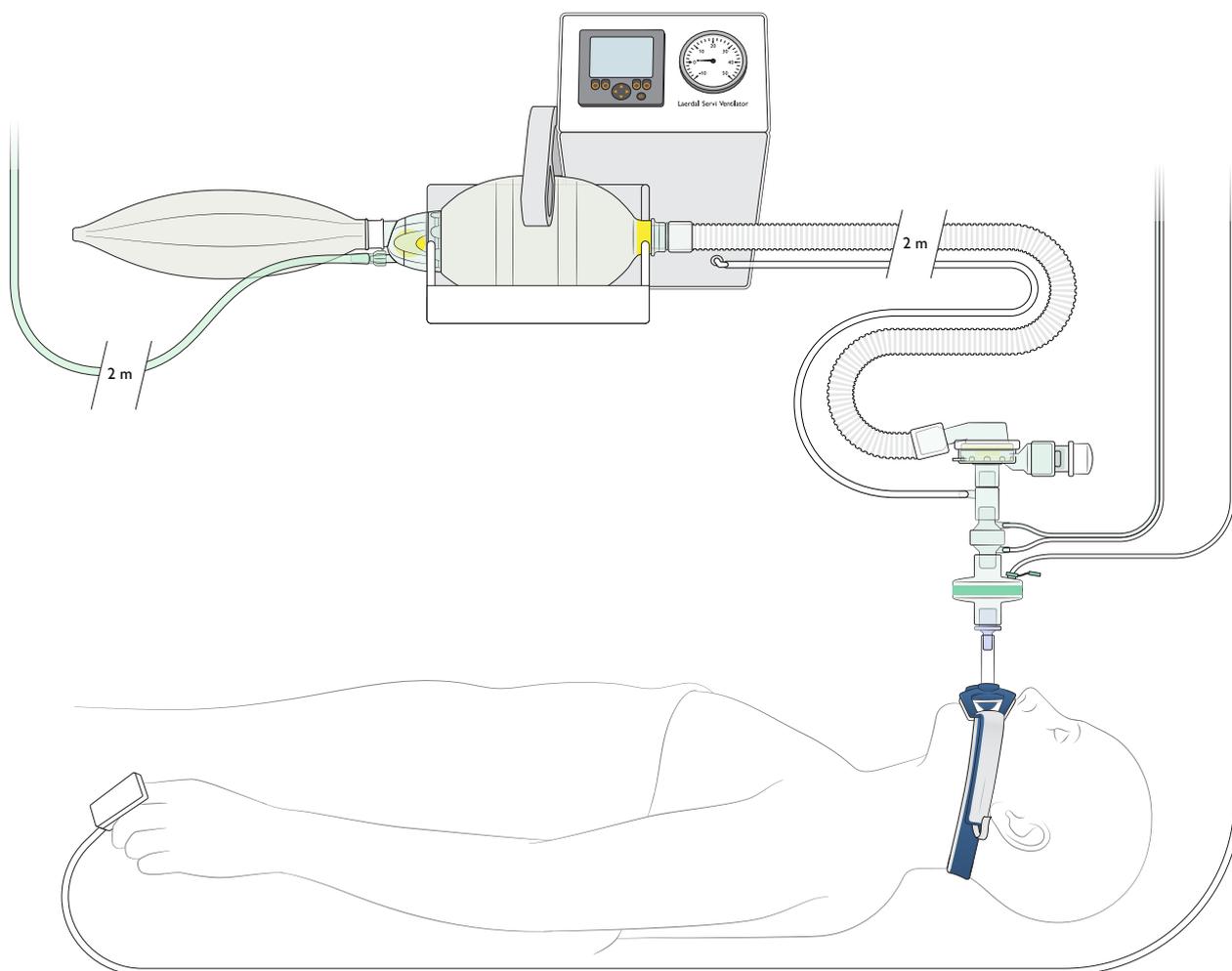


Laerdal Servi Ventilator

Technical Data Sheet



Description

Laerdal Servi Ventilator (LSV) is a basic critical care ventilator that is designed for simplicity in use and for sustainability in equipment-constrained settings. It provides two modes of ventilation:

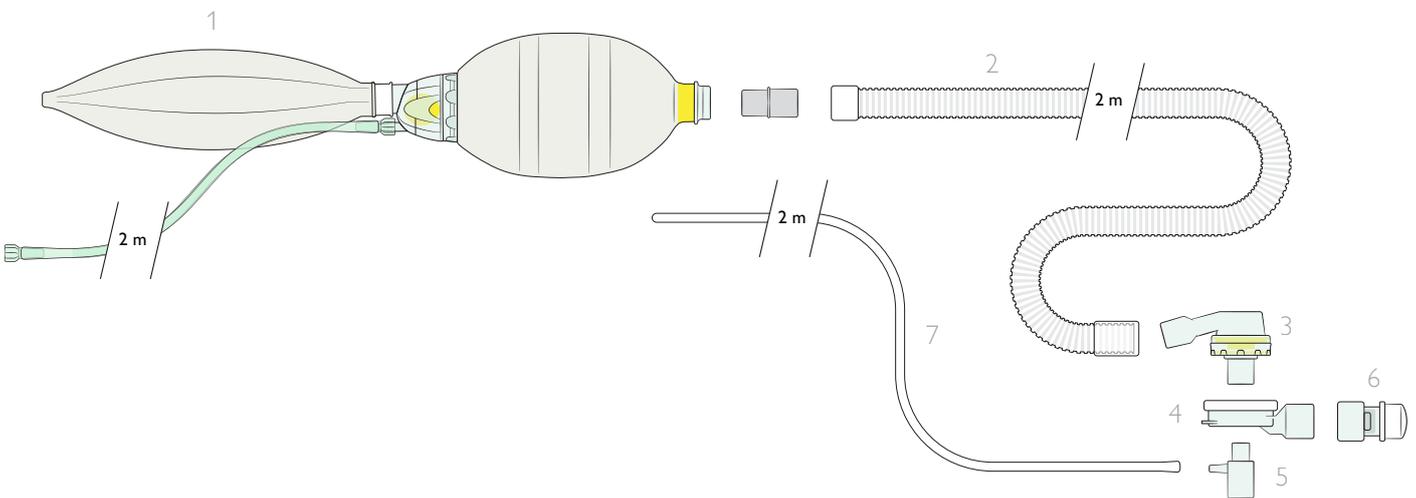
- Volume-Controlled Ventilation
- Volume-Assisted Ventilation (To be evaluated)

Simplicity in use

- LSR is a commonly used operator-powered resuscitator with known accessory types. All ventilatory functions are transparent or visible and are easy to explain.
- The Compression Unit's user interface has simple parameter adjustments.
- ICU staff can be trained in full use of LSV in < 30 minutes.
- Non-specialist staff under supervision may be trained in monitoring the LSV.

Ventilator Breathing System

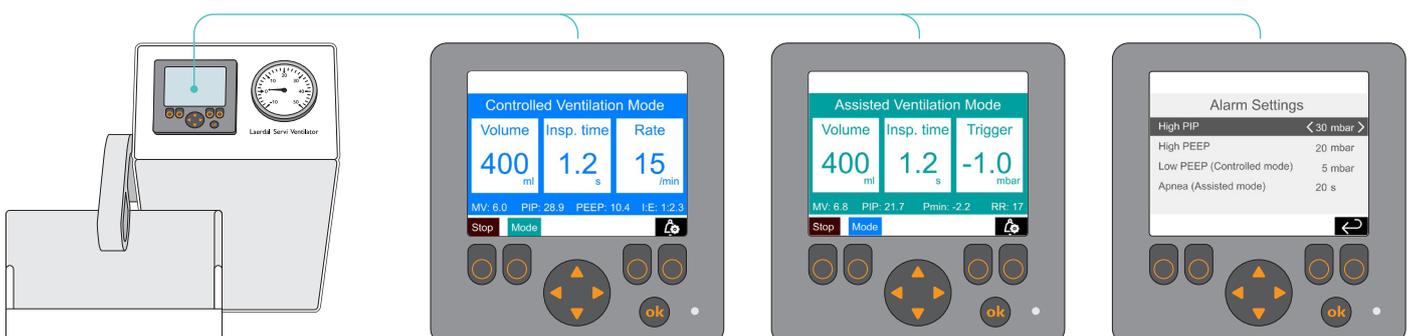
The Ventilator Breathing System (VBS) utilizes the Laerdal Silicone Resuscitator (LSR) for providing positive-pressure ventilation with PEEP, FiO₂ and pressure limitation. An HME Filter is added to retain patient's lung humidity and protect the environment from contaminated air. The VBS can be pre-assembled and tested externally before insertion into the Compression Unit.



1. Oxygen tubing and reservoir kit
2. Extension tube, 2 m
3. Patient Valve
4. Exhalation port Ø 30 mm
5. Manometer connector
6. PEEP valve, adjustable 0-20 mbar
7. connecting tube

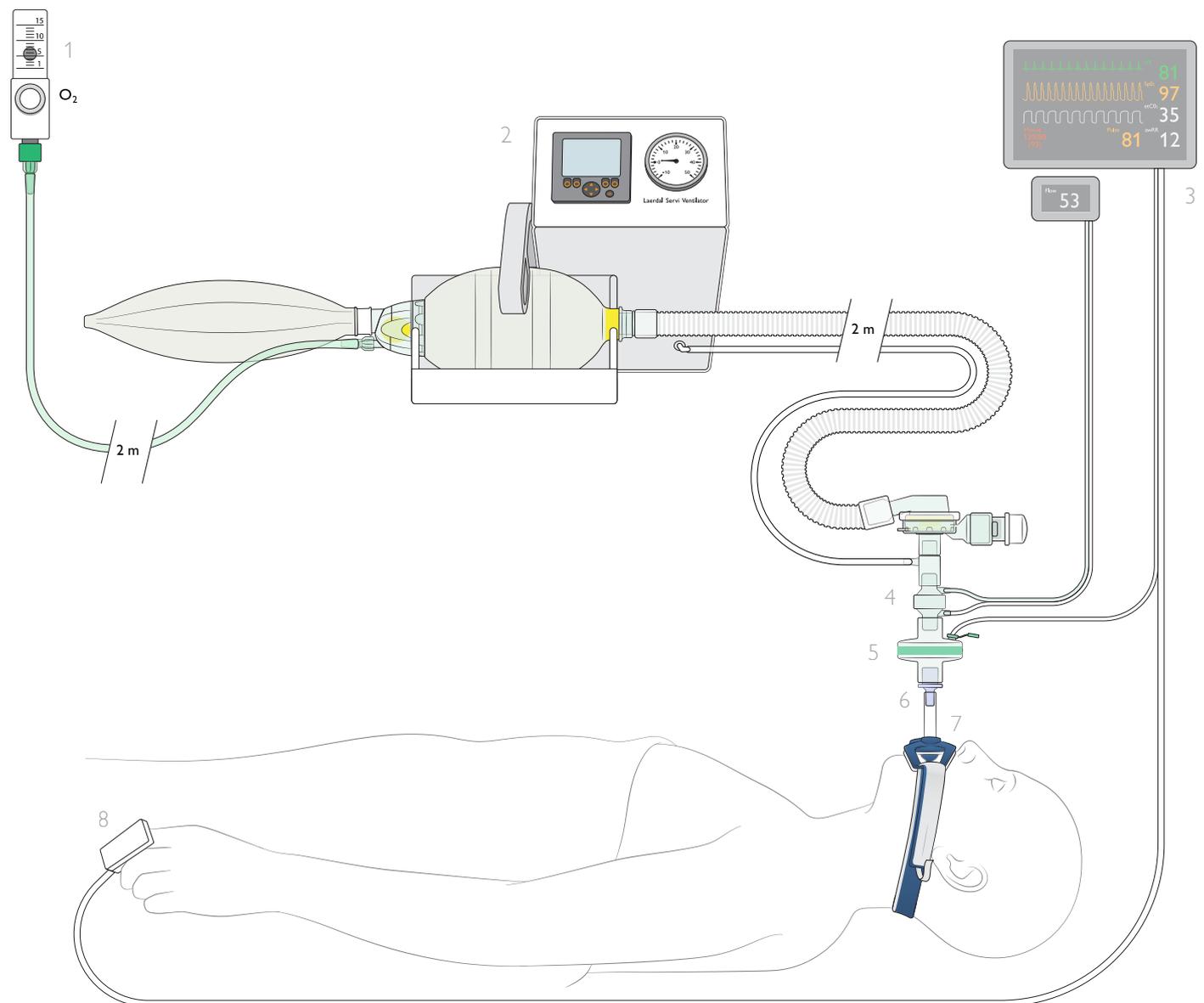
The Compression Unit

The Compression Unit cradles the resuscitator and compresses its bag with non-linear speed, as computed from operator-set parameters for tidal volume, inspiratory time and rate, and with a constant-to-decelerating flow profile. The user interface menu system has two mode pages and one alarm-settings page.



Patient Monitoring

Patient Monitoring with physiological-based alarms is not provided and must be established by other devices. Pulse oximetry may provide a minimum of monitoring and alarms, while oxygen and flow measurement sensors must be connected into the VBS circuit to comply with ISO 80601-2-12 requirements.



- | | | |
|------------------------------------|------------------------|---------------------------|
| 1. Oxygen flow regulator | 4. Oxygen flow adaptor | 7. Tube holder |
| 2. Compression Unit | 5. HME filter | 8. SpO ₂ probe |
| 3. Patient Monitor and flow sensor | 6. Intubation tube | |

Component supply & sustainability

- LSR components are reusable at >100 cycles of steam autoclaving (sterilization). Spare parts are available.
- Use-organization reprocesses and function tests breathing system before patient use.
- Required consumables:
 - Standard HME-filter also in use at hospitals.
- Single-use components which have reusable alternatives:
 - 2-meter breathing system tube, 22 mm diameter. Similar alternatives available in hospitals (TBD),
 - PEEP valve
- Compression Unit does not need external service or calibration.
- Long-term storage when there is interval inspection/charging of battery, and consumables expiry date control.

Known restrictions:

- Invasive (endotracheal) use only.
- Tidal volume only ≥ 200 ml
- Airway pressure not above >50 mbar
- Closed-catheter suctioning suction while maintaining PEEP is not feasible.

Specifications

Compression Unit		
Runs on mains electricity with >30 min battery backup.		
Compression parameters:	Tidal Volume:	200-800 ml
	Inspiration time:	0.5 – 2.0 s
	Controlled Ventilation:	Ventilation Rate: 5-30 /min
	Assisted ventilation:	Trigger pressure: -0.5 to 10 mbar. Adjustable apnea alarm before converting to Controlled Ventilation Mode
Motor cannot provide airway pressure above 80 mbar (safety).		
Airway pressure monitoring:	Digital pressure sensor for alarms.	
	Analog manometer -10 to +50 mbar for direct observation.	
Audible and visual alarms:	Too high PIP (adjustable threshold 25 – 50 mbar)	
	Too high PEEP (adjustable threshold 5 – 25 mbar)	
	Too low PEEP (adjustable threshold 0 – 10 mbar)	
	Disconnection in the airway system (too low pressure change)	
	Apnea alarm in assisted ventilation mode (adjustable threshold 15 – 30 s)	
	Technical alarms (e.g. loss of mains or overheating)	

VBS
PEEP adjustable 0-20 mbar
PIP limited to approx. max. 35 mbar / lockable with clip.
FiO ₂ up to 100% from external oxygen flow regulator (3-15 LPM input).
Table for minute-volume combinations of FiO ₂ from 0.21-1.0.

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