

# NOVODOSER

Liquid Nitrogen Dosing  
BEVERAGE | FOOD | PERSONAL CARE | CHEMICAL



*Dosing for a Greener World*

[www.novodoser.com](http://www.novodoser.com)

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# NovoDoser® Applications

## *How it works*

The dosing process involves supplying LN2 to the NovoDoser® through a vacuum-insulated pipe/hose, directing it into the dosing head. A sensor detects the presence of a container and sends pulses to the controller. Upon receiving these signals, the controller activates the dosing head to dispense the required amount of LN2 into the container.

As the LN2 droplets enter the container, they rapidly evaporate and expand by approximately 700 times, converting into gaseous N2. This process effectively fills the container's headspace with inert N2 gas, displacing residual oxygen and achieving the desired pressure.

## *Why Liquid Nitrogen Dosing?*

### PRESSURIZATION

- ✓ PET and PP bottles
- ✓ Aluminum cans
- ✓ Aluminum bottles
- ✓ Non-carbonated drinks



**Enhanced Container Rigidity:** Strengthen bottles or cans to eliminate paneling issues, particularly during the hot filling process.

**Container Light weighting:** Reduce packaging costs and minimize the environmental carbon footprint by using lighter packaging materials.



# NovoDoser® Applications

## NITRO-INFUSED BEVERAGE

- ☒ Beer
- ☒ Coffee
- ☒ Tea

**Nitro-Infused Beverage:** Infusing the beverage with nitrogen creates a luxurious, thick, and creamy texture, enhancing the mouthfeel and flavor of the drink, along with a beautiful cascade of nitrogen bubbles in your glass.



## INERTING

- ☒ Nuts
- ☒ Wine
- ☒ Fruit Juice
- ☒ Vegetable Oil
- ☒ Vitamin Drink
- ☒ Sauces
- ☒ Snack
- ☒ Automobile Oil
- ☒ Beer
- ☒ Tea
- ☒ Coffee Seed



**Oxygen Exclusion:** Minimize residual oxygen in the product's headspace to prevent oxidation and maintain product quality.

**Extended Product Shelf Life:** Incorporating N<sub>2</sub> gas in packaging significantly prolongs the product's shelf life.

**Alternative to Traditional Modified Atmosphere Packaging (MAP):** Using inert gas, such as N<sub>2</sub>, offers a more efficient and effective solution than traditional inert gas flushing for preserving product freshness.



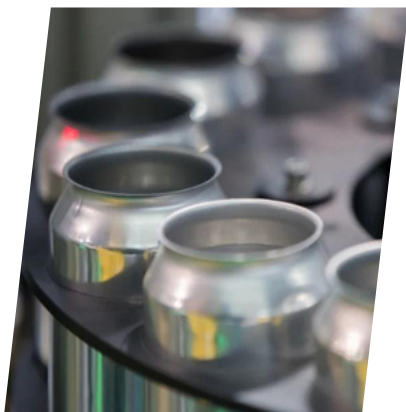
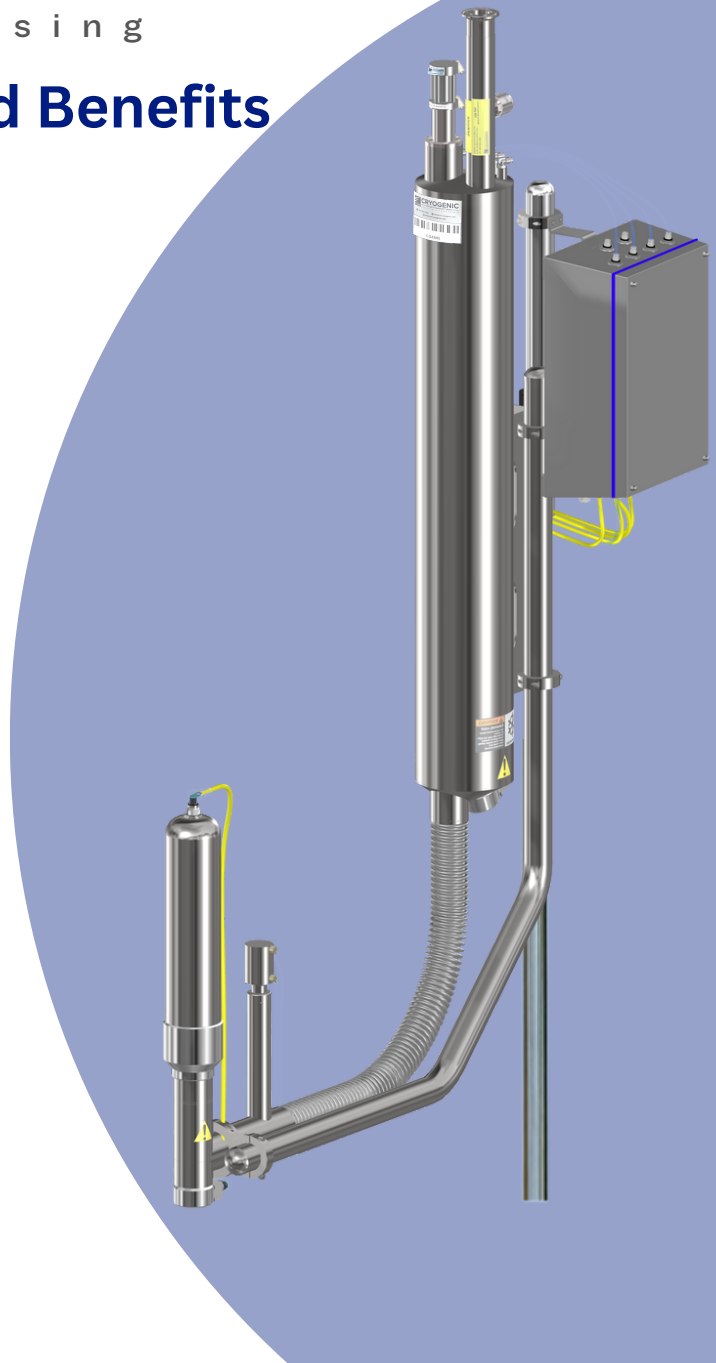
# NOVODOSER

Liquid Nitrogen Dosing

## Ergonomic Features And Benefits

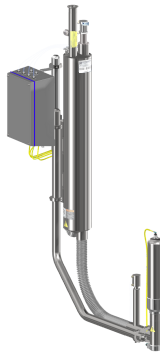
- **Frost-free Nozzle** – Self-generating GN2 for dosing head blanketing
- **Consistent Container Pressure** – Delivers accurate dosing with  $\pm 2\%$  precision
- **Lowest LN2 Consumption** – Discrete dosing for speeds up to 2000\* containers per minute
- **Lowest LN2 Losses** – Proprietary vacuum insulation with lowest heat leak of 0.1 LPH
- **Minimized Product Splash** – Lowest dose pressure in its class, 0.3 psi
- **Sub-cooled LN2** – Ensures constant LN2 density for accurate dosing
- **Corrosion Resistant** – Optional 316L material grade for the Doser body
- **Highest Hygiene Design** – All external surface features rounded corners and sloped design for easy wash-down
- **Lowest Maintenance** – Ultra long life cycle dosing valve (> 60 million cycles); Superior to IP65 rated sensors & electrical cables
- **Ease of Installation** – Compact size and flexible dosing head for easy installation in limited space
- **Applications Flexibility** – Compatible with soft-dose and micro-dose technology for hot fill, powder, and granular applications
- **Multi-lingual HMI** – Available in English, Spanish, Chinese, etc.
- **5 Years Vacuum Warranty** – Lowest cost of ownership

\*Controller Specific





## Selection Guide *Specifications*

| Series                            | L                                                                                 | H                                                                                  | Q                                                                                   |                |
|-----------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|
| NovoDoser Body                    |  |  |  |                |
|                                   | Stainless Steel 300 Series <sup>①</sup>                                           |                                                                                    |                                                                                     |                |
|                                   | Head Pressure                                                                     | 0.3 psi                                                                            | 0.3 - 0.55 psi                                                                      | 0.5 - 1.05 psi |
|                                   | Dose Accuracy                                                                     | ± 3%                                                                               | ± 2%                                                                                | ± 2%           |
|                                   | Dose Volume, mg/dose                                                              | 10 to 1400                                                                         | 5 to 1400                                                                           | 5 to 1400      |
| Subcooling                        | Yes                                                                               | Yes                                                                                | Yes                                                                                 |                |
| Nozzle Blanketing                 | Self-Generated N2                                                                 | Self-Generated N2                                                                  | Self-Generated N2                                                                   |                |
| Steady State Consumption          | < 0.026 gal / hour<br>(< 0.1 liter / hour)                                        | < 0.029 gal / hour<br>(< 0.11 liter / hour)                                        | < 0.035 gal / hour<br>(< 0.13 liter / hour)                                         |                |
| Body Dimension                    | 33” H x 5” W<br>(850 x 129 mm)                                                    | 42” H x 5” W<br>(1070 x 129 mm)                                                    | 58” H x 5” W<br>(1474 x 129 mm)                                                     |                |
| Dosing Head Actuator <sup>④</sup> | Electric (EA) & Pneumatic (HS)                                                    | Pneumatic (HS) & Servo (ES)                                                        | Servo (ES)                                                                          |                |
| Dosing Head Arm Reach             | 18” (457 mm)                                                                      | 18” (457 mm)                                                                       | 31” (788 mm)                                                                        |                |
| Weight                            | 30 lbs (14 kg)                                                                    | 35 lbs (16 kg)                                                                     | 44 lbs (19 kg)                                                                      |                |
| Liquid Nitrogen Supply            | ≤ 100 psi (≤ 6.8 bar)                                                             | ≤ 100 psi (≤ 6.8 bar)                                                              | ≤ 100 psi (≤ 6.8 bar)                                                               |                |
| Gaseous Nitrogen Supply           | 100 psi (6.8 bar)                                                                 | 100 psi (6.8 bar)                                                                  | 100 psi (6.8 bar)                                                                   |                |
| Electrical                        | 110-220 VAC                                                                       | 110-220 VAC                                                                        | 110-220 VAC                                                                         |                |

**Note:**

① SS316/316L for external material

② **NovoDoser Aseptic** – Sterilization / Sanitization through steam or chemicals

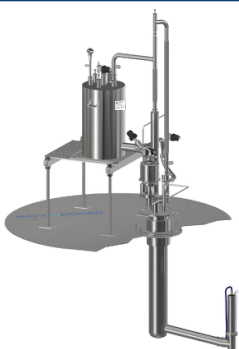
③ To operate with Phase Separator

④ Electric (EA) Actuator: 13.8" (351.5 mm) H x 2.3" (57 mm) W; Pneumatic (HS) Actuator: 14" (354 mm) H x 2.5" (63.5 mm) W; Servo (ES) Actuator: 13.8" (351.5 mm) H x 2.3" (57 mm) W

⑤ NovoDoser **UltraClean / Aseptic Dosing Actuator** - Customizable according to filler manufacturers

# NOVODOSER

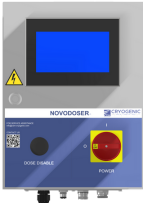
L i q u i d   N i t r o g e n   D o s i n g

| P (Petite)                                                                        | C (UltraClean)                                                                    | A (Aseptic) <sup>②</sup>                                                            |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |
| Stainless Steel 300 Series <sup>①</sup>                                           | SS316/316L                                                                        |                                                                                     |
| 0.4 - 3 psi <sup>③</sup>                                                          | 0.3 psi                                                                           | 0.4 psi                                                                             |
| ± 2%                                                                              | ± 2%                                                                              | ± 2%                                                                                |
| 10 to 1400                                                                        | 5 to 1400                                                                         | 5 to 1400                                                                           |
| Yes                                                                               | Yes                                                                               | Yes                                                                                 |
| Self-Generate N2                                                                  | Self-Generate N2                                                                  | Self-Generate N2                                                                    |
| < 0.03 gal<br>(0.11 liter) / hour                                                 | < 0.03 gal<br>(0.11 liter) / hour                                                 | < 0.12 gal<br>(0.40 liter) / hour                                                   |
| 13"H x 2.5"W (340 x 63mm)                                                         | Customize to Filler Machine                                                       | Customize to Filler Machine                                                         |
| Electric (EA) &<br>Std. Pneumatic (BIMBA)                                         | UltraClean <sup>⑤</sup>                                                           | Aseptic <sup>⑤</sup>                                                                |
| 3.7" (93mm)                                                                       | Customize to Filler Machine                                                       | Customize to Filler Machine                                                         |
| 6 lbs (3kg)                                                                       | Customize to Filler Machine                                                       | Customize to Filler Machine                                                         |
| ≤ 22 psi (≤ 1.5 bar)<br>100 psi (6.8 bar)<br>110 - 220 VAC                        | ≤ 100 psi (≤ 6.8 bar)<br>100 psi (6.8 bar)<br>110 - 220 VAC                       | ≤ 100 psi (≤ 6.8 bar)<br>100 psi (6.8 bar)<br>110 - 220 VAC                         |



# Controller Selection Guide

## Controller *Specifications*

| Controller Model               | 250FD                                                                             | 500SC                                                                             | 1000DSC                                                                             | 2000DSC                                                                             |
|--------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                |  |  |  |  |
| PLC Platform                   | Siemens S7-1200                                                                   | Siemens S7-1200                                                                   | Siemens S7-1200                                                                     | Siemens S7-1200                                                                     |
| HMI (LCD touch screen)         | 4.3" Color                                                                        | 7.0" Color                                                                        | 7.0" Color                                                                          | 10.0" Color                                                                         |
| Max. Discrete Dosing           | 500 CPM                                                                           | 1000 CPM                                                                          | 2000 CPM                                                                            | 2000 CPM                                                                            |
| Dosing Head Actuator           | Electric (EA)                                                                     | Electric (EA) /<br>Pneumatic (HS)                                                 | Pneumatic (HS) /<br>Servo (ES)                                                      | Servo (ES)                                                                          |
| Dynamic Dose                   | ✓                                                                                 |                                                                                   |                                                                                     |                                                                                     |
| Fixed Delay                    | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Dose Timing Synchronization    |                                                                                   | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Dose Volume Synchronization    |                                                                                   | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Encoder Compatibility          |                                                                                   |                                                                                   | ✓                                                                                   | ✓                                                                                   |
| Thermo-Purging:                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| - Quick System Purging         |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| - Rapid Nozzle Defrosting      | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| - CIP Protection               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Nozzle Pre-Cooling             | Manual                                                                            | Auto                                                                              | Auto                                                                                | Auto                                                                                |
| Filler Command Signal          | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Filler Signal Exchange         |                                                                                   |                                                                                   | ✓                                                                                   | ✓                                                                                   |
| Modbus RTU User Interface      | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Mobile Remote Monitoring (LAN) |                                                                                   |                                                                                   |                                                                                     | ✓                                                                                   |
| Smart Maintenance              |                                                                                   |                                                                                   |                                                                                     | ✓                                                                                   |
| Recipe Storage                 | 5                                                                                 | 5                                                                                 | 12                                                                                  | 20                                                                                  |
| Certifications                 | CE                                                                                | CE                                                                                | CE                                                                                  | CE                                                                                  |



# NovoDoser® Aseptic

Dosing with Ultra-hygienic Confidence



## Features and Benefits

### Aseptic LN<sub>2</sub> Dosing

Ultimate Aseptic Doser that delivers **sterile LN<sub>2</sub> dosing** with advanced **SIP (Steam-in-Place)** functionality, achieving *log 9 purity* for high-sterility applications in food & beverage, pharma and biotech

### Chemo-Sanitization

The nozzle is sanitizable during filler **CIP (Clean-in-Place)** interval using customizable recipes and duration settings, helping maintain ultra-high hygienic performance

### CIP Protection

Prevents nozzle freeze up during or after filler CIP or wash down, by keeping moisture out of the dosing head. Built to handle high-pressure washdowns and harsh chemicals for longer service life and less downtime

### Continuous Low Pressure Dosing

Supports uninterrupted, low-pressure LN<sub>2</sub> dosing for smooth, efficient, and consistent packaging pressure or inerting

### Precise Dosage Control

± 2% dosing accuracy to ensure packaging pressure stability and consistent product quality

### Process Monitoring with Data Logging, History Records and Alarms

Advanced process monitoring with data logging system ensure compliance to GAMP 5 requirements. The real time monitoring alerts operators for system faults via on-screen text messages, buzzer and light beacon alarms

### Advanced HMI Control

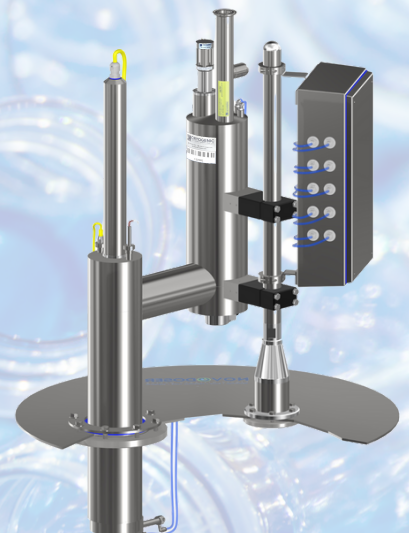
Features high performance Siemens PLC S7-1200 and a 10" color touchscreen, designed with intuitive display for easy setup and process monitoring

## NovoDoser® UltraClean

**A new generation of NovoDoser® UltraClean with a frost-free nozzle, corrosion-resistant 316L material construction, and hygienic wash-down design in compliance with stringent ultra-clean bottling line requirements.**

### Specifications

- Continuous dose mode with option of discrete dose
- Controller with Siemens S7-1200 PLC platform
- NEMA 4X IP65 stainless steel enclosure
- HMI comes with a TFT color touch screen
- Accurate dose weight: ±2%
- Smart maintenance allows users to plan the maintenance schedule
- Direct LN<sub>2</sub> feed pressure up to 100 psi (6.8 bar)
- ModBus user interface
- Alarm log to assist system troubleshooting and performance monitoring
- Recipe storage for 10 recipes or more
- 316L material construction for higher corrosion resistance
- Hygienic Dosing Head wash-down design, IP65 rated



# System Solutions

## *Benefits to Customer*

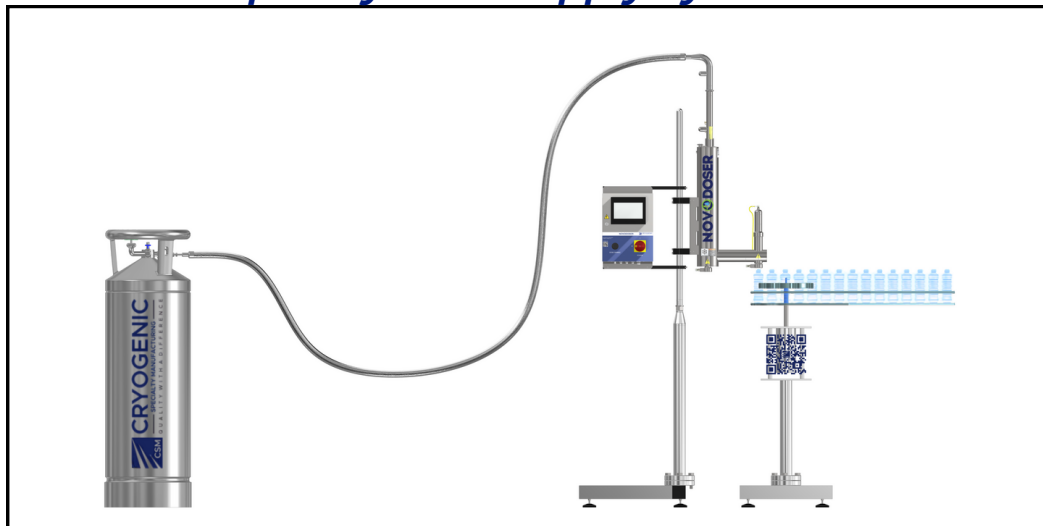
**Single Source, Single Responsibility:** End-to-end solutions covering system design, manufacturing, installation, testing, and commissioning.

**System Level Engineering Approach:** Our system level engineering approach ensures minimal heat loss, reduced cooling waste, lowest LN<sub>2</sub> consumption, shorter project lead times, and fastest ROI - delivering unmatched efficiency and cost savings.

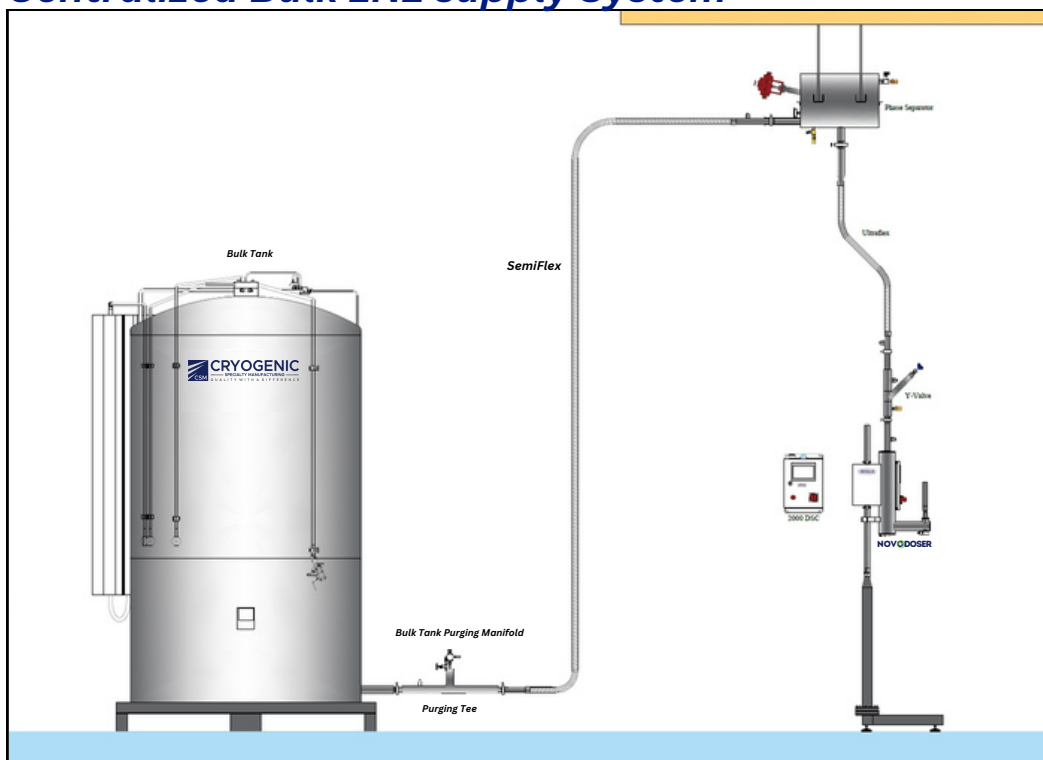
**Seamless Safety & Performance Integration:** Incorporates critical safety functions and performance monitoring, e.g. O<sub>2</sub> monitoring, emergency shutdown systems, thermo, pressure, and flow monitoring.

**Effortless FMCS Integration:** Seamless FMCS integration using standard MODBUS TCP/IP communication protocols.

## *Dewar or Liquid Cylinder supply System*



## *Centralized Bulk LN2 supply System*

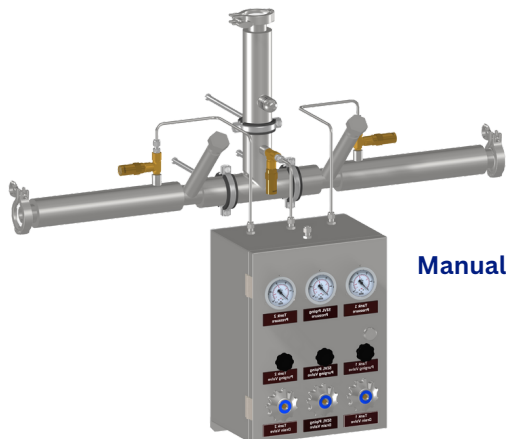


# Dewar Changeover

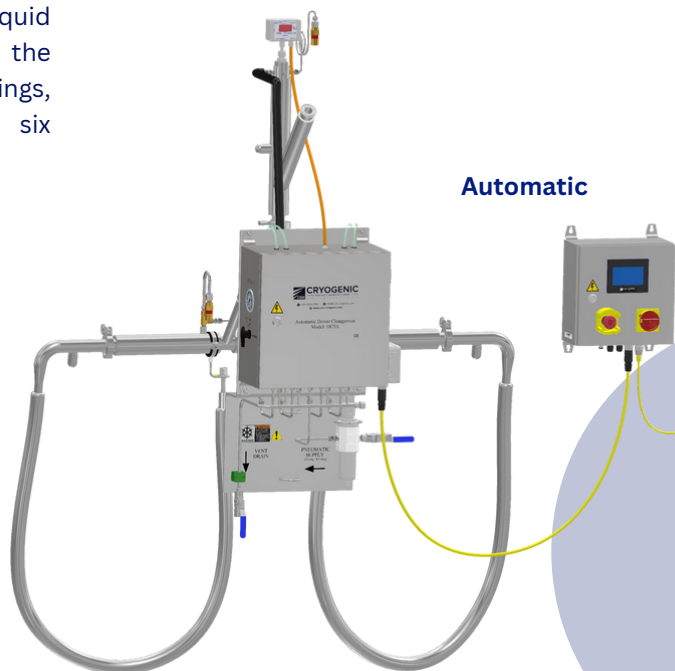
## How it works?

An uninterrupted liquid nitrogen supply with LGC is achievable using a dewar changeover system. The station consists of two sides: one active supply and one standby. When the active supply is depleted, the operator simply switches over to the standby tank manually. For unattended operation, an automatic changeover option is available.

CSM's dewar changeover system is fully vacuum-insulated, ensuring exceptionally low heat loss—at least 20 times lower than foam-insulated stations. This results in minimal liquid boil-off, maintaining consistent liquid supply quality at the point of use. Reduced boil-off leads to significant LN2 savings, enabling equipment capital payback within at least six months.



# Manual

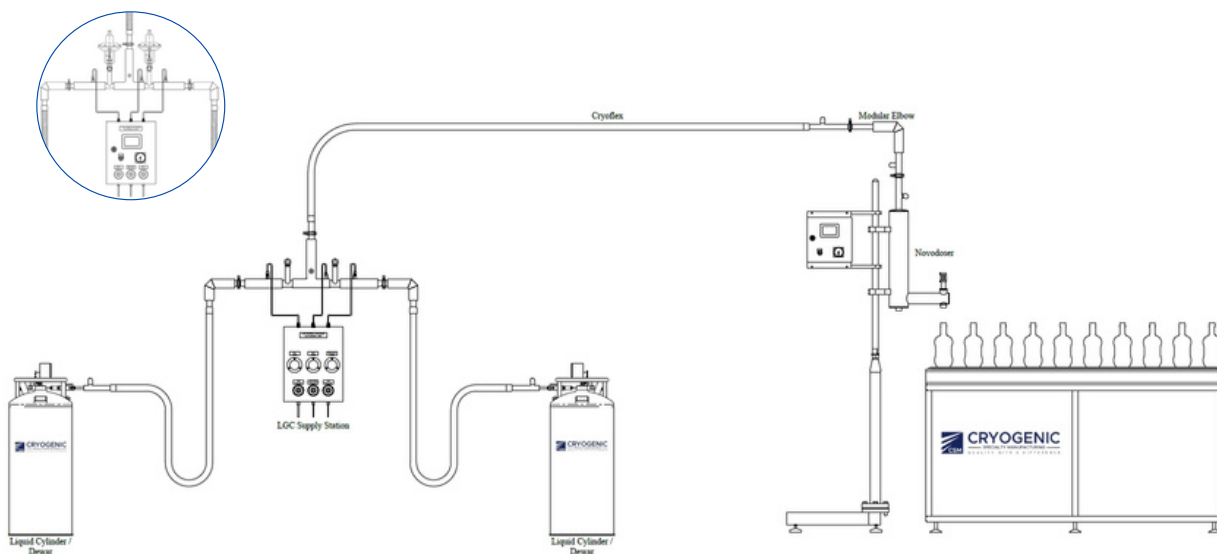


Automatic

## Features and Benefits

- Minimal liquid supply downtime for higher productivity
- Available in 1x1, 2x2, 4x4 liquid cylinder configurations
- Frost-free and condensation-free operation with vacuum insulation system
- Prevent premature liquid cylinder changeouts through proper monitoring
- Compact size enables ease of installation in limited spaces

## Typical Dewar Changeover System® for LN2 Supply

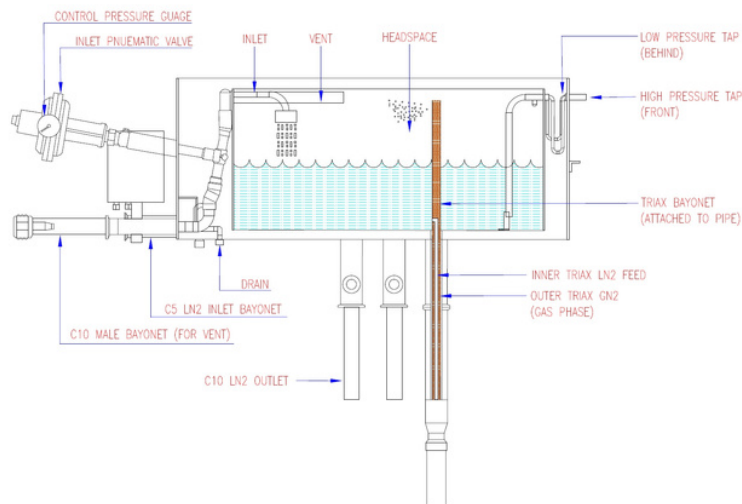


# Phase Separator

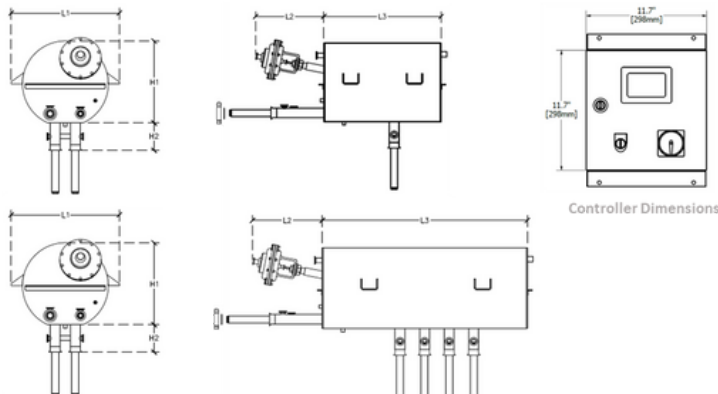
## Atmospheric Pressure

The atmospheric-type Phase Separator is primarily used in specialized applications that demand extremely high-quality, low-pressure liquid nitrogen. CSM's Phase Separator is a vacuum-insulated reservoir holding tank for liquid nitrogen, equipped with a differential pressure level control system that operates with a proportional inlet valve.

The Phase Separator is continuously filled with liquid nitrogen under atmospheric conditions. Typical applications include direct feed to a LN2 doser or a closed-loop liquid nitrogen circulation system, typically found in MBE (Molecular Beam Epitaxy) system applications.



| Model | H1            | H2           | L1            | L2            | L3             |
|-------|---------------|--------------|---------------|---------------|----------------|
| C22   | 16.4" (417mm) | 5.5" (140mm) | 21.6" (549mm) | 14.2" (361mm) | 24.4" (620mm)  |
| C46   | 16.4" (417mm) | 5.5" (140mm) | 21.6" (549mm) | 14.2" (361mm) | 41.7" (1060mm) |



## Features and Benefits

- Differential pressure controls and a proportional inlet valve help to maintain a constant liquid level within +/- 5%
- Provides a ready supply of vapor free, pure liquid nitrogen for critical applications
- Available in 22 and 46-liter operating capacities, with bottom outlets ranging from 2 to 12 outlets. Higher capacities for custom application are available.
- Equipped with specially designed universal outlet connections, allowing compatibility with both liquid feed Triax pipes and vapor return Coax pipes. This feature enhances installation flexibility in multiple pairs of closed-loop piping systems.

# Cryogenic Transfer Hoses

## Semi-Flex Vacuum Insulated Transfer Hoses



**Semi-Flex**



Semi-Flex is a semi-rigid, bendable pipe with optimal flexibility, making it suitable for long-distance piping system applications as an alternative to traditional rigid piping. Its lightweight stainless steel construction reduces cool-down losses to an absolute minimum. Available in sizes of DN16 (1/2"), DN25 (1"), DN32 (1.25"), and lengths ranging from 6m to 18m.

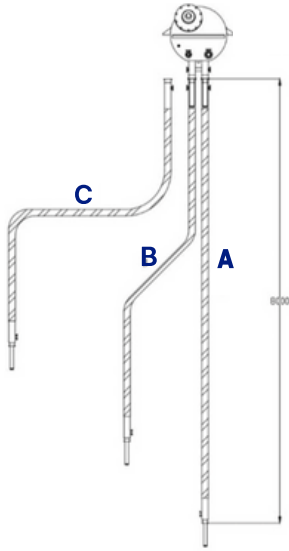
- Semi-Flex can be coiled for shipment by air freight, eliminating the need for expensive logistics.
- Tees, elbows, bayonets, and valves can be incorporated with Semi-Flex transfer hoses for a customized LN2 piping system application.
- Selected hoses are kept in stock for immediate delivery.
- Super insulation and proprietary chemical getters ensure long-lasting vacuum integrity.
- Each hose is evacuated ( $10^{-6}$  torr), helium leak checked ( $1 \times 10^{-9}$  std cc/sec), and liquid nitrogen cold-shock tested before shipping.
- Vacuum insulation eliminates frost, ice, and related safety hazards.

## Semi-Flex Specifications

| Model                     | SF16                                                                                                                                                      | SF25                           | SF32                           |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------|
| Inner Diameter            | DN 16<br>½" (16.2 mm)                                                                                                                                     | DN 25<br>1" (25.1 mm)          | DN 32<br>1½" (34.2 mm)         |
| Outer Diameter            | DN 40<br>(52.1 mm)                                                                                                                                        | DN 50<br>(62.8 mm)             | DN 65<br>(81.2 mm)             |
| Steady State Heat Leak    | 1.4 btu/hr/ft<br>(1.3 watts/m)                                                                                                                            | 1.5 btu/hr/ft<br>(1.4 watts/m) | 1.6 btu/hr/ft<br>(1.5 watts/m) |
| Bayonet Heat Leak         | 4.0 btu/hr<br>(1.2 watts)                                                                                                                                 | 8.1 btu/hr<br>(2.4 watts)      | 8.1 btu/hr<br>(2.4 watts)      |
| Max. Operating Pressure   | 200 psig<br>(13.8 bar)                                                                                                                                    | 200 psig<br>(13.8 bar)         | 200 psig<br>(13.8 bar)         |
| Weight                    | 1.0 lbs/ft<br>(1.4 kg/m)                                                                                                                                  | 1.3 lbs/ft<br>(1.9 kg/m)       | 3.0 lbs/ft<br>(4.5 kg/m)       |
| Min. Bend Radius (Static) | 12" (30 cm)                                                                                                                                               | 16" (40 cm)                    | 18" (45 cm)                    |
| Vacuum Insulation Type    | Static or Dynamic Vacuum                                                                                                                                  |                                |                                |
| Maximum Length            | Single Spool 59 ft (18.00 m)                                                                                                                              |                                |                                |
| Protective Outer Covering | RFB - Regular Flex Braid                                                                                                                                  |                                |                                |
| Material Construction     | Stainless Steel Series 300                                                                                                                                |                                |                                |
| Standard Testing          | Dimensional Check<br>He leak checked $1 \times 10^{-9}$ cc/s                                                                                              |                                |                                |
| Optional                  | Pneumatic pressure test, Vacuum retention testing, LN2 cold shock, pre-material certs.,<br>X-ray, ASME B31.3 certification, CFOS cleaning for O2 services |                                |                                |

# CSM Cryogenic Transfer Hoses

## Hoses Selection Guide



| Installation Method | Hose Type  |            |
|---------------------|------------|------------|
|                     | Triax-Flex | Ultra-Flex |
| A                   | ✓          | ✗          |
| B                   | ✓          | ✓          |
| C                   | ✓          | ✗          |

| Hose Type  | ID   | OD   | Bending Radius |
|------------|------|------|----------------|
| Triax-Flex | DN16 | DN40 | 300mm.         |
| Ultra-Flex | DN8  | DN25 | 152mm.         |
|            | DN12 | DN32 | 203mm.         |

**Ultra-Flex transfer hose** is an ultra-flexible, vacuum-insulated LN2 transfer hose with high flexibility and the lowest dynamic bend radius among all cryogenic hoses on the market. Due to its lightweight stainless steel construction, cool-down loss is reduced to an absolute minimum. Ultra-Flex hoses are protected by a tough, anti-kink stainless steel spiral wrap outer covering. Its non-wire braid prevents potential operator injuries caused by sharp wires found in traditional braided sleeves.

Typical hoses are manufactured with pipe thread ends or female flare 1/2" JIC/CGA fittings, or C5 bayonets. These hoses are used in a wide variety of applications, including tool connections with portable dewars supplying LN2 to test handlers, LN2 dosers, or any moving reservoirs, custom OEM applications.



Ultra-Flex

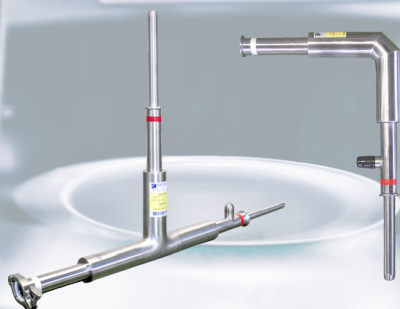
**Triax-Flex® transfer hose**, when used with an atmospheric Phase Separator system, delivers liquid nitrogen (LN2) in pure liquid form at atmospheric pressure. This system eliminates two-phase flow to use points by continuously venting gaseous vapor to the atmosphere through the phase separator. By separating and venting vapor before liquid delivery, only sub-cooled LN2 is supplied to each use point via gravity. Triax-Flex® is commonly used in applications where single-phase liquid is critical to the production process, such as MBE, LN2 dosers, cryopreservation, or any process requiring pure LN2 supply.

Triax-Flex® is available in static or dynamic vacuum insulation. The dynamic version requires an external pump to continuously evacuate its vacuum annular space, maintaining insulation integrity. Both static and dynamic systems feature Triax female bayonet connections, elbows, tees, valves, or custom connections (e.g., A5, A10, TAL) to the point of use.



Triax-Flex

## RELATED PRODUCT:



Modular Fittings



Modular Valves

# Worldwide Sales & Service



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