

# SLE5000

Infant Ventilator for Conventional Ventilation  
(Also available with optional HFO)



 **SLE**

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.

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.

## High Frequency Oscillation (HFO) Option

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

The SLE5000 provides sinusoidal ventilation with active expiration.

The main benefits of HFO include:

- Improves ventilation at lower pressures
- Higher levels of PEEP can be used without having to use high peak airway pressures to maintain appropriate levels of CO<sub>2</sub>
- Produces more uniform lung recruitment
- Reduces airleaks
- Improved oxygenation in infants with severe RDS (Respiratory Distress Syndrome)



Version 5  
Software



Targeted Tidal  
Volumes



Valveless  
System



Hot Wire  
Flow Sensor

# Sophisticated & Powerful

## Extensive Capabilities

Modes include: CPAP, CMV+ TTV, PTV, PSV, SIMV+ TTV + PSV

- Ability to preset parameters in all modes of operation
- Full colour, 12.1" touch-screen operation
- Integral flow monitoring measuring lung mechanics and displaying of loops and waveforms
- Trending of measured parameters
- Unique, patented valveless technology
- Integral battery with up to 60 minutes operating capability
- Software based, allowing for upgrading to versions with new or improved functions.

## 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, compared to pressure limited ventilation.<sup>(1)</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 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.<sup>(2)</sup>

## Nasal CPAP

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

## High Frequency Oscillation (HFO)

You can upgrade this SLE5000 Conventional to an SLE5000 Conventional plus HFO.

*Please ask your SLE Distributor for more details.*



## 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



SLE5000 with optional HFO

### Integrated battery

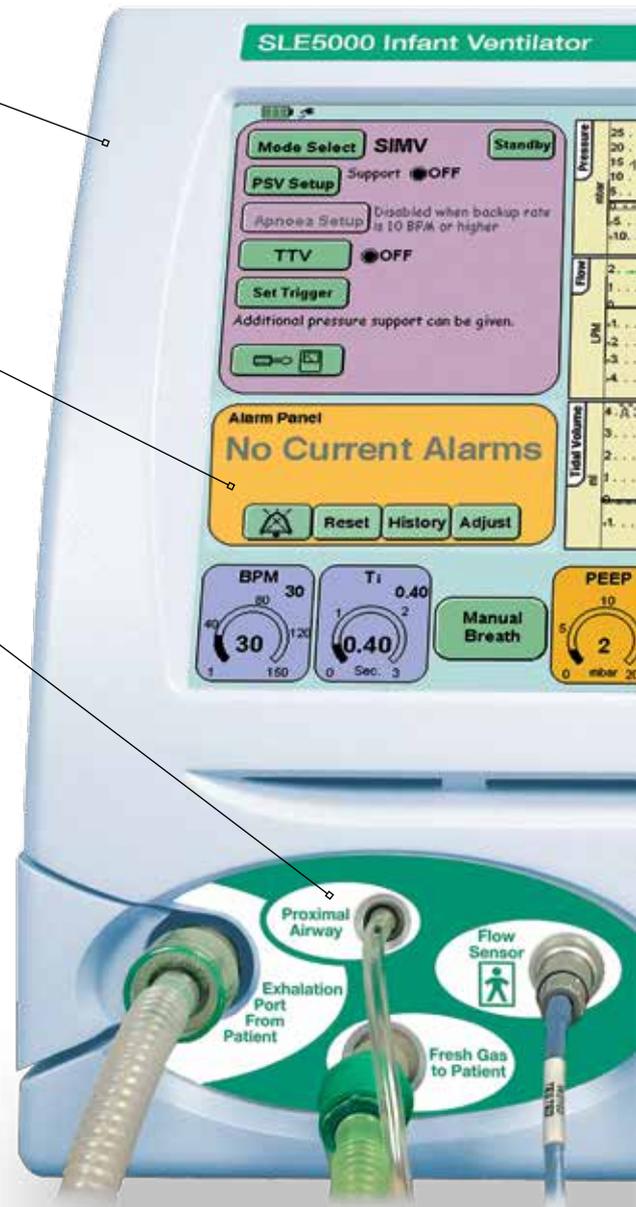
The SLE5000 has an internal battery that ensures uninterrupted operation in case of a mains supply failure. The battery lasts for more than one hour in normal operation conditions. This makes the ventilator even safer and makes it ideal for use in internal hospital transport.

### 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.

### Patient Circuit Connections

Front panel mounted patient circuit connections with autoclavable exhalation block.



## 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.



## 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.*

## 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



# Smart & 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 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...

## Specification

### 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
Oxygen:	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 sec
PEEP Pressure:	0 to 20 mbar
Inspiratory Pressure:	0 to 65 mbar
Volume Targeting:	2 to 200 ml
Oxygen:	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%)
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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% (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.second/l
Triggering:	Inspiratory flow (0.2 to 10 l/min)

Above values are measured under ATPD (Ambient Temperature and Pressure, Dry) conditions

#### Oxygen Concentration

Range:	21 to 100% (Resolution 1%)
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#### 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)

### User Settable alarms

#### High Pressure

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

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 to 10 mbar below high pressure threshold.
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#### Low Tidal Volume

Range:	0 to 200 ml
Resolution:	0.2 ml

#### Low Minute Volume

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

#### High Minute Volume

Range:	0.02 to 18 litres
Resolution:	0.1 litre

#### Apnoea time

Settable only in CPAP or when Backup rate 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 O<sub>2</sub> input

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

#### Operating Environment

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

#### Dimensions

Size, ventilator only:	330mm W x 330mm H x 470mm D
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Height on trolley:	131 cm
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Weight, ventilator only: 22.1 kg

#### Constructed to conform to:

BS EN 60601-1:1990  
BS EN 60601-1-2:2001  
BS EN 60601-1-4: 1996  
BS EN 60601-2-12:2006  
Medical Devices Directive (93/42/EEC)

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
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### Ventilation Modes: with optional 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
Frequency Range:	3-20 Hz
I:E :	(11.2:1 to 1:600)
Inspiratory Pressure:	0 to 65 mbar
Delta Pressure range:	4 to 180 mbar
PEEP range:	0 to 20 mbar
O <sub>2</sub> :	21% to 100%

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

Weight, ventilator only: 22.4 kg

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.



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CSDD0123/0UK/001 03/14