



*Touch-screen Neonatal Ventilator  
with High Frequency Oscillation*

SLE5000



When the smallest thing matters



## SLE5000: 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) ventilation 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 the 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 SLE5000 infant ventilator is the result of years of experience in the field of neonatal ventilation and it was designed using all of this experience. 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

## 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, depending 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.<sup>(1)</sup> 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<sup>plus</sup>)

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, as compared to pressure limited ventilation.<sup>(2)</sup> In TTV<sup>plus</sup>, 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 in 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 more successful weaning.<sup>(3)</sup>

## CPAP

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



**Version 5  
Software**



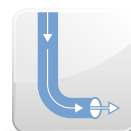
**High Frequency  
Oscillation**



**Targeted  
Tidal Volumes**



**Open Lung  
Concept**



**Valveless  
System**



**Hot Wire  
Flow Sensor**

## References

**1. Pressure and flow waveform characteristics of seven high frequency ventilators.**

Harcourt ER, John J, Dargaville PA, Zannin E, Davis PG, Tingay DG: Presentation and Poster at FAOPS and PSANZ Conference March 2012

**2. Volume-targeted versus pressure-limited ventilation in the neonate.**

Wheeler K, Klingenberg C, McCallion N, Morley CJ, Davis PG: Cochrane Library 2010, Issue 11

**3. Work of breathing during SIMV with and without pressure support.**

Deena Shefali Patel, Gerrard F Rafferty, Silke Lee, Simon Hannam and Anne Greenough: Arch. Dis. Child. Published online 17 Feb 2009; doi:10.1136/adc.2008.152926

### Integrated Battery

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

### Audible and Visual Alarms

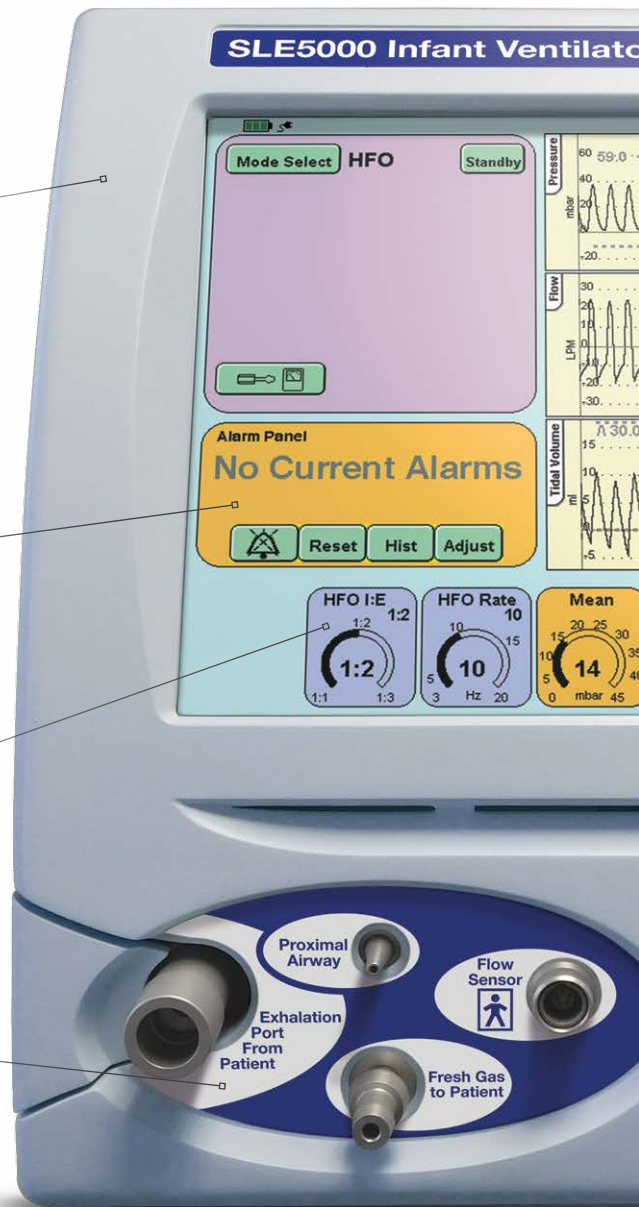
The alarm panel provides an immediate audible and pictorial view of the alarm condition, thus allowing easy monitoring, plus an alarm history of the last 100 conditions.

### 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.

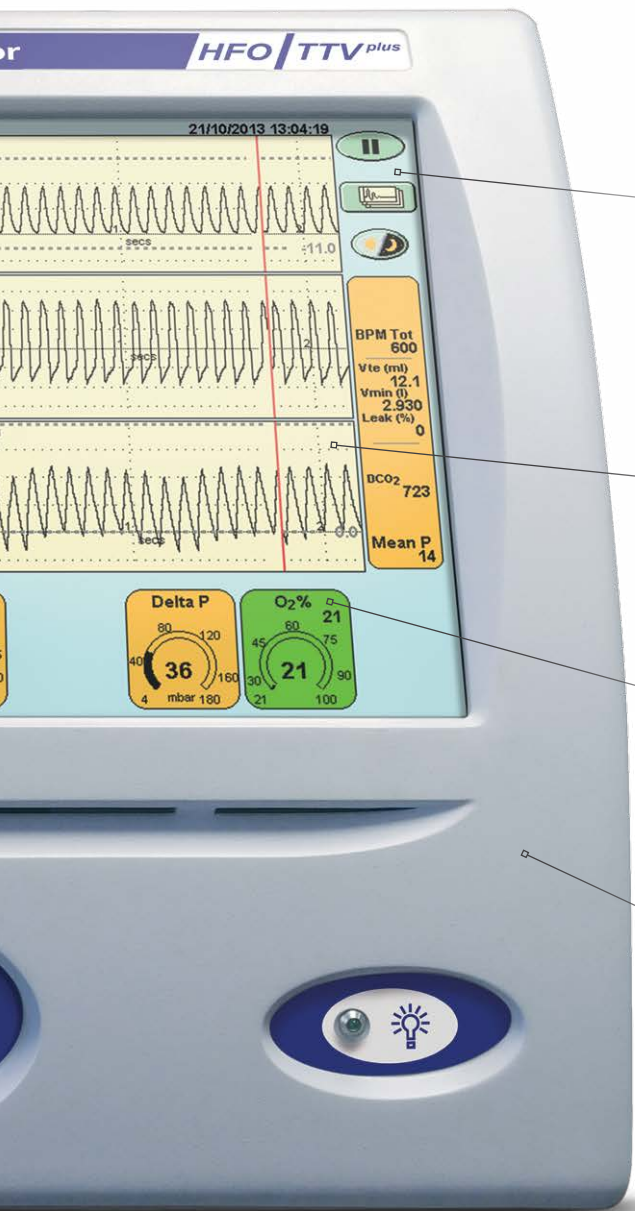


## Safe & Easy-to-Use

At SLE, we believe that the User should be able to concentrate on the most important part of their job: looking 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.

*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.*



### 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.

## Unique Interface

SLE has worked hard to deliver the best user interface in the market, with in-depth thought given to all user scenarios. Features include:

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

*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.*



# Smart, Reliable and Cost-Effective



## 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 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 s  
CPAP Pressure ..... 0 to 20 mbar  
Inspiratory Pressure ... 0 to 65 mbar  
Volume Targeting ..... 2 to 200 ml  
O<sub>2</sub> ..... 21% to 100%

### CMV / SIMV

BPM ..... 1 to 150  
I:E Ratio ..... (11.2:1 to 1:600)  
Inspiratory Time ..... 0.1 to 3.0 s  
PEEP Pressure ..... 0 to 20 mbar  
Inspiratory Pressure ... 0 to 65 mbar  
Volume Targeting ..... 2 to 200 ml  
O<sub>2</sub> ..... 21% to 100%

## Ventilation Modes: HFOV

### HFOV Only

Frequency Range ..... 3-20 Hz  
I:E Ratio ..... 1:1, 1:2, 1:3  
Delta Pressure Range .. 4 to 160 mbar  
Mean Airway Pressure Range .. 0 to 45 mbar  
O<sub>2</sub> ..... 21% to 100%

### HFOV+CMV

BPM ..... 1 to 150  
Inspiratory Time ..... 0.1 to 3.0 s  
Frequency Range ..... 3-20 Hz  
I:E ..... (11.2:1 to 1:600)  
Inspiratory Pressure ..... 0 to 65 mbar  
Delta Pressure Range .. 4 to 160 mbar  
PEEP Range ..... 0 to 20 mbar  
O<sub>2</sub> ..... 21% to 100%

## Monitoring Parameters

### Measurement of Flow & 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 Vol. ... 0 to 999 ml  
Expiratory Minute Vol. ... 0 to 18 litres  
Deadspace ..... <1 ml  
Weight ..... <10 g

### Conventional Ventilation & Combined Modes Only:

Tube Leakage ..... 0 to 99%  
(resolution: 1%, averaged over 10 breaths)

Breath Rate (total) ..... 0 to 250 BPM  
Dynamic Compliance ... 0 to 100 ml/mbar  
(resolution: 1 ml/mbar)  
C20/C ..... Resolution 0.1  
Sampling Time ..... 2 ms  
Resistance ..... 0 to 1000 mbar/l/second  
Triggering ..... Inspiratory flow  
(0.2 to 10 l/min)

All 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 s  
Resolution ..... 1 second

## Technical Specifications

### Power Requirements

Voltage ..... 100-250 V  
50-60 Hz  
Power ..... 115 VA  
Battery Back-up ..... 45-60 mins.  
(dependant on mode of operation)  
Battery Charging...  
Full charge 24 hours, 80% charge after 8 hours

### Outputs

RS-232C

### Air & O<sub>2</sub> 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 ... 330 mm W  
x 330 mm H  
x 470 mm D  
Height on Trolley ..... 131 cm  
Weight, Ventilator Only ... 22.4 kg

## 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

The SLE5000 conforms to all relevant regulations and certifications in the countries in which it is sold.



SLE Limited  
Twin Bridges Business Park  
232 Selsdon Road  
South Croydon  
Surrey  
CR2 6PL  
UK



When the smallest thing matters

**tel:** +44 (0)20 8681 1414  
**fax:** +44 (0)20 8649 8570  
sales@sle.co.uk  
www.sle.co.uk