLOCK FOR 2255 VIAL

Aluminum block holds eight 2255 vials. Two Cryo-Blocks, allows 16 samples to run simultaneously. Sold in pairs.

TECHNICAL INFORMATION

VIAL AND TITER PLATE CAPACITY TABLE

	PART #	MiniG CAPACITY	HOLDER	NUMBER OF LAYERS
Titer plate	Various	2	n/a	2
2 mL vial	Various	48	1680	2
5 mL vial	Various	48	1681	2
15 mL vial (short)	Various	10	n/a	2
15 mL vial (tall)	2252-PC-30	12	1685	1
50 mL vial (tall)	2253-PC-48	6	1686	1
75 mL vial	2254	2	1688	1
Cryovials	2255	n/a	n/a	1
16 oz. (480 mL) jar	2256	1	n/a	1
25 oz. (750 mL) jar	2258	n/a	n/a	1

TECHNICAL INFORMATION

STACKING TRAY	GENO/GRINDER CAPACITY	HOLDER	NUMBER OF LAYERS	STACKING
1690T	6	n/a	3	2189T
1690T	96	2300	2	2189C
1690T	96	2191	2	2189C
1690T	24	2193	2	2189C
n/a	24	2197	1	n/a
n/a	16	2196-16-PE	1	n/a
n/a	6	2198	1	n/a
n/a	6	2257	1	n/a
n/a	2	n/a	1	n/a
n/a	2	2259	1	n/a

OPERATING LOAD RESTRICTIONS

To maintain proper functionality of the Geno/Grinder, the maximum recommended total sample load in the clamp assembly is 4 lb. (1.8 kg). The total sample load includes sample, vials (or titer plates), grinding media, holders (or cryo-blocks), and nesting trays. For Sample loads exceeding 2.0 lb.

(0.9 kg), the maximum recommended operating rate is 1500 rpm. Sample loads less than 2.0 lb. can be run at rates up to the maximum of 1750 rpm. Dynamic loads greater than 2 lb. can create a rate error. When stacking 4 or 6 titer plates, do not add more than five 4 mm steel balls to a single titer plate well.

Operating with loads that exceed the recommended maximum rate and weight limits can result in damage to the Geno/Grinder. Therefore, warranty restrictions or invalidation may apply.

USING THE GENO/GRINDER® FOR BEAD BEATING

Bead beating is the preferred method to disrupt a variety of microorganisms and plant or animal tissues. In bead milling, grinding media such as steel or ceramic balls or glass beads are vigorously agitated inside a sealed vial or titer plate with the sample. The most commonly used grinding balls are steel ball bearings 4 mm in diameter. Disruption or cell lysis occurs as a result of the crushing action of the grinding media as they collide with the sample. Low shearing of nucleic acids can be achieved by varying the agitation speed of the mill. It is considered the method of choice for disruption of yeast and fungi and tough-to-disrupt cells such as bacteria and microalgae.

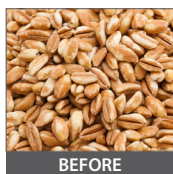
This method is one of the few that avoids cross-contamination between samples because both vials and grinding media are disposable. SPEX SamplePrep offers a comprehensive range of grinding media, vials, jars and titer plates for ranging from 0.6 to 750 mL. The size and amount of the grinding media used is important. Speed and effectiveness of disruption can be increased dramatically by increasing the density, form and amount of grinding media in the sample vial or titer plate. Tough tissues may require precooling to embrittle the sample and this also serves to preserve any temperature-sensitive components such as RNA or Proteins. SPEX SamplePrep offers a full range of cryogenic Kryo-Tech® accessories for this purpose. The loading of the beads should always allow adequate movement inside the sample vials but can be up to 80% of the total sample volume, provided there is still adequate agitation

of the bead slurry. The higher the ratio of grinding media to sample volume, the faster the rate of cell disruption. After homogenization, the beads settle and the cell extract can be removed.

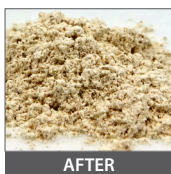
The Geno/Grinder® offers analysts a versatile high-throughput bead mill for plant or animal tissue homogenization. The patented design has a true linear grinding motion that provides the most efficient mechanism for tissue homogenization and cell lysis. The powerful and compact design enables complete disruption with or without buffer in about 1-3 minutes, with high yields. The Geno/Grinder® has also been successfully used for pesticide residue extraction from fruit and vegetable samples using the QuEChERS technique.

A comprehensive guide for beating is available. For further information visit www.spexsampleprep/application-notes.

PROTOCOLS



BEFORE



AFTER

SPELT SEEDS BEAD BEATING

Insert one seed and one grinding ball in each well of the deep well titer plate.

Grinding Balls=4 mm

Rate=1,400 RPM

Time=1 minute



BEFORE



AFTER

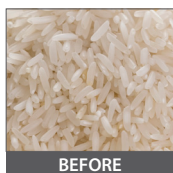
CANNABIS

Place two grinding balls into a 50 mL centrifuge tube.

Grinding Balls=11 mm

Rate= 1,500 RPM

Time= 1-2 minutes



BEFORE



AFTER

RICE

Dispense one steel bead into each well of the deep well titer plate.

Grinding Balls=4 mm

Rate= 1,500 RPM

Time= 2 minutes

BEFORE & AFTER SAMPLES

CORN

Sample was inserted in 2255 vials with two tungsten carbide balls (7/16"). 15 minute pre-cool of vials in Cryo-Block in liquid nitrogen. Five minute grind at 1,500 RPM.



BEFORE



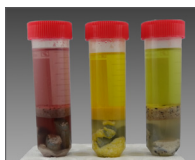
AFTER

FRUIT

Insert pre-homogenized fruit into 50 mL tubes. Insert into foam holders, place into clamp and run Geno/Grinder from 1,000 to 1,500 RPM for 1 minute with solvent or water.



BEFORE



AFTER

ANIMAL TISSUE

Pre-chill sample in 2251 grinding container using a 2660 Cryo-block submerged in liquid nitrogen for 5 minutes. Set Geno/Grinder speed for 1,500 RPM for 2 minutes.



BEFORE



AFTER

APPLICATION NOTES

APPLICATION NOTE SP001: CELL DISRUPTION / APPLICATION: CELL LYSIS

MECHANICAL DISRUPTION FOR HIGH-THROUGHPUT FATTY ACID EXTRACTION FROM ANIMAL TISSUE SAMPLES

Sample preparation is often the bottleneck in the process of efficient analysis work. Up to now efforts to mechanically disrupt cells through grinding have been based on the modification of traditional ball or swing mills with an adapter for micro titer plates. The Geno/Grinder® was the first available mill specifically designed for cell disruption. Two deep well plates (PP), used for collecting and storing of biological materials with 1.5 – 2 ml wells were placed next to each other in the Geno/Grinder clamp assembly. Freeze dried rat muscle or livers were placed in each plate well and spiked with 100 mM KH_2PO_4 buffer at pH 2 or trichloro-acetic acid.

APPLICATION NOTE SP011: HOMOGENIZATION APPLICATION: DNA EXTRACTION OF LEAF MATERIAL

EXTRACTION OF NUCLEIC ACIDS FROM SUGAR BEET LEAVES

Sugar beet leaf tissue is freeze-dried, and 0.5 to 1 grams of each sample is placed in a 2mL Eppendorf vial with two steel balls. The samples are pulverized, 96 at a time, in a SPEX Geno/Grinder that is run for two periods of one minute at 1000 strokes per minute. Then 300 μL of buffer is added to each vial and the contents homogenized by running the vials for 30 seconds at 1000 strokes/minute. The vials are centrifuged and the lysed plant tissue transferred to microtiter plates, then mixed, filtered, rinsed and dried prior to DNA analysis.

APPLICATION NOTE SP013: GRINDING / DISRUPTION APPLICATION: STARCH AND SOLUBLE METABOLITE MEASUREMENT IN LEAVES

PERCHLORIC ACID EXTRACTION OF LEAVES FOR MEASUREMENT OF STARCH AND SOLUBLE METABOLITES

Harvested plant material is placed in SPEX 5-mL vials and chilled in liquid nitrogen. Perchloric acid is added to each vial along with a stainless steel ball. The vials are run in a SPEX Geno/Grinder for 90 seconds at 1500 strokes per minute, or longer if necessary to pulverize the contents. More perchloric acid is added to each vial, which is mixed, then centrifuged. The supernatant is analyzed for soluble metabolites, and the centrifuged pellet assayed for starch.

APPLICATION NOTE SP014: RNA EXTRACTION FROM FUNGUS

APPLICATION: RNA EXTRACTION

RNA EXTRACTION FROM ASPERGILLUS PARASITICUS MYCELIUM

Some strains of the filamentous fungus *Aspergillus Parasiticus* are nontoxic, and others produce aflatoxins in infected grain and other food products. To study this, RNA was extracted from *Aspergillus* samples after pulverizing them cryogenically in a SPEX Geno/Grinder, then adding Puresol to the vials and returning them to the Geno/Grinder to homogenize the samples.

APPLICATION NOTE SP016: LYSING / HOMOGENIZATION

APPLICATION: DNA EXTRACTION FROM RICE SEEDS

QUICK DNA EXTRACTION FROM RICE SEED

Samples are prepared using a 96-well 1 mL assay block. Dispense one 5/32 in. (4 mm) stainless steel bead into each well using the Grinding Ball Dispenser (SPEX SamplePrep Cat. No. 2100). Next, add one seed to each well. Dispense extraction buffer into each well and securely cap each well. After the samples have been capped, grind them in the Geno/Grinder at 500 strokes/minute for two minutes.

APPLICATION NOTE SP017: LYSIS TIME AND OTHER VARIABLES

ON DNA EXTRACTION / APPLICATION: DNA EXTRACTION FROM FRESH BASIL LYSED

EFFECT OF LYSIS TIME AND OTHER VARIABLES ON DNA EXTRACTION FROM FRESH BASIL LYSED IN 2 ML TUBES WITH THE GENO/GRINDER®

The Geno/Grinder® was compared with a competitive cell lyser (Competitor A) for extraction of DNA from fresh basil. In addition, homogenization time and operating rate were varied for the Geno/Grinder, while buffers, grinding media and tube size remained constant. Results indicated that use of the Geno/Grinder provided DNA with higher molecular weight than the competitive instrument. In addition, optimal homogenization conditions using the Geno/Grinder were found to be 90 sec. at a rate of 2000 cyc/min.

APPLICATION NOTE SP018: HIGH THROUGHPUT DISRUPTION OF YEAST IN A 96-WELL FORMAT / APPLICATION: DNA/RNA AND OTHER EXTRACTIONS

HIGH THROUGHPUT DISRUPTION OF YEAST IN A 96-WELL FORMAT

Mechanical disruption of yeasts has traditionally been accomplished by using either a french press or bead beater. In both approaches, samples are processed individually. For experiments where large numbers of yeast clones must be examined in a high throughput screening environment, individual processing is a major bottleneck and impractical. Consequently, a method is needed that combines mechanical disruption of cells in a high throughput format. The Geno/Grinder (SPEX SamplePrep, Metuchen, NJ), a bead beater originally designed to smash seeds in deep well plates, can be used to disrupt yeast in a microwell plate format.

APPLICATION NOTE SP020: LYSING OF BACTERIAL CELLS APPLICATION: DNA/RNA AND OTHER EXTRACTIONS

LYSING OF BACTERIAL CELLS IN THE GENO/GRINDER®

The Geno/Grinder was tested to determine if this technology could be used to lyse bacterial cells. Standard 96-well titer plates were used with 400-600 μ silica grinding beads (Molecular Biology Grade, cat. no. 2166). The delivery of the beads into each cell of the titer plate can be accomplished in a number of ways. In this case micropipette tips were filled to the mark with grinding beads, and each tip emptied into a titer plate well. This technique will deliver approximately 0.4 grams of silica beads per well. Other delivery systems are commercially available.

APPLICATION NOTE SP021: EXTRACTION OF RNA/CDNA AND GENOMIC DNA FROM TISSUE WITH REAL-TIME PCR / APPLICATION: DNA/RNA AND OTHER EXTRACTIONS

EXTRACTION OF RNA/CDNA AND GENOMIC DNA FROM TISSUE WITH REAL-TIME PCR

Fresh samples of animal tissue were collected, trimmed to approximately 50–100 mg of wet weight, snap-frozen in liquid nitrogen, and stored at -80°C . The animals were man, dog, cat, mouse, cow, and horse, as well as fish and clams; see Table 1. Before DNA and/or RNA extraction, the tissues were transferred frozen to a deep-well titer plate standing on a block of dry ice. Each well contained two 4 mm stainless steel balls (SPEX CertiPrep cat. no. 2150) and 500 microliters of buffer (Applied Biosystems nucleic acid purification lysis buffer). The plates were sealed with a plastic cover and subjected to grinding in the 2000 Geno/Grinder for 2 minutes at a setting of 1000 strokes/minute.

APPLICATION NOTE SP027: SAMPLE HOMOGENIZATION OF FOOD SAMPLES FOR STABLE ISOTOPE RATIO ANALYSIS

STABLE ISOTOPE RATIO ANALYSIS FOR THE TESTING OF AUTHENTICITY OF FOOD PRODUCT ORIGIN AND PRODUCTION METHOD CLAIMS APPLICATION

Food Fraud is a global problem with a long heritage. With global food supply chains growing in complexity, fraudulent food labelling has become an ever increasing risk. Consumers are becoming more aware and concerned with how and where their food products originate. Suppliers are taking a more active interest in protecting their brand reputation. Through the application of Stable Isotope Ratio Analysis (SIRA), consistency with labelling claims for geographical origin and/or production method of food and food products can be established. By using this technique we are able to help protect consumer, supplier and producer interests.

APPLICATION NOTE SP024: PESTICIDE ANALYSIS: STANDARD QUECHERS VS MODIFIED METHOD / APPLICATION: QUECHERS / PESTICIDE EXTRACTION

ANALYSIS OF PESTICIDES IN FRUIT AND VEGETABLE PRODUCTS USING A STANDARD QUECHERS METHOD AND A MODIFIED METHOD INVOLVING THE GENO/GRINDER

Pesticide residues in agricultural food sources are widely considered to cause adverse health effects when consumed by humans. In particular, much of the produce sold in the U.S. is imported and concern over pesticide levels in these fruits and vegetables in comparison to those grown domestically has resulted in increased testing for pesticide residues.

In this study, the Geno/Grinder was employed to homogenize the fruit/vegetable samples and to mix the produce rapidly and thoroughly with the salts and solvent in an effort to improve the extraction step. The goal of the study was to determine whether the use of the Geno/Grinder during the extraction step would increase pesticide recovery over the traditional, manual QuEChERS method.

APPLICATION NOTE SP022: THE BENEFITS OF THE GENO/GRINDER FOR PESTICIDE RESIDUE ANALYSIS / APPLICATION: PESTICIDE RESIDUE EXTRACTION

THE BENEFITS OF THE GENO/GRINDER® HIGH-THROUGHPUT TISSUE HOMOGENIZER TO INCREASE SAMPLE THROUGHPUT FOR PESTICIDE RESIDUE ANALYSIS BY LC/MS/MS

Sample preparation for pesticide residue analysis has typically followed DuPont Report No. AMR 3705-95, "Analytical Method for the Determination of Famoxadone and Cymoxanil Residues in Various Matrices." (2) In this procedure, ground-up samples are weighed into extraction jars, followed by the addition of water to allow them to re-hydrate prior to extraction. Acetonitrile is added and samples are ground with a laboratory homogenizer. The plant matrix is then allowed to settle out and liquid extracts are filtered and collected in mixing cylinders containing sodium chloride. The mixing cylinders are capped, shaken, and inverted to aid in the dissolution of sodium chloride and then allowed to stand while the acetonitrile (upper layer) and water phases separate. Acetonitrile aliquots are taken for cymoxanil and famoxadone analysis.

Canna-Prep®

Cannabis Sample Preparation

SPEX SamplePrep is an industry leader in Sample Preparation products for the Cannabis Industry. Our Homogenizers, Grinders and Cryogenic Mills provide reliable, reproducible results with no cross contamination. We have the expertise and equipment to help startups and established labs.

To learn more about how our products can be used in cannabis testing and applications visit our website www.canna-prep.com.



 **GENO/GRINDER®**



 **FREEZER/MILL®**



Scan the QR code with your smart phone to see how our Freezer/Mill easily grinds edibles.

SPEX SamplePrep has been providing superior sample preparation equipment and supplies since 1954. This handbook, now in its 14th edition, has been an important tool that provides our customers not only with information about our products, but also how they can be used in different techniques and applications. This is backed by our unique knowledge and expertise to help our customers select the most appropriate products for their sample preparation needs.



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