

LIQUID AEROSOL DEVICES (Air-free)

► For doses up to 1 ml in Rat, Guinea Pig, or Custom MicroSprayer® Aerosolizer - Model IA-1B



MicroSprayer® Aerosolizer
- Model IA-1B shown with
1 ml polycarbonate syringe

Description: For fast, precise, air-free liquid aerosol administration with no waste. Made of rigid stainless steel, 19-gauge tubing with rounded tip, with Luer hub. Can be used with liquids, solutions or suspensions in a wide range of formulations from nanoparticles to large biological formulations.

Operates with: Either 500µl gas-tight, sterilizable glass OR 1 ml disposable polycarbonate syringe. (Smallest dose may need to be tested by end user.)

Particle size range: Mass Median Diameter of approx. 22 µm (microns).

NOTE: Particle size analyzed with water only using laser defraction method.

Outer tube diameter: .042" (1.1 mm) except at tip which is .048" (1.2 mm)

Inner diameter: .032" / .81mm (Inner diameter of passage through the patented aerosol components at the very tip is approximately 140 microns.)

Custom lengths: Available straight or with bend. Longer lengths may be inserted directly or via an endotracheal tube in larger species.

Re-usable/Sterilizable: Can be cleaned and sterilized with hot water, organic solvents, autoclave or ultrasound.

ITEM #	DESCRIPTION	PRICE
IA-1B-R-GL500	For Rat (2" tip) w/ 500 µl glass syringe	\$815.00
IA-1B-R	For Rat w/ 1ml polycarbonate syringe	\$720.00
IA-1B-GP-GL500	For Guinea Pig (3" tip) w 500 µl ml glass syringe	\$830.00
IA-1B-GP	For Guinea Pig w/ 1ml polycarbonate syringe	\$735.00
IA-1B-C	Custom length	Ask for quote
B-SYR-GL500	500 µl sterilizable, gas-tight glass syringe	\$95.00
B-SYR	1ml disposable polycarbonate syringe	\$3.90
RCA-1B	Reverse Cleaning Adaptor (NEW!)	\$55.00

► For doses of 25-µl to 250-µl in Mouse, Rat or Custom MicroSprayer®/Syringe Assembly - MSA-250



Includes:
MicroSprayer®
Aerosolizer Model IA-1C
and FMJ-250 High
Pressure Syringe
(Re-usable and
sterilizable)

Description: For fast, precise, air-free targeted liquid aerosol administration. Can be used with liquids, solutions or suspensions in a wide range of formulations from nanoparticles to large biological formulations

Syringe Capacity: Maximum syringe capacity 250 µl (microliters). A set of volume stops is provided with each syringe. These are attached to the plunger to permit precise doses of 25 µl or 50 µl, or combinations of those amounts. Syringe holds multiple doses.

Particle size range: Mass Median Diameter of 16 µm (microns)

NOTE: Particles analyzed with water using laser defraction method.

ITEM #	DESCRIPTION	PRICE
MSA-250-M	For Mouse (1.25" tip)	\$2,240.00
MSA-250-R	For Rat (2" tip)	\$2,255.00
MSA-250-C	Custom lengths (straight or w/bend)	Ask for quote

MicroSprayer® Aerosolizer (liquid) - Model IA-1C



Requires FMJ-250
High Pressure Syringe

Description: For fast, precise liquid aerosol administration with no waste. MicroSprayer® Aerosolizer made of flexible, 23-gauge, stainless steel tubing with rounded tip. Hub: 1/4-28 tpi.

Operates only with: Penn-Century's patented FMJ-250 Syringe (REQUIRED)

Outer diameter: .025" (0.64 mm), except at the very tip which is .028" (0.71mm)

Inner diameter: .017" / .43mm (Inner diameter of passage through the patented aerosol components at the very tip is approximately 60 microns.)

Particle size range: Mass Median Diameter approximately 16 µm (microns)

NOTE: Particles analyzed with water only using laser defraction method.

Custom lengths: Available straight or with bend. Longer lengths may be inserted directly or via an endotracheal tube or bronchoscope.

Re-usable/Sterilizable: Can be cleaned and sterilized with hot water, organic solvents, autoclave or ultrasound.

ITEM #	DESCRIPTION	PRICE
IA-1C-M	For Mouse (1.25" tip)	\$750.00
IA-1C-R	For Rat (2" tip)	\$765.00
IA-1C-C	Custom length (straight or w/ bend)	Ask for quote
RCA-1C	Reverse Cleaning Adaptor (NEW!)	\$75.00

FMJ-250 High-Pressure Syringe



Required for use with
MicroSprayer®
Aerosolizer - Model IA-1C

Description: Unique patented design operates at 3000 psi. Constructed of stainless steel, glass and chemically-resistant components with a replaceable plunger with a Teflon® tip. May be used with any length Model IA-1C.

Syringe Capacity: 250 µl (microliters). Two sets of volume spacers are provided with each syringe. These are attached to the plunger, and removed one by one, per instructions provided, to permit precise single doses of either 25 µl or 50 µl, or combinations of those amounts. Syringe can hold multiple doses.

Re-usable/Sterilizable: Can be cleaned and sterilized with hot water, organic solvents, autoclave or ultrasound.

ITEM #	DESCRIPTION	PRICE
FMJ-250	FMJ-250 High-Pressure Syringe	\$1,450.00
PLU-250	Replacement Plunger for FMJ-250	\$140.00

DRY POWDER DEVICES (Air syringe)

► For doses up to 5 mg in Rat, Guinea Pig or Custom Dry Powder Insufflator™ - Model DP-4



Description: For fast, efficient, targeted administration of precise doses of aerosolized dry powder. Precise powder dose is held away from ambient air inside the device. Puffs of air applied by 3 ml air syringe “insufflate” the powder dose and send it out the delivery tube to the lungs or other targets. Device made of chemically resistant PEEK™ and silicone valves. Standard delivery tube made of rigid, hollow stainless steel 18-gauge tubing with rounded tip.

Single dose range: 1-5 mg (May be loaded with ONLY ONE dose at a time)

For larger single doses: 100mg Sample Chamber Extension may be attached for larger doses above 5 mg.

Operates with: Commercial 3 ml plastic air syringe (provided) that must be set for correct volume per Instructions. (100% dose delivery typically requires more than one puff of air, depending on powder type and dose size.)

Particle size range: Dry Powder Insufflator™ can be loaded with dry powders in a very wide range of sizes, from nanoparticles to bioactive macroparticles. Device does not filter or alter powders traveling through it.

Delivery tube: Stainless steel with rounded tip. Outer diameter .050” (1.1 mm) except at rounded tip which is .058” / 1.5mm

Inner diameter: .038” / .97mm (Hollow throughout)

Custom delivery tubes: Available in stainless steel - straight or with bend, or in flexible nylon tubing. Longer lengths may be inserted directly, or via an endotracheal tube or bronchoscope in larger species.

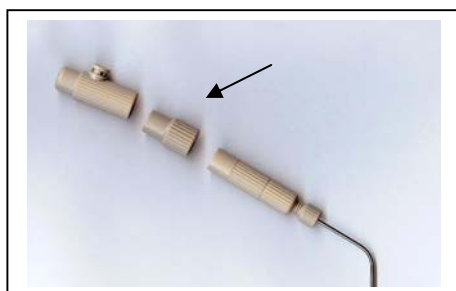
Reusable/Sterilizable: Stainless steel tip detachable and autoclavable.

NOTE: Dry methods of cleaning are required for main PEEK™ parts of device.

ITEM #	DESCRIPTION	PRICE
DP-4-R	For Rat (2" tip)	\$825.00
DP-4-GP	For Guinea Pig (3" tip)	\$840.00
DP-4-C-CSS or DP-4-C-CPL	Custom length delivery tubes in stainless steel or flexible nylon	Ask for quote

Extra delivery tubes only for Model DP-4

DP-EXT-R	For Rat (2" tip)	\$265.00
DP-EXT-GP	For Guinea Pig (3" tip)	\$280.00
DP-EXT-CSS or DP-EXT-CPL	Custom length delivery tubes in stainless steel or flexible nylon	Ask for quote



100 mg Sample Chamber Extension Model SC-X
\$98.00

Extends the capacity of Sample Chamber for larger single doses above 5 mg. For use with Model DP-4 only.

► For doses up to 2 mg in Mouse Dry Powder Insufflator™ for Mouse



Description: For fast, efficient targeted administration of precise doses of aerosolized dry powder directly to the lungs in mice. Has also been used for intranasal or *in vitro* uses. Precise powder dose is held away from ambient air inside the device. Puffs of air (200 µl) are applied by 3 ml air syringe to “insufflate” the powder dose and send it out the delivery tube to the lungs. The device is made of chemically resistant PEEK™ and silicone valves. The delivery tube made of rigid, hollow stainless steel tubing with rounded tip, suitable in length and diameter for intratracheal insertion in mouse.

Single dose range: 1-2 mg (May be loaded with ONLY ONE dose at a time)

Operates with: **IMPORTANT NOTE:** The Model DP-4M for Mouse was sold in past with Penn-Century's unique Air Pump - Model AP-1. This made it easier to make repeated puffs of air. This Air Pump is no longer available for purchase due to changes by our supplier. A new model AP-2 is in development.

The Model DP-4M for Mouse remains available for purchase. It can also be operated with a 3 ml air syringe set to apply 200 microliter puffs of air.

However, correct intratracheal use requires considerable practice and skill.

Particle size range: Dry Powder Insufflator™ can be loaded with dry powders in a very wide range of sizes from nanoparticles to bioactive macroparticles. Device does not filter or affect powders traveling through it.

Delivery tube: Stainless steel with rounded tip. **Outer diameter** .025”/.63 mm except at rounded tip which is .028”/.71 mm

Inner diameter: .020”/.51 mm (Hollow throughout)

Reusable/Sterilizable: Stainless steel tip can be detached and sterilized with liquids. **NOTE:** Dry methods of cleaning (compressed gas or air) are required for main PEEK™ parts of device.

ITEM #	DESCRIPTION	PRICE
DP-4M	Dry Powder Insufflator™ for Mouse	\$935.00
DPM-EXT	Extra delivery tube only for DP-4M	\$340.00

Pulmonary Aerosol Kit for Mouse – PAK-MSA

Save on everything you need for a liquid intratracheal aerosol study in mice



MicroSprayer® Aerosolizer Pulmonary Aerosol Kit for Mouse (Liquid)

For fast, efficient targeted pulmonary administration in mice

- MicroSprayer® Aerosolizer for Mouse- Model IA-1C-M
- FMJ-250 High-Pressure Syringe (Doses from 25 to 250 µl)
- Small Animal Laryngoscope for Mouse
- Mouse Intubation Platform
- **NEW!** Reverse Cleaning Adapter included with purchase, to clear blocked tip of MicroSprayer® Aerosolizer

ITEM #	PRICE
PAK-MSA	\$4,230.00

ACCESSORIES

For easier, safer, more rapid intubation

Small Animal Laryngoscope - Model LS-2



For easier liquid or dry powder intratracheal aerosol administration

Description: Researchers love our Small Animal Laryngoscopes. Designed to clearly illuminate the trachea and epiglottis for easier, faster intubation and insertion of a Penn-Century MicroSprayer® or Dry Powder Insufflator™. **Features:** Easy-grip handle with curved ergonomic shape fits securely in the palm of the hand. Coated with non-slip Santoprene™ rubber. Operates with long-lasting 3-volt lithium battery (included). Energy efficient, fiberoptic LED light source for clear, bright illumination. Each device comes with a removable, custom-made small, tapered stainless steel blade for holding aside the animal's tongue. (Specify which animal when ordering). All parts are sterilizable.

ITEM #	DESCRIPTION	PRICE
LS-2-M	LED Handle and Blade Assembly for Mouse	\$ 1,350.00
LS-2-R	LED Handle and Blade Assembly for Rat	\$ 1,355.00
LS-2-GP	LED Handle and Blade Assembly for Guinea Pig	\$ 1,360.00
LS-2-M/R	NEW! Save with Combo Kit: Includes (1) LED Handle with (2) Blade Assemblies (1) Mouse and (1) Rat	\$2,015.00
LS-2-C	For larger species	Ask for quote



Laryngoscope Blade Assembly Only - Model LS-BA

Can be attached to any Model LS-2 Handle to permit use in other animals. The Laryngoscope Blade Assembly is comprised of:

- A green plastic and metal fitting which securely attaches the Blade Assembly to the laryngoscope handle
- A stainless steel light pipe that holds a fiber-optic bundle (The LED light source is housed in the LS-2 Handle.)
- A stainless steel blade tip used to gently hold aside the animal's tongue to better visualize the trachea and epiglottis

ITEM #	DESCRIPTION	PRICE
LS-BA-M	Blade Assembly with tip for Mouse	\$745.00
LS-BA-R	Blade Assembly with tip for Rat	\$750.00
LS-BA-GP	Blade Assembly with tip for Guinea Pig	\$755.00
LS-BA-C	For larger species	Ask for quote

Mouse Intubation Platform - Model MIP

Attaches to any lab clamp stand (not included)



Description: The Mouse Intubation Platform provides a simple, durable, lightweight, easy-to-use system for supporting the anesthetized mouse during intubation and/or insertion of our aerosol delivery devices.

Features: Adjustable to user's preferred height, angle or work surface. Solid Plexiglass®/Perspex® base and stainless steel support rod, easily attached to any standard lab clamp stand (not included).

- Unique tilt and swivel neck

support helps the user to straighten and optimize the neck position of mouse for easier insertion and visualization of the trachea.

- Stainless steel side posts with plastic "wire" maintain the anesthetized animal securely in the correct position for intubation, suspended from the front incisors.
- Two side posts to secure the mouse on its back with a rubber band.
- Additional, adjustable stainless steel side posts prevent lateral movement of the mouse during intubation

Specifications:

Platform dimensions: 4.5" x 6 1/8 x 3/8" (15 x 23 x 6 cm)

Stainless steel support rod: 8" (20 cm)

Weight: 15.6 oz with support rod - (450 gr)

ITEM #	DESCRIPTION	PRICE
MIP	Mouse Intubation Platform	\$690.00

NOTE: Platform can be attached to any lab clamp stand (NOT INCLUDED)

New! Intubation Platform for Rat - Model IPR



Description: The Intubation Platform for Rat provides a solid, stable, easy-to-use system for supporting the anesthetized rat during intubation and/or insertion of our aerosol delivery devices.

Features:

- Solid Plexiglass®/Perspex® base and stainless steel support rod, easily attached to any standard lab clamp stand (not included.)
- Adjustable to the user's preferred height, angle or work surface.
- Special tilt and swivel neck support permits user to straighten and optimize neck position for ease of

insertion and visualization of the trachea.

- Stainless steel side posts to prevent lateral movement during intubation, can be adjusted to rats of wide range of sizes and lengths
- Stainless steel posts with plastic "wire" maintain the anesthetized r in the correct position for intubation, suspended from the front incisors.

Specifications:

Platform dimensions: 9 5/8" x 5 7/8 x 3/8" (22 x 15 x 6 cm)

Stainless steel support rod: 8" (20 cm)

Weight: 15.6 oz with support rod - (450 gr)

ITEM #	DESCRIPTION	PRICE
RIP	Rat Intubation Platform	\$790.00

NOTE: Platform can be attached to any lab clamp stand (NOT INCLUDED)

Get everything you need for intratracheal aerosol studies in rat

Pulmonary Aerosol Kit for Rat (Liquid) RAT-PAK-1B For larger dose volumes up to 1 ml or more



- Includes: MicroSprayer® Aerosolizer - Model IA-1B-R
- One 500 µl precision glass syringe and five (5) disposable 1 ml polycarbonate syringes
- Small Animal Laryngoscope for Rat
- NEW! Intubation Platform for Rat
- NEW! Reverse Cleaning Adapter- RCA-1B to clear blocked tip

ITEM #	PRICE
RAT-PAK-B	\$2,930.00

Pulmonary Aerosol Kit for Rat (Liquid) RAT-PAK-1C For smaller dose volumes up to 250 µl



- MicroSprayer® Aerosolizer for Rat - Model IA-1C-R
- FMJ-250 High-Pressure Syringe (250-µl capacity)
- Small Animal Laryngoscope for Rat
- NEW! Intubation Platform for Rat
- NEW! Reverse Cleaning Adapter- RCA-1C to clear blocked tip

ITEM #	PRICE
RAT-PAK-C	\$4,350.00

Pulmonary Aerosol Kit for Rat (Dry Powder) For Dry Powder doses up to 5 mg – or more*



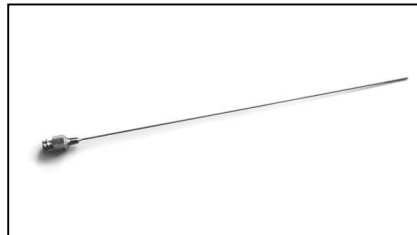
- Dry Powder Insufflator for Rat – Model DP-4-R
- 3 ml Air Syringe
- Small Animal Laryngoscope for Rat
- Rat Intubation Platform

ITEM #	PRICE
RAT-PAK-DP	\$2,920.00

Inquire about our custom device options

All Penn-Century aerosol drug delivery devices are available in custom length for intratracheal or other uses in larger species, in other locations of the body, or in *in-vitro*, *ex-vivo*, or other experimental laboratory set-ups. Examples include longer custom devices for veterinary applications in: rabbits, ferrets, dogs, cats, chickens, pigs, sheep, monkeys, horses, etc. Depending on the study design, custom devices can be made for intratracheal insertion via an endotracheal tube or bronchoscope. **Contact us for details and quote.**

Custom Length MicroSprayer® Aerosolizer - Model IA-1B-C



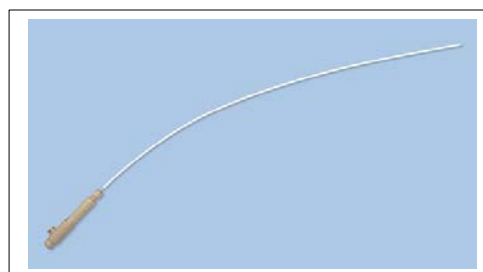
Operates with 500 µl sterilizable glass syringe or 1 ml disposable polycarbonate syringes. Insert in larger animals via an endotracheal tube

Custom Length MicroSprayer® Aerosolizer - Model IA-1C-C



Operates with FMJ-250 High Pressure Syringe. Insert in larger animals via bronchoscope or endotracheal tube

Custom Length Dry Powder Insufflator™ - Model DP-4-C



Operates with 3 ml air syringe. Available with rigid stainless steel or flexible nylon delivery tube. Insert via bronchoscope or endotracheal tube

PENNCENTURY™

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NOTE: All prices in US Dollars.
Contact us for a quote at info@penncentury.com or 215-753-6540



Custom device questionnaire

All Penn-Century aerosol drug delivery devices are available in custom length for intratracheal or other uses in larger species, in other locations of the body, or in *in-vitro*, *ex-vivo*, or other experimental laboratory set-ups. Examples of custom devices include longer devices for: rabbits, ferrets, dogs, cats, chickens, pigs, sheep, monkeys, horses, etc.

For optimal aerosol deposition in the lung, the device must be measured so the tip reaches to the carina (first bifurcation). In larger animals it may also be possible to insert the device in one lung, if desired.

To assure that we have sufficient information to provide you with a device that will best suit your needs, we will need the following information. **Please consider this information carefully, and ask questions if you need guidance, as these devices are manufactured for you specifically. Once production begins, orders cannot be changed, and custom length devices cannot be returned or exchanged.** To obtain a quote for a custom length MicroSprayer® Aerosolizer or Dry Powder Insufflator™, please complete the following form and send it to Penn-Century by fax at 215-220-3040. Or scan and send it to us as an email attachment to: info@penncentury.com.

1. What animal do you plan to use for your study? _____ OR Do you plan an *in vitro* set-up? (No animal used) _____
2. If using an animal, will the animal grow bigger, mature, or change in size during the course of your study? _____
3. What type of material do you plan to administer? ___ liquid ___ liquid solution/particle suspension ___ dry powder
4. Approximately what dose volume are you planning to administer per animal? _____
5. Where do you plan to insert the device? (check one)
 - ___ directly in the trachea by itself?
 - ___ into the trachea through an endotracheal tube or catheter?
 - ___ into the trachea through a bronchoscope/endoscope?
 - ___ into another location of the body (i.e. intranasal, sinuses, colon, stomach, vagina, cervix, etc.)? Specify: _____
 - ___ *in vitro* or other lab set-up? Describe: _____
6. Have you ever used a Penn-Century intratracheal device before? _____
7. If so, which Penn-Century device did you use? _____ In which animal? _____
8. Have you ever intubated an animal? _____ If so, what animal? _____
9. Does the size or anatomy of the animal, or your lab equipment require the intratracheal portion of the device to be:
 - ___ flexible ___ rigid ___ Not important
10. Does the size or anatomy of the animal or your lab application require the intratracheal portion of the device to be:
 - ___ straight ___ with a standard 120-degree bend ___ Not important
11. Do you plan to insert the device: ___ up to the carina/first bifurcation only ___ past the carina into one lung?
12. Approximate measurement (in inches or centimeters) from the front incisor of the animal to the carina? ___ in ___ cm
13. What disease are you studying? _____
14. What is the general goal of your study? _____

15. If you are able, please tell us what material you plan to administer. _____
16. If you are not able to name the formulation, please describe the characteristics of your formula:
- a. IF A LIQUID? Is your formula viscous/thick? If your formula is a suspension or solution, please describe size of particles and other attributes. (NOTE: When using Penn-Century MicroSprayer® Aerosolizers, the drug or formula passes through patented aerosolizing components in the tip that may clog or block the tip after repeated use, or effect your particular formulation in some way. You may not be able to determine this in advance without buying the device and doing a feasibility study.) _____
 - b. IF A DRY POWDER? Approximate particle size? Stickiness? Does it rapidly absorb moisture?

 - c. Pharmaceutical (small molecule) vs Biological/bioactive? _____
 - d. Nanoparticle/microparticle? _____

Please print your contact information clearly:

Name _____ Position/Responsibility _____

Organization _____ Address _____

Dept or Lab _____ Email _____

Phone _____

To obtain a quote for a custom length MicroSprayer® Aerosolizer or Dry Powder Insufflator™, please complete the following form and send it to Penn-Century by fax at 215-220-3040. Or scan and send it to us as an email attachment to info@penncentury.com.