Critical care ventilation

AVEA® comprehensive ventilator specifications

The AVEA® comprehensive ventilator has integrated BICORE technology for advanced pulmonary monitoring. Front panel connection ports are provided for esophageal balloon catheters, tracheal catheters and proximal flow sensors. Heliox administration, Pflex, nCPAP and the unique scroll pump compressor come as standard features. External battery and VCO_2 are available options.
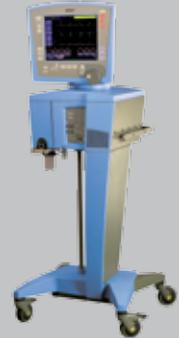
Setup

Leak compensation	ON, OFF
Circuit compliance compensation	0.0 to 7.5 ml/cmH₂O[1]
Humidifier compensation	Active, passive
Endotracheal tube	
Diameter	2.0 to 10.0 mm
Length	2.0 to 30.0 cm
Automatic tube compensation	ON, OFF
Patient setup	
Patient weight	0.1 to 300 kg
Patient ID	Alphanumeric 24 characters

Mode

Mode type	A/C, SIMV, CPAP/PSV, NPPV, nCPAP
Breath type	APRV/BiPhasic[1], Volume, Pressure, TCPL[2], PRVC[1]
Apnea backup	Volume, Pressure, TCPL[2]

Primary settings

Rate	1 to 150 bpm (neonatal, pediatric), 1 to 120 bpm (adult)
Tidal volume	2.0 mL to 2.5 L
Inspiratory pressure	0 to 80 cmH₂O (neonatal), 0 to 90 cmH₂O (adult, pediatric)
Peak flow	0.4 to 150 L/min
Inspiratory time	0.15 to 5.0 sec
Pressure support ventilation (PSV)	0 to 80 cmH₂O (neonatal), 0 to 90 cmH₂O (adult, pediatric)

Primary settings (continued)

PEEP	0 to 50 cmH₂O
Flow trigger	0.1 to 20 L/min
%O₂	21% to 100%
Pressure high[1] (in APRV mode)	0 to 90 cmH₂O
Time high[1] (in APRV mode)	0.2 to 30 sec
Time low[1] (in APRV mode)	0.2 to 30 sec
Pressure low[1] (in APRV mode)	0 to 45 cmH₂O

Manual controls

Manual breath	One breath
Expiratory hold	Maximum 20 sec (adult, pediatric), 3 sec (neonatal)
Inspiratory hold	Maximum 3 sec
Increase O₂	Set percentage O₂ + 0% to 79% O₂
Synchronized nebulizer	Available when peak flow > 15 L/min
Disconnect for suction	Active

Advanced settings

Bias flow	0.4 to 5.0 L/min
Volume limit	2.0 mL to 2.5 L
Inspiratory rise	1 to 9
Flow cycle	Off to 45%

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Advanced settings (cont.)

PSV rise	1 to 9
PSV cycle	5% to 45%
PSV TMAX	0.15 to 5.0 sec
Waveform	Square, decelerating
Sigh	ON, OFF[1]
Pressure trigger	0.1 to 20 cmH$_2$O
Demand flow	ON, OFF
Volumetric capnography[3]	EtCO$_2$ averaging 1 or 8 breaths, VCO$_2$ averaging 3, 6, 9 or 12 minutes

Electrical/pneumatic/input/output

Gas composition FiO$_2$	21% to 100%
Pneumatic input	
Air/heliox	20 to 80 psig (1.38 to 5.52 bar)
Compressor (internal)	0 to 9.5 psig (0.21 to 0.66 bar)
Oxygen	20 to 80 psig (1.38 to 5.52 bar)
Electrical	
A/C	100, 120, 230, 240 VAC; 47 to 65 Hz
D/C (internal/external battery)	20 to 29 VDC
Data I/O	
Analog inputs (x2)	0 to 1, 5 VDC
Video output	SVGA
Nurse call	Normally open or normally closed

Advanced patient monitoring

Proximal hot wire flow sensor[2]
Proximal variable orifice flow sensor (infant, pediatric, adult)
Proximal airway pressure monitoring
Tracheal pressure monitoring[1]
Esophageal pressure monitoring[1]
Volumetric capnography[3]

Maneuvers

AutoPEEP airway	(Automated) 0 to 50 cmH$_2$O
MIP/P100	(Automated) −60 to 120 cmH$_2$O
Slow flow (Pflex)	Automated

Advanced gas blending system

Air/oxygen blending	21% to 100%
Internal heliox blending system	All concentrations from 80/20 helium/oxygen to 0/100 helium/oxygen

Battery power

1 hour of ventilator use on internal battery (standard) or 30 minutes ventilator and compressor
4 hours of ventilator use on external battery[3] or 2 hours ventilator and compressor

Environmental/physical

Environmental temperature	
Storage	-20° to 60° C (-4° to 140° F)
Operating	5° to 40° C (41° to 104° F)
Barometric pressure	760 to 545 mmHg
Physical weight	
Ventilator (includes user interface module)	83 lbs (37.6 kg)
Ventilator and compressor (internal)	90 lbs (40.8 kg)
Physical size	
Pneumatic module	17"w x 10.5"h x 16"d (43.2 cm x 26.7 cm x 40.6 cm)
User interface module	16.25"w x 13.75"h x 2.5"d (41.3 cm x 35 cm x 6.4 cm)
Viewable size	12.1" (diagonal)
Resolution	800 x 600

Internal compressor

Internal scroll pump 7 lbs (3.2 kg)

Alarms

Vent Inop	Ventilator inoperative
Loss of gas	All gas sources lost
Circuit disconnect	Patient circuit disconnected
Ext. high Ppeak	High Ppeak longer than 5 seconds
Safety valve	Safety valve open
Circuit occlusion	Circuit occlusion
High Ppeak	High peak pressure

Alarms (continued)

Apnea interval	Apnea interval exceeded
Loss of O_2	Oxygen supply lost
Loss of air	Air supply lost
Loss of heliox	Heliox supply lost
Low battery	Internal/external batteries low
Loss of A/C	Main AC power lost
Low PEEP	Low PEEP cmH_2O
Low Ppeak	Low PIP cmH_2O
Low Vte	Low tidal volume
Low Ve	Low minute volume
Low %O_2	Low FiO_2 reading
High %O_2	High FiO_2 reading
ILV disconnect	Independent lung ventilation lost
Alarm test	Test alarm/set loudness
Invalid gas ID	Gas type ID bad or missing
High Ve	High minute volume
High rate	High breath rate
Max insp time	Inspiratory time limit exceeded
I:E limit	I:E ratio limit exceeded
Fan failure	Cooling fan failure
High Vt	High tidal volume
Vol limit	Volume limit exceeded
Low $EtCO_2$[3]	Low end tidal CO_2
High $EtCO_2$[3]	High end tidal CO_2
nCPAP pressure limit[2]	nCPAP pressure limit exceeded
Low nCPAP pressure[2]	Low nCPAP cmH_2O
High nCPAP pressure[2]	High nCPAP cmH_2O

Waveforms

P_{AW}	Airway pressure cmH_2O
Pinsp	Inspiratory (machine) cmH_2O
Flow	Airway flow l/m or ml/m
Vt	Airway volume liters or ml

Waveforms (continued)

Flow insp	Inspiratory flow L/min
Flow exp	Expiratory flow L/min
Analog 0	Analog input channel 0 (volts)
Analog 1	Analog input channel 1 (volts)
PCO_2 wave[3]	Capnogram

Loops

Flow-volume	Airway flow/airway volume
P_{AW}-volume	Airway pressure/airway volume
Pinsp-volume	Inspiratory (machine)/airway volume
Pes-volume[1]	Esophageal pressure/airway volume
Ptr-volume[1]	Tracheal pressure/airway volume
Ptp-volume[1]	Transpulmonary pressure/airway volume
PCO_2-Vte[3]	Exhaled CO_2/exhaled VT

Monitored parameters

Vte	Tidal volume, expired
Vte/kg	Vte normalized to patient weight
Vti	Tidal volume, inspired
Vti/kg	Vti normalized to patient weight
Spon Vt	Tidal volume, spontaneous
Spon Vt/kg	Spontaneous Vt normalized to patient weight
Mand Vt	Tidal volume, mandatory
Mand Vt/kg	Mandatory Vt normalized to patient weight
Vdel	Machine volume delivered
Leak	Difference, Vi and Vt, percent
Ve	Minute volume
Ve/kg	Ve normalized to patient weight
Spon Ve	Minute volume, spontaneous
Spon Ve/kg	Spontaneous Ve normalized to patient weight
Rate	Breath rate, total
Spon rate	Rate, spontaneous
Mand rate	Rate, mandatory

Monitored parameters (continued)

Ti	Time, inspiratory
Te	Time, expiratory
I:E	Ratio, Ti/Te
f/Vt	Rapid shallow breathing index
Ppeak	Peak inspiratory pressure
Pmean	Mean airway pressure
Pplat	Plateau pressure
PEEP	Positive end expiratory pressure
Air inlet	Pressure, air supply
O_2 inlet	Pressure, oxygen supply
FiO_2	Percentage oxygen content delivered
Cdyn	Dynamic compliance
Cdyn/kg	Dynamic compliance, normalized
Cstat	Static compliance
Cstat/kg	Static compliance, normalized
C20/C	Compliance ratio
Rrs	Respiratory system resistance
Rpeak	Peak expiratory airway resistance

Monitored parameters (continued)

Rimp[1]	Imposed resistance
Rlung[1]	Lung resistance
PIFR	Peak inspiratory flow
PEFR	Peak expiratory flow
dP_{AW}[1]	Delta airway pressure
DPes[1]	Delta esophageal pressure
Pbaro	Barometric pressure
nCPAP[2]	MAP while in nCPAP mode
CPAP flow	Mean inspiratory flow while in CPAP mode
WOBp[1]	Work of breathing, patient
WOBi[1]	Work of breathing, imposed
WOBv[1]	Work of breathing, ventilator
AutoPEEP	AutoPEEP airway
dAutoPEEP	Delta AutoPEEP airway
AutoPEEPes[1]	AutoPEEP esophageal
Ccw[1]	Chest wall compliance
Clung[1]	Lung compliance
MIP	Maximum inspiratory pressure
P100	Respiratory drive
$EtCO_2$[3]	End tidal CO_2
VCO_2[3]	CO_2 elimination
$VtCO_2$[3]	Amount of CO_2 exhaled per breath
Vd ana[3]	Anatomical dead space
Vd/Vt ana[3]	Anatomical dead space/tidal volume ratio
VA[3]	Alveolar ventilation
Vd phy[3]	Physiological dead space
Vd/Vt phy[3]	Physiological dead space/tidal volume ratio
Vd alv[3]	Alveolar dead space
OI[3]	Oxygenation index
P/F[3]	PaO_2/FiO_2 ratio

Specifications subject to change without notice.

1 Not available in neonatal range

2 Available in neonatal range only

3 Available option

⚠ **WARNING:** U.S. Federal Law restricts this device to sale by or on the order of a physician.

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