HAMILTON-C2

Technical specifications

The HAMILTON-C2 mechanical ventilator is a universal ventilation solution for all patient groups. The HAMILTON-C2's compact design and independence from external power and air supplies allow for maximum mobility throughout the hospital. The integrated high-performance turbine guarantees top performance even with noninvasive ventilation.

- Ventilation of adults, children, and neonates
- Tidal volumes as low as 2 ml
- > 7 h of battery operating time
- Independent air supply
- Advanced ventilation modes including ASV®
- High-performance NIV ventilation

For more information, visit our website: **www.hamilton-medical.com/C2**

Swiss Quality

HAMILTON MEDICAL
Intelligent Ventilation since 1983

Technical specifications

Ventilation Cockpit

Dynamic Lung	Real-time visualization of the lungs with representations of tidal volume, lung compliance, resistance, and patient activity
Vent Status	Visual representation of ventilator dependency, grouped into oxygenation, CO_2 elimination, patient activity
ASV target graphics	Graphic display of target and actual parameters for tidal volume, frequency, pressure, patient activity, and minute ventilation
Monitoring	Display of 41 monitoring parameters
Real-time waveforms	Paw, Flow, Volume, Ptrachea, CO_2 [1)]
Others [1)]	Loops: P-V, V-Flow, P-Flow, V-FCO_2 [1)], V-PCO_2 [1)], Trends: 1, 6, 12, 24, and 72 hours

Alarms

Operator adjustable	Low/high minute volume, low/high pressure, low/high tidal volume, low/high rate, apnea time, low/high oxygen, low/high $PetCO_2$ [1)]
Special alarms	O_2 cell, disconnection, exhalation obstructed, loss of PEEP, pressure not released, flow sensor, pressure limitation, performance limited, battery, power supply, gas supply, oxygen concentration, ASV
Loudness	Adjustable (1 – 10)

Ventilation Modes

Type	Mode	Description	Adult/Ped.	Neonatal [1)]
Closed-loop control	ASV	Adaptive Support Ventilation. Guaranteed minute volume based on user settings and application of lung-protective rules.	✓	
Pressure	PCV+	Pressure-controlled ventilation. Biphasic breathing	✓	✓
	PSIMV+	Pressure-controlled synchronized intermittent mandatory ventilation	✓	✓
	SPONT	Pressure support ventilation	✓	✓
	APRV	Airway pressure release ventilation	✓	✓
	DuoPAP	Duo positive airway pressure	✓	✓
Volume	(S)CMV+/APVcmv	(Synchronized) controlled mandatory ventilation	✓	✓
	SIMV+/APVsimv	Synchronized intermittent mandatory ventilation	✓	✓
Noninvasive	NIV	Noninvasive ventilation	✓	✓
	NIV-ST	Spontaneous / timed noninvasive ventilation	✓	✓
	nCPAP-PS [1)]	Nasal continuous positive airway pressure - pressure control		✓

Maintenance

Blower lifetime	Dynamic lifetime surveillance; typically 8 years. 5 year warranty.

[1)] Optional - not available in all markets

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Standards	IEC 60601-1, IEC 60601-1-2, ISO 80601-2-12, CAN/CSA-C22.2 No. 601.1, UL 60601-1
Configurations	
Options [1)]	Neonatal ventilation, nasal CPAP, volumetric mainstream capnography, sidestream capnography
Electrical and gas supplies	
Input voltage	100 to 240 VAC, 50 / 60 Hz or 12 to 24 V DC
Power consumption	50 W typical, 150 W maximum
Backup battery time	7 h typical with 2 Li-Ion batteries / hot swappable
Oxygen supply	280 to 600 kPa (41 to 87 psi), V´max 120 l/min
Low pressure oxygen	≤15 l/min, max. 600 kPa for low pressure
Air supply	Integrated ultra-quiet turbine
Degree of protection	IP21
Environment	
Temperature	Operating: 5°C to 40°C (41°F to 104°F) Storage: -20°C to 60°C (-4°F to 140°F)
Humidity	10% to 95%, noncondensing (operating and storage)
Altitude	Up to approx. 4,000 m (13'120 ft), 1,100 to 600 hPa
Interface connectors	USB, RS-232, nurse call, CO_2
Event log	Storage and display of up to 1,000 events with date and time
IntelliTrig	
Leak compensation	Automatic response to varying leaks and configurable trigger sensitivity in all modes Inspiratory leakage up to 85 l/min, expiratory leakage up to 30 l/min
IntelliSync	Guaranteed rate ventilation

[1)] Optional - not available in all markets

Technical specifications

Controls

Type	Adult / Pediatric	Neonatal [1]
Special functions	Manual breath, O_2 enrichment, standby, sigh, screen lock, apnea backup ventilation, inspiratory hold, print screen, suctioning tool, dimmable screen, configurable quick-start settings, start up settings based on patient height and gender, integrated pneumatic nebulizer, tube resistance compensation TRC, reference loops	Manual breath, O_2 enrichment, standby, screen lock, apnea backup ventilation, inspiratory hold, print screen, dimmable screen, configurable quick-start settings, start up settings based on patient weight and gender, tube resistance compensation TRC, reference loops
Ventilation modes	See page 2, Ventilation modes	See page 2, Ventilation modes
Patient groups	adult / pediatric	neonatal
Patient height	30 to 250 cm	-
Patient gender	male / female	-
Patient weight	-	0.2 to 30 kg
Respiratory rate		
(S)CMV+/APVcmv	4 to 80 b/min	15 to 150 b/min
SIMV+/APVsimv+	1 to 80 b/min	1 to 150 b/min
PCV+	4 to 80 b/min	15 to 150 b/min
NIV-ST	5 to 80 b/min	15 to 150 b/min
PSIMV+	5 to 80 b/min	15 to 150 b/min (without IntelliSync 5 to 150 b/min)
DuoPAP	1 to 80 b/min	1 to 150 b/min
APRV	1 to 80 b/min	1 to 150 b/min
nCPAP-PS[1]	-	15 to 150 b/min
Tidal volume	20 to 2,000 ml	2 to 300 ml
PEEP/CPAP	0 to 35 cmH_2O	0 to 25 cmH_2O
Oxygen	21% to 100%	21% to 100%
I:E ratio	1:9 to 4:1 (DuoPAP 1:599 to 149:1)	1:9 to 4:1 (DuoPAP 1:599 to 149:1)
%MinVol (ASV)	25% to 350%	-
Inspiratory time (TI)	0.1 to 12 s	0.1 to 12 s
Flow trigger	off, 1 to 20 l/min	off, 0.1 to 5 l/min
Pressure control	5 to 60 cmH_2O, added to PEEP/CPAP	3 to 60 cmH_2O, added to PEEP/CPAP
Pressure support	0 to 60 cmH_2O, added to PEEP/CPAP	0 to 60 cmH_2O, added to PEEP/CPAP
Pressure ramp	0 to 2,000 ms	0 to 600 ms
P high (APRV/DuoPAP)	0 to 60 cmH_2O	0 to 60 cmH_2O
P low (APRV)	0 to 35 cmH_2O	0 to 25 cmH_2O
T high (APRV/DuoPAP)	0.1 to 40 s	0.1 to 40 s
T low (APRV)	0.2 to 40 s	0.2 to 40 s
Expiratory trigger sensitivity (ETS)	5% to 80% of peak inspiratory flow	5% to 80% of peak inspiratory flow
Peak flow	up to 240 l/min	up to 240 l/min

[1] Optional - not available in all markets

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Monitoring parameters

Type	Parameter	Unit	Description	Numeric monitoring	Wave-forms	Vent Status	Dynamic Lung
Pressure	Paw	cmH_2O;mbar;hPa	Real-time airway pressure		✓		
	Ppeak	cmH_2O;mbar;hPa	Peak airway pressure	✓			
	Pmean	cmH_2O;mbar;hPa	Mean airway pressure	✓			
	Pinsp	cmH_2O;mbar;hPa	Inspiratory pressure			✓	
	PEEP/CPAP	cmH_2O;mbar;hPa	Positive end expiratory pressure/ continuous positive airway pressure	✓		✓	
	Ptrachea	cmH_2O;mbar;hPa	Real-time tracheal pressure		✓		
	Pplateau	cmH_2O;mbar;hPa	Plateau or end inspiratory pressure	✓	✓		
Flow	Flow	l/min	Real-time inspiratory flow		✓		
	Insp Flow	l/min	Peak inspiratory flow	✓			
	Exp Flow	l/min	Peak expiratory flow	✓			
Volume	Volume	ml	Real-time tidal volume		✓		✓
	VTE/VTE NIV	ml	Expiratory tidal volume	✓			
	VTI/VTI NIV	ml	Inspiratory tidal volume	✓			
	ExpMinVol/MinVol NIV	l/min	Expiratory minute volume	✓		✓	
	MVSpont/MVSpont NIV	l/min	Spontaneous expiratory minute volume Leakage minute volume	✓			
	Leak/MV Leak	%;l/min	Leakage percentage at the airway	✓			
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	✓			✓
	%fSpont	%	Percentage of spontaneous breathing rate			✓	
Lung mechanics	Cstat	ml/cmH_2O	Static compliance	✓			✓
	AutoPEEP	cmH_2O;mbar;hPa	AutoPEEP or intrinsic PEEP	✓			
	RCexp	s	Expiratory time constant	✓			
	Rinsp	cmH_2O*s/l	Inspiratory flow resistance	✓			✓
	RSB	1/l*min	Rapid shallow breathing index			✓	
	PTP	cmH_2O*s;mbar*s	Pressure-time product	✓			
	P0.1	cmH_2O;mbar;hPa	Airway occlusion pressure	✓			
Oxygen	O_2	%	Airway oxygen concentration (FiO_2)	✓		✓	
Carbon dioxide[1)]	CO_2	mmHg%	Real-time CO_2 measurement		✓		
	$FetO_2$	%	Fractional end-tidal CO_2 concentration	✓	✓		
	$PetCO_2$	mmHg;Torr;kPa	End-tidal CO_2 partial pressure	✓	✓		✓
	$SlopeCO_2$	%CO2/l	V/Q status of the lung	✓			
	VTalv	ml	Alveolar tidal ventilation	✓			
	VTaiv/min	ml	Alveolar minute ventilation	✓			
	V'CO_2/min	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	✓			

[1)] Optional - not available in all markets

Technical specifications

Accessories

Trolley accessories	Cylinder holder, humidifier support, tubing support arm, infusion poole
Compact transport solution	Bed mount and wall mount available
Adapter plate	Quick-lock adapter plate for various applications

Physical dimensions

Size	See illustrations below
Weight	9.5 kg (21 lb) without trolley
Display	10.4 in, TFT color, backlit, touch screen
Main patient outlet	ISO 5356-1; 22M/15F
Oxygen inlet (high pressure)	DISS or NIST male
Oxygen inlet (low pressure)	CPC quick coupling, 3.2 min ID

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