

# NITRONOX HD SCAVENGER SYSTEM USER'S MANUAL / INSTRUCTIONS

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## Examination

All components should be removed from their respective shipping containers and examined. Any omissions and/or damage should be reported to the Porter dealer, immediately.

## User Responsibility

The Nitronox<sup>®</sup> HD Scavenger System is designed for use with the Nitronox HD Inhalation Analgesia System (Refer to Instructions FM-1308), and to perform in accordance with specifications herein when installed, operated and maintained as instructed in this manual. It should be carefully read and understood prior to operation and use of the scavenger system.



## Warnings

- **Use Scavenging Monitor** for N<sub>2</sub>O in the patient treatment area to insure that controls are effective in achieving low levels of ppm (parts per million) exposure. Contact Porter or Authorized Distributor for details on monitors and testing.
- The Nitronox Scavenger System is intended to be used by medical personnel trained in its use and the use of nitrous oxide and oxygen for medical applications.
- An EXPLOSION hazard exists when flammable agents are exhausted into the vacuum system (Page 7).
- The Nitronox Scavenger interface is supplied with a removable flow resistor. This foam resistor must be REPLACED every six months to help prevent the possibility of increased resistance due to particle entrapment (Page 8).
- Medical workers are exposed to N<sub>2</sub>O during administration of N<sub>2</sub>O/O<sub>2</sub> conscious sedation analgesia. NIOSH has recommended that exposures should be minimized. Contact NIOSH (1-800-35-NIOSH) to receive NIOSH Publications on *Control of Nitrous Oxide in Dental Operatories*. Exposure can be minimized by effective controls. National Institute for Occupational Safety and Health (NIOSH) publications state that controls, including System Maintenance, Ventilation and Work Practices can effectively reduce N<sub>2</sub>O concentrations in patient procedures. Your accessory Nitronox Scavenger System is an important part of the system of controls in medical settings.

Manufacturer:



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The Quality System for Porter Instrument is certified to ISO 13485.

Check our website: [www.porterinstrument.com](http://www.porterinstrument.com) for additional information.

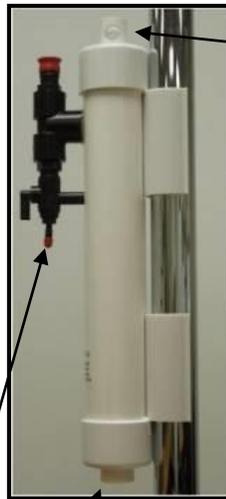
To register your product: [www.porterinstrument.com/resources-dental](http://www.porterinstrument.com/resources-dental) choose Warranty tab.

To download a User's Manual: [www.porterinstrument.com/resources-dental](http://www.porterinstrument.com/resources-dental) choose Manuals tab

## Nitronox<sup>®</sup> HD Scavenger System - Description



Fig. 1



Limit Orifice

Drain Valve

Fig. 1.1  
Interface

Ambient opening (foam resistor)



Fig. 1.2  
Demand Valve  
Manifold Mount



Fig. 1.3  
Demand Valve  
Manifold Mount  
Assembly



Fig. 1.4  
19mm Hose

The system components are (Fig. 1):

- A Manifold Mount (Fig. 1.2) located to seal the exhaust ports of the Demand [breathing] Valve (Figs. 1.2, 1.3).
- A cylindrical Interface (Fig. 1.1) to connect the central vacuum system with the scavenger collection manifold. It contains:
  - Orifices to limit vacuum pressure and flow.
  - Opening to ambient to help prevent over/under pressurization of the patient exhaust circuit.
  - A valve to automatically drain any internal condensation.
- The Interface is connected to the rear of the support pole to the Hospital Nitronox HD unit.
- A corrugated 19mm hose (Fig. 1.4) to connect the Manifold Mount Assembly to the Interface. The hose is an integral part of the disposable Medical Breathing Circuit.

## Nitronox<sup>®</sup> HD Scavenger System - Description

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The gas flow path through the scavenger system starts with patient exhalation into the exhaust ports of the demand valve and then to the tee of the disposable Medical Breathing Circuit through the one-way valve into the 19 mm scavenger hose. The hose leads the gas into the scavenger interface. The interface is open at the top to ambient via a calibrated foam resistor. In addition, the interface contains an internal pathway for gas passage permitting waste gas to follow a preferential path to wall vacuum.

From the internal pathway of the interface, the waste gas flows through a ball-type control valve to a calibrated orifice contained within the barbed wall vacuum connector. The final gas path is through the DISS or QUICK connect vacuum hose to the wall vacuum outlet and the central vacuum pump system (or appropriate connections to a portable vacuum source).

If central vacuum flow through the calibrated orifice exceeds the exhaled flow from the patient, room air will be drawn from ambient into the vacuum system via the scavenger interface. Also the internal volume of the interface acts as a surge chamber to absorb a short duration of excessive patient flow. During this short duration, excess gas will fill the interface allowing time for the vacuum flow to exhaust the gas during the next patient inspiration. Under abnormally large exhalations, it is possible that the excess exhaled gas may exceed the capacity of the interface chamber, and exhaust to ambient. This entrance and exit of gas to ambient is a feature operating only during transient unbalanced periods.

Control of excess flow from the central vacuum through the orifice is provided by the ball control valve. The ball valve limits the central vacuum flow between an upper (maximum) and a lower (minimum) limit. No control other than the passive interface capacity and preferential flow path within the interface is provided for excess patient exhalation such as during a cough.

An automatic relief valve is provided in the bottom of the interface to prevent condensation from causing a water seal of any internal gas passages. This is another feature operating only when condensation occurs.

## Installation

### Mobile Stand Mount

Connect the cylindrical Nitronox Scavenger interface to the center column assembly of the Mobile Stand (Figs. 2.1, 2.2). Use the mounting clips of the interface to position the assembly on the column. Orient the interface assembly vertically with open end (foam resistor) up and condensation relief drain valve down.

Fig. 2.1



Fig. 2.2



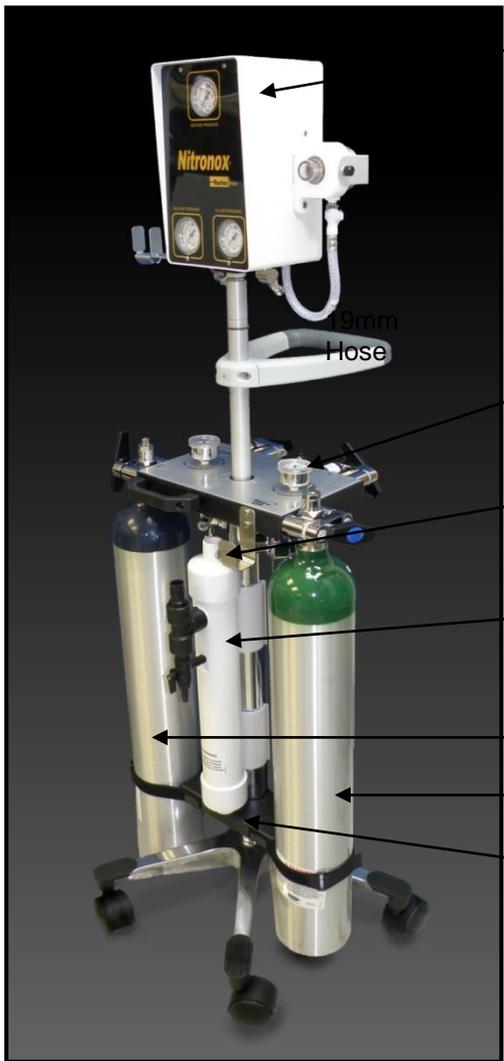


Fig. 3.1 E-Stand with 4 cylinders

## Installation

### Mobile E-Stand Mount

The Porter Mobile E-Stand is for use with two “E” cylinders of O<sub>2</sub> and two “E” cylinders of N<sub>2</sub>O (Figs. 3.1, 3.2). The two pressure gages reflect cylinder pressure only. When the gas supply is opened, gas will flow through the check valves into the block and be regulated down to 50 PSIG (3.4 bar) at the regulators, out through the hoses to the Nitronox. The check valves prevent the gas from flowing between cylinders or out into the room if only one cylinder is in use. Each Mobile Stand may be adjusted to a desired height for use and storage. Refer to FM-916 Mobile E-Stand Installation and Instructions for information on monthly checks, cylinder installation, height adjustment, check valve replacement.

Connect the cylindrical Interface to the center column assembly of the Mobile E-Stand. Use the mounting clips of the interface to position the assembly on the column. Orient the interface assembly vertically with ambient open end (foam resistor) up and condensation relief drain valve down. Position the interface between the four cylinder positions as shown in Fig. 3.1 (cylinders are closer together on opposite side).

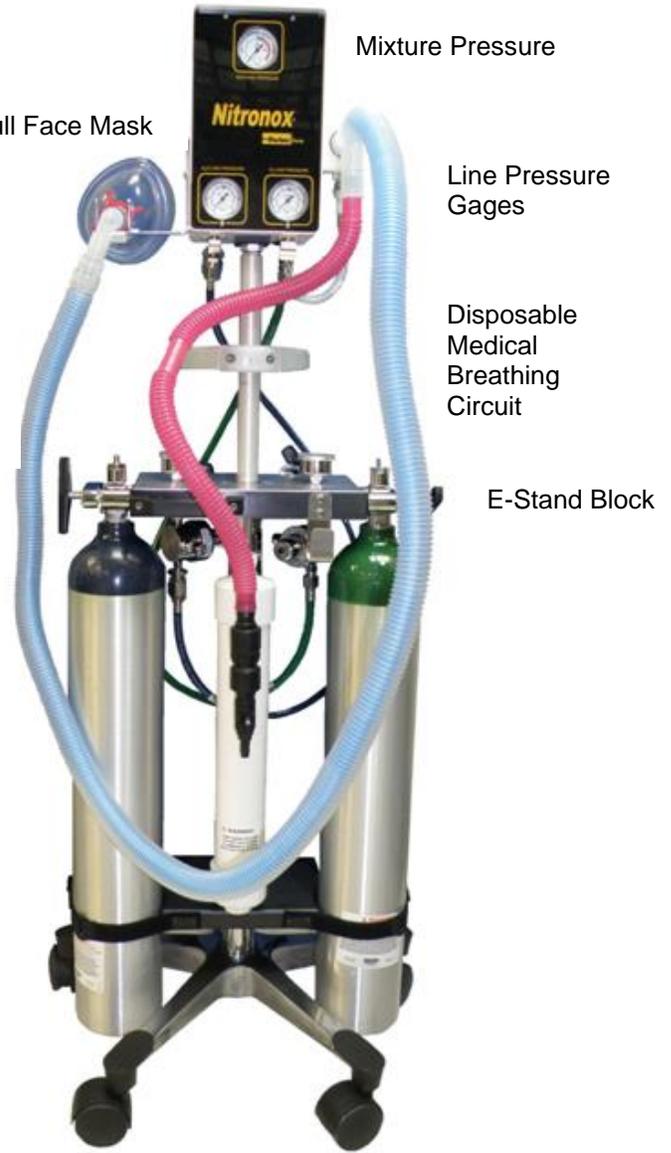


Fig. 3.2 E-Stand with Nitronox & Scavenger

# Installation

## **Wall Mount:** Figs. 4, 5

1. Hold the scavenger interface against the wall in the desired mounting location.
2. Mark four mounting-hole locations on wall using the interface mounting plates as templates.
3. Drill four holes in the locations marked:

**Note:**

- For dry wall or plaster, drill hole suitable for a screw attachment.
- For wooden studs, drill appropriate pilot hole, 1-1/2 inches (4 cm) deep to accept mounting screws.

4. Insert appropriate receptacle (not provided) in hole, if necessary.
5. Mount the scavenger interface using four screws (not provided) in the prepared locations (Fig. 4).

**Note:** Mounting installation must be done on both the top and the bottom brackets.



Fig. 4 Scavenger Wall Mount

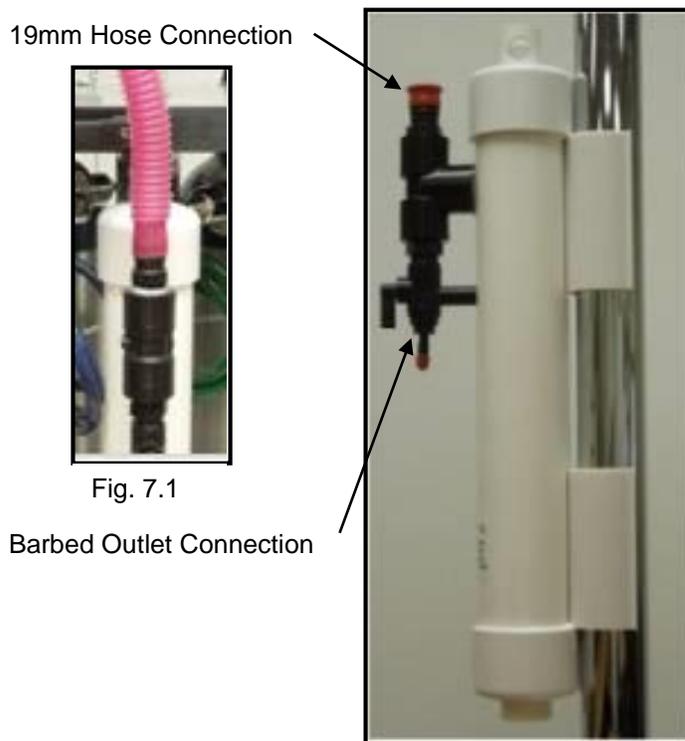


Fig. 5 Nitronox Housing Wall Mount

## Hose Connections: Fig. 7

1. Connect the 19 mm scavenger hose of the disposable Medical Breathing Circuit to the Interface (Fig. 7.1).
2. Connect vacuum hose between the vacuum source inlet (using appropriate connection such as DISS, QUICK connect, etc.) and the barbed outlet connector on the interface. Push the tubing on the barb so that two to three barbs are covered.

**Note:** Hold the barbed outlet while pushing tubing onto barb to reduce excess strain.



### Warning

An EXPLOSION hazard exists when flammable agents are exhausted into the central vacuum system.

## Preparation of Nitronox HD Scavenger Parts for use with Porter Medical Breathing Circuit

For further details, refer to Nitronox HD User's Manual FM-1308 and Porter Medical Breathing Circuit FM-1304

1. Attach Demand Valve Manifold Mount Assembly to the right side of the Nitronox HD using one screw on the top (Fig 8.1) and one screw on the bottom (Fig 8.2).



Fig. 8.1



Fig. 8.2

2. Push Demand Valve into Manifold (two sealing o-rings). (Fig. 9)
3. Tighten thumb screw of Retaining Bracket to the side of the Manifold to secure the Demand Valve (Fig. 10)

Fig. 9



Fig. 10



Fig. 11

4. Connect the Gas Delivery Hose to Demand Valve (Fig. 11). This is a quick connect attachment. Push the two ends together until click sound is heard. To remove – push the metal clip in – and pull apart.

5. Attach Mask Hanging Bracket to the Left side of the Nitronox HD (Fig. 12).

Fig. 12



6. Assembled Nitronox HD unit (Fig. 13).

Fig. 13



## Operation

1. Connect wall or Mobile E-Stand gas supplies – O<sub>2</sub> and N<sub>2</sub>O. Connect vacuum source to Nitronox Scavenger barb.
2. For best scavenging vacuum flow, turn the ball valve lever to the vertical (full on position) (Fig. 14).  
**Note:** With the ball valve lever in the full on position, the vacuum flow should accommodate the exhaust gas from all normal breathing patterns (30 – 35 LPM, maximum).
3. If the overall demand for vacuum is overloading the central system, the ball valve may be slightly throttled to reduce vacuum flow by turning the ball lever to the 45° from vertical position.  
**Note:** With the lever in the 45° from vertical position, the ball valve will still allow a vacuum flow of 8 to 12 LPM, minimum.
4. The interface is designed so that condensed water vapor should discharge from the bottom, if its volume exceeds 40 to 50 cc/mL.



Fig. 14

## USING THE PORTER MEDICAL BREATHING CIRCUIT WITH NITRONOX

1. Attach disposable breathing circuit "tee" to demand valve on side on Nitronox unit (Fig. 15)

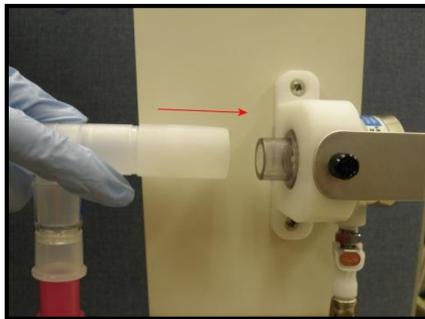


Fig. 15.



Fig. 16

2. Connect magenta hose of the disposable breathing circuit to the scavenger (Fig. 16).

3. Attach mask or mouthpiece (not included) to elbow (Fig. 17).



Fig. 17



Fig. 18

4. Hang mask in cradle of hanging bracket (Fig. 18).

5. Dispose breathing circuit and mask after use.



# Maintenance

## Cleaning

We recommend the use of an approved disinfectant for the dental / medical environment for cleaning the **outside** of the Nitronox Scavenger System. (See Nitronox User's Manual / Instructions FM-1308 for special demand valve cleaning instructions). Do not spray disinfectant directly onto housing. Spray disinfectant into disposable towel and wipe unit thoroughly removing excess disinfectant to eliminate buildup.

**CAUTION:** Introduction of moisture or other contaminants into this device may result in defective operation.

**CAUTION:** Never oil or grease any part of this system (minimize fire or explosion potential).

## Field Replacement

1. Replacement of the foam flow resistor PN 61962300 (refer to Figure 1.1) approximately every six months and periodic replacement of the Scavenger Hose Assembly.



### Warning

**The foam flow resistor is to be replaced approximately every 6 months to help prevent the possibility of increased resistance due to particle entrapment.**

2. Pull the foam resistor (one inch, diameter, by six inches, long) from the top center hole of the interface cylinder with the use of forceps or needle nose pliers.
3. Using a 12-inch long (30 cm), stiff strip of music wire (or equivalent), insert a new foam resistor into the interface top-center hole until the top of the foam resistor reaches the lower edge of the horizontal vent holes.
4. Remove the wire, holding top of the foam resistor with the forceps or needle nose pliers.

**Replacement Parts:** Contact Porter

## Specifications

**Note:** Porter may apply technical advances whenever it is desirable. Specifications are subject to change WITHOUT NOTICE. Porter should be contacted for current information.

Materials of Construction - Plastics:ABS, PVC, Polyethylene, Nylon, Natural Latex Rubber (flutter valve; does not come in contact with patient).

### Dimensions:

	<u>Diameter</u>	<u>Length</u>
Manifold	2-1/4" (5.7 cm)	1" (2.5 cm)
Interface	2-1/2" (6.4 cm)	20" (50.8 cm)
Scavenger Hose (19 mm)	19 mm, ID	Variable
Vacuum Hose (not supplied)	3/8" (9.5 mm), ID	As Required

### Vacuum Source:

Pressure	-10" to -21" Hg (-250 mm to -533 mm Hg)
Flow	2.0 to 3.5 SCFM (56.6 to 100 LPM)

### Interface Flow:

Ball Valve Full Vertical (Max. Flow)	30 – 35 LPM	Ball Valve 45° Position (Min. Flow)	8 – 12 LPM
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### Relief Valve (Condensation):

Relief Volume	40 – 50 cc/mL
Retention Volume	5 – 10 cc/mL

### Ambient Temperature Limits:

Minimum	40°F (5°C)	Maximum	140°F (60°C)
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The Quality System for Porter is certified to ISO 13485. The scope of our registration is: The design, manufacture, distribution and servicing of Nitrous Oxide - Oxygen Sedation Flow Meters, Gas Scavenging Systems, Steam Sterilizers, Gas Distribution and Office Communication Systems for use by a physician, dentist or licensed healthcare professional.