SLE5000

Touch-screen Neonatal Ventilator with
High Frequency Oscillation

When the smallest thing matters
Designed for Neonates

Neonatal ventilation poses real challenges to neonatologists and caregivers. Neonatal patients, especially premature infants are very fragile and have undeveloped respiratory systems that require very small tidal volumes. Therefore, precision and reliability are crucial. Triggered modes of ventilation, require the finest technology to ensure reliable detection of the baby’s breathing. Fast triggering of mechanical breaths is essential, in order to reduce the patient’s work of breathing.

However, there are neonates who cannot be adequately ventilated with even the most sophisticated conventional ventilation mode, and for these infants, High Frequency Oscillation (HFO) is the only mode able to provide adequate gas exchange.

In the busy NICU environment, medical and nursing staff need a ventilator that provides them with all the tools they need to treat their most challenging patients. The ventilator needs to be intuitive and require minimum amount of training to use effectively. The patient is always the main focus and technology is the means to achieve a good outcome.

The SLE 5000 infant ventilator is the result of years of experience in the field of Neonatal ventilation and it was designed with all this experience in mind. The SLE5000 is a dedicated neonatal ventilator that addresses all the challenges of neonatal ventilation.

Keep reading, to find out what the SLE5000 can do for your patients...

Sophisticated & Powerful

- V5 software
- High Frequency Oscillation
- Targeted Tidal Volumes
- Open Lung Concept
- Valveless System
- Hot Wire Flow Sensor
High Frequency Oscillation (HFO)

In the SLE5000, HFO is powerful enough to cater for a wide range of patients from 300 g to 20 kg, dependant on lung mechanics.

In HFO mode, the SLE5000 provides oscillation with active expiration ensuring adequate gas exchange.

The SLE5000 produces square pressure and volume waveforms, ensuring more tidal volume at lower pressures than the competition.\(^1\)

Since the same circuit is used between HFO and conventional modes of ventilation no patient disconnection is required. This ensures seamless transition between ventilation modes, which helps in maintaining alveolar recruitment.

Targeted Tidal Volume plus (TTV\(^{\text{plus}}\))

Recent research indicates that the use of volume targeted ventilation offers significant improvement in ventilation outcomes, such as reduction of death, air leak syndrome and chronic lung disease, compared to pressure limited ventilation.\(^2\)

In TTV\(^{\text{plus}}\), the SLE5000 measures the expired tidal volume (Vte) and adjusts the PIP in accordance with the changing lung mechanics, to deliver the user-set Vte at the user-set Ti.

A new algorithm further improves the stability of delivered volumes and ensures delivery of the breath at the user set Ti.

The latest software adds ET tube leak compensation of up to 50% and automatic adjustment of PIP according to an individual patient’s lung mechanics. Additionally, optimisation of the alarm system reduces nuisance alarms.

Pressure Support Ventilation (PSV)

PSV is a mode of ventilation where the baby has control of the start and the termination of inspiration. This level of interaction leads to better patient synchrony.

The SLE5000 boasts an automatic leak compensation algorithm that will ensure flow termination even at the presence of a leak.

PSV is also available in SIMV. By pressure supporting spontaneous breathing, the SLE5000 helps reducing the work of breathing of the baby, potentially leading to faster and successful weaning.\(^3\)

CPAP

The SLE5000 can be used with nasal prongs, giving the user even more options for weaning babies and supporting them immediately after extubation.

References


Unmatched Ease of Use
At SLE, we believe that the User should be able to concentrate on the most important part of their job: look after their patients. That’s why the SLE5000 has been designed to be so intuitive and easy to use.

New users find the transition to the SLE5000 seamless. Most of them only require a minimum amount of training to use the SLE5000 effectively. Considering the potential of the SLE5000, this is a huge achievement.

Integrated battery
The SLE5000 has an internal battery that ensures uninterrupted operation in case of a mains supply failure. The battery lasts for more than one hour in normal operation conditions. This makes the ventilator even safer and makes it ideal for use in internal hospital transport.

Audible and Visual Alarms
The alarm panel provides an immediate audible and pictorial view of the alarm condition, thus allowing easy monitoring, plus an alarm history of the last 100 conditions.

Variable I:E Ratio
1:1, 1:2 and 1:3 ratios are available in HFO mode

Patient Circuit Connections
Front panel mounted patient circuit connections with autoclavable exhalation block.

Quality Build
The SLE5000 case is manufactured in a unique solid cast polyurethane moulding. This tough material is ideal for use in a busy neonatal unit and easily withstands the knocks and bumps of everyday life.
Unique Interface
SLE has worked hard to deliver the best User Interface in the market. Thought has been given to all aspects of the user scenarios. Some of the things that make the SLE5000 User Interface so intuitive, innovative and unique:

- Full touch operation
- Logical layout of the different sections
- Minimal number of sub-menus
- Easy-to-read characters
- Colour-coding of controls

Safe & Easy-to-Use

Integral screen
Colour-coded user touch screen. Easy-to-use, logical sequence allowing quick, smooth adjustments. The SLE5000’s 12.1 inch screen means that all the data you need can be easily seen.

Real-time Data Display
Real-time lung mechanics measurements and ventilatory data. This allows for continuous feedback for making crucial clinical decisions.

Pre-Setting Facility
Parameters can be preselected for the next mode whilst continuing to ventilate the patient in the current mode of ventilation.

Compact Unit
The SLE5000 ventilator is housed in a single compact box, making it easier to clean and use. The integrated touch screen is angled for perfect visibility and easy to read from a distance.

Low Cost of Ownership
The SLE5000 uses the same standard patient circuit for both conventional ventilation and HFO ventilation, which means that there are no hidden costs when you switch between modes.
Valveless System
All of SLE’s ventilators use ‘valveless technology’. This means that the management of the airflow is controlled not by a mechanical valve, but by a jet of air, acting as a pneumatic piston. This system is based on 20 years of patented technology, and offers many significant advantages.

The first of these is that there is no additional resistance in the circuit. This ensures that even with the smallest of babies there is minimal resistance to flow and the Work of Breathing is kept to a minimum.

The high-speed air jets also mean that the system is very reactive allowing very precise control of the airflow with none of the problems of inertia and sticking associated with conventional valves.

The simplicity of the design - a single exhalation block and exhaust manifold also mean that cleaning and assembly are much simplified and reduce the chances of infection or mis-assembly.

Technology
The SLE5000 measures flow and volume using a hot wire technology sensor, designed to be placed proximally to the patient, which is essential for the accuracy on neonates.

Using a small, lightweight sensor with less than 1 ml of additional deadspace ensures minimal interference with breathing.

Upgradeable
The SLE5000 is a modern, sophisticated ventilator operating with advanced software.

This ensures that your ventilator can always be upgraded and incorporate new features that are dictated by advances in the clinical field as well as feedback from our customer base across the world.

Reliable
SLE’s goal is to always provide the best quality products. This is why we always work to improve the performance, reliability and consistency of our components.

In recent years, we have developed quieter valves, made our ventilators run cooler, added processing power, reduced maintenance costs, made servicing easier and introduced a brand new flow sensor.

Our customers can be sure that SLE will not only maintain the high standards that we have set, but keep raising the bar...
Specifications

Ventilation Modes: Conventional

**CPAP / PTV / PSV**
- **Inspiratory Time:** 0.1 to 3.0 sec
- **CPAP Pressure:** 0 to 20 mbar
- **Inspiratory Pressure:** 0 to 65 mbar
- **Volume Targeting:** 2 to 200 ml
- **O2:** 21% to 100%

**CMV / SIMV**
- **BPM:** 1 to 150
- **I:E Ratio:** (1.2:1 to 1:600)
- **Inspiratory Pressure:** 0 to 20 mbar
- **Volume Targeting:** 2 to 200 ml
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**Ventilation Modes: HFOV**

**HFOV Only**

- **Frequency Range:** 3-20 Hz
- **I:E Ratio:** 1:1, 1:2, 1:3
- **Delta Pressure range:** 4 to 800 mbar
- **Mean Airway Pressure range:** 0 to 45 mbar
- **O2:** 21% to 100%

**HFOV+CMV**

- **BPM:** 1 to 150
- **Inspiratory Time:** 0.1 to 3.0
- **Frequency Range:** 3-20 Hz
- **I:E :** (1.2:1 to 1:600)
- **Inspiratory Pressure:** 0 to 65 mbar
- **Delta Pressure range:** 4 to 800 mbar
- **PEEP range:** 0 to 20 mbar
- **O2:** 21% to 100%

**Monitoring Parameters**

**Measurement of Flow and Volume**

- **Flow Sensor Type:** 10 mm dual-hot-wire anemometer (autoclavable or single use)
- **Flow Rate:** 0.2 to 32 l/min (Accuracy ±8%)
- **Expiratory Tidal Volume:** 0 to 999 ml
- **Expiratory Minute Volume:** 0 to 18 litres
- **Deadspace:** <1 ml
- **Weight:** <10 g

**Conventional Ventilation and combined modes only:**

- **Tube Leakage:** 0 to 99%
- **Breath Rate (total):** 0 to 250 BPM
- **Dynamic Compliance:** 0 to 100 ml/mbar
- **C20/C:** Resolution 0.1
- **Sampling Time:** 2 ms

**Resistance:** 0 to 1000 mbar/second

**Triggering:** Inspiratory flow

(0.2 to 10 l/min)

The above values are measured under ATPD (ambient temperature and pressure, dry) conditions.

**Oxygen Concentration**

- **Range:** 21 to 100%
- **(Resolution 1%)**

**Pressure**

- **Real-time Pressure measurement:** Resolution 1 mbar
- **Sampling time:** 2 ms
- **Peak Pressure:** 0 to 175 mbar (resolution 1 mbar)
- **PEEP Pressure:** 0 to 175 mbar (resolution 1 mbar)
- **Mean Pressure:** -175 to 175 mbar (resolution 1 mbar)

In HFO combined mode, Delta P is measured during expiration only.

**User Settable Alarms:**

**High Pressure**

Autoset when patient pressure controls are adjusted or can be manually adjusted.

- **Range:** 10 to 110 mbar
- **Resolution:** 0.5 mbar

**Cycle Fail**

Autoset when patient pressure controls are adjusted or may be manually adjusted.

**Low Pressure**

Autoset when patient pressure controls are adjusted or can be manually adjusted.

- **Range:** -10 mbar
- **(Conventional)**
- **70 mbar (HFOV modes) to** 10 mbar below high pressure threshold

**Low Tidal Volume**

- **Range:** 0 to 200 ml
- **Resolution:** 0.2 ml

**High Minute Volume**

- **Range:** 0.02 to 18 litres
- **Resolution:** 0.1 litre

**Low Minute Volume**

- **Range:** 0 to 0.02 litres below High Minute Volume threshold
- **Resolution:** 0.1 litre

**Apnoea time**

Settable only in CPAP or when Backup rate is less than 10 BPM.

- **Range:** 5 to 60 sec
- **Resolution:** 1 second

Technical Specifications

**Power Requirements**

- **Voltage:** 100-250 V
- **50-60 Hz**
- **Power:** 115 VA
- **Battery back up:** 45-60 minutes (dependant on mode of operation)
- **Battery charging:** Full charge 24 hours, 80% charge after 8 hours

**Outputs**

- **RS-232C**

**Air and O2 input**

- **Pressures:** 2.8 - 6 bar
- **Fresh Gas Flow:** 8 litres/min
- **Maximum gas flow:** 60 litres/min

**Operating Environment**

- **Temp:** 10-40 °C
- **Humidity:** 0-90% (non-condensing)

**Dimensions**

- **Size, ventilator only:** 330mm W x 330mm H x 470mm D
- **Height on trolley:** 131 cm
- **Weight, ventilator only:** 22.4 kg

**Construced to conform to:**

- **BS EN 60601-2-12: 2006**
- **Medical Devices Directive (93/42/EEC)**
- **EMC**
- **BS EN 60601-1-2: 2001+A1**
- **BS EN 61000-3-2: 2006**
- **BS EN 61000-3-3: 1995 +A1**
- **European conformity mark: CE 0120**

**Environmental storage conditions**

- **When packed for transport or storage:**
- **Ambient Temperature:** -40 °C to +70 °C
- **Relative Humidity:** 10% to 90% (non-condensing)
- **Atmospheric Pressure:** 500 hPa to 1060 hPa
SLE is a world leader in the design and manufacture of neonatal ventilators.

Years of ventilation experience have given the company an understanding of the challenges that nurses and clinicians are facing when caring for the tiniest and most critical babies.

From being the pioneers of neonatal Patient Triggered Ventilation (PTV) in the 1980’s, to the introduction of combined HFO (High Frequency Oscillation) in the 1990’s, and the design of the first touch-screen Neonatal Ventilator in the 2000’s, SLE has maintained a position of strength in neonatal ventilation.

The company’s guiding principle is to support clinical and nursing staff in their everyday work.

The knowledge and experience gained during years of development is evident in the SLE5000 ventilator: the result of SLE’s ongoing commitments to innovation, competency and care.