

## Orientation package for nitrous oxide



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# Delivering nitrous oxide at Royal Children Hospital

Only RCH accredited staff (Division one nurses and Doctors) may administer nitrous oxide in the Emergency, Ambulatory, and wards and credentialed Dentist in the Dentistry Clinics. The delivery of nitrous oxide for any treatment or procedure at RCH should be performed in accordance with the Procedural Sedation Guidelines and documented Recorded on the Record of Sedation for Procedure MR755/A or MR 180/O Record of Sedation for Procedure for Emergency Department.

Ongoing accreditation is the responsibility of the accredited staff member and will be evidenced in a Professional Practice Portfolio (Nursing) and Professional standards of individual governing professions.

## Porter nitrous oxide MDX delivery system

The Porter MDX nitrous oxide system is designed as a portable nitrous oxide delivery unit. The unit comprises of:

- Oxygen and nitrous gas hose( connects to piped gas source on the wall panel)
- MXR flow metre – adjusts concentrations and gas flows
- Connection for 2 litre reservoir bag
- Gas scavenging unit (scavenger cylinder encased in a protective metal cover)
- Base with wheels

\*In dentistry clinic the gas scavenge system is set up in accordance to specifications for this clinical area.

## Maintenance and Servicing

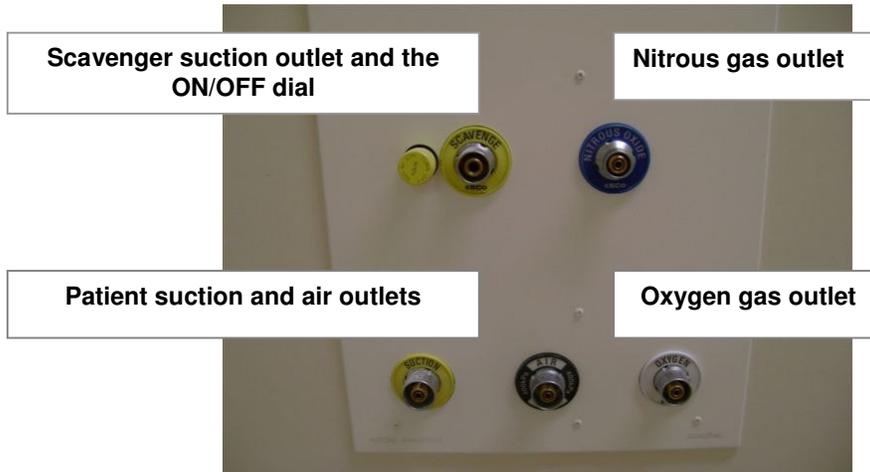
MXR units will have regular service checks as per scheduled arranged by the Biomedical Engineering Department at RCH.

Units suspected of having faults or gas leaks should be removed from clinical use and reported to Comfort Kids Program and sent to Department of Biomedical Engineering for servicing.

# Equipment

## Gas panel – Gas panels may vary

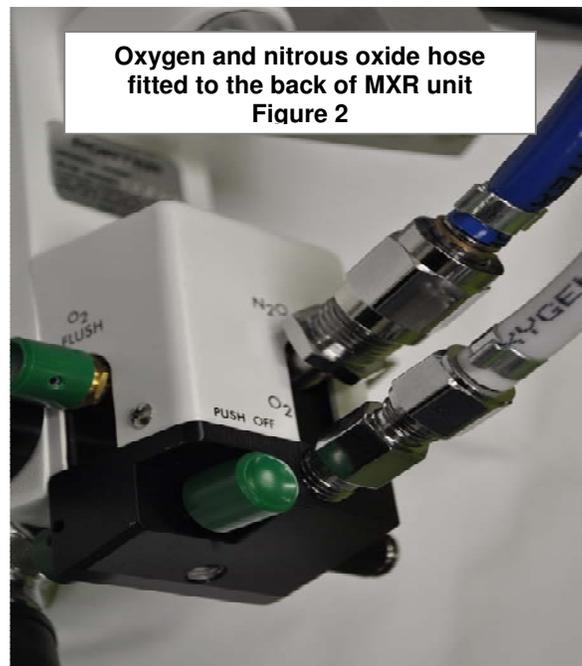
The ward and ambulatory areas have gas panel in each treatment room which includes dedicated oxygen, nitrous and gas scavenge outlet. (Figure 1)



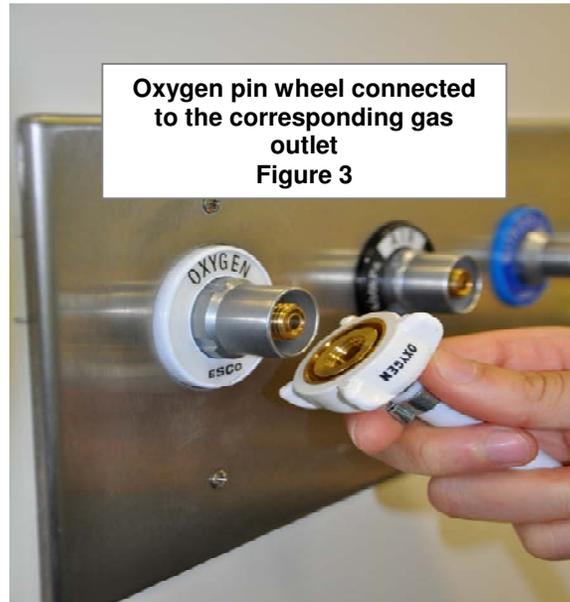
Panels in Departments of Dentistry, Emergency and Medical Imaging may vary.

## Gas hoses and connection points

**First:** Check: oxygen hose (white) and the nitrous hose (blue) are securely connected to the back of MXR nitrous oxide unit (Figure 2)



**Second** attached the pin wheels by threading the “oxygen” and “nitrous oxide” hose to the corresponding gas outlet located on the panel. (Figure 3)

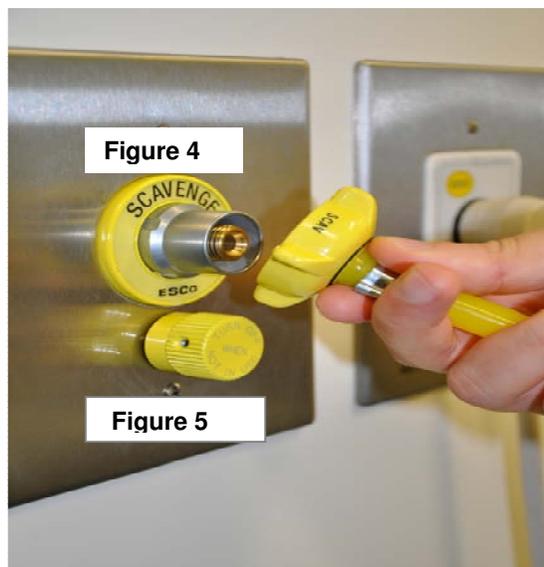


**Note:** if this process is reversed gas will flow into hose immediately when pin wheel is connected to the wall panel making it difficult to connect to the MXR unit and exposing the operator to nitrous oxide.

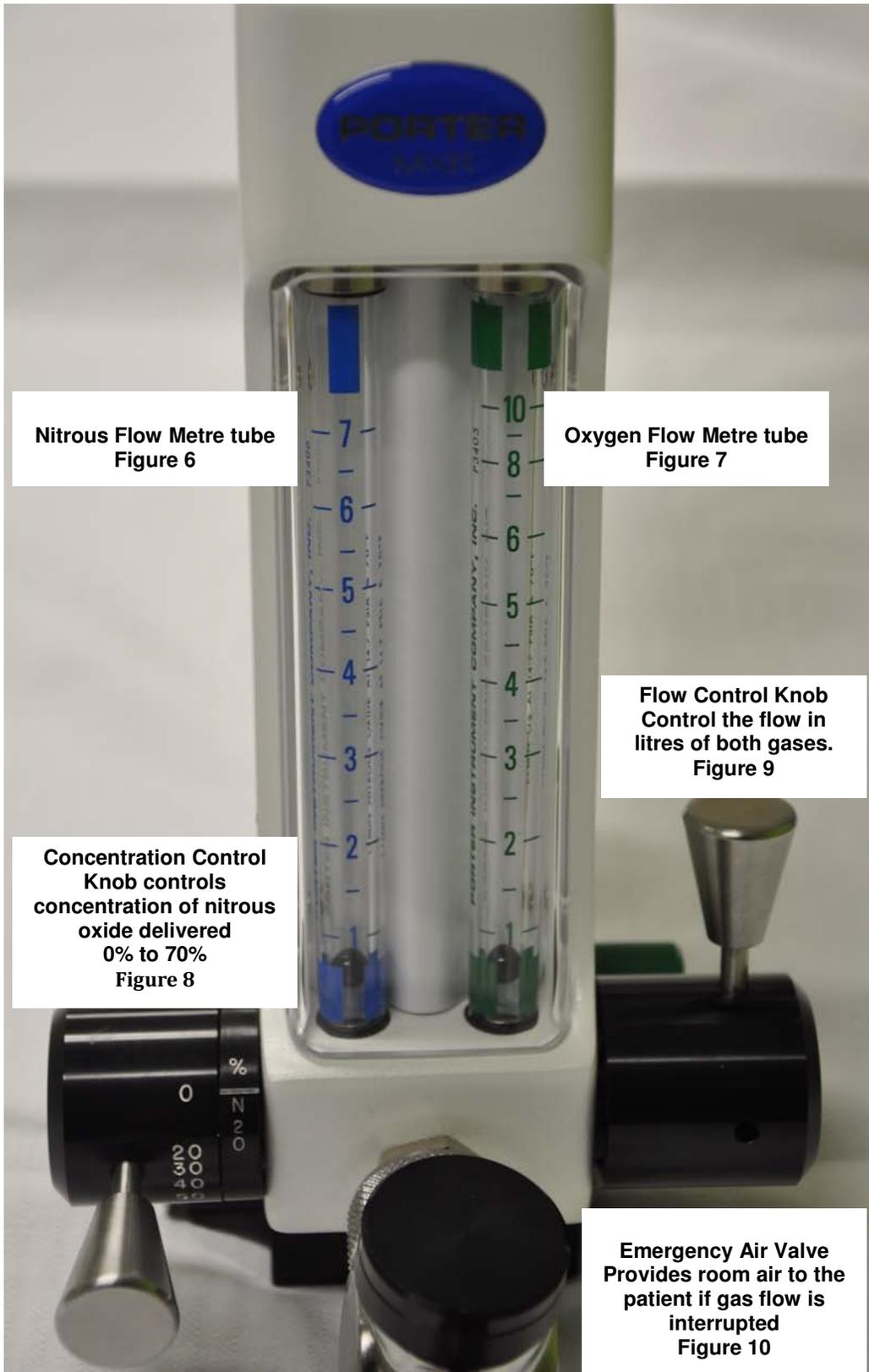
Safety mechanism: each medical gas has a specific threading patten to prevent the wrong gas connected to a gas source. E.g. oxygen pin wheel will not connect to nitrous oxide.

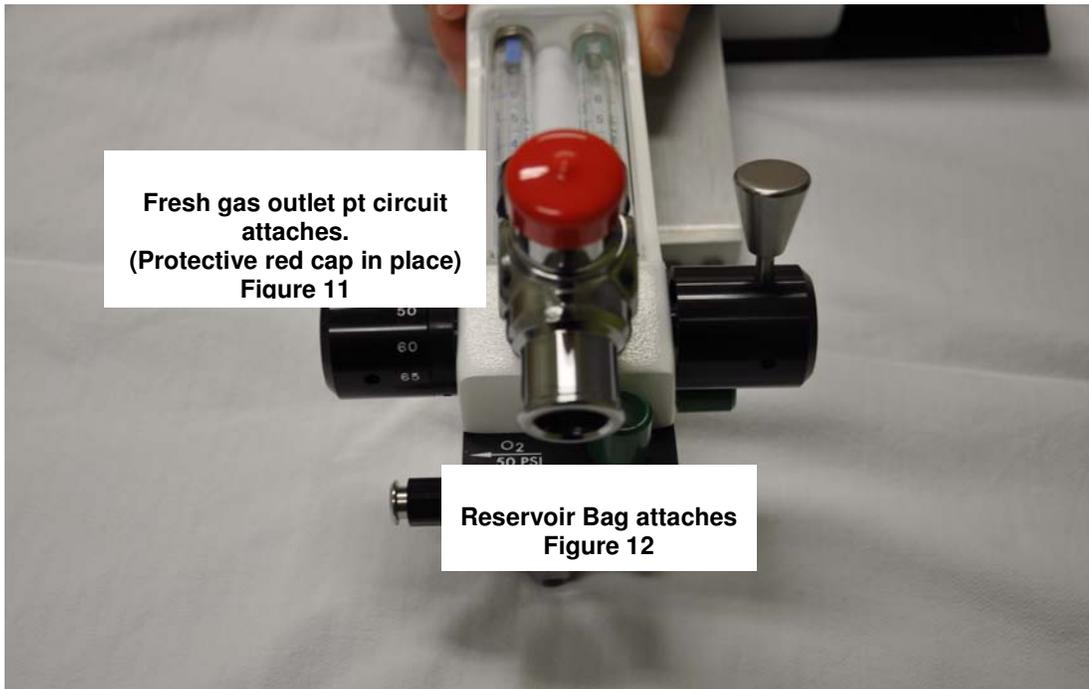
## Scavenger system

Thread the gas scavenger pin wheel to the scavenger hose outlet on the wall panel. (Figure 4) Check to ensure the scavenger tubing is connected to the nipple at the top of metal box that encases the scavenger unit. Turn gas scavenging system ON by turning the dial counter clock wise and OFF turning the dial clock wise. (Figure 5)



## Orientation to the MXR Nitrous Unit





## Disposable Circuits

Except for the Dentistry Department all clinical areas will use a disposable patient circuit supplied by stores department via Imprest List. The disposable circuit attaches to fresh gas outlet Figure 11 and to the connector on the scavenger outlet. The disposable circuits have a built in bacterial filter and a one way valve that allows exhaled gas to be scavenged away from the patient. A facemask or mouth piece is the only additional equipment added to the circuit.

## Equipment Checks

Prior to the start of the procedure check the MXR delivery unit, gas hoses, scavenger and emergency equipment to ensure it is functional. For all procedural sedations the sedater should know the exact location of closest “resuscitation trolley” and emergency buzzer.

Equipment check process	
<p><b>Check connections for both gases are:</b></p> <ul style="list-style-type: none"> <li>Secured at the back of the MXR unit.</li> <li>Secured at the wall outlet</li> </ul>	Refer to Figure 2 and 3
<p><b>Check Scavenging System:</b></p> <ul style="list-style-type: none"> <li>connected at wall outlet</li> <li>Yellow tubing is connected to nipple located at the top of the scavenger unit.</li> </ul>	Refer to Figure 4
Turn Scavenger Dial ON” using the yellow dial.	Refer to Figure 5  Turn the Scavenger Dial counter clock wise ON - dull suction heard from the scavenger unit.
<p><b>Check nitrous oxide fail safe mechanism</b></p> <p>Positive Switch - Off position</p> <ul style="list-style-type: none"> <li>Position the Flow Control Knob to zero (litres) and position the Concentration Knob to zero %.</li> </ul>	Refer to Figure 13  The “green” switch pushed away from the operator toward back of machine.
<ul style="list-style-type: none"> <li>Turn Concentration Control Knob to 50% nitrous oxide.</li> <li>Turn the Flow Control Knob to 3-4 litres/ min of oxygen.</li> <li>The reservoir bag is inflated and check for cracks or perforations in the bag. Replace the bag is cracks or perforations appear.</li> </ul>	Refer to Figure 8  Refer to Figure 9 <i>Note: both flow metres should have equal amounts of flow in each of the flow metres</i>  Refer to Figure 12
<ul style="list-style-type: none"> <li>Interrupt the O2 supply by carefully loosening the Oxygen Pin Wheel at the wall outlet.</li> <li>Reconnect the O2 hose at the wall outlet.</li> <li>Return the Concentration Control Knob and Flow Control Knob to zero.</li> </ul>	Refer to Figure 3 The gas will make a “hissing noise. The nitrous oxide fail safe valve should initiate and the nitrous flow metre should <b>drop as the oxygen flow decreases and stops completely.</b>  Refer to Figure 8 and 9
<p><b>Connect the circuit</b></p> <ul style="list-style-type: none"> <li>Connect the disposable patient circuit</li> </ul>	Blue limb- to patient side Refer Figure 11 Pink limb- to scavenger – white adaptor

### Note:

**All nitrous oxide equipment is designed with fail safe mechanism to ensure that when oxygen source is interrupted the unit will shut down automatically. The fail safe mechanism is designed to prevent hypoxemia and tissue death. The minimum amount of oxygen concentration delivered is 30%. At no time should a patient receive 100% nitrous oxide. Confirmed or suspected malfunctions; remove the MXR unit, secure a note identifying the equipment as faulty and send the unit to Department of Biomedical Engineering.**

# Operation Guide

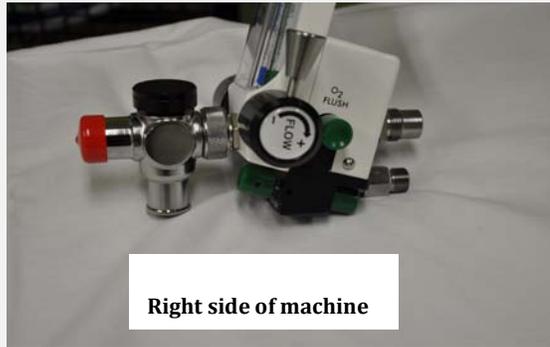
## Operating MXR unit

Start with an equipment check.



Complete equipment check and connect the disposable circuit to the MXR unit.

Turn Positive Switch "ON" this is accomplished by pushing green button forward toward the operator.



Set the flow rate using the Flow Control Knob to: 5-6 litres for a child and 6-8 litres an adolescent. The reservoir bag should be ¾ full. At this time check the bag for perforations or cracks. Refer to figure 7 and 8

During the sedation period adjustments may need to be made to the flow; this is done by turning the Flow Control Knob clockwise to increase the flow or counter clockwise to decrease the flows. Refer to Figure 9



Use the Concentration Control Knob located left hand side of machine and incrementally increase the nitrous oxide to the desired concentration level. Concentration Increments located on the face of the Concentration Control Knob. Refer to Figure 8.

At the end of the procedure decrease the nitrous oxide concentration incrementally to 0 %. Refer to Figure 8

\*Administer 100% oxygen for 3-5 min until the patient returns to baselines level of sedation. Some patients may require 100% oxygen for 5-10 minutes before returning to baselines level of sedation.



Turn the Positive Switch "OFF" by pushing the "green" button away from operator.

Disconnect the nitrous, oxygen and scavenger connections from the wall outlets. Secure the hoses and store the portable unit in the medication room as per DHS guidelines.

Do not use the Power Flush button to deliver 100% oxygen, if oxygen is required for emergency purposes use face mask or bag/mask as per BLS guidelines.

## Troubleshooting MXR Unit

Problem	Possible Cause	Action
No oxygen and or nitrous oxide gas flow.	Gas supply is not connected properly. Interruption or leak in the gas supply.	Check oxygen and nitrous oxide connections at the wall panel and back of MXR unit.  Turn the ON/OFF switch to the ON position.
Nitrous oxide flow metre working but no oxygen flow noted in oxygen flow metre.	Failsafe mechanism malfunctioning	Remove from clinical areas immediately and report and send equipment to Department of Biomedical Engineering.
Gas leaking from the On/Off switch	Damage to the O ring inside the ON/OFF switch	Remove from clinical areas immediately and report and send equipment to Department of Biomedical Engineering.
Gas is leaking around the pin wheel of the oxygen or nitrous hose.	Damage to the pin wheel threads or the gas hose.	Remove from clinical areas immediately and report and send equipment to Department of Biomedical Engineering.
Reservoir bag fails to inflate	Inadequate gas flows or patient hyperventilating.  Tear or perforation in the reservoir bag.	Check adequate flow of oxygen and nitrous, increase flows litres/min and check the reservoir bag.  If the reservoir bag is damaged, remove and replace from the Emergency Nitrous Equipment Box.
Reservoir bag overinflating	Gas flows need adjusting Patient hypo ventilating.	Reduce gas flows and or nitrous oxide concentration. . Assess patient's respiratory status and UMSS score.  Issues does not resolve: stop the procedures and Remove from clinical areas immediately and report and send equipment to Department of Biomedical Engineering.
High pitched whistle sound heard.	Emergency air valve initiated due to loss in oxygen gas flow/source.	Check oxygen and nitrous oxide connections at the wall panel and back of MXR unit.

## Notes: