
*Multi-Mode, Touch-Screen*
*Infant Ventilator*

# SLE6000

SLE
When the smallest thing matters

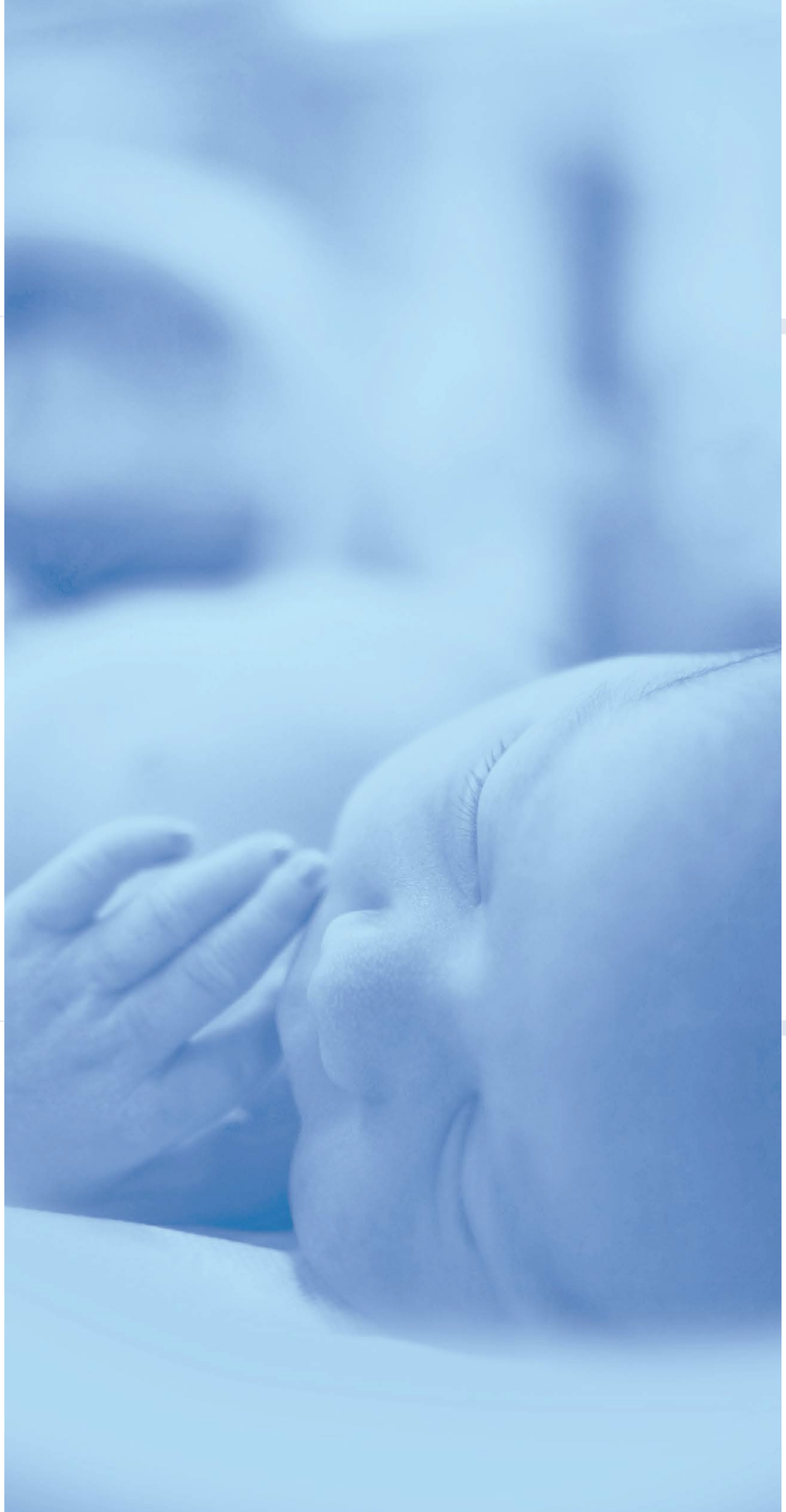

# Ventilate with Confidence

The care of infants and in particular neonates is hugely challenging. Their unique physiological and developmental needs require specialised, precise treatment. Nobody is more aware of this than SLE, having focused solely on the design and manufacture of infant ventilators since the 1980s.

When you buy one of our ventilators you can be sure it's optimised for infants - without compromise. You can also be sure it will keep pace with the ever changing needs of babies - whilst being safe, reliable and easy to use.

The SLE6000's specialist lung-protective features include SLE's own High Frequency Oscillation Ventilation (HFOV) using proprietary bidirectional jets, Pressure Support Ventilation (PSV), Volume Targeted Ventilation (VTV) and a choice of non-invasive ventilation modes (NIV) including High Flow Therapy.

The SLE6000 sees the introduction of the new Lunar™ interface, which incorporates a low-glare screen (in keeping with the increased emphasis on developmental care) whilst setting a new benchmark in usability.



## Volume Targeted Ventilation

Volume Targeted Ventilation (VTV) is a lung protective mode of ventilation that can reduce the risk of serious complications such as BPD, pneumothorax, atelectasis and hypocarbia [3].

In VTV mode, the SLE6000 monitors and targets the expiratory tidal volume (Vte) and can compensate for an ET tube leak of up to 50%.

## Non-Invasive Ventilation

The SLE6000 is unique in allowing for the choice of either dual or single-limb non-invasive ventilation, extending the interface options available to medical staff. These can include passive interfaces (such as the SLE Miniflow™ in dual-limb mode and active (fluidic-flip) interfaces (such as the SLE1000 Generator or Infant Flow™) in single-limb mode. NIV can be applied using a nasal mask or nasal prongs.

Servo-controlled flow compensates for varying leaks and results in a more consistent pressure requiring fewer staff interventions.

The option of dual-limb modes for nasal CPAP allow for higher pressures with shorter rise times, which is useful when using the therapy in the acute phase. All modes can be used with the same patient circuit, providing a seamless transition between modes, reducing patient discomfort and lowering the cost of treatment.

## Alarms & Lightbar

All messages and alarms in the information bar are easy to see from a distance and are colour-coded based on priority. A 360° lightbar further enhances visibility.

## Primary Menu Buttons

With its simple menu structure the SLE6000 offers many features, but operation is still very easy to learn and use. Four simple choices give instant access to: Modes, Alarms, Utilities and Layout.

## Additional Parameters

Secondary controls are normally hidden, and are accessible via this button.

## Main Parameters

Primary ventilation parameters are permanently visible for immediate access and change between modes to show only the required parameters.


## Pause / Screen Capture Button

Pauses the waveforms for 120 seconds. The paused screen can be stored in memory and downloaded to a USB memory stick when required.

## Measured Values

Large and easy-to-read. Each parameter is clearly labelled, plus the user is easily able to switch between basic and advanced data display at any time.

## Compact Design

The SLE6000 ventilator is housed in a single compact box, making it easier to clean and use.

The integrated touch-screen is angled for optimal visibility and easy to read from a distance.

## Graphics Section

The customisable graphics section allows the user to switch between different screen layouts that can be configured to meet individual requirements.

# Use with Confidence...

*The simplicity of the SLE6000 interface allows the user to easily access the necessary information whilst making the learning process much faster.*

The SLE6000 user interface has been designed to be easily visible to the operator without excessive glare, whilst emitting as low a light as possible so as not to provide unnecessary stimulus to the patient. This is how the Lunar™ interface was born.

Recent research in Developmental Care has shown that excessive light is involved in retinal damage, sleep pattern alterations, disturbance of circadian rhythms and poor growth [4].

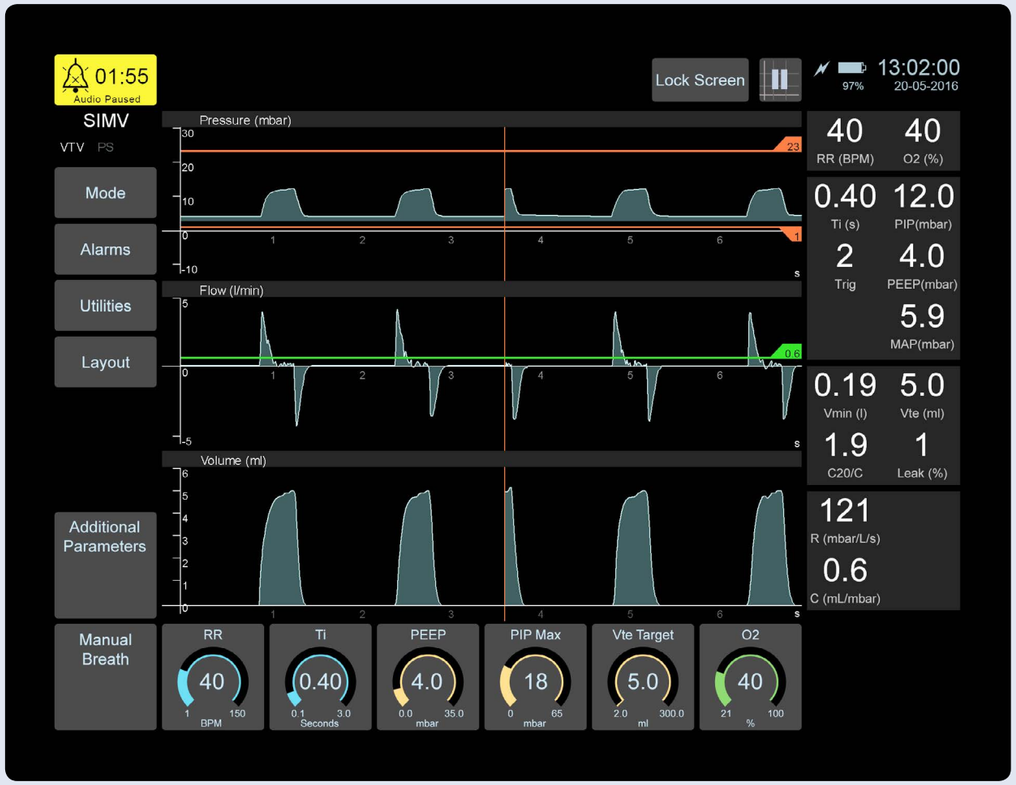
# ...and see everything

Some of this light comes from the equipment around the patient, and it is for this reason that we have chosen to implement a low-lux (Lunar™) interface on the SLE6000.

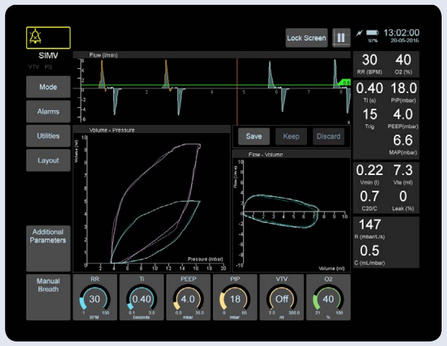
Additionally, the carefully designed workflow enables users to manage ventilation with fewer interactions with the machine, giving more time to deal with the patient's care.

*The SLE6000's high-resolution, easy-to-understand screen allows you to concentrate on the patient and not the ventilator.*

# A New Way of Working




This ventilator has been set up to show SIMV with three waveforms. In this example, the audio alarm has been pre-silenced and a countdown timer within the button shows the remaining time. By default only the necessary parameters to control SIMV are visible.



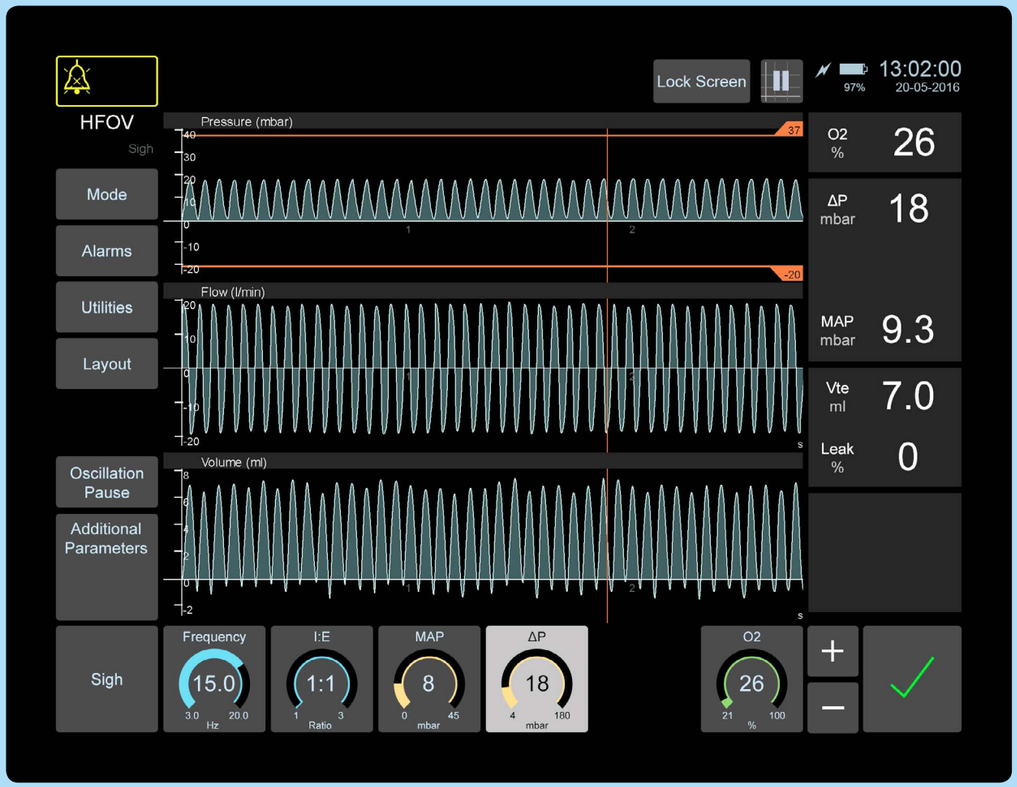
A lung mechanics screen shows additional data - in this case two loops. A secondary column of data can be shown when required.

An alarm screen gathers all alarm settings in one place. Alarming parameters will show as cyan, yellow or red depending upon priority.

# Intuitive Interface

All parameters are trended and can be shown on the trend screen. A maximum of 14 days can be recalled and then scrolled and zoomed.

Non-invasive ventilation can be as easy as invasive ventilation, with parameter controls only appearing when they are required.




Switching to HFOV is a button-push away, and does not require any changes to the patient circuit. Parameter controls have changed to reflect the new mode. The ‘Additional Parameters’ button can display secondary controls for this mode. Selecting any parameter activates the + and - keys to adjust the parameter value.


# Valveless Technology

Many of SLE's engineering innovations have been incorporated into the SLE6000, including the unique SLE 'valveless' system.

- The valveless system uses bidirectional jets that give fast, accurate control of the airflow.
- The elimination of an expiratory valve means there is no diaphragm that can become sticky, causing inadvertent pressures. It also means that expiratory valves cannot be lost or misassembled prior to use.
- No expiratory valve also means less servicing and easier cleaning.



# Buy with Confidence

With the world of ventilation continuously changing, the SLE6000 has been conceived as a modular system – capable of adapting to new respiratory therapies as they emerge.

The standard chassis is split into pneumatic and electronic sections, with each able to accommodate future upgrades as technology develops. For instance, the electronics section is controlled by a powerful microprocessor that can easily incorporate new features such as $SpO_2$ or $CO_2$ monitoring.

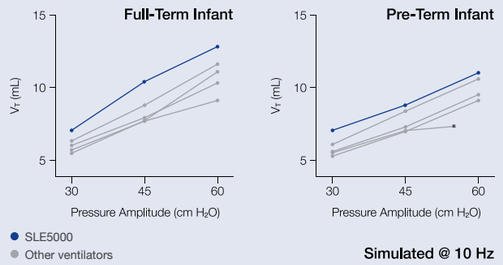
The software is also modular, with new modes added quickly and easily by your local engineer (through a USB port), so your SLE6000 will continue to meet your clinical requirements well into the future.

From the durable casing through to the medical grade aluminium used in the chassis (not to mention the rigorous testing), the SLE6000 has also been built to last structurally, further reducing its 'total life costs' – which our customers have long recognised as a big plus with SLE ventilators.

## References

**1 :** Harcourt ER, John J, Dargaville PA, Zannin E, Davis PG, Tingay DG.
**Pressure and flow waveform characteristics of eight high-frequency oscillators**
*Pediatr Crit Care Med. 2014 Jun;15(5):e234-40*

**2 :** Grazioli S, Karam O, Rimensberger PC.
**New generation neonatal high frequency ventilators: effect of oscillatory frequency and working principles on performance**
*Respir Care. 2015 Mar;60(3):363-70. doi: 10.4187/respcare.03048. Epub 2014 Nov 18*




**3 :** Peng WS, Zhu HW, Shi H, *et al*.
**Volume-targeted ventilation is more suitable than pressure-limited ventilation for preterm infants: a systematic review and meta-analysis**
*Arch Dis Child Fetal Neonatal Ed 2014;99: F158–F165.*

**4 :** Thomas T. Lai, MD, Cynthia F. Bearer, MD, PhD.
**Iatrogenic Environmental Hazards in the Neonatal Intensive Care Unit**
*Clin Perinatol 35 (2008) 163–181*

## Modes

- **Conventional Ventilation:**
  *CPAP, CMV, SIMV, PTV & PSV, VTV (Volume Targeted Ventilation)*
- **HFOV:**
  *HFOV, HFOV+CMV*
- **NIV:**
  *nCPAP, NIPPV, nHFOV*
- **High Flow Oxygen Therapy**

## Key features & specifications

- *Ventilate patients up to 30 kg*
- *Unique Lunar™ interface*
- *Sharp 12.1'' colour LED touch-screen*
- *V/P, F/P, F/V loops available, with 'store' function*
- *Compact, single-box design*
- *Typical 3+ hour battery life (in all modes) in normal use*
- *24V DC input*
- *14 day data trending*
- *Screen capture*
- *Proximal flow sensor*
- *Flow and pressure breath detection*
- *Nebuliser interface*
- *RS232, VGA, USB, Ethernet*

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# SLE6000 Data Sheet

## Specifications (V1.0 software)

The SLE6000 is a high-specification, compact infant ventilator that offers a range of conventional modes with additional options for non-invasive ventilation (NIV), high frequency oscillation ventilation (HFOV) and high flow oxygen therapy. The unique Lunar™ interface is easy to learn and easy to use, and is designed to minimise glare and light overspill into the NICU environment.

### *Invasive Ventilation Modes*

| ▶ CPAP | |
|---|---|
| Inspiratory Time (Ti) | 0.1 to 3.0 seconds |
| CPAP | 0 to 35 mbar |
| PIP | 0 to 65 mbar |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| RR Backup | 1 to 150 BPM |
| Rise Time | 0.1 to 3.0 seconds |
| Trigger Sensitivity<br>with flow sensor:<br>without flow sensor: | <br>0.2 to 20 l/min<br>1 to 100% |

| ▶ CMV | |
|---|---|
| Respiratory Rate (RR) | 1 to 150 BPM |
| Inspiratory Time (Ti) | 0.1 to 3.0 seconds |
| PEEP | 0 to 35 mbar |
| PIP | 0 to 65 mbar |
| Volume Targeted Ventilation (VTV) | 2 to 300 ml † |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| Rise Time | 0.1 to 3.0 seconds |

| ▶ PTV & PSV | |
|---|---|
| Respiratory Rate (RR) | 1 to 150 BPM |
| Inspiratory Time (Ti) | 0.1 to 3.0 seconds |
| PEEP Pressure | 0 to 35 mbar |
| PIP Pressure | 0 to 65 mbar |
| Volume Targeted Ventilation (VTV) | 2 to 300 ml † |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| Rise Time | 0.1 to 3.0 seconds |
| Trigger Sensitivity<br>with flow sensor:<br>without flow sensor: | <br>0.2 to 20 l/min<br>1 to 100% |
| Termination Sensitivity (% of peak insp flow) (PSV only) | 5 to 50% |

| ▶ SIMV | |
|---|---|
| Respiratory Rate (RR) | 1 to 150 BPM |
| Inspiratory Time (Ti) | 0.1 to 3.0 seconds |
| PEEP | 0 to 35 mbar |
| PIP | 0 to 65 mbar |
| Volume Targeted Ventilation (VTV) | 2 to 300 ml † |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| Rise Time | 0.1 to 3.0 seconds |
| P Support | 0 to 65 mbar |
| Trigger Sensitivity<br>with flow sensor:<br>without flow sensor: | <br>0.2 to 20 l/min<br>1 to 100% |
| Termination Sensitivity (% of peak insp flow) | 5 to 50% |
| *Termination Sensitivity parameter is not shown when pressure support (P Support) is off.* | |

| ▶ HFOV | |
|---|---|
| Frequency | 3 to 20 Hz |
| I:E Ratio | 1:1 / 1:2 / 1:3 |
| MAP | 0 to 45 mbar |
| Delta P | 4 to 180 mbar |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| Sigh RR | 1 to 150 BPM |
| Sigh Ti | 0.1 to 3.0 seconds |
| Sigh P | 0 to 45 mbar |

| ▶ HFOV+CMV | |
|---|---|
| Respiratory Rate (RR) | 1 to 150 BPM |
| Inspiratory Time (Ti) | 0.1 to 3.0 seconds |
| Frequency | 3 to 20 Hz |
| PEEP | 0 to 35 mbar |
| PIP | 0 to 65 mbar |
| Delta P | 4 to 180 mbar |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| HFO Waveform | Oscillation on both high and low cycles or Oscillation on low cycle only. |
| Oscillation pause | 60 seconds |

† *VTV control, when enabled, becomes Vte Target control.*

### *Non-Invasive Ventilation Modes*

| ▶ nCPAP D (Dual Limb)<br>*for passive nCPAP interfaces e.g. SLE Miniflow* | |
|---|---|
| Inspiratory Time (Ti) | 0.1 to 3.0 seconds |
| CPAP | 0 to 35 mbar |
| PIP | 0 to 65 mbar |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| RR Backup | 1 to 150 BPM |
| Rise Time | 0 to 3.0 seconds |
| Trigger Sensitivity | 1 to 100% |

| ▶ NIPPV D (Dual Limb) | |
|---|---|
| Respiratory Rate (RR) | 1 to 150 BPM |
| Inspiratory Time (Ti) | 0.1 to 3.0 seconds |
| PEEP | 0 to 35 mbar |
| PIP | 0 to 65 mbar |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| Rise Time | 0 to 3.0 seconds |

| ▶ nHFOV D (Dual Limb) | |
|---|---|
| Frequency | 3 to 20 Hz |
| I:E Ratio | 1:1 / 1:2 / 1:3 |
| Mean Airway Pressure | 0 to 45 mbar |
| Delta P | 4 to 180 mbar |
| $O_2$ Concentration | 21 to 100% |
| ▷ **Additional Parameters** | |
| Sigh RR | 1 to 150 BPM |
| Sigh Ti | 0.1 to 3.0 seconds |
| Sigh P | 0 to 45 mbar |

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## Misc. Specifications

| ▷ Power AC | |
|---|---|
| Mains Voltage | 100-240V / 50-60Hz |
| Power | 115 VA |
| Fuses (x2) | T2.5AH 250V (5x20 mm) |
| Battery Back-up | Typical 3+ hour battery life (in all modes) in normal use |
| Battery Charging | Full charge: 18 hours 80% charge: 8 hours |
| **▷ Power DC** | |
| Voltage | 24V 4A |
| **▷ Operating Environment** | |
| Temperature | +10°C to +40°C |
| Relative Humidity | 10-90% (non-condensing) |
| **▷ Dimensions** | |
| Size, ventilator only | w 330 mm x h 369 mm x d 548 mm |
| Height on Pole | 1140 mm |
| Weight (Ventilator only) | 20 kg |
| **▷ Pneumatic Connectors** | |
| Exhalation Port | 15 mm F / 22 mm M Conical (ISO5356-1) |
| Proximal Airway | 5 mm Non-conical |
| Fresh Gas Port | 15 mm M Conical (ISO5356-1) |
| Nebulizer Port (on rear) | 5 mm Non-conical |
| **▷ Classification (Electrical)** | |
| Type of protection against electric shock: | Class 1 |
| Degree of protection against electric shock: | Type BF, applied part |
| *Unit Must Be Earthed.* | |
| **▷ Connectors (Rear mounted)** | |
| RS232 Data port | |
| Video out port | |
| USB Power Port for nebuliser | |
| USB Data port | |
| Nurse Call | |
| 24V DC input | |
| SpO2 | |
| EtCO2 | |
| RJ45 Ethernet networking port | |
| **▷ IP Rating** | |
| Type of protection against ingress of water | IP21 |
| **▷ Environmental Storage Conditions** | |
| Ambient Temperature | -20°C to +50°C |
| Relative Humidity | 10% to 90% non-condensing |
| **▷ Sound levels** | |
| Sound pressure level | 49 dBA |

## Measurement

| ▷ Flow Sensor | |
|---|---|
| Flow Sensor Type: | *10 mm dual-hot-wire anemometer. Single-use or autoclavable sensors available. Sensor electrically isolated.* |
| Applied Part | Type BF |
| Flow Rate | 0.2 to 30 l/min |
| Accuracy | ±8% maximum |
| Dead Space | 1 ml |
| Weight | 10 g |
| **▷ Flow** | |
| Flow rate | 0 to 99 l/min |
| **▷ Volume** | |
| Expiratory Tidal Volume | 1 to 999 ml |
| Expiratory Minute Volume | 0 to 18 L |
| **▷ Measured Parameters** | |
| Leak | 0 to 99% |
| Respiratory Rate | 0 to 999 BPM |
| Compliance | 0 to 99.9 ml/mbar |
| C20/C | 0 to 9999 |
| Resistance | 0 to 999 mbar/l/second |
| Inspiratory Time | 0 to 9.99 seconds |
| Expiratory Time | 0 to 9.99 seconds |
| Vmin | 0 to 99.99 l |
| Trigger Resolution | 1 |
| Vte | 0 to 99.9 ml |
| DC02 | 0 to 9999 |
| I:E Ratio | 1:9.9 to 9.9:1 |
| Oxygen Concentration | 0 to 999% |
| Peak Pressure | 0 to 999 mbar |
| PEEP Pressure | 0 to 999 mbar |
| Mean Pressure | -999 to 999 mbar |
| Delta P | 9 to 999 mbar |
| *Above values are obtained under ATPD (ambient temperature and pressure, dry) conditions.* | |

## Gas

| ▷ Gas Supplies | |
|---|---|
| Oxygen | The ventilator requires a supply of medical grade oxygen between 2.8 to 6 bar |
| Air | The ventilator requires a supply of medical grade compressed air to ISO8573.1 Class 1.4.1 (minimum level of filtration) between 2.8 to 6 bar |
| **▷ Gas Flows** | |
| Variable Fresh Gas Flow | 5 to 30 l/min |
| Maximum Gas Flow | 85 l/min |

*The SLE6000 conforms to all relevant regulations and certifications in the countries in which it is sold.*

*See the 'Instructions for Use' for the full range of specifications.*

*The contents and specifications of this data sheet were correct at the time of writing. Specifications are subject to change without notice.*

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