

HAMILTON·S1

Technical Specifications

INTELLiVENT®-ASV	Fully closed loop ventilation solution, automatic MinVol, PEEP and FiO ₂ adjustment, based on physiological patient conditions
Ventilation Cockpit	
Dynamic Lung	Real-time visualization of the lungs with representations of tidal volume, lung compliance, resistance, and patient activity including haemodynamic status, cuff pressure
Vent Status	Visual representation of ventilator dependency and weaning progress, grouped into oxygenation, CO ₂ elimination, and patient activity
ASV target graphics	Graphic display of target and actual parameters for tidal volume, frequency, pressure, and minute ventilation
INTELLiVENT	Ventilation & Oxygenation Horizon™ Ventilation & Oxygenation Map™, Guide™
Numeric monitoring	50 monitoring parameters can be displayed (see Monitoring parameters)
Real-time waveforms/loops	Simultaneous display of up to 8 waveforms or up to 4 loops based on: volume, flow, airway pressure, auxiliary pressure (esophageal pressure) or CO ₂ , reference loops
Trending	Simultaneous display of up to 10 parameter trends, selected from all 50 monitoring parameters, for 1, 3, 12, 24 or 96 hours
Others	Graphic curve freeze and cursor function, inspiratory and expiratory hold. Layout can be configured with combinations of the graphic displays described above. User configurable default graphics layout.
Controls	
Ventilation modes	(S)CMV, SIMV, SPONT, ASV, P-CMV, P-SIMV, APVcmv, APVsimv, DuoPAP, APRV, NIV, NIV-ST, nCPAP-PS (optional)
Special functions	Nebulizer, manual breath, O ₂ enrichment, standby, sigh, apnea backup ventilation, tube resistance compensation (TRC), optional heliox application
Patient types	Adult, pediatric, infant/neonatal (optional)
Patient gender	Male, female
Patient height	Adult (130 to 250 cm), pediatric (30 to 150 cm)
(S)CMV and P-CMV rate	1 to 150 b/min
SIMV, P-SIMV, DuoPAP rate	1 to 80 b/min
Tidal volume/target tidal volume	2 to 2000 ml
PEEP/CPAP (P low)	0 to 50 cmH ₂ O (DuoPAP and APRV)
Oxygen	21 to 100%
I:E ratio	1:9 to 4:1
Inspiratory time (Ti)*	0.1 to 10 s (10 to 80% of cycle time)
Pause time	0 to 8 s (0 to 70% of cycle time)
Peak flow	1 to 180 l/min
T low (APRV)	0.1 to 30 s
T high (DuoPAP and APRV)	0.1 to 30 s
Pressure trigger	0.1 to 10 cmH ₂ O below PEEP/CPAP
Flow trigger	0.1 to 15 l/min
Automatic base flow	2 to 30 l/min, depending on flow trigger setting
Pressure control	3 to 100 cmH ₂ O, added to PEEP/CPAP



Pressure support	0 to 100 cmH ₂ O, added to PEEP/CPAP
P high (DuoPAP and APRV)	0 to 50 cmH ₂ O
Pressure ramp	25 to 200 ms
Expiratory trigger sensitivity (ETS)	5 to 70 % of inspiratory peak flow
% minute volume (ASV)	25 to 350 %
Cuff pressure	5 to 50 cmH ₂ O (optional)
Flow patterns	Sine, square, 100 % decelerating, 50 % decelerating
Additional Features	IntelliTrig – Automatic leakage compensation, Integrated Aeroneb nebulizer, CO ₂ , SpO ₂ ,
Pulmonary function assessment	
P/V Tool Pro	Automatic maneuver for static compliance assessment and lung recruitment including transpulmonary pressure
Alarms	
Operator-adjustable	Low/high minute volume, low/high pressure, low/high tidal volume, low/high rate, apnea time, low/high PetCO ₂ , low/high SpO ₂ quality, %leak
Special alarms	Oxygen concentration, disconnection, loss of PEEP, exhalation obstruction, SpO ₂ , HLI, check settings, Flow Sensor alarms, ASV/APV, CO ₂ , power supply, batteries, gas supplies, cuff leakage
Loudness	Adjustable (1-10)
Event log	Storage and display of up to 1000 events with date and time stamp
Standards	IEC 60601-1, IEC 60601-1-2, IEC 60601-2-12, EN 794-1, C22.2 No. 601.1, UL 60601-1
Options	Infant/neonatal application, heliox application, communications interface including 2 x RS-232C ports, remote nurse call and I:E ratio, integrated power strip, extended hot-swappable batteries, IntelliCuff (cuff pressure controller)

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Configurations and dimensions



Ventilation modes			Infant/neonatal capability	Physical dimensions		Electrical and gas supplies	
Type	Mode	Description		Size	See above (right)	Input voltage	100 to 240 V ~ ±10%, 50/60 Hz
Fully closed-loop control	INTELLiVENT®-ASV	Fully closed loop ventilation ventilation and oxygenation based etCO ₂ , RR and SpO ₂		Weight	57 kg (125.6 lb) with standard trolley, 42 kg (92.6 lb) with shelf mount	Power consumption	210 VA maximum
Closed-loop control	ASV	Adaptive support ventilation. Guaranteed minute volume with variable tidal volume and respiratory rate (based on user settings, application of lung-protective rules)		Display (detachable)	15 in., TFT color, backlit, touchscreen, 3 m (10 ft) cable	Backup battery time	1 hour typical with internal battery. 1 hour each optional hot-swappable extended battery
Adaptive	APVcmv	Adaptive pressure ventilation + CMV	✓	Main patient outlet	ISO 22M/15F	Oxygen, Heliox and air supplies	200 to 600 kPa (29 to 86 psi)
	APVsimv	Adaptive pressure ventilation + SIMV	✓	Air and oxygen inlets	DISS male, NIST (option), adapter for heliox, adapter for NF (option)	Environment	
Pressure	P-CMV	Pressure-controlled mandatory ventilation	✓			Temperature	10 to 40 °C (operating), -10 to 60 °C (storage)
	P-SIMV	Pressure-controlled synchronized intermittent mandatory ventilation	✓			Humidity	30 to 75% noncondensing (operating), 5 to 85% noncondensing (storage)
	SPONT	Pressure support ventilation with bidirectional backup	✓			Altitude	Up to 3000 m (11,483 ft), automatically adjusted
	DuoPAP	Dual positive airway pressure (biphasic positive airway pressure)	✓			Interface connectors	
	APRV	Airway pressure release ventilation	✓			USB and CompactFlash for screenshots, DVI with VGA output, RJ45	
Volume	(S)CMV	(Synchronized) controlled mandatory ventilation					
	SIMV	Synchronized intermittent mandatory ventilation					
Noninvasive	NIV	Noninvasive ventilation with bidirectional backup					
	NIV-ST	Noninvasive ventilation with mandatory rate					
	nCPAP-PS	Synchronized nasal CPAP for infants/neonates (optional)	✓				

Type	Parameter	Unit	Description	Numeric		Dynamic		
				monitoring/ Trending	Waveform/ Loops	Vent Status	Lung (visual)	
Pressure	Paw	cmH ₂ O or mbar	Real time airway pressure		✓			
	Paux	cmH ₂ O or mbar	Real time auxiliary pressure		✓			
	Ppeak	cmH ₂ O or mbar	Peak airway pressure	✓				
	Pmean	cmH ₂ O or mbar	Mean airway pressure	✓				
	Pminimum	cmH ₂ O or mbar	Minimum airway pressure	✓				
	Pplateau	cmH ₂ O or mbar	Plateau airway pressure	✓				
	PEEP/CPAP	cmH ₂ O or mbar	Positive-end expiratory pressure / cont. positive airway pressure	✓		✓		
	Pcuff	cmH ₂ O or mbar	Cuff pressure	✓			✓	
	Pinsp	cmH ₂ O or mbar	Inspiratory pressure			✓		
Flow	Flow	l/min	Real time inspiratory/expiratory flow		✓			
	Insp Flow	l/min	Peak inspiratory flow	✓				
	Exp Flow	l/min	Peak expiratory flow	✓				
Volume	Volume	ml	Real time tidal volume		✓		✓	
	VTE/VTEspont/VTI	ml	Expiratory tidal volume / Spont VTE / Inspiratory tidal volume	✓				
	ExpMinVol/MVspont	ml	Expiratory minute volume / Spont minute vol.	✓		✓		
	VLeak	ml/%	Leakage volume at the airway	✓				
	VT/IBW	ml/kg	Ratio of tidal volume and ideal body weight to avoid excessive VT	✓				
Time	I:E		Inspiratory / expiratory ratio	✓			✓	
	fTotal	b/min	Total breathing frequency	✓			✓	
	fSpont	b/min	Spontaneous breathing frequency	✓				
	TI	s	Inspiratory time	✓			✓	
	TE	s	Expiratory time	✓			✓	
	VariIndex	%	Index of spontaneous respiratory rate variability			✓		
	%fSpont	%	Percentage of spontaneous breathing rate			✓		
	Lung mechanics	Cstat	ml / cmH ₂ O	Static compliance	✓			✓
PO.1		cmH ₂ O or mbar	Airway occlusion pressure	✓		✓		
AutoPEEP		cmH ₂ O or mbar	AutoPEEP or intrinsic PEEP	✓				
PTP		cmH ₂ O*s	Pressure time product	✓				
RCexp		s	Expiratory time constant	✓				
RCinsp		s	Inspiratory time constant	✓				
Rexp		cmH ₂ O / l/s	Expiratory flow resistance	✓				
Rinsp		cmH ₂ O / l/s	Inspiratory flow resistance	✓			✓	
RSB		1/l*min	Rapid shallow breathing index	✓		✓		
WOBimp		J/l	Imposed work of breathing	✓				
Oxygen	Oxygen	%	Airway oxygen concentration (FiO ₂)	✓		✓		
	CO ₂	CO ₂	mmHg/Torr/kPa/%	Real time CO ₂ measurement		✓		
FetCO ₂		%	Fractional end-tidal CO ₂ concentration	✓				
PetCO ₂		mmHg/Torr/kPa	End-tidal CO ₂ partial pressure	✓			✓	
SlopeCO ₂		%CO ₂ /l	V/Q status of the lung	✓				
Vtalv		ml	Alveolar tidal ventilation	✓				
V'alv		l/min	Alveolar minute ventilation	✓				
V'CO ₂		ml/min	CO ₂ elimination	✓				
VDaw		ml	Airway dead space	✓				
VDaw/VTE		%	Dead space fraction measured at the airway opening					
VeCO ₂		ml	Exhaled volume of CO ₂	✓				
ViCO ₂		ml	Inspired volume of CO ₂	✓				
SpO ₂		Plethysmogram		Real time plethysmogram		✓		
		SpO ₂	%	Saturation (pulse oximetry)	✓			✓
	SpO ₂ /FiO ₂	%	SpO ₂ /FiO ₂ ratio as approximation to PaO ₂ /FiO ₂ ratio	✓				
	HLI	%	Heart Lung Interaction Index (non-invasive information about hemodynamic status of the patient)	✓			✓	
Pulse	1/min	Pulse rate	✓			✓		

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