

Liquid Nitrogen "LN2" Shippers

2024

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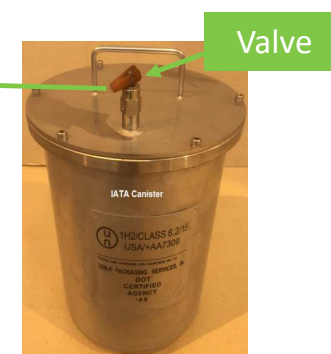
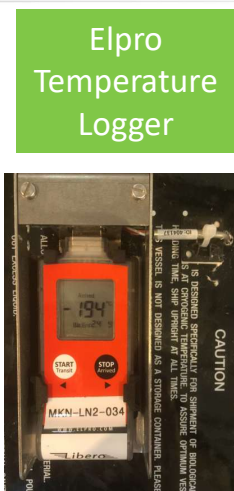


What are LN2 shippers?



Liquid Nitrogen "LN2" Shippers are used to maintain deep cryogenic temperatures during transportation across any distance. These shippers utilize LN2 in a dry vapor form to maintain temperatures below -150°C for ten or more days under normal conditions. LN2 shippers rely on a vacuum as the insulator to maintain these cryogenic temperatures and, therefore, must be constructed as a cylindrical metal vessel with a removable lid. Efforts must be made to **keep any LN2 upright at all times during transit** as tilting greatly impacts the thermal performance of the unit (upright performance of 10 days is standard, but if left tilted at a 90-degree angle the unit may only last two days)

INTRODUCTION OF LN2 DRY SHIPPER (OR MVE CRYOSHIPPER)



MVE IATA with Elpro Cap

- The MVE IATA with Elpro Cap is the standard LN2 shipper offering throughout the Marken network
- This unit makes up the majority of the global inventory of LN2 shippers and is most likely to be in stock at any given LN2 branch
- This unit records temperature data on a passive data logger, the Elpro Libero CE
- GPS data can be collected by utilizing a Sentry 600 datalogger
- 10 day hold time (upright), & validated with 3+ day continual on-side hold time
- Largest payload capacity of available Marken LN2 shippers



MVE IATA with Sentinel Cap

- The Sentinel Cap is a two-device solution that collects and transmits payload temperature, GPS, tilt, and other core sensors in real-time
- Parent-child relationship between the Sentinel device and the Sentry 600 device
 - ❑ Sentinel communicates payload temperature data to the Sentry 600 via bluetooth
 - ❑ Sentry 600 sends data to the cloud
 - ❑ White face Sentry 600's are specifically used for Sentinel Caps
- The Sentinel Cap utilizes the MVE IATA dewar
 - ❑ Both components are Marken owned
 - ❑ Leveraging the MVE IATA promotes familiar form and payload capabilities
- Qualified for 10+ days of thermal performance

Before each shipment, confirm that the shipment date is within the calibrated date range – but not within 4 weeks of the calibration expiration date



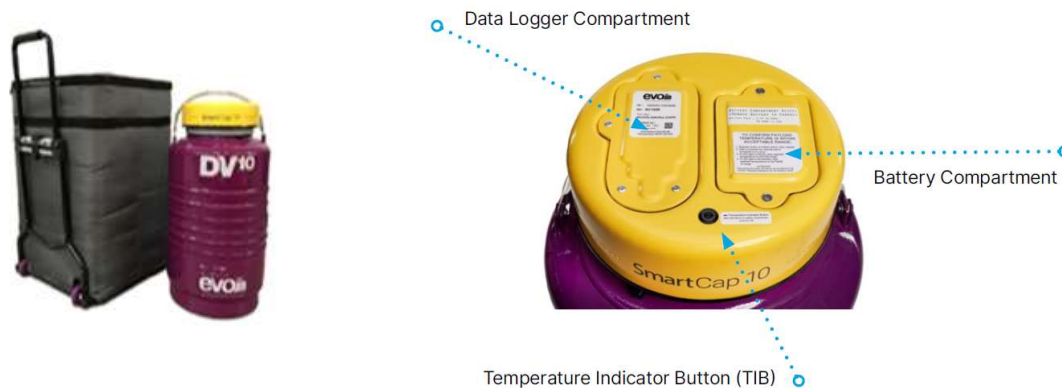
MVE IATA Shipper with blue "Mushroom" outer shipper



"Sentinel Cap" with Sentinel 100c Data Logger

BioLife DV10

- The Biolife DV10 is a high-performing LN2 shipper with a built-in datalogger and rechargeable battery
- We utilize the evoIS web platform for shipment creation live shipment monitoring, and it can also assist with DV10 inventory controls
- These LN2 shippers are leased models specifically for Cell & Gene Therapy clients
- 15+ day hold time (upright), & validated with 3+ day continual on-side hold time.
- Smaller payload capacity compared to MVE IATA.



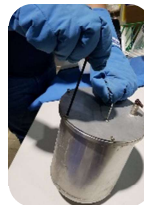
Product Overview



Shipper Name	General Description	Live Monitoring During Transit	Logger Type	Battery Life	Qualified Thermal Performance	Availability
MVE IATA with Elpro	Passive data shipper - standard Marken offering, majority of global inventory	No	Elpro Libero CE	3 Years	10 days upright	All
Sentinel Cap (Phasing out - not available)	Live data shipper - utilizes MVE IATA dewar	Yes	Sentinel 100c + Sentry 600	15 Days minimum	10 days upright	All - phasing out 2023
Sendum Cap	Live data shipper - Client specific for Kite Pharma ONLY	Yes	PT300D with ASP300	10 Days minimum	10 days "dynamic"	Client specific
Sentry600 Cap	Live data shipper - utilizes MVE IATA dewar, includes improved open lid sensor capabilities	Yes	Sentry 600	15 Days minimum	10+ days upright	Release TBD - replacing Sentinel Cap 2024
DV10	Live data shipper - C> dedicated product, extended thermal performance	Yes	Sendum PT300D with AP300	15 Days minimum	15+ days upright	C> client only - low inventory

Driver instructions

- Remove the cryoshipper lid – pull, do not twist
- Remove the metal canister.
- Immediately replace the cryoshipper lid back to the cryoshipper to minimize its opening time.
- Lift up the valve to release internal pressure
- Unbolt the metal canister using the tool provided with the dry shipper.
- There are six bolts to remove.



Driver instructions

- Place the cryobox(es) correctly into the metal canister.
- If there are no cryoboxes, place the samples that should already be in its primary receptacles (e.g. blood tubes) into absorbent sleeve, then place it into a 95Kpa bag, seal it. Fill the remaining space with cushioning bubble to prevent the samples from damaging
- Replace the lid on the metal canister by bolting on – do not over tighten - and close the pressure valve down.
- Remove the top lid of the transport case and cryoshipper lid then carefully lower the canister back into the cryoshipper



Driver instructions

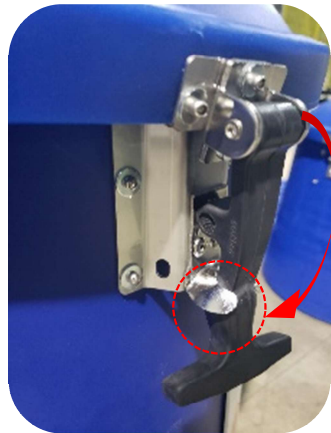
- Immediately replace the cryoshipper lid back to the cryoshipper and ensure it is correctly fitted.
- Return the tool to its original position in the dry shipper transport case.
- Enclose an itemized list of content.
- Check the temperature logger:
 - if it was started by Marken prior to collection, confirm it is displaying a “logging transit” or “Run” state.
 - if it is to start at collection, press the < Start > button until it displays a “logging transit” or “Run” state.
- **Driver must notify Marken immediately in case of a temperature excursion alarm.**



Delivering What Matters From Clinical To Commercial

Driver instructions

- Close the transport case by twisting the two latches.
- Seal the lid using a security seal with unique identification number which will be recorded on the waybill and in the Marken booking system Maestro.
- In case of a temperature excursion alarm, driver must notify Marken immediately.



Driver instructions



- On arrival at the site / delivery point, the consignee may complete the unloading process without the assistance of the driver. If the shipper requires assistance, the following procedure must be followed.

Note: Prior to opening a Cryoshipper and handling accessories, ensure that all required Personal Protective Equipment (PPE) is worn (Face Shield, cryogenic gloves and suitable footwear – Boots or closed tongue safety shoes). Ensure the process is only being carried out in a well ventilated area. 4.6.1 Position the Cryoshipper as close as possible to where the samples will be transferred and stored. 4.

- Open the Transport Case Lid by twisting the two latches to the left. DO NOT open the Cryoshipper Lid. Seals may need to be removed.
- When the consignee is ready to unload the samples, carefully remove the Cryoshipper lid (pull, do not twist) and remove the Canister. Place the Canister on a safe and secure surface. Immediately replace the lid back on the Cryoshipper.

Note: Ensure that the lid is removed from the Cryoshipper for the minimum amount of time.

- Release the internal pressure from the Canister by lifting up the valve on Canister Lid.
- Unbolt the Canister Lid using the HEX key located in the Transport Case. There are six bolts to remove.
- Handover the loading/ unloading of the samples to the site representative.



FOR MORE INFORMATION



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