INHALED NITRIC OXIDE IN RETRIEVAL - NETS

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- Inhaled nitric oxide (iNO) is used to treat pulmonary hypertension
- iNO can be used for all road, rotary and fixed wing retrievals when the NETS 2012 series neonatal system is fitted with the specially designed nitric module
- the use of iNO in retrieval requires a third clinical team member, called the iNO team member
- the iNO team member is responsible for the safe delivery, monitoring and troubleshooting of iNO, for the patient, the clinical team and other transport staff/parent travelling with the patient
- competency training is required to be accredited as the iNO team member

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st November 2021	**Review Period**: 3 years
Team Leader:	Staff Specialist	**Area/Dept**: NETS

CHANGE SUMMARY

- New document on SCHN ePolicy platform
- Contents page added
- Added nitric accreditation process
- incorporated TAS/CASA, Toll and RFDS requirements for safe iNO use in rotary wing and fixed wing aircrafts
- additions made to emergency procedures in the event of a major nitric oxide (NO) gas leak
- additions made to emergency procedures in the event of an emergency landing/ditching, electrical malfunction or smoke involving the NETS 2012 series neonatal system
- addition of seating configuration in road vehicle, rotary wing and fixed wing aircrafts
- Appendix added – Toll and Air Ambulance seating configuration and BOC nitric oxide safety data sheet
- **2/12/21:** Minor review. Reduction in minimum PSI required for rotary or fixed wing retrieval from 1500 to 1200psi. See pg 6.
- **4/02/22:** Minor review:
  - Updated accreditation process to include Pel-Air training requirements. See pg 5.
  - Removed reference to B200 aircraft, replaced with Pel-Air B350 aircraft and seating configurations in the new aircraft. See pg 21 and 32
  - Toll rotary wing seating configuration changed to accommodate air crewman access to rear cabin. See pg 21 and 31
  - Moved sentences around to read more logically for calibration. See pg 26
  - Added Pel-Air reference for updated training. See pg 30

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READ ACKNOWLEDGEMENT

- All NETS staff responsible for the delivery of iNO during NETS retrievals

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Accreditation Process

Accredited nitric team members will have completed the following:

1. Online virtual training simulator for INOmax DSIR Plus
2. Read and acknowledged the Inhaled Nitric Oxide (iNO) in Retrieval guideline
3. iNO written learning package
4. Pel-Air online training module, with a pass grade in the exam
5. iNO competency skills assessment (CSA), with an annual refresher

Prior to Departure

- To deliver iNO in transport at least one team member must be accredited to deliver Nitric Oxide
- On-call Nurse Manager must be notified when a decision is made to use iNO (prior to team departure); this discussion will include suitability and responsibility of additional team member(s)
- The team should consist of 3 clinical staff (*2 nurses and 1 doctor = nurse delivering nitric* or *2 doctors and one nurse = doctor delivering nitric*)
- When the team nurse or doctor is being coached then a 4th team member responsible for iNO will be added. If due to transport restrictions, where capacity or weather does not allow for a 4th team member, the staff member being coached will likely be taken off the team to enable nitric to be administered. Other variations to team structure must be approved by the on-call Nurse Manager
- The iNO team member is responsible for the iNO setup, monitoring, documentation, continual delivery, emergency contingencies and discontinuation of the iNO treatment
- In *aircraft retrievals*, the NETS coordinator must inform Aeromedical Control Centre (ACC) that iNO will be carried on board the aircraft. ACC will inform the pilot
- The NETS coordinator must ensure the nitric oxide boxes are ticked on the Aircraft Tasking Request form that is sent to ACC
- In *aircraft retrievals*, the iNO team member must ensure the pilot is aware that iNO is being carried on board the aircraft **before** the system is loaded into the aircraft for any leg of the retrieval
- In *rotary wing (RW) retrievals*, the iNO team member must keep the 2nd environmental monitor on their person the entire time iNO is carried on board and monitor levels to alert the pilot if a leak is detected. Alternatively, the 2nd environmental monitor can be placed with the pilot/aircrewman in the cockpit
- In *fixed wing (FW) retrievals*, the 2nd environmental monitor must be given to the FW pilot to carry on their person in the cockpit

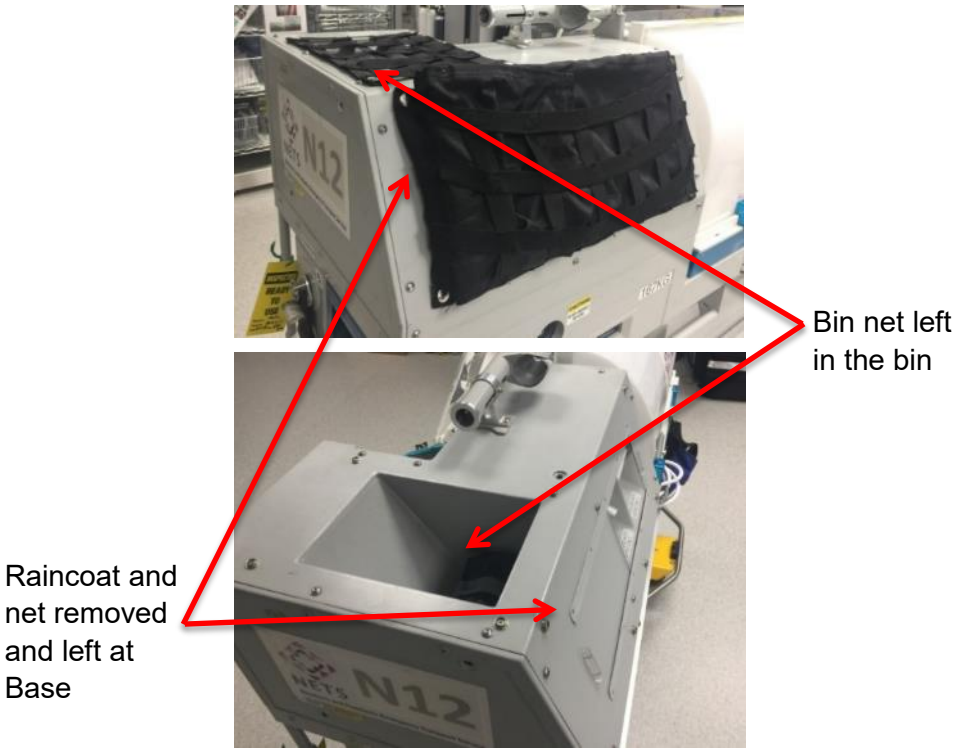
- ***In all forms of transport it is the iNO team member's responsibility to discuss emergency contingencies with all clinical team members, EVO, crewman, flight nurse and pilot in the event of a major gas leak, smoke or electrical malfunction involving the neonatal system***

Equipment Required

- Nitric Oxide INOmax DSIR plus system (iNO module) - located in the equipment room
- iNO cylinder – ensure cylinder contents ≥500psi (road) or ≥1200psi (RW and FW)
- 1x environmental monitor for road retrievals; or 2x environmental monitors for aircraft retrievals – must have an in date operational tag attached
- iNO accessories pack - contains the items required for the pre-use check, delivery and documentation of iNO to the patient
- Any 2012 series neonatal system can be used for the iNO set-up

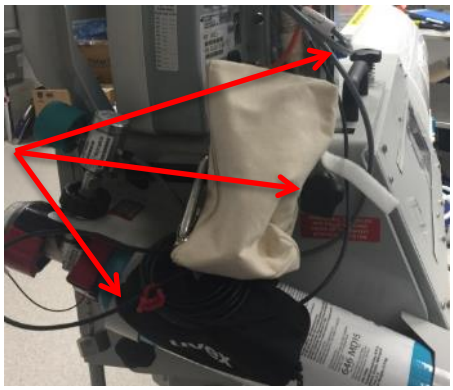
On Base Pre-departure Set-up

1. Unclip and remove the storage bin black net, the raincoat and its netting. The bin net can be left in the storage bin on the system. The raincoat and its net can be left on the cleaning shelf in the Equipment room at Base.

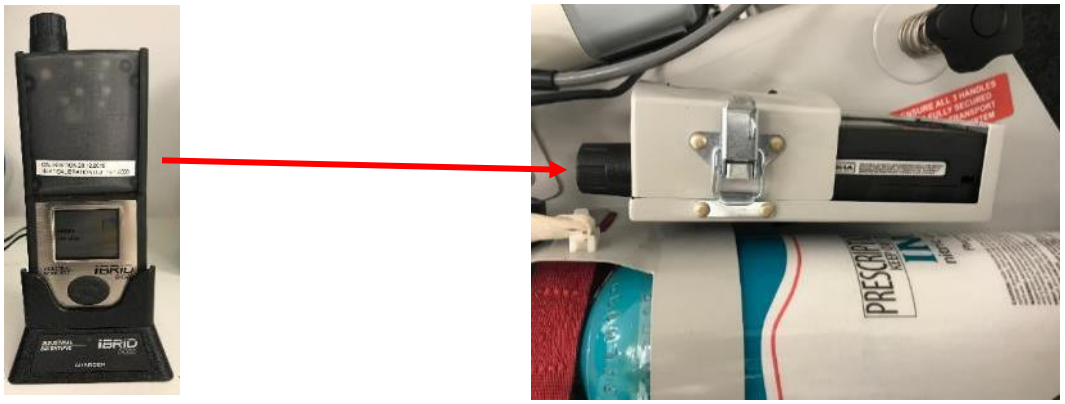


2. With a minimum of **two** staff members, use the two handles to slide the iNO module onto the 2012 series neonatal system and secure in place via the three screw points.

3 screw points



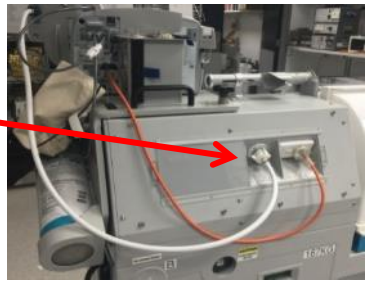
3. Secure the environmental monitor for the iNO module to the mounting bracket located above the cylinder. The 2nd environmental monitor can be stowed in the accessories pack until it is required ie. leg 1/2/3 in any aircraft, even when not being used



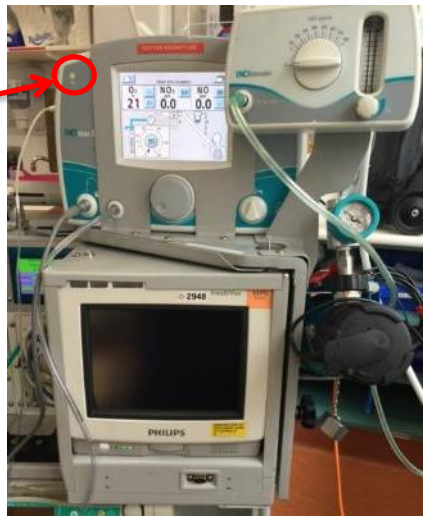
4. Ensure the cylinder retention strap is clipped and the buckle is tightened

5. Ensure iNO module power source and high pressure oxygen hose is connected to the back of the 2012 series neonatal system and the power is switched on.

O_2 high pressure hose connected to the back of the 2012 SERIES NEONATAL system



Ensure green light is illuminated



NOTE: Ensure the 2012 SERIES NEONATAL system is connected to mains power and Oxygen wall source for the pre-use check to avoid draining the 2012 series neonatal system battery and cylinders. This will supply the nitric module with power and Oxygen.

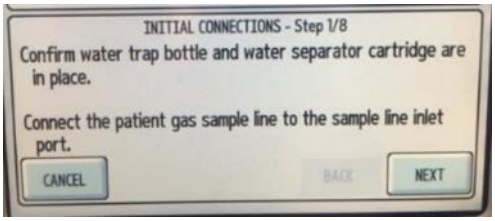
Detailed Setup

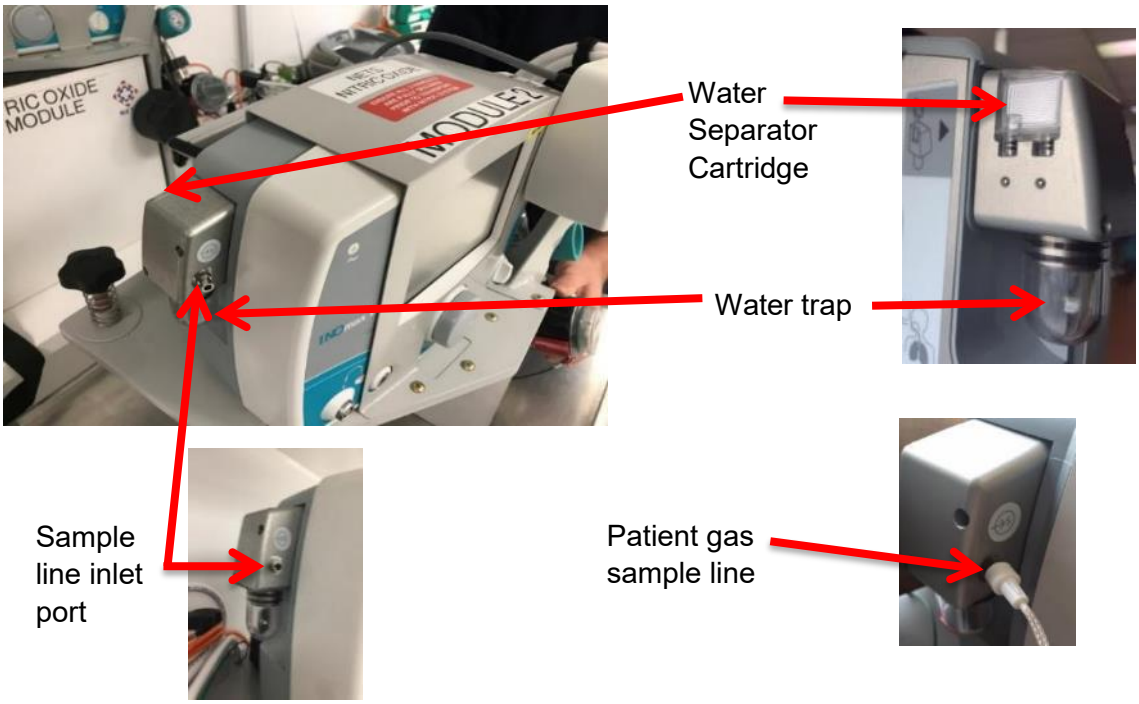
- Turn INOmax DSIR ON (black switch at back of unit), verify speaker function sounds. A self-test screen will appear.
- **Using the on screen Pre-Use wizard, follow the step-by-step instructions to complete the Pre-Use procedure.**
- The Pre-use Wizard can also be initiated by entering the menu screen and selecting the Pre-Use Checkout button.

Note: A low range calibration automatically starts following the self-test. If a high range calibration is due contact NETS biomedical engineers and do not use the Nitric Unit.

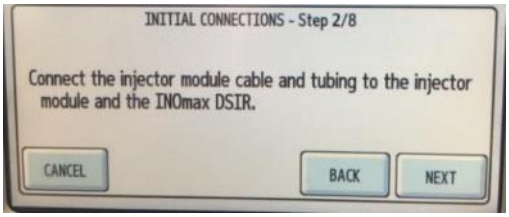
Use the steps below as an <u>additional</u> guide to aid set-up

Step 1/8 Initial Connections





Step 2/8 Initial Connections

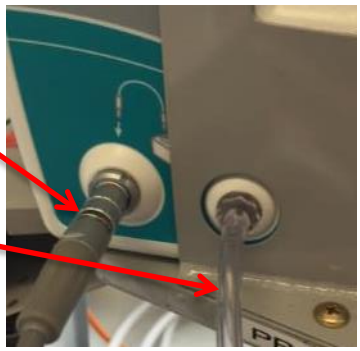


Note: Ensure the red dots are aligned.

Never drop the injector module – it is very sensitive

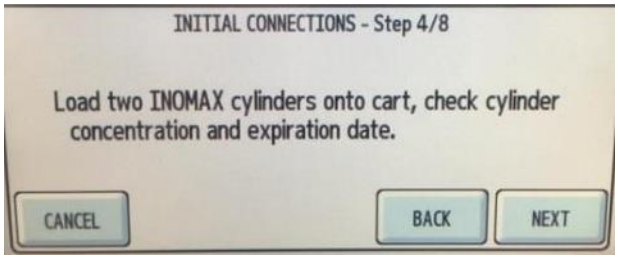
Injector Module Cable

NO/NO_2 injector tubing



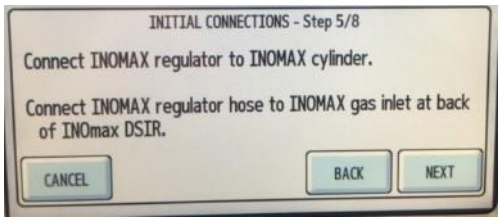
Injector Module

Step 4/8 Initial Connections

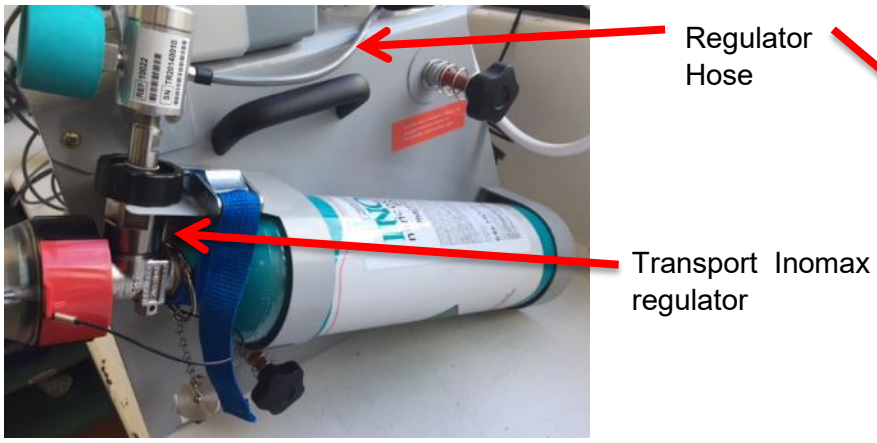


For NETS purposes, ensure **ONE** transport INOMAX cylinder is secured to the side of the Nitric Unit and check cylinder for product identify labels, concentration, and expiration date (product expires the **1st** of the month).

Step 5/8 Initial Connections



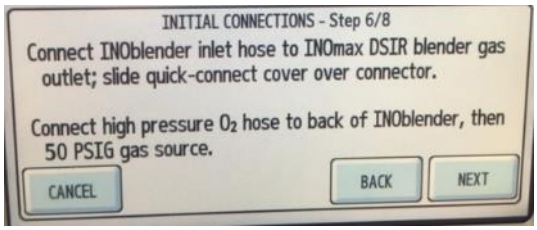
At NETS, the INOMAX regulator is already connected to the cylinder, but double check it is connected and secured. The regulator hose can connect to either one of the two inlet ports at the back of the unit.

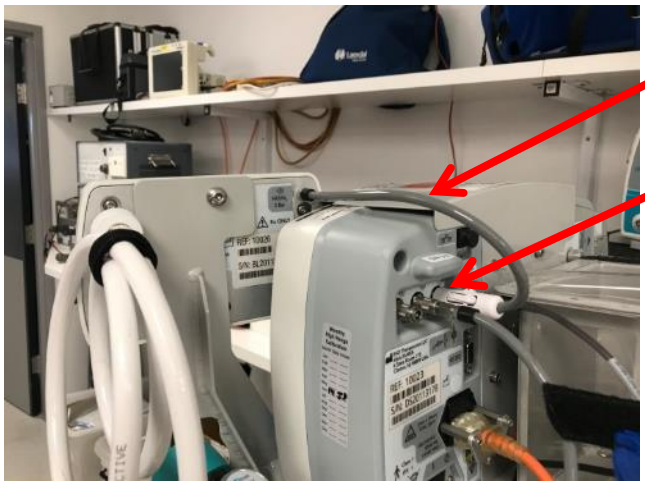


If a new cylinder is to be installed, connect the high pressure transport Inomax regulator to INOMAX cylinder and tighten the fitting.

Note: Ensure the white plastic tip is in place on the regulator connector and not chipped or cracked.

Step 6/8 Initial Connections



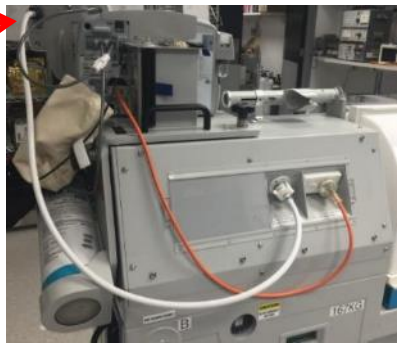


INOblender Inlet Hose

DSIR Blender gas outlet

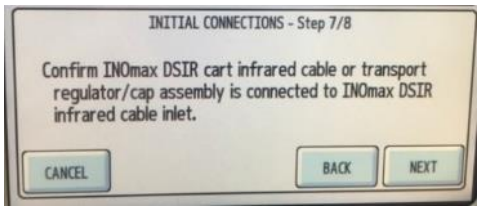
Quick connect cover

Check the O_2 hose is connected to the back of the INOblender and to the O_2 gas source on the back of the 2012 SERIES NEONATAL system. Ensure the 2012 SERIES NEONATAL system gas hoses are connected to the main wall supply.



Step 7/8 Initial Connections

Remove red safety cap, noting the non-decimal reading on the INOmeter. Document this on the Nitric Oxide DSIR Plus documentation chart for retrieval.

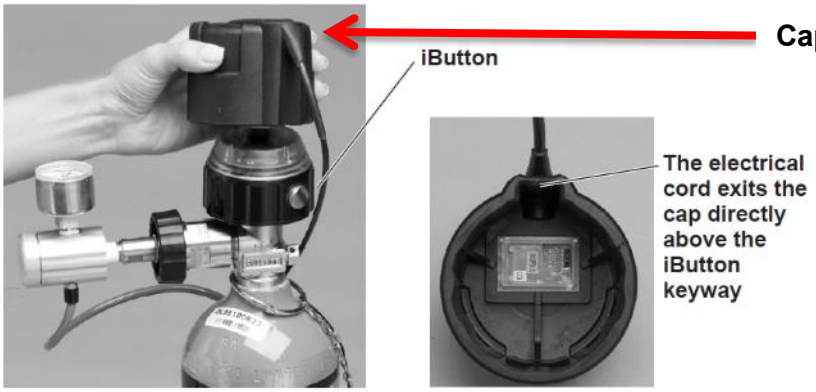


Note: The digital display alternates between total cumulative time for that cylinder (non-decimal reading) and time since cylinder was opened for the current job (decimal reading). Every 0.1 = 6 minutes

Total cumulative time

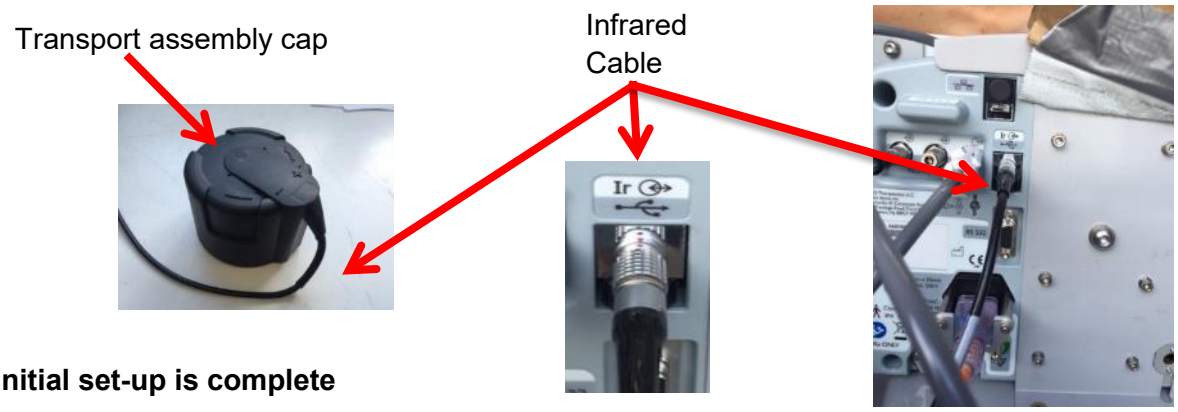
Time open for current job

Place the Cap Assembly over the INOmeter



Note: Be sure to align the keyway inside the Cap Assembly with the iButton on the INOmeter. Do not push the top of the cap as this will damage the sensitive reader.

Confirm transport regulator cap assembly is installed and INOmax DSIR infrared cable is connected to infrared cable inlet.

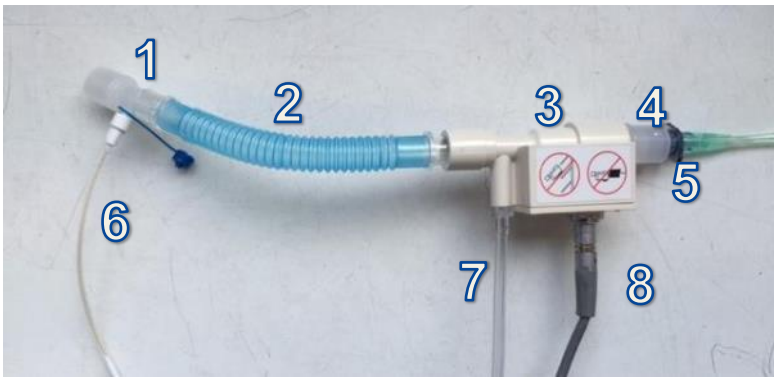


Initial set-up is complete

Backup Delivery Test

Assemble pre-use set up connectors and tubing (as per photo – or press 'SHOW DIAGRAM' on INOmax display) and ensure INOblender connected to Oxygen supply.

1. Gas sample tee adapter
2. Paediatric Extension
3. Injector Module
4. 22M / 15F X 22M / 15F Adapter
5. Adapter 15M Fits 4.5 mm Tubing
6. Patient gas sample line
7. NO/NO_2 Injector tubing
8. Injector Module Cable



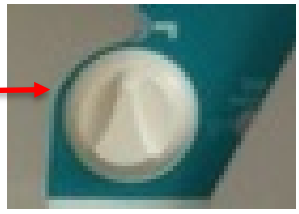
Follow the onscreen prompts to complete the Automated Purge and backup delivery test.

NOTE: The automated purge removes nitrogen dioxide (NO_2) from the module. Once this step has been completed the INOblender can be used to hand ventilate the patient in an emergency while the rest of the pre-use check is performed. Completing the automated purge in the first 2 steps will ensure a delivery dose can be dialled on the DSIR plus. You will not be able to perform the INOblender pre-use check if you are using the Inoblender to hand ventilate the patient, and will need to keep selecting "next" to skip the steps to reach the end of the pre-use check.

Back-up delivery test – follow the prompts on the screen

- Set the 02 flow meter to 10L/min.
- Turn on the integrated pneumatic backup switch ('backup on' alarm will sound)

Integrated pneumatic backup switch



- Allow time for the monitored values to stablise and verify NO and NO_2 readings are within accepted ranges as displayed on screen.
  - *NO 14-26 ppm*
  - *NO_2 <1.0 ppm*
- After the values have stabilised turn off the pneumatic backup switch.

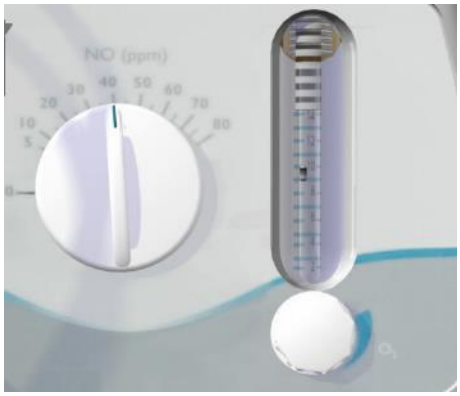
Performance Test – follow the prompts on the screen

- Ensure 0_2 flowmeter remains at 10L/min.
- INOmax DSIR plus will automatically set dose to 40ppm

- Allow values to stabilise
  - *$Fi0_2$ 92%-98%*
  - *NO_2 <1.5ppm*
  - *NO 35-45 ppm*
- After the values have stabilised the dose will return to zero
- Turn off the 0_2 flow meter
- Remove the injector module and reconnect the adapters

**If using the INOblender as flow meter for pre-use test then ignore step 1 of INOblender test*

- On the INOblender set the dose to 40ppm and O_2 flowmeter to 10L/min
- Verify monitored values 32-48 ppm
- Turn the dose and O_2 flowmeter off.
- The system is now ready for patient use.

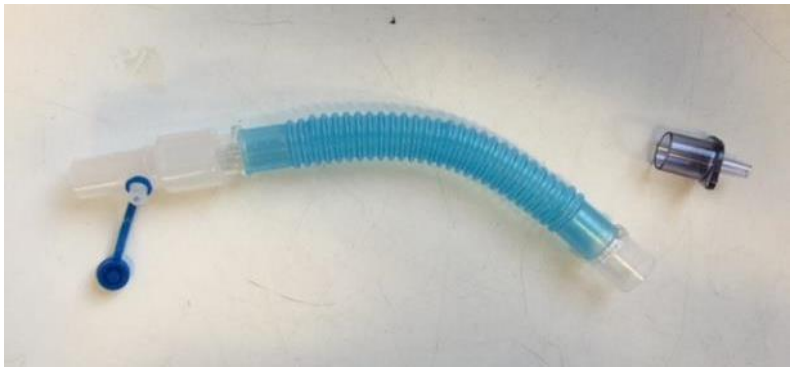


If therapy is <u>not</u> being commenced within <u>10 minutes</u> close the cylinder and <u>depressurise</u> the regulator by manually purging the regulator line on the back of the INOMAX DSIR system.

Patient Connection

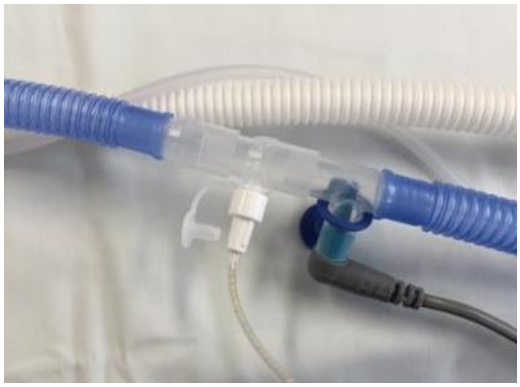
NOTE: Perform Crossvent ventilator leak test prior to connecting nitric into circuit – otherwise leak test will fail.

Remove the blue corrugated tubing and sample line connector from the circuit and place in Nitric accessories pack.

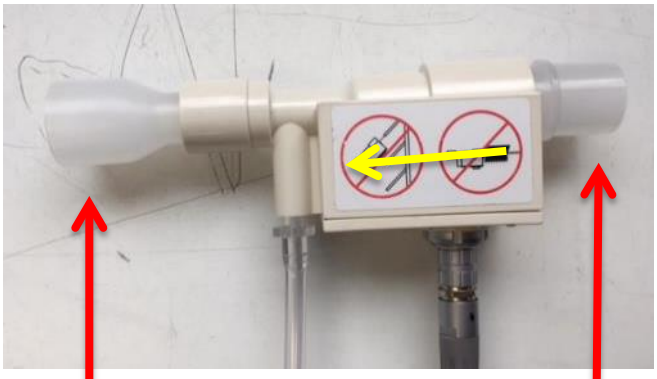


Attach the patient sample line to the ventilator circuit sample connector from the crossvent circuit accessories packet.

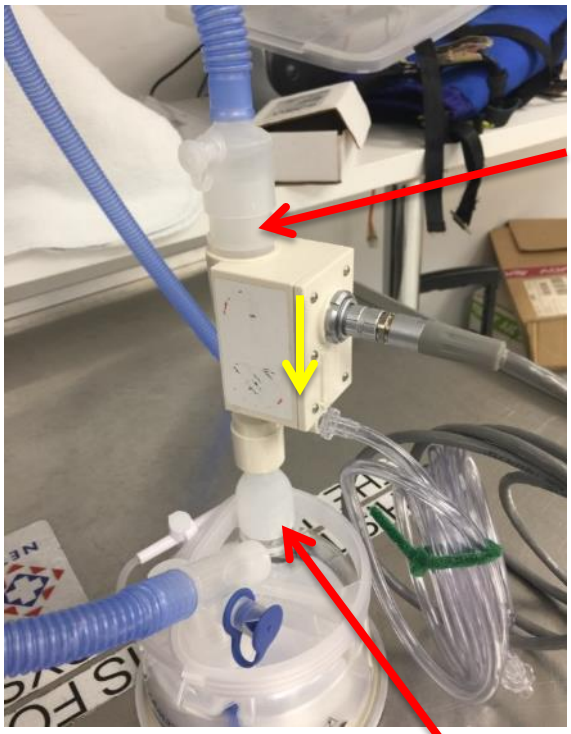
Place on the blue inspiratory limb of the ventilator circuit just above the temperature probe at patient end.



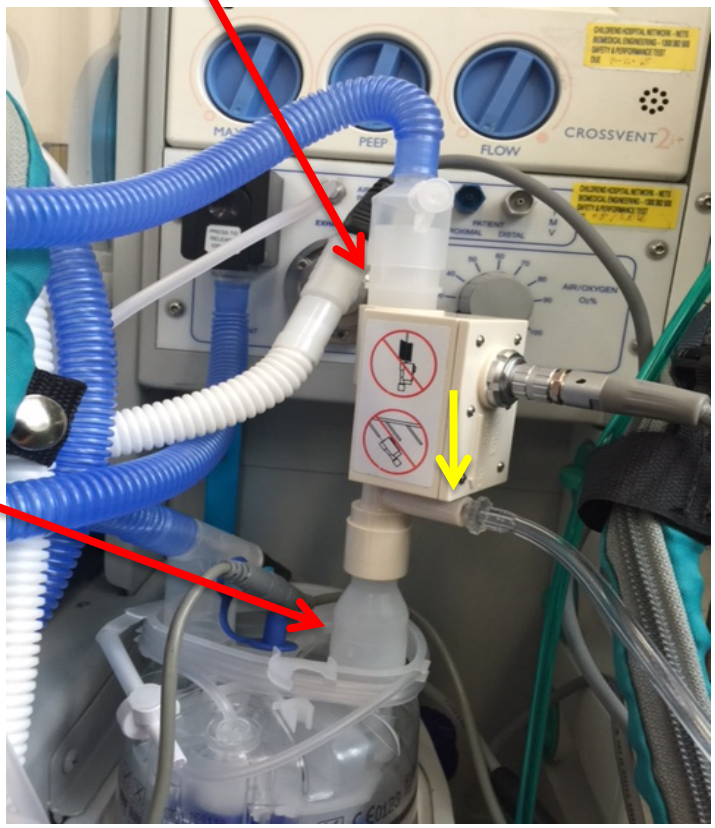
Add a 22F x 15M adapter to the humidifier base PRE HUMIDIFIER and the 22M /15F x 22M/15F to the other end of the injector module (Ventilator end)



Connect the injector module with the arrow pointing DOWN on the PREHUMIDIFICATION side of the humidifier chamber.



22M x 15F/22M x 15F adapter



22F x 15M adapter

Connect anaesthetic bagging circuit to INOblender flow outlet

The bagging circuit can be stowed in the box behind the nitric module

Use of iBRID MX6 Environmental Monitor on Retrieval

- Switch monitor on by pressing and holding on/off button for 3 seconds (note the on/off button also functions as a 'confirm' button for on-screen messages)
- The pump will make a whirring noise (as it in-trains air) then beep
- Pump on' message will appear
- Follow on screen prompts when they appear ('Block pump inlet' / 'Unblock pump inlet')
    - NOTE: To block inlet place hand over inlet port on top left of monitor
- Pump will then re-start to commence monitoring of NO_2 & NO

- Zero sensors:
    - Hit on/off button
    - Use the arrow buttons to highlight the 'sensor' menu then on/off button to select
    - Use the arrow buttons to highlight 'zero all' then on/off button to select
    - On 'zero all sensors?' message select 'yes'
    - Progress bar will load followed by 'zero complete' message
    - On 'calibrate all sensors?' message select 'no' (this is performed regularly by biomed)

- Secure the system environmental monitor into the mounting bracket located above the NO cylinder on the iNO module
- Minimum and maximum alarm limits are preset and cannot be changed – NO is set to start alarming at 5ppm and NO_2 at 3ppm
- There will first be red flashing alarm lights, followed by an audible alarm
- During monitoring the battery status is shown by the battery symbol in the bottom left of the screen

At the Referring Hospital

Open the INOmax cylinder.

NO is registered with the Australian Therapeutic Goods Administration (TGA). **It needs to be prescribed on the medication chart**. Start and stop times as well as dosage changes must be charted accurately.

On commencement of iNO therapy, document 15-minutely the set NO dose and administered reading (ppm); NO_2, cylinder contents level (psi) and environmental monitor readings on INOmax DSIR Plus observation chart, and continue until infant is transferred to receiving hospital NO set-up.

If patient is already ventilated via NETS 2012 series neonatal system, to ensure the iNO circuit is ready for use the NETS team will need to disconnect the infant from the ventilator and commence hand ventilating whilst the Nitric team member completes the set-up of iNO in the ventilator circuit. The INOblender may be used for hand ventilating if desired (see below).

If patient requires hand ventilating with iNO:

- Abrupt discontinuation on iNO therapy can result in cardio-respiratory compromise
- Place bagging circuit and test lung from ventilator circuit near head of patient
- Set the INOblender flow meter to desired flow
- Set the INOblender dose to the same NO dose as the patient is receiving via the ventilator
- Clear the NO_2 build up in the bagging circuit by squeezing bag 3 times before connecting to patient
- Remove ventilator circuit from ETT and place test lung on circuit
- Commence hand ventilating
- After patient has been reconnected to the ventilator circuit turn off the INOblender flow meter

TROUBLESHOOTING:

1. **First line of contact is NETS biomed via CCC**
2. **If matter is unable to be resolved CCC to contact Ikaria: 1300 198 565**

Departing Referring Hospital

- Ensure the system environmental monitor is secured in the specially designed mounting bracket on the iNO module
- Ensure the NO cylinder retention strap is clipped and the buckle tightened
- Ensure protective eyewear and oxygen masks are available in the event of a major gas leak
- The iNO team member must initiate discussion with other clinical team members, porter/EVO, crewman, flight nurse (FN) and pilot about the risks of disconnection of the iNO setup when moving in and out of vehicles/buildings and along corridors, footpaths etc. and agree on a plan in relation to movement of the neonatal system
- ***In all forms of transport it is the iNO team member's responsibility to discuss emergency contingencies with all clinical team members, EVO, crewman, FN and pilot in the event of a major gas leak, smoke or electrical malfunction involving the neonatal system with considerations to patient safety and clinical concerns***
- If flying in RW or FW, before loading the system into the aircraft the iNO team member must inform the pilot that iNO is being administered or may be initiated at any time during flight
- In RW retrievals, the iNO team member must keep the 2nd environmental monitor on their person the entire time iNO is carried onboard. Alternatively, the pilot/aircrewman may decide to place the 2nd environmental monitor in the cockpit
- In FW retrievals, the iNO team member must give the 2nd calibrated and ready-to-use environmental monitor to the pilot to keep on their person in the cockpit.

In Transit

NOTE: Ensure the 2012 SERIES NEONATAL system is always connected to the vehicle or hospital main power and gas supply to minimise the risk of depleting the system internal battery and oxygen cylinder. The only situation where the system is not connected to main power and gas supply is moving from the hospital to the vehicle and vice versa.

- The nitric cylinder contents gauge must be visible to at least one team member, preferably the iNO team member
- If the environmental monitor alarms with NO>5ppm and/or NO_2>3ppm, follow emergency procedures for gas leak
- See the following table for seating arrangements in the various modes of transport.

Recommended seating positions and responsibilities for team members during iNO retrieval		
Road vehicle	**Rotary Wing**	**Fixed wing**
- iNO team member will sit in the rear most seat at the back of the ambulance - retrieval team to sit in the rear front seats - the retrieval Dr will be required to call out the cylinder contents and environmental monitor levels to the iNO team member to record 15-minutely	- iNO team member will be inside the helicopter during loading of the neonatal system to trouble shoot any disconnections while loading - iNO team member will sit in the seat portside of the crib nearest to the infusion pumps, system environmental monitor and nitric module so they can continue 15-minutely nitric obs and trouble shoot the nitric in-flight if required - retrieval nurse will sit in the seat portside of the crib nearest to the patient head where they can still perform their duties of recording 15-minutely obs, aspirating gastric tube, temperature monitoring, manage infusion pumps etc. The retrieval nurse will need to keep the retrieval Dr informed on the patient condition since the Dr will not be able to visualise the baby during flight - the retrieval Dr will sit on the starboard rear seat - a parent will not be able to travel with the team as the starboard front seat will need to remain empty. If there is a major gas leak and the aircrewman needs to enter the rear cabin to open doors they will require access to a seat and the aircraft tethering system - see appendix 1 – Toll seating configuration	- iNO team member to enter the aircraft during patient loading, to trouble shoot disconnections and monitor the patient. They are the most appropriate team member for this as they are responsible for the safe delivery of iNO and can also trouble shoot the patient or the system if required - the neonatal system is loaded on the **forward pod only** - In the Pel-Air B350, the iNO team member will sit in the front rearward facing seat near the pilot and the FN in the rearward seat closest to the iNO cylinder. The retrieval team will be in the seats alongside the neonatal system. Check with crew if a parent can travel – see appendix 2 - The FN will be able to visualise the system environmental monitor, delivery screen and cylinder contents. Therefore, they will read out the values to the iNO team member for their 15-minutely nitric obs recording - The iNO team member will need to discuss with the FN what simple manoeuvres they can do to trouble shoot the nitric module. Any major trouble shooting will likely require the iNO team member to reposition within the aircraft during flight and this should be part of the emergency contingencies discussion with the entire crew - See appendix 2 – Pel-Air/AA seating configuration

Handing over at Receiving Hospital

- When ready to transfer patient, disconnect ventilator and place test lung with HME on ventilator circuit
- Connect patient to receiving unit ventilator and nitric set-up
- Document contents of cylinder
- Document number on digital display
- Turn off NO cylinder and remove transport cap assembly and stow in the pouch provided
- Replace red safety cap. A " " should be seen on the digital display

Emergency Procedures – Major Gas Leak

A major gas leak will be detected on the environmental monitor when NO>5ppm and/or NO_2>3ppm. If the environmental monitor alarms the following emergency contingencies should be adhered to with additional requirements depending on the location and/or mode of transport.

For all modes of transport:

- Ensure own personal safety, wear Personal Protective Equipment (PPE) including goggles & mask
- The retrieval nurse and Dr are to maximise interventions and treatment for the infant, while the iNO team member is responsible for troubleshooting the iNO module and keeping the team safe
- Provide oxygen to those with symptoms
- iNO team member to document the time and levels
- Maximise environmental ventilation where possible to clear NO levels
- iNO team member is to monitor (and record if practical) exposure levels 5-minutely until the system environmental monitor readings have normalised
- Notify NETS CCC/duty consultant when practical
- Documentation of incident should be written in the infant's notes
- Complete an IIMS on return to NETS Base
- Staff must seek medical attention at completion of mission

If the environmental monitor alarms with a NO≥25ppm:

- Turn off NO cylinder at the regulator

If the environmental monitor alarms with a NO reading 5-25ppm and/or there are signs of a leak:

- iNO can continue to be delivered while the iNO team member checks all lines and connections to rectify leak if possible
- If the leak cannot be rectified and the NO is not critical for patient well-being, turn off the NO cylinder at the regulator

Emergency Procedures for Major Gas Leak in Referring/Receiving Hospital

Additionally:

- Evacuate the area of all non-essential personnel
- Deny entry to any personnel not wearing protective clothing
- Extinguish all ignition sources
- Ventilate enclosed spaces by opening all doors and windows in the room
- Air conditioning augments clearing of NO from the ambient air
- Notify emergency services
- Conscious victims or infants in open cots should be taken to an uncontaminated area
- The gas supply in cribs should be turned up so that all circulating air is from the gas inlets
- Cribs should be relocated as soon as possible
- Ventilated patients should remain on the ventilator circuit and evacuated if possible

Emergency Procedures for Major Gas Leak in Road Vehicle

Additionally:

- Inform EVO to stop at first available safe location and to notify NETS CCC
- Maximise airflow through the vehicle by opening windows
- Ensure air conditioning is on maximum with the recycle turned off
- Open all doors when the vehicle has safely stopped

Emergency Procedures for Major Gas Leak in Rotary Wing

Additionally:

- iNO team member is to notify the pilot of increased NO environmental levels and to document the time and measurement
- iNO nurse to verify the pilot has increased the cockpit/cabin airflow to maximum
- Pilot may decide to descend while still maintaining maximum cockpit/cabin airflow
- iNO team member must monitor (and record if practical) exposure levels 5-minutely for at least the system environmental monitor and maintain regular communication with pilot/crewman

- In RW, the pilot may slow the aircraft to allow the front cockpit windows to be opened. If necessary, the crewman will enter the rear cabin to open the side doors to clear NO levels - ***if this occurs, all NETS team members are to remain secured in their seat harness***
- If the NO levels have not dissipated after 10 minutes of monitoring, the pilot may decide to descend and land while still maintaining maximum cockpit/cabin airflow
- If the pilot decides to land the aircraft, reduced airflow through the cockpit/cabin may not dissipate the NO. Therefore, continue to monitor (and record if practical) environmental levels 5-minutely until the aircraft has landed, stopped and the doors are open
- If at any time the environmental monitor alarms with a NO measurement ≥25ppm turn off the NO cylinder at the regulator

Emergency Procedures for Major Gas Leak in Fixed Wing

Additionally:

- Should either of the environmental monitors alarm there should be a call or shout of 'GAS, GAS, GAS' – this will likely be from the FN or pilot since they will be closest to the environmental monitors
- iNO team member is to document the time and measurement, and is to verify and record the pilot's monitor level
- Pilot will don a flight deck oxygen mask and smoke goggles
- iNO nurse to verify the pilot has increased the cockpit/cabin airflow to maximum
- if NO level is 5-25ppm, iNO can be continued while the iNO team member tries to rectify the leak. If the iNO is not critical for patient wellbeing, turn off iNO at the cylinder
- The pilot may decide to descend and depressurise as appropriate
- iNO team member must continue to monitor (and record if practical) exposure levels 5-minutely for at least the system environmental monitor and maintain regular communication with pilot. If after 10 minutes the NO levels have not dissipated the pilot will descend and depressurise
- if the pilot has decided to land the aircraft they will divert to the nearest suitable airport, activating SSR Code 7700 and declaring 'PAN, PAN, PAN'
- When the aircraft has landed and is taxiing, reduced airflow through the cockpit/cabin may not dissipate the NO. Therefore, continue to monitor (and record if practical) environmental levels 5-minutely until the aircraft has stopped and the doors are open
- If at any time the environmental monitor alarms with a NO measurement ≥25ppm turn off the NO cylinder at the regulator

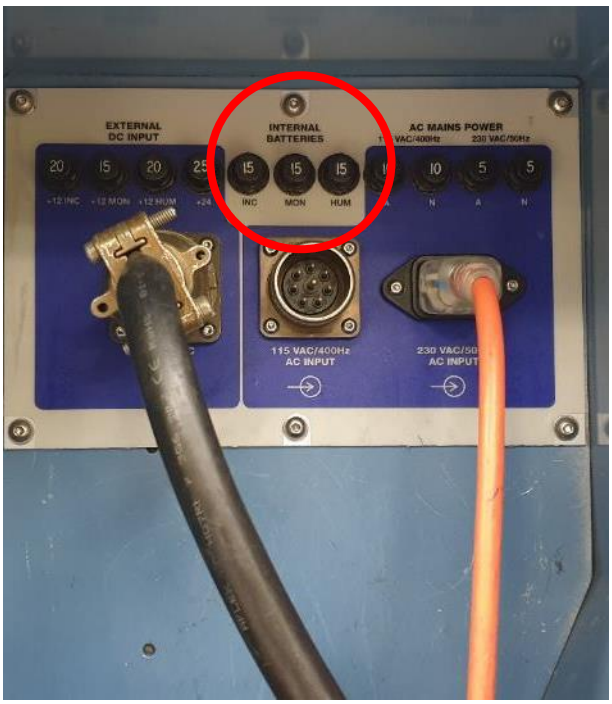
Emergency Landing or Ditching

In the rare event the RW or FW aircraft is forced to do an emergency landing or ditching, irrespective of a gas leak or not:

- the iNO must be turned off at the cylinder
- All loose items, including lines, must be stowed and the stowage compartment closed

Emergency Procedures – Electrical Malfunction or Smoke

- In FW or RW, the aircraft aeromedical bus power will be shut down by the pilot/crewman to isolate the NETS neonatal system from the aircraft power
- A NETS team member/FN is to pull the three circuit breakers on the neonatal system power panel, labelled “Internal Batteries” – this will isolate the NETS equipment from the neonatal system power



- Medical equipment will continue on their own internal batteries, such as the monitor, ventilator and infusion pumps
- If necessary, turn off individual NETS equipment for complete power shutdown

Troubleshooting

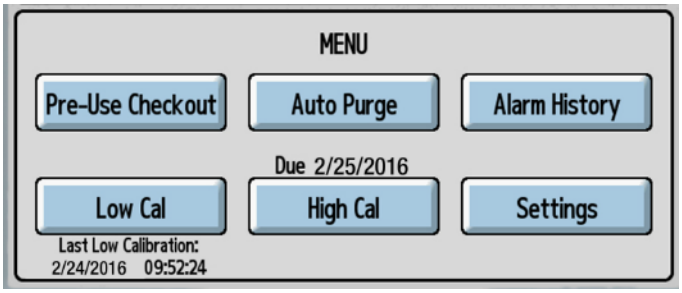
Calibration

Low range calibration will automatically occur following any dose setting at an interval of 3, 6, and 12 hours and then 12 hourly if no further changes are made. Low range calibration will be automatically carried out every 12 hours while system is in use. During calibration inspired gases are not monitored and gas monitoring alarms are disabled. Only system alarms remain active, and this active alarm is what is heard while the low range calibration is being performed - monitor the patient closely.

High range calibration of all 3 sensors should be carried out every 30 days ($O2/NO_2/NO$).

Calibration can be accessed via the menu button on the display screen.

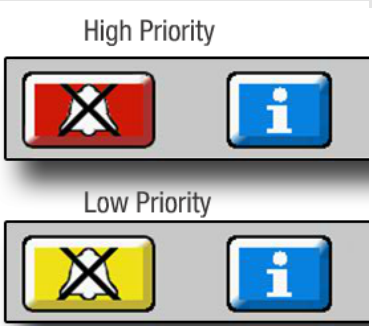
The last date of low range calibration will be displayed under the 'Low Cal' button. The next due date for high calibration will be displayed above the 'High Cal' button. This date will be flashing if the calibration is overdue.



Low calibration must be completed prior to any high calibration.

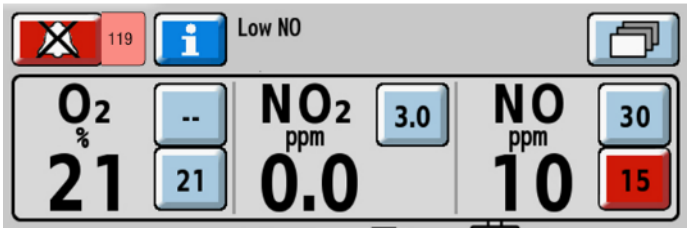
Alarms

If an alarm occurs, safeguard the patient first before troubleshooting. There are two types of alarms: high priority and low priority.



For information about the alarm press the blue  button. The INOmax DSIR plus will guide you through troubleshooting options.

The alarm silence button will permanently silence a low priority alarm, while only temporarily silencing a high priority alarm for a period of two minutes.



The alarm message will remain on the display for as long as the condition is active, regardless if the alarm silence button has been pressed.

On Return to NETS Base

Cleaning and Restocking

- Ensure cylinder is closed and red safety cap in place
- Purge nitric from system (grey regulator hose)
- Remove nitric set-up from ventilator circuit
- Remove and wipe down grey injector module cable (non-disposable item)
- Place Injector module in the container marked “Injector module” and send to inhalation therapy for cleaning
- Remove and wipe down water trap and put back on Nitric System (non-disposable item)
- Remove and dispose of all other cables including:
    - water separator cartridge
    - clear nitric injector module tubing
    - plastic adapters on either end of injector module
    - patient sample line
- Ensure environmental monitor/s are switched off (press & hold on/off button the press on/off button again to confirm to continue with shut down)
- Place environmental monitor/s into charging dock which is connected to mains power – ‘Battery charging’ message will appear on screen
- Restock paperwork, non-consumables and consumables
    - Non-consumables
        - injector module
        - grey injector module cable
    - Consumables
        - water separator cartridge
        - clear nitric injector module tubing
        - plastic adapters
        - patient sample line
- If cylinder had less than 500psi at the end of the retrieval a replacement will be required. A new cylinder is located in the garage in storage cage with other gas cylinders. Please inform coordinator and notify NETS biomedical engineers as a new cylinder will need to be ordered
- Ensure contents of Accessories Pack are complete and ready for use then seal with a blue tag.
- Clean the 2012 series neonatal system as normal and resecure the bin netting and the system raincoat and netting.

Educational Notes

The Safework Australia 8-hour safe working limit for NO is 25ppm. Acute health effects from over-exposure are unlikely; however, exposure to nitrogen dioxide (NO2) (nitric oxide converts to nitrogen dioxide when oxidised by oxygen in air) can produce an irritating effect on the mucous membranes of the eyes, nose, throat, and lungs. Prompt medical attention is mandatory in all cases of un-prescribed overexposures.

Oxygen displacement is the greatest immediate hazard from exposure to the nitrogen component of this mixture in a rapid release. Symptoms of oxygen deficiency may include: rapid breathing, diminished mental alertness, impaired muscular coordination, emotional instability, and fatigue. Assist victim to an uncontaminated area with fresh air or oxygen; call for rescue personnel.

Emergency Overview – see appendix 5

- Effect of exposure may be delayed up to 72 hours following exposure.
- If irritation occurs when working with this product, inhalation exposure may have already occurred.
- Prompt medical attention is mandatory in all cases of overexposure.
- Inhalation may result in chemical pneumonitis and pulmonary oedema.
- This product will accelerate combustion and increase the risk of fire and explosion. Therefore all ignition sources should be extinguished.

First Aid Measures in Emergency – see appendix 5

Prompt medical attention for patients and staff is mandatory in all cases of overexposure.

Corrosive to the eye: Rinse cautiously with water for fifteen minutes. Remove contact lenses if present and easy to do. Continue rinsing.

Inhalation: Move person to fresh air and keep comfortable for breathing.

Immediate effects: Irritation of the nose and throat.

6- 24 hours post-exposure: May experience blue lips and breathing difficulties, accelerated and irregular choking, cyanosis and tightness of the chest.

Skin exposure: Contact with rapidly expanding gas may cause burns or frostbite.

Nitric Oxide and Pregnancy: Animal reproduction studies have not been conducted with inhaled nitric oxide. It is not known if inhaled nitric oxide can cause foetal harm when administered to a pregnant woman or can affect reproductive capacity.

Symptoms: *(may worsen over 12-24 hours post exposure.)*

- Irritant to mucous membranes
- Mild cough
- Exacerbation of pulmonary diseases
- Cyanosis
- Dyspnoea

  - Wheeze
  - ENT irritation
  - Headache/dizziness
  - Tight chest
  - Chest pain
- Ventilated areas have a lower concentration of NO & NO_2 than non-ventilated areas. Air conditioning reduces these concentrations further [6]
- The amount of NO_2 formed during therapy depends upon gas flow, minute volume & FiO_2 [8]
- The worst case scenario if a D cylinder were to empty entirely in various vehicles is given below, along with the actual measured values of NO & NO_2 when 40ppm was delivered with a flow of 20L/m (adapted from Kinsella et al., 2002) – Note: Cabin volume of AW139 helicopter is 283 cubic feet, a little bigger than that of the King Air 90

Vehicle	Cabin Volume (cubic feet)	Maximum concentration with complete D cylinder release	Measured NO (ppm)	Measured NO_2 (ppm)
King Air 90	247	40	< 0.1	< 0.1
King Air 200	393	25	Not measured	Not measured
Ground Ambulance	289	34	< 0.1	< 0.1

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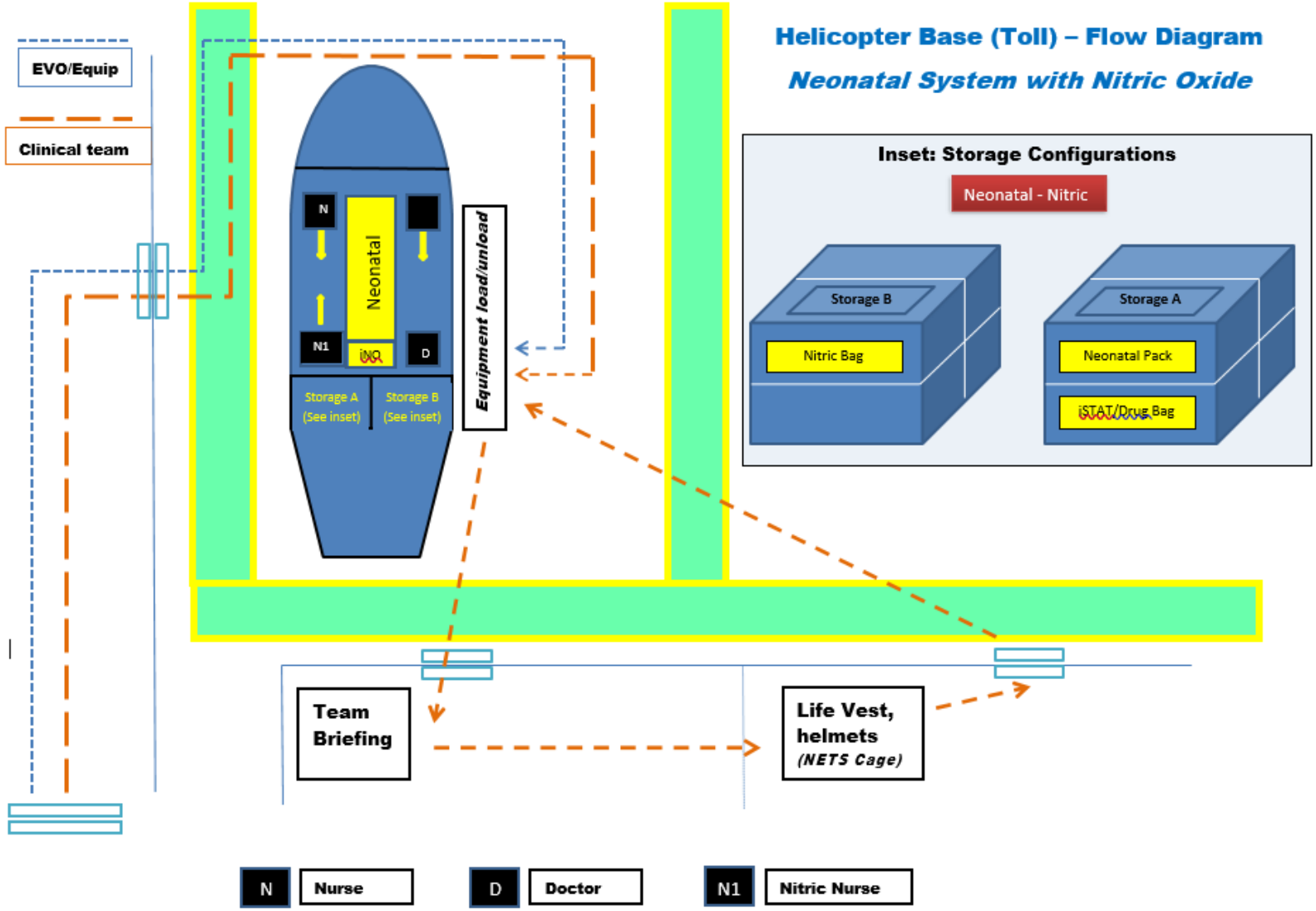
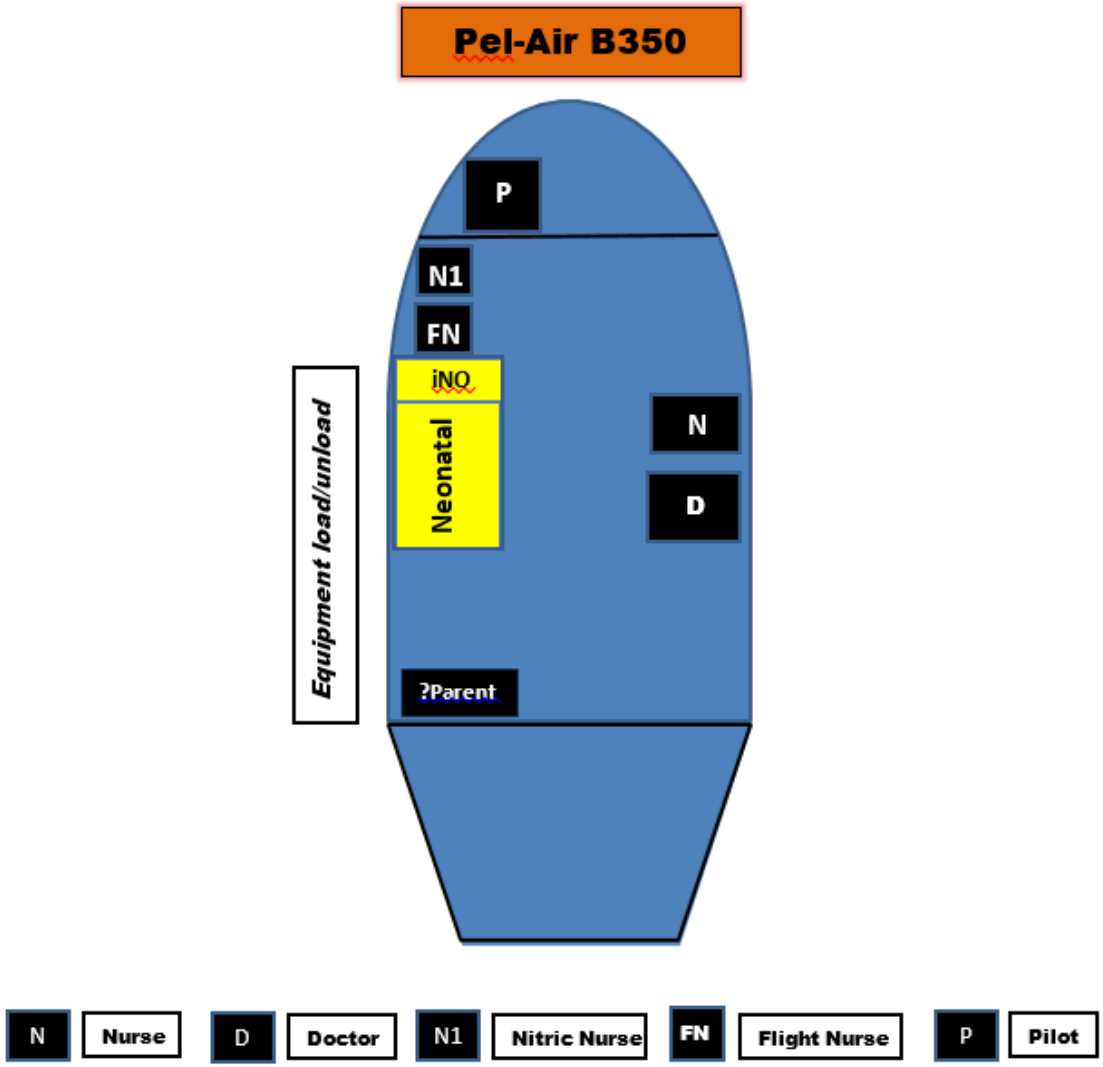
13. Total Aerospace Solutions Pty Ltd (2019), Aircraft flight Manual Supplement Document Number TAS0567-FMS-02 Revision Original for Textron B300C Kingair Operation with NETS Neonatal Unit Equipped with Inhaled Nitric Oxide Module, TAS

Appendix 1 – Recommended Toll Seating Configuration – AW139



Appendix 2 – Recommended Pel-Air/Air Ambulance Seating Configuration



Appendix 3 – BOC Nitric Oxide Safety Data Sheet

BOC
A Member of The Linde Group

Safety data sheet
Nitric oxide, compressed

Creation date : 28.01.2005 Version : 1.2 GB / E SDS No. : 088
Revision date : 31.08.2011 page 1 / 5

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Product name
Nitric oxide, compressed

EC No (from EINECS): 233-271-0
CAS No: 10102-43-9
Index-Nr.
Chemical formula NO
REACH Registration number:
Not available.

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses
Industrial and professional. Perform risk assessment prior to use.
Uses advised against
Consumer use.

1.3. Details of the supplier of the safety data sheet
Company identification
BOC, Priestley Road, Worsley, Manchester M28 2UT
E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number
Emergency phone numbers (24h): 0800 111 333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)
Press. Gas (Compressed gas) - Contains gas under pressure; may explode if heated.
Ox. Gas 1 - May cause or intensify fire; oxidiser.
Acute Tox. 1 - Fatal if inhaled.
Skin Corr. 1B - Causes severe skin burns and eye damage.
EUH071 - Corrosive to the respiratory tract.

Classification acc. to Directive 67/548/EEC & 1999/45/EC
T+; R26 | C; R34 | O; R8
Very toxic by inhalation.
Causes burns (to eyes, respiratory system and skin).
Contact with combustible material may cause fire.
Risk advice to man and the environment
In high concentrations may cause asphyxiation.
Compressed gas.

2.2. Label elements
- Labelling Pictograms

- Signal word
Danger

- Hazard Statements

H280	Contains gas under pressure; may explode if heated.
H270	May cause or intensify fire; oxidiser.
H330	Fatal if inhaled.
H314	Causes severe skin burns and eye damage.
EUH071	Corrosive to the respiratory tract.

- Precautionary Statements

Precautionary Statement Prevention

P244	Keep valves and fittings free from oil and grease.
P260	Do not breathe gas, vapours.
P220	Keep away from combustible materials.
P280	Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary Statement Response

P304+P340+P315	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice/attention.
P303+P361+P353+P315	IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothes. Rinse skin with water/shower. Get immediate medical advice/attention.
P305+P351+P338+P315	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.
P370 + P376	In case of fire: Stop leak if safe to do so.

Precautionary Statement Storage

P403	Store in a well-ventilated place.
P405	Store locked up.

Precautionary Statement Disposal
None.

2.3. Other hazards
None.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances
Nitric oxide, compressed
CAS No: 10102-43-9
Index-Nr.:
EC No (from EINECS): 233-271-0
REACH Registration number:
Not available.
Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures
Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures
First Aid General Information:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
First Aid Inhalation:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

088 / EDV / 23.08.2011

Safety data sheet
Nitric oxide, compressed

First Aid Skin / Eye:
Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Immediately flush eyes thoroughly with water for at least 15 minutes.
First Aid Ingestion:
Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed
Delayed adverse effects possible. May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Prolonged exposure to small concentrations may result in pulmonary oedema.

4.3. Indication of any immediate medical attention and special treatment needed
Treat with a corticosteroid spray as soon as possible after inhalation. Obtain medical assistance. Absorption of nitric oxide may lead to the formation of methemoglobin, and a conversion fraction of 10% may be noted as a "lilac" cyanosis. High levels of conversion (>35-40%) may be indications for treatment with intravenous methylene blue or exchange transfusion.

SECTION 5: Fire fighting measures

5.1. Extinguishing media
Suitable extinguishing media
All known extinguishants can be used.

5.2. Special hazards arising from the substance or mixture
Specific hazards
Supports combustion. Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products
None that are more toxic than the product itself.

5.3. Advice for fire-fighters
Specific methods
If possible, stop flow of product. Move container away or cool with water from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
Special protective equipment for fire-fighters
Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus.
Guideline:
EN 943-2:2002: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Evacuate area. Ensure adequate air ventilation. Eliminate ignition sources. Use self-contained breathing apparatus and chemically protective clothing. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Monitor concentration of released product. EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

6.2. Environmental precautions
Try to stop release. Reduce vapour with fog or fine water spray. Monitor concentration of released product.

6.3. Methods and material for containment and cleaning up
Ventilate area. Wash contaminated equipment or sites of leaks with copious quantities of water. Hose down area with water.

6.4. Reference to other sections
See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Only experienced and properly instructed persons should handle gases under pressure. The substance must be handled in accordance with good industrial hygiene and safety procedures. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Avoid exposure, obtain special instructions before use. Use no oil or grease. Do not smoke while handling product. Keep equipment free from oil and grease. Ensure the complete gas system has been (or is regularly) checked for leaks before use. Installation of a cross purge assembly between the container and the regulator is recommended. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Avoid suckback of water, acid and alkalis. Do not allow backfeed into the container. Open valve slowly to avoid pressure shock. Refer to supplier's handling instructions. Protect containers from physical damage; do not drag, roll, slide or drop. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminates particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the container contents.

7.2. Conditions for safe storage, including any incompatibilities
Keep container below 50°C in a well ventilated place. Segregate from flammable gases and other flammable materials in store. Observe all regulations and local requirements regarding storage of containers. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. Containers should not be stored in conditions likely to encourage corrosion.

7.3. Specific end use(s)
None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
Exposure limit value

Value type	value	Note
TLV (ACGIH)	25 ppm	2011

DNEL not available
PNEC not available.

8.2. Exposure controls
Appropriate engineering controls
A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep concentrations well below occupational exposure limits. Product to be handled in a closed system and under strictly controlled conditions. Consider work permit system e.g. for maintenance activities. Preferably use permanent leak-tight connections (eg. welded pipes). Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation. Gas detectors should be used when toxic quantities may be released. Gas detectors should be used when quantities of oxidising gases may be released.
Personal protective equipment
Eye and face protection
Protect eyes, face and skin from contact with product. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Wear goggles and a face-shield when transfilling or breaking transfer connections Wear eye protection to EN 166 when using gases. Full-face mask recommended
Guideline:
EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking
Skin protection
Hand protection
Advice: Wear working gloves and safety shoes while handling containers., Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Guideline: EN 374-1/2/3 Protective gloves against chemicals and micro-organisms.

Body protection
Protect eyes, face and skin from contact with product. Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.
Guideline:
EN 943: Protective clothing against liquid and gaseous chemicals, including liquid aerosols and solid particles.
Other protection
Wear working gloves and safety shoes while handling containers. EN ISO 20345 Personal protective equipment - Safety footwear.
Respiratory protection
Keep self contained breathing apparatus readily available for emergency use., Use SCBA in the event of high concentrations, The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD., When allowed by a risk assessment a supplied air respirator may be used.
Guideline:
EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking

Guideline:
EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.
Thermal hazards
No precautionary measures are necessary.
Environmental Exposure Controls
Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
General information
Appearance/Colour: Brownish gas
Odour: Poor warning properties at low concentrations.
Odour threshold:
Odour threshold is subjective and inadequate to warn for over exposure.
Melting point: -164 °C
Boiling point: -152 °C
Flash point: Not applicable for gases and gas mixtures.
Evaporation rate:
Not applicable for gases and gas mixtures.
Flammability range: Non flammable.
Vapour Pressure 20 °C: Not applicable.
Relative density, gas: 1
Solubility in water: 67 mg/l
Partition coefficient: n-octanol/water:
Not applicable.
Autoignition temperature: Not applicable.
Oxidising properties: Oxidiser.
Molecular weight: 30 g/mol
Critical temperature: -93 °C
Relative density, liquid: 1,3

9.2. Other information
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity
Unreactive under normal conditions.

10.2. Chemical stability
Stable under normal conditions., Decomposes at room temperature to other nitrogen oxides and nitrogen. Oxidises in air to form nitrogen dioxide which is extremely reactive.

10.3. Possibility of hazardous reactions
Violently oxidises organic material.

10.4. Conditions to avoid
Heat.

10.5. Incompatible materials
Air, Oxidiser. May react violently with reducing agents. May react violently with combustible materials. For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products
Under normal conditions of storage and use, hazardous decomposition products should not be produced. Decomposes at room temperature to other nitrogen oxides and nitrogen. Oxidises in air to form nitrogen dioxide which is extremely reactive.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute oral toxicity
No data available.

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Acute inhalation toxicity
Value: LC50
Species: Rat
Exposure time: 1 h
Value in non-standard unit: 115 ppm

Value: LC50
Species: Rat
Exposure time: 4 h
Value in non-standard unit: 57,5 ppm
Delayed fatal pulmonary oedema possible., May be fatal if inhaled.
Skin irritation
Severe corrosion to the skin at high concentrations.
Eye irritation
Severe corrosion to the eyes at high concentrations.
Sensitization
No known effects from this product.
Genetic toxicity in vitro
Test type: In vitro gene mutations test on mammalian cells:
Mutagenic

Test type: Ames test in vitro:
Mutagenic
Assessment carcinogenicity
No known effects from this product.
Assessment toxicity to reproduction
No known effects from this product.
Specific Target Organ Toxicity (STOT) - Single Exposure
Severe corrosion to the respiratory tract at high concentrations.
Specific Target Organ Toxicity (STOT) - Repeated Exposure
Severe corrosion to the respiratory tract at high concentrations.

Aspiration hazard
Not applicable to gases and gas mixtures

SECTION 12: Ecological information

12.1. Toxicity
No data available.

12.2. Persistence and degradability
No data available.

12.3. Bioaccumulative potential
No data available.

12.4. Mobility in soil
No data available.

12.5. Results of PBT and vPvB assessment
No data available.

12.6. Other adverse effects
May cause pH changes in aqueous ecological systems.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Do not discharge into any place where its accumulation could be dangerous. Gas may be scrubbed in alkaline solution under controlled conditions to avoid violent reaction. Contact supplier if guidance is required. Must not be discharged to atmosphere. Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods.
Gases in pressure containers excluding those, which are mentioned under 16 05 04

EWC Nr. 16 05 04*

SECTION 14: Transport information

ADR/RID

14.1. UN number
1660

14.2. UN proper shipping name
Nitric oxide, compressed

14.3. Transport hazard class(es)
Class: 2
Classification Code: 1TOC
Labels: 2.3, 5.1, 8
Hazard number: 265
Tunnel restriction code: (D)
Emergency Action Code: 2PE

14.4. Packing group (Packing instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

IMDG

14.1. UN number
1660

14.2. UN proper shipping name
Nitric oxide, compressed

14.3. Transport hazard class(es)
Class: 2.3
Labels: 2.3, 5.1, 8
EmS: FC,SW,

14.4. Packing group (Packing instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

IATA

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

Other transport information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product

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containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Seveso Directive 96/82/EC: Covered

Other regulations

Dangerous Substances and Explosive Atmospheres Regulations (DSEAR 2002 No. 2776)
Management of Health and Safety at Work Regulations (1999 No. 3242)
The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541)
Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677)
Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306)
Personal Protective Equipment Regulations (1992 No. 2966)
Control of Major Accident Hazards Regulations (COMAH, 1999 No. 743)
Chemical Hazards Information and Packaging for Supply (CHIP, 1994 No. 3247)
Pressure Systems Safety Regulations (PER, 2000 No. 128)

15.2. Chemical safety assessment

CSA has not been carried out.

SECTION 16: Other information

Ensure all national/local regulations are observed. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information

Note:
When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line.
As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

References

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.European Chemical Agency: Information on Registered Substances http://apps.echa.europa.eu/registered/registered-sub.aspx#search European Industrial Gases Association (EIGA) Doc. 169/11 Classification and Labelling guide.ISO 10156:2010 Gases and gas mixtures – Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.International Programme on Chemical Safety (http://www.inchem.org/)Matheson Gas Data Book, 7th Edition.National Institute for Standards and Technology (NIST) Standard Reference Database Number 69The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).The European Chemical Industry Council (CEFIC) ERICards.United States of America's National Library of Medicine's toxicology data network TOXNET (http://toxnet.nlm.nih.gov/index.html)Agency for Toxic Substances and Diseases Registry (ATSDR) (http://www.atsdr.cdc.gov/)Substance specific information from suppliers.EH40 (as ammended) Workplace exposure limits.

End of document

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