NOXtec
NITRIC OXIDE Monitor and Delivery System

NOXtec

O₂
20.1 (%)

NO
5.1 (ppm)

NO₂
0.0 (ppm)

DOSE
5.2 (ppm)

ITC
INGENIERÍA Y TÉCNICAS CLÍNICAS
Nitric Oxide Monitor and Delivery System

NOXtec is a device used for dosing NO gas to adults, paediatric and new-borns patients and monitor the concentration of NO, NO2 as well as O2. The dosing and the monitoring modules are autonomous and independent. Parameters are pre-set in independent non-volatile memory before the real time execution, minimizing the risks during therapies.

In NOXtec

The cylinders are automatically commuted and the internal circuit is vented for minimizing the undesirable concentration of NO2 during the treatment.
The device is easy to use. The dynamic and intuitive user interface is based on a colour 10.1’ LCD. The studies can be saved to increase the control of the treatments and to make the process easier to the operator.

The system works in 4 different modes:

1. Real-time where the device is dosing with a flow of NO/N₂ proportional to the bias flow all the time, following the variations in the bias flow due to the patient's breathing.
2. Automatic where the NO/N₂ flow is calculated averaging the bias flow during 20 seconds or 3 breathing cycles.
3. Semi-Automatic where the value of the bias flow is defined in the interface manually but the calculation of the dosing flow is calculated according to the NO concentration set.
4. Manual where the dose is controlled by mean of a manual flow controller incorporated to the device. Additionally, in the trolley of the device it could be incorporated an optional manual blender that allows dosing gas without using the main electronic device and using a combination of Air and Oxygen as driving gas.

Application examples

- Persistent pulmonary hypertension in new-born babies
- Acute post-operative cardiac patients
- Acute respiratory distress syndrome (ARDS)
- Research in new areas of application
## Technical Specifications

### Monitoring Module

- **Independent, micro-controlled and double redundancy. Alarms thresholds pre-programmed in EEPROM**
  - **NO measurement principle**
    - NO & NO2: 4-electrode Electrochemical sensor
    - O2: Partial Pressure Electrochemical sensor (ISO 80601)
  - **Measuring range**
    - NO: 0 – 100 ppm (could be expanded to 0 – 200 ppm on demand)
    - NO2: 0 – 20 ppm
    - O2: 0 – 100%
  - **Accuracy**
    - NO: +/- 3%
    - NO2: +/- 3%
    - O2: +/- 2.5%
  - **Resolution**
    - NO: 0.2 ppm
    - NO2: 0.2 ppm
    - O2: 0.2%
  - **Response time**
    - NO: < 10 seconds
    - NO2: < 40 seconds
    - O2: < 20 seconds
  - **Sample line flow**
    - 100 - 150 ml / min
  - **Sensor operating life**
    - 6 months

### Industrial design and external blender

- **Unit dimensions (main box)**
  - 270 x 160 x 320 mm
- **Total dimensions**
  - 290 x 190 x 350 mm
- **Trolley dimensions**
  - 550 x 610 x 1300 mm
- **Main box weight**
  - 5.5 Kg
- **Weight including trolley**
  - ****
- **Cylinder capacity**
  - For 2 x 20 l cylinders
- **O2 + air flow**
  - 0.5 – 15 l/min
- **O2 concentration**
  - 21 – 100%
- **Flow steps**
  - 12 positions
- **Materials**
  - Stainless Steel and PTFE

### Environmental and power supply

- **Operational temperature**
  - 10 – 40 ºC
- **Storage temperature**
  - 0 - 60 ºC
- **Operational humidity**
  - 15 - 90%
- **Power supply**
  - 100 - 240 VAC, 50 - 60 Hz
- **Battery life**
  - > 6h
- **Battery changing time**
  - > 4h

### Alarms

- **All controlled in real-time dosing and monitoring boards, including sounds. LCD is only for visual indication**

  - **Dosing module error**
    - Dosing flow controller current is too high or too low
    - Output dosing flow is too high or too low
    - Regulated internal pressure is too high, too low or too unstable
  - **Monitor module error**
    - Sampling pump current is too high or too low
    - Sampling flow is too high or too low
    - Sampling line is obstructed
    - Water trapping positioning error
  - **Gas measurement**
    - NO concentration too high or too low (excluding setting time)
    - NO concentration too high
    - O2 concentration too high or too low
    - Bias flow too unstable in real-time or automatic mode
  - **Low content in cylinders**
    - One cylinder lower than threshold and the other in yellow area
    - Both cylinders lower than threshold
    - Failure purging new cylinder connected
    - New cylinder connected not automatically purged and not in use
  - **Purging required**
    - New cylinder connected not automatically purged in use
  - **Power supply**
    - Failure in main power
    - Low battery with failure in main power
    - Failure charging the battery

### Dosing module

- **Real-time: dosing flow is proportional to bias flow**
- **Automatic: bias flow is averaged during 20 seconds**
- **Semi-automatic: bias flow is set manually**
- **Manual: 12 steps flow controller for dosing**

  - **Operational modes**
    - **NO dosing delivery range**
      - 0 – 80 ppm (could be expanded on demand)
    - **Accuracy on dosing**
      - +/- 10%
    - **Resolution on dosing**
      - 0.2 ppm
    - **Ventilator flow range**
      - 1.5 – 30 lpm
    - **Dosing flow**
      - 0 – 4.0 lpm
    - **Set-up time**
      - <5 min fs
    - **Display**
      - LCD 10.1’ colour