Manual No. 6412

# Liquid Nitrogen ($LN_2$) Sprayer - Freeze Treatment Instrument 500ml (16oz.)


This manual should be made available to all users of this equipment. For best results and maximum durability of the equipment, carefully read and follow all instructions. Failure to do so can lead to serious injury or catastrophic damage to the user, machine, supplies, or surrounding areas. All safety suggestions must be followed closely, and extreme precaution must be taken to ensure proper use of the equipment by only qualified personnel who have read this guide.

# I. Getting Started

Hello, new liquid nitrogen sprayer user!

Thank you for choosing our liquid nitrogen sprayer. For smooth and safe operations, please read and understand this manual. The operation and maintenance information listed within has been updated as of its printing. In light of the ever-changing nature of technology, the company reserves the right to modify specifications or procedures for this machine without notice. The company will not assume any responsibility for equipment damage or malfunction that is due to improper operation, incorrect repairs, or the use of parts from another company.

The liquid nitrogen sprayer has passed through rigorous testing. Like all of our products, it is made with quality materials at an affordable price. This sprayer is suitable for use in your restaurant, home, garden, lab, and many other potential locations.

The company provides a 12-month warranty from the date of sale. During this first year, the company is responsible for any replacement parts needed because of manufacturing or material issues. After this 12-month period, the company will only replace parts at their current retail cost. The warranty will only be in effect if all instructions in the manual are followed fully. The warranty does not cover unforeseeable forces of nature or "acts of god" (fire, earthquakes, floods, etc.).
When warranty service is required, inform the company and describe the problem. When doing so, please include the

following information: Purchase Date, Order Number, Consignee Name, and Delivery Address.

This manual includes basic safety precautions and instructions regarding installation, operation, and maintenance. Therefore, before operating the equipment, please read carefully and fully comply with all instructions and fully understand the listed product requirements.

This manual does not include instructions for all possible uses or functions of this machine.

## II. Application

The USS-LNS00001 is a liquid nitrogen ($LN_2$) freeze treatment device designed for treating skin conditions such as warts or other cryogenic freezing requirements. While primarily intended for medical use, it can also function in sprayer mode for applications like cryogenic cooking, gardening, plumbing, and more.

Constructed from aluminum alloy with a protective oxide layer, this liquid nitrogen sprayer is lightweight at only 1.23 lbs when empty. Its internal double-wall structure, comprising a vacuum and synthetic insulating materials, ensures excellent insulation. Although not intended for extended liquid nitrogen storage, it can safely retain it for up to 6 hours. The handle is made of Plexiglas, and all freeze heads are autoclave safe.

# III. Principle

The USS-LNS00001 freeze-treatment/sprayer instrument utilizes liquid nitrogen as a cooling source. Liquid nitrogen is stored in an airtight receiver that is pressurized by the liquid nitrogen's spontaneous evaporation. If the adjustable discharge gas valve screw is closed, the pressure will build up and drive the liquid nitrogen from the container body via perfusion tube to $LN_2$ transfer arm and finally through the freeze head. The perfusion tube is a very thin tube that reaches to the bottom of the container body. When liquid nitrogen reaches the cold head it gasifies fiercely and mostly gas is discharged through the outlet pipe. (See the picture on the first page to locate the outlet pipe). The freeze head can then reach extremely low-temperatures capable of freezing the desired area by simply touching the area with the freeze head. This will freeze-damage the desired area and most often achieve freezing without pain.

One of the freeze heads has an opening that can allow a small flow of liquid nitrogen out of the sprayer and is used for sprayer mode. In this mode the device can be used for diverse applications from cooking to removal of undesired weeds. Exercise extreme caution when using the sprayer with hollow freeze head.

# IV. Safety Note

***This sprayer should only be operated by adults who have read and fully understood this manual.***

- Only use with proper care and training.
- Liquid nitrogen can be extremely dangerous if it comes in contact with bare skin. Always have proper safety equipment on when using the sprayer.
- Always take proper safety precautions when using the sprayer to avoid injury.
- Make sure lid is tightly on the sprayer before use.
- Keep the area around the sprayer clear and free of any debris.
- Never allow operation of this equipment by children.
- Only use parts from the original manufacturer to ensure safety and highest performance of the machine.
- Only use legally obtained liquid nitrogen in this sprayer,and use.
- Only for the purposes explicitly discussed online and in the manual. Using the sprayer for any other use voids the warranty and removes responsibility for injury or damage from U.S.Solid.
- Liquid Nitrogen is an extremely cold (-321$^{o}$F) cryogenic liquid. Direct skin contact with liquid nitrogen (or cold vapors) can cause frostbite. While pouring liquid nitrogen, you must wear cryogenic protective gloves. Do not pour liquid nitrogen if wearing open toed shoes. Although liquid nitrogen is odorless, use only it in a well ventilated area due to an asphyxiation hazard.
- NOTE: If the outer layers of the bottle body are covered with water or frost, it means that the insulating barrier has been breached. Stop using and discard (it cannot be repaired). Most often this happens if the outer wall is punctured. This voids the warranty and breaks the insulation barrier.

# V. Specifications

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| Volume | 0.5 L (16 oz) |
| Vessel Diameter | 3.35" (85 mm) |
| Vessel Height | 7.87" (200 mm) |
| Empty Weight | 1.23 lb |
| Static Holding Time | 6 h |
| Operating Cycle | 20 min |
| Temperature of Freeze Head | -292 °F |

**Notes: The liquid nitrogen sprayer is not design for prolonged storage of $LN_2$.**

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| Diameter of Circular Freeze Head 1 | 33/64" |
| Diameter of Circular Freeze Head 2 | 5/16" |
| Diameter of Circular Freeze Head 3 | 13/64" |
| Diameter of Circular Freeze Head 4 | 5/32" |
| Diameter of Circular Freeze Head 5 | 3/32" |
| Diameter of Circular Freeze Head 6 | 1/16" |
| Diameter of Circular Freeze Head 7 | 3/64" |
| Diameter of Rectangular Freeze Head 8 | ¼"x 7/64" |
| Diameter of the Hole on Hollow head | 0.07" |

# VI. Operation and Maintenance

There are TWO kinds of freeze heads:

- Closed freeze heads are designed for treating skin conditions.
- Hollow head is designed for use in sprayer mode.

**a. Clean the liquid nitrogen sprayer**

Before operating, make sure that the apparatus is wiped clean. Dust and water condensation can clog the small ducts that allow the flow of liquid nitrogen.

**b. Attach the desired freeze head**

Select one of the 9 heads and securely screw it onto the threaded end of the $LN_2$ transfer arm. Closed freeze heads are available in various sizes and shapes, offering great utility when addressing the diverse geometries associated with skin conditions.

**c. Add liquid nitrogen**

Unscrew the sprayer cap and carefully add a small quantity of liquid nitrogen into the bottle to cool it beforehand. Allow the surface of the liquid to settle, then continue adding liquid nitrogen as needed. Be cautious not to overfill the bottle.

**d. Put the cap on the container.**

- Before use, please ensure that the sealing ring is properly installed, otherwise leakage may occur.
- Rotate the adjustable discharge valve screw counterclockwise to loosen it before securely fastening the sprayer cap onto the container body, preventing exposure to liquid nitrogen spray during cap installation.

e. **Close the adjustable discharge valve screw by rotating it clockwise**. As the screw closes, liquid nitrogen will flow through the freeze head.

- If you're using a closed freeze head, the outlet pipe will start discharging gas. Once the freeze head reaches extremely low temperatures, apply it directly to the skin area.
- If you're using a hollow freeze head, liquid nitrogen will spray through the head.

f. **When finished, rotate the adjustable discharge gas screw counterclockwise.** This action will stop the outlet pipe or hollow freeze head from spraying gas. When the instrument is not in use, ensure to empty the liquid nitrogen from the bottle.

g. **After using** the liquid nitrogen sprayer (still cold), various parts of the device condense water that if not removed, can promote slow bacterial growth. To avoid this and mixing with the liquid nitrogen, it is advised to clean the sprayer after each use as follows :

- When the temperature of the container body reaches 32°F, inject water between 100-122°F and clean with a clean cloth.
- Rinse thoroughly with clean water.
- Invert the sprayer bottle and allow it to air dry. You can use open air or warm air for drying. If using warm air, ensure the temperature does not exceed 140°F.