

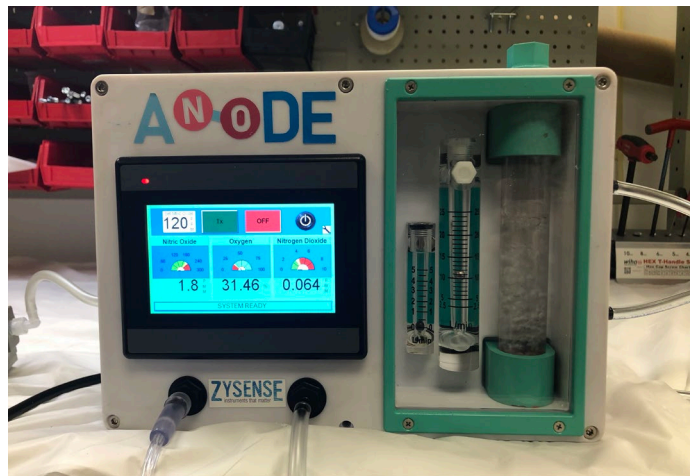
ANODE

Automated Nitric Oxide Dosing Equipment

Zysense ANODE is a highly precise automated medical grade nitric oxide gas dosing equipment used in research and in clinical trials under approved IRB protocols. Nitric Oxide is being used in a wide range of applications, including in neonatal intensive care units, pulmonary hypertension treatment, treatment of antibiotic resistant bacterial infections, and treatment of wounds that do not heal easily like diabetic foot wounds, or infections in the immunosuppressed, etc.

ANODE was developed by Zysense LLC - a leading provider of the highly precise chemiluminescence nitric oxide analyzer, NOA-280i, globally used as a research and monitoring instrument. ANODE can be used as a standalone instrument for dosing nitric oxide from low PPM levels to 300 ppm levels. If an application demands the use of nitric oxide at higher dosage levels, but also requires detection of nitric oxide at even lower PPB levels, ANODE can be combined with the use of Zysense NOA-280i for precise system to monitor and control dosage of nitric oxide up to 500 ppm.

ANODE was developed at the request of various clinical researchers. The goal was to develop a robust, easy to use, fully automated nitric oxide dosing system that can use cylinders of nitric oxide at any concentration (800 to 18,000 PPM), from any medical grade NO gas supplier. This results in an incredible cost savings from current methodologies. In addition, **this reduces the need to swap empty cylinders frequently**. It is common that during cylinder exchange, oxygen (ambient air) can enter the line and can oxidize the nitric oxide to nitrogen dioxide. **Nitrogen dioxide is a toxic pollutant in inhaled nitric oxide therapy and because the levels of nitrogen dioxide must be maintained at less than 2 ppm, even a small oxygen leak into a nitric oxide line can be potentially harmful.**



AUTOMATED NITRIC OXIDE DOSING EQUIPMENT

In practice, it is well known that nitric oxide, dosed in a ventilator at oxygen concentrations greater than 100 ppm, has a potential for a higher conversion rate of nitric oxide to nitrogen dioxide.. ANODE is designed for the clinical research community to facilitate the use of high dosage nitric

oxide treatment with a nitrogen dioxide scrubber to ensure the researcher can deliver a higher purity of nitric oxide, and for the evaluation of the treatment efficacy of nitric oxide.

ANODE Device:

The ANODE device is designed to deliver a precise amount of nitric oxide at a pre-determined flow rate that has been defined for the specific application. Prior to use, the ANODE operator must connect the approved nitric oxide gas cylinder and flush the line with pure nitrogen gas to ensure that there is no residual air (oxygen) in the line. Once the line is flushed with nitrogen, the operator must connect the approved high concentration nitric oxide gas cylinder – once connected, the valve can be opened. The nitrogen gas line is then closed, and the pure oxygen line is connected to the nitric oxide line near the inhalation point. The nitric oxide is blended with oxygen for inhaled nitric oxide therapy.

If the treatment requires an external application of Nitric Oxide on the skin, nitric oxide is blended with pure nitrogen and delivered to the affected location. To receive the highest effectiveness from the treatment, the affected area is covered with a plastic film and the gas is delivered directly to the patient's skin.

For Inhaled therapy: It is recommended that pure nitrogen gas is used to purge the line between uses. Regarding the pure oxygen mixing, care must be taken to ensure the nitric oxide and pure oxygen mixes as close to the delivery point as possible to reduce the formation of nitrogen dioxide.

NO₂ SCRUBBER

Zysense has developed an NO₂ scrubber that removes Nitrogen Dioxide in the NO delivery line to maintain low levels (< 1 ppm) of Nitrogen Dioxide in the NO delivery gas line. The scrubber is a consumable item with a limited use-time and is intended for use in cleaning gases for high precision measurement in parts per million any time Nitrogen Dioxide may be present. This proprietary technology was developed for use with the Zysense NOA 280i to measure nitric oxide and nitrogen dioxide using the Zysense NOA 280i when Nitrogen dioxide is in detectable parts per million levels.

Process Flow Diagram for using ANODE as a standalone dosing and measurement

ANODE is used as a standalone dosing and measurement platform in applications where nitric oxide is dosed continuously. This is the preferred option when ease of use and ease of transport (light weight), reliability and speed are critical. ANODE is typically used with the NO₂ scrubber designed for use in dosing NO ranging from 1 ppm to 250 ppm where NO₂ levels can become high. (See Fig. 1)

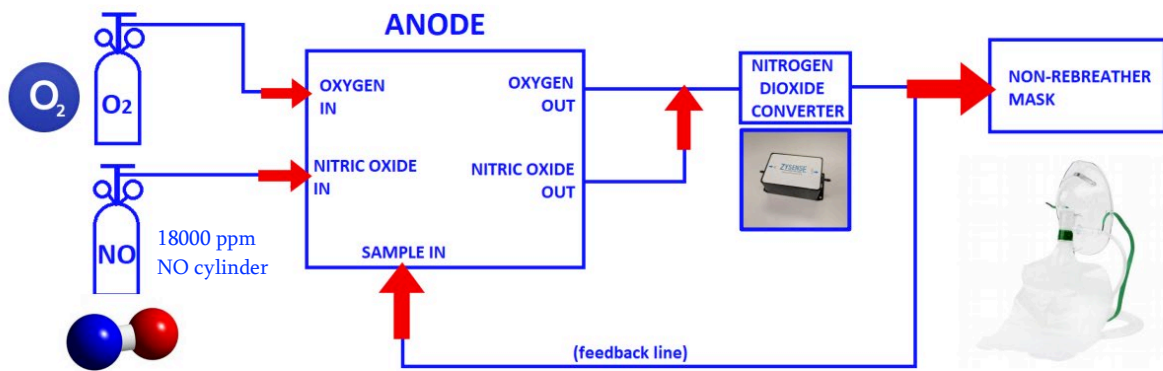


Figure 1

HIGH PRECISION DOSING PLATFORM

ANODE measures nitric oxide using a custom designed sensor that is accurate for measurement in parts per million levels. If higher accuracy levels in parts per billion levels are needed, then ANODE can be combined with the Zysense NOA 280i to accurately measure from 0.1 parts per billion to 500 parts per million range.

For ultra-high precision and faster feedback control, Zysense NOA 280i is used in conjunction with the ANODE to receive rapid NO measurement feedback and for better control of Nitric oxide delivery for clinical trials. (see Figure 2)

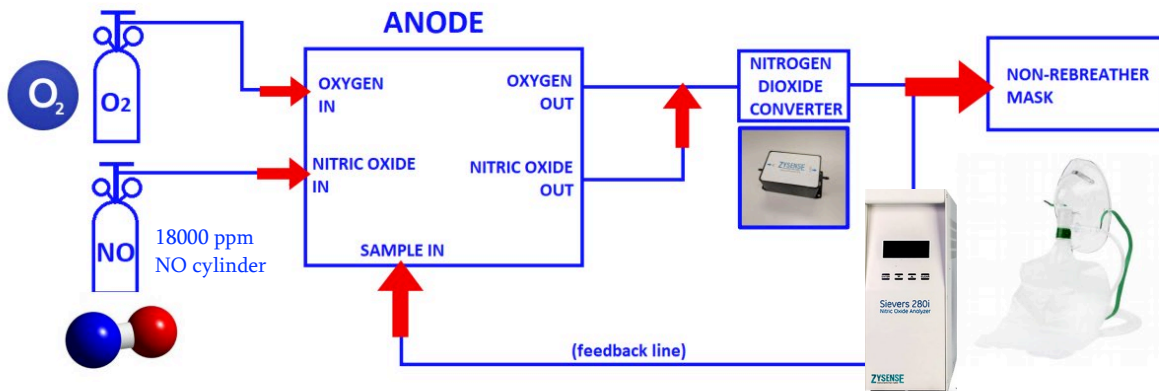


Figure 2

ANODE (Automated Nitric Oxide Dosing Equipment) is designed to be lightweight, portable, and can be located close to the patient for accurate delivery of nitric oxide to the patient without long hoses that can create residual nitrogen dioxide.

ANODE can be used with any approved gas vendors that provide medical grade Nitric Oxide or with any equipment that can create nitric oxide onsite.



ZYSENSE ANODE



ZYSENSE NO 280I