



Manual NO.: 9175

# Liquid Nitrogen Container

For USS-YDS series

## Contact Information

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This manual should be made available to all users of this equipment, For best results, and for 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 A safety suggestions must be followed closely, and extreme precaution must be taken to assure proper use of the equipment by only qualified personnel who have read this guide.

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## I. Getting Started

Hello new liquid nitrogen dewar user! Thank you for choosing our liquid nitrogen tank. 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 product without notice. The company will not assume any responsibility for equipment damage or malfunction that is due to improper operation, incorrect repairs, or use of parts from another company.

The liquid nitrogen dewar has passed through rigorous testing. Like all of our products, it is made with quality materials at an affordable price. This liquid nitrogen tank is sturdy enough for use in your lab, classroom, or home, depending on the circumstance.

The company provides a 12-month warranty from the date of the 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, Name, and Delivery Address.

This manual includes basic safety precautions and instructions regarding basic use and maintenance. Therefore, before using 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 liquid nitrogen tank.

## II. Backgrounds

- U.S. Solid Liquid Nitrogen Dewars are vacuum insulated containers made of aircraft grade aluminum alloy. They have a fiberglass neck construction and provide the highest efficiency possible in liquid nitrogen storage. The dewar will maintain cryo storage between the temperatures of -320 and -238 Fahrenheit (-196 and -150 degree).
- The dewar is designed to be used with inert liquids only! Liquid oxygen is not compatible with fiberglass materials, and must not

be stored in these dewars.

- Proper care should always be taken when handling and transporting these vessels. Sharp blows to the exterior of the vessel can damage it or create a leak in the vacuum. Always be careful when moving or using the container, and make sure all handlers have been trained on proper safety procedures. Never stack dewars or put weight on them.
- Upon receipt of your dewar, examine the dewar and all packaging for signs of damage incurred during shipping. If damaged, please reach out to us immediately, and we will rectify the situation.
- There are important indicators that there is a leak or vacuum loss. Specifically, a few hours after filling if you notice frost or sweat on the outside of the vessel, this is an indication of a leak or loss of vacuum. Check for this carefully after filling for the first time. Some frost at the top immediately after filling is to be expected.
- Be sure to note that these dewars are intended as storage dewars. There are two types of liquid nitrogen containers: storage and transportation dewars. Storage dewars are made to hold liquid nitrogen, but are not to be used for the transport of liquid nitrogen. Transportation dewars have vibration and shock support systems that are absent in your storage vessel.

### III.Applications

Liquid nitrogen tanks are generally used in the following aspects:

#### ■ Preservation of Animal Semen Viability

It is primarily used for the preservation and long-distance transportation of semen from superior breeding animals such as cattle and sheep, as well as rare and valuable animals.

#### ■ Preservation of Biological Sample Viability

In biomedical applications, vaccines, bacterial strains, cells, and both human and animal organs can be submerged in liquid nitrogen within specialized containers for extended preservation while retaining their functionality. Upon demand, they can be thawed and prepared for immediate use.

#### ■ Cryogenic treatment of metal materials

Liquid nitrogen stored in a tank can be used for cryogenic treatment of metals, altering their metallurgical structure and significantly enhancing their hardness, strength, and wear resistance.

#### ■ Cryogenic assembly of precision parts

Cryogenic treatment with liquid nitrogen can enhance the assembly quality of precision parts, thereby improving the overall performance of the equipment or instrument.

### IV.Safety Instructions

#### VACUUM TESTING

- Upon receiving the tank, pre-cool it with two-thirds liquid nitrogen. After you pour it in, the liquid nitrogen will begin to boil. There will be a significant amount of smoke, but it will disappear after about 15 minutes. Do not cover the tank and allow the gas to evaporate. The boiled liquid nitrogen will settle down after approximately one hour. The time may vary slightly depending on the size of the container.
  1. The upper cover of the container might accumulate frost, but the container itself should not. If this occurs, please do not hesitate to contact us for assistance.
  2. If liquid nitrogen continues to boil after two hours, it could indicate a failure in the tank's insulation, potentially leading to increased evaporation rates. If you observe this occurrence, please don't hesitate to contact us for further guidance and potential solutions.
- Vacuum testing is also necessary for tanks that have been unused for an extended period before use.



### PRE-COOLING BEFORE USE

- Fill the liquid nitrogen tank completely with LN2 and let it stand for approximately 48 hours. LN2 tends to evaporate rapidly during initial use. If there is no frost or condensation on the outside of the tank, it means the tank is well insulated and the liquid nitrogen is being stored at the correct temperature. Additionally, if the liquid nitrogen inside the tank is stable and not agitated, it indicates that the pressure is being maintained effectively. Regular checks like these are crucial for ensuring the safety and functionality of your liquid nitrogen tank. If you notice any changes or irregularities, they should be addressed immediately to prevent potential issues.
- After about 48 hours, refill the Dewar and place your samples inside, securing them with 6 canisters using straps.

### WARNING

Boiling and splashing always occur when a warm container is filled with cryogenic liquid or when objects are inserted into the liquid.

### FROSTBITE WARNING!!

- To avoid frostbite, use extreme care when handling liquid nitrogen, liquid nitrogen storage or transfer vessels, and any item that has

come in contact with the liquid nitrogen. When handling, use proper gloves and eye wear, making sure no skin is exposed to the potentially damaging effects.

- Wear proper safety attire at all times. This means a face shield, cryogenic gloves (for instance, JFLNTO0008 and JFLNTO0009, the U.S. Solid brand of liquid nitrogen gloves), and a cryogenic apron. There should be no exposed skin when working with liquid nitrogen.
- Use extreme caution when pouring or transferring liquid nitrogen to avoid splashing. Splashing of liquid nitrogen is dangerous situation, and proper care must be taken to avoid it.
- Immediately remove any clothing or safety attire which has come into direct contact with liquid nitrogen. In the case of liquid nitrogen splashing or otherwise coming in contact with your clothes or safety attire, extricate yourself from the situation immediately, and remove said attire.
- Do not overfill the liquid nitrogen container. This can lead to splashing of liquid. Additionally, it can lead to vacuum failure.

### PROPER SHIPPING AND STORAGE WARNING

- Always keep the liquid nitrogen dewar in an upright position. Even during shipping and when empty, vessel must be kept upright.

Failure to do so can lead to vacuum failure.

- Do not pressurize or tightly seal the liquid nitrogen container, or otherwise prevent any gas from escaping. This can lead to dangerous pressure buildup.
- Use in a dry environment to prevent the cork from freezing in the neck.

### ASPHYXIATION WARNING!!

The escape of the liquid nitrogen vapors into the air will deplete oxygen. The depletion of oxygen can lead to asphyxiation and/or death. As such, do not store or use liquid nitrogen dewars in areas that have poor ventilation.

## V.Usage Notice

- The container is designed exclusively for filling with liquid nitrogen and should not be used with other gases. Liquid nitrogen is an ultra-low temperature liquid (-196°C). When filling, exercise caution to prevent splashing and injury. During transportation and storage, always keep the tank in an upright position.
- The storage tank is designed for long-term storage and is suitable for short-distance transportation. For long-distance transportation, it is recommended to use a transportation tank.

- Only use the neck plug provided by the manufacturer to seal the container. Do not substitute it with other plugs, as this can cause continuous evaporation of liquid nitrogen, may leading to increased pressure and potential damage to both the container and the person.
- The vacuum sealing joint of the container is a critical component for maintaining the vacuum in the interlayer. Any damage to this part will immediately compromise the vacuum, rendering the container unusable. Therefore, users must not open the vacuum sealing joint of the container without authorization.
- When transporting, always place the container upright and secure it if necessary.

## VI.Filling Instructions

- Fill the vessel using a funnel or transfer line whenever possible. Avoid spilling liquid nitrogen over the vacuum cap on the side of the dewar, as this can shrink the vacuum seal and allow air to leak into the vacuum space. This can cause vacuum failure, and permanent damage to the vessel.
- For best performance from your liquid nitrogen dewar, follow the steps below:

1. Open shipping container with dewar inside and remove cork, cover, and canister assembly by lifting straight up.
2. Position the pump out valve away from the operator when filling the tank. Slowly pour liquid nitrogen into the empty container with a funnel or transfer hose. Pour slowly to prevent spillage or overfilling.

**Note: Follow established safety practices for transfer of liquid nitrogen. Transfer using a cryogenic hose with a phase separator, pouring container with a funnel, or another approved filling device.**

- Refill the vessel to the desired level after a two hour cool down settling time.
- If filling your dewar from a pressurized source, make sure the source tank is at a low pressure (22 PSI or lower).
- If a transfer hose is used for extracting liquid nitrogen from a pressurized source, always use a phase separator on the end of the hose.
- As always, make sure proper safety attire is worn and used during the transfer processes.
- Weigh unit for your records after following steps 1-6.

## VII. Measuring Liquid Nitrogen Instructions

- When measuring the amount of liquid nitrogen, always use a wooden or plastic dipstick. Never use a hollow tube to measure liquid nitrogen.
- Level will be indicated by the frost line on the dipstick. This develops when the dipstick is removed from the dewar.

## VIII. Maintenance

- Follow the steps for filling as usual
- Check outside of container for signs of major frost or condensation. These are indicators of a weak vacuum, and need to be addressed immediately.
- In case of weak vacuum, reach out to the manufacturer for more information, or to redeem the warranty in any extreme cases. Do not use a liquid nitrogen container that has a visible leak, as this could create a dangerous situation.
- When putting in and taking out frozen items, try to make the opening of the tank as short as possible to reduce the loss of liquid nitrogen, and do not lift the bucket completely, so as not to affect

the storage effect of the items.

- Strictly avoid excessive impacts and collisions to prevent damage to the vacuum insulation.
- Regularly check the liquid nitrogen level to prevent damage to stored items.
- During container use, impurities in liquid nitrogen cause gradual water accumulation and bacterial growth in the inner tank, reducing semen fertilization rates. It's advisable to wash the container with warm water (40-50°C) 1-2 times annually to mitigate these effects.

## IX. Specification

The liquid nitrogen container is generally composed of high-strength aviation aluminum for both the inner and outer bladder, with a vacuum layer in between. It can be divided into storage tanks and transportation tanks.

- The storage tank is mainly used for the static storage of indoor liquid nitrogen and is not suitable for long-distance transportation under working conditions.

Model	Volume (L)	Caliber (mm)	Outer Dia. (mm)	Height (mm)	Net Weight (kg)	Storage Time (days)
YDS-2-35	2.8	35	224	420	2.3	15
YDS-3	3.15	50	224	450	3.2	35
YDS-6	6.7	50	284	504	4.7	65
YDS-6-210	6.7	210	284	504	4.5	3
YDS-10	10.8	50	330	580	5.8	100
YDS-10-80	10.8	50	330	540	5.8	56
YDS-10-125	10.5	125	330	540	6.1	30
YDS-10-210	10.0	210	330	520	7.6	6
YDS-15	16.5	50	354	600	8.2	150
YDS-15-80	16.5	80	354	600	8.2	100
YDS-15-125	16.2	125	354	600	8.2	50
YDS-20	21.6	50	384	640	11.2	175
YDS-20-80	21.6	80	384	640	11.3	150
YDS-20-125	21.6	125	384	640	11.2	130
YDS-30	31.5	50	438	700	13.8	260
YDS-30-80	31.5	80	438	700	13.8	150
YDS-30-125	31.5	125	438	700	15.4	100
YDS-30-210	31.5	210	438	700	15.6	49
YDS-35	35.5	50	438	740	14.6	290
YDS-35-80	35.5	80	438	740	16	170

Model	Volume (L)	Caliber (mm)	Outer Dia. (mm)	Height (mm)	Net Weight (kg)	Storage Time (days)
YDS-35-125	35.5	125	438	740	16.5	140
YDS-35-210	35.5	210	438	740	16.5	56
YDS-120-125	120	125	610	1050	35.9	200
YDS-120-210	120	210	610	1050	35.9	137
YDS-150-125	151	125	610	1170	41.8	250
YDS-150-210	151	210	610	1170	41.8	172
YDS-175-125	178	125	610	1270	47.5	196
YDS-175-210	178	210	610	1270	47.5	180

- The transportation tank is specially designed with anti-vibration features to meet transportation requirements. It can be used not only for static storage but also for transportation while filled with liquid nitrogen. However, it should still be protected from severe impacts and vibrations.

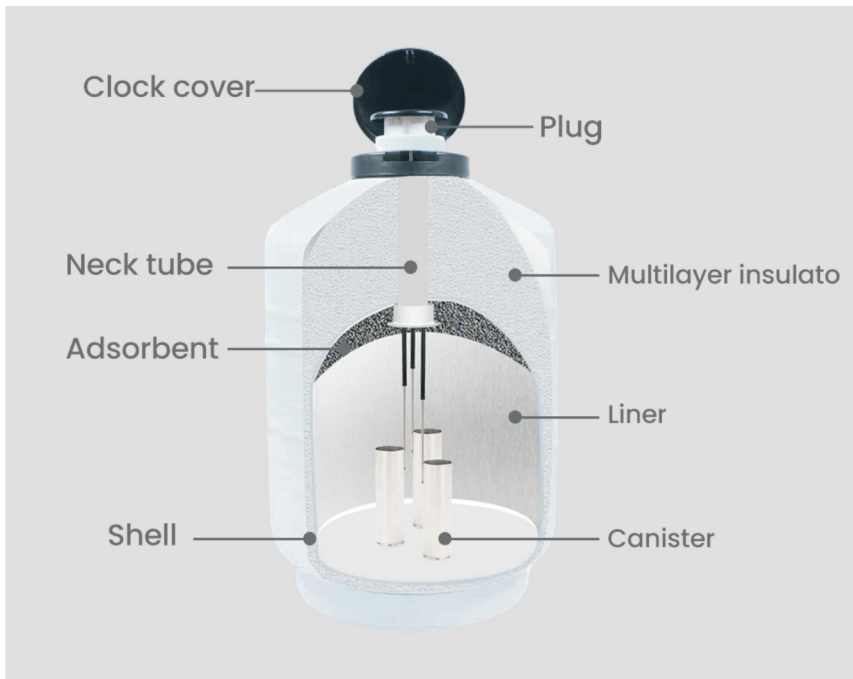
Model	Volume (L)	Caliber (mm)	Outer Dia. (mm)	Height (mm)	Net Weight (kg)	Storage Time (days)
YDS-10B	10	50	330	580	5.8	80
YDS-20B	20	50	384	640	11.5	110
YDS-30B	31.5	50	438	700	13.8	210

Model	Volume (L)	Caliber (mm)	Outer Dia. (mm)	Height (mm)	Net Weight (kg)	Storage Time (days)
YDS-35B	35.5	50	438	740	16.7	185
YDS-50B	50.5	50	476	815	20.7	220
YDS-50B-80	50	80	476	815	22.6	160
YDS-50B-125	50	125	476	815	23.2	120
YDS-50B-210	50	210	476	815	22.3	75
YDS-60B-210	60	210	476	815	23	100
YDS-65B	65	50	476	815	23	260
YDS-65B-125	65	125	520	785	22.8	150
YDS-65B-210	65	210	520	785	22.8	90
YDS-80B	80	50	610	890	28	215
YDS-80B-125	80	125	610	890	30.7	135
YDS-80B-210	80	210	480	900	30.7	95
YDS-100B	102	50	610	970	32	270
YDS-100B-80	102	80	610	970	32.8	180
YDS-100B-125	102	125	610	970	32.8	168
YDS-100B-210	102	210	610	970	32.8	115

Model	Volume (L)	Caliber (mm)	Outer Dia. (mm)	Height (mm)	Storage Time (days)	NO. of Square Canister	NO. of Square Canister	NO. Of 2.0 ml Cryogenic Vials
YDS-30-125	30	125	440	730	100	6	4	600
YDS-35-125	35	125	440	740	110	6	5	750
YDS-47-127	47	127	508	716	105	6	5	750
YDS-50-125	50	125	515	770	106	6	5	750
YDS-65-125	60	125	610	830	150	7	6	1050
YDS-65-216	65	216	680	664	83	6	4	1944/2400
YDS-95-216	95	216	680	720	101	6	5	2430/3000
YDS-115-216	115	216	680	776	122	6	6	2916/3600
YDS-145-216	145	216	680	888	154	6	8	3888/4800
YDS-175-216	175	216	680	1000	184	6	10	4860/6000

- We also have the liquid nitrogen tank equipped with square carrying buckets can store 2.0 milliliter cryogenic vials. Such containers are commonly used for the long-term preservation of biological samples such as cells and tissue specimens. The use of liquid nitrogen freezing can effectively protect samples from damage and preserve their biological activity for extended periods. This setup facilitates the storage and management of samples, thereby aiding in sample management tasks within the laboratory.

## X. Diagram



extremely low thermal conductivity, allowing it to maintain a high vacuum for a long time and providing excellent refrigeration performance.

- The neck plug, made of thermal insulation polyurethane material, reduces the evaporation of liquid nitrogen and secures the lifting cylinder.
- The transport liquid nitrogen tank features supports at the bottom and sides to ensure its safety and stability.

As shown in the picture:

- The container is composed of a high-quality aviation aluminum inner liner, an outer liner, and a high-strength fiberglass neck tube, making it strong and durable.
- There is a high vacuum layer between the inner and outer liners. This vacuum layer is equipped with multi-layer imported thermal insulation materials and gas adsorbents. The neck tube has

## XI.Daily Evaporation Test

The testing should be conducted in a quiet environment at atmospheric pressure, with indoor temperature controlled at 20°C.

Fill the container with more than half of its capacity with liquid nitrogen. After letting it sit for 48 hours, perform the first weighing (A) in grams. Weigh it again after 3 days to get the second measurement (B) in grams. Calculate the evaporation rate (Q) using the following formula:

$$Q = \frac{A - B}{3}$$

If you need to express the evaporation rate in volume (liters), use the following conversion formula:

$$Q(volume) = \frac{Q(weight)}{\rho}$$

where  $\rho$  is the density of liquid nitrogen, approximately 0.808 kg/L.

So,

$$Q(volume) = \frac{A - B}{3 \times 0.808}$$

In this formula:

- $Q_{weight}$  is the evaporation rate in grams per day.
- $\rho$  is the density of liquid nitrogen in kg/L.