



# A comprehensive ventilation system

For **clinicians** and **administrators** in the acute care environment, the Avea™ comprehensive ventilation system is the **complete package** of **advanced maneuvers** that empowers clinicians at the bedside to **improve patient outcomes** and **decrease costs-of-care**, while the Respiratory Knowledge Portal **wirelessly receives actionable data** to help clinicians improve respiratory care processes.



## The importance of Respiratory Knowledge Portal

Electronic Medical Records (EMR) integration helps improve charting workflow for respiratory therapists. This means less time doing documentation and more time caring for patients.

The Respiratory Knowledge Portal enhances compliance with policies and protocols for alarm setting, sedation, ventilation and ventilator-associated event (VAE) surveillance, and thereby helps improve patient care and financial results.

## Wireless connectivity

The unique combination of VWi Bridge and the Avea comprehensive ventilator delivers a seamless and reliable enterprise connectivity and analytics solution to improve workflow.





## Avea comprehensive ventilator standard functions and accessories

- ✓ Neonatal, pediatric and adult capable
- ✓ Intra-breath flow demand system in volume control
- ✓ Artificial airway compensation
- ✓ Heliox delivery
- ✓ Slow flow Pflex maneuver
- ✓ Infant nCPAP and nIMV
- ✓ Volume guarantee
- ✓ Loops and waveforms
- ✓ Proximal hot-wire flow sensor
- ✓ Proximal variable-orifice flow sensor
- ✓ Proximal airway pressure monitoring
- ✓ Synchronized and volume-compensated nebulizer
- ✓ 24-hour trending with custom histograms
- ✓ Super VGA color-graphics monitor
- ✓ User-configurable monitored parameters
- ✓ Increase FiO<sub>2</sub>, user configurable
- ✓ Integrated, heated exhalation-filter system
- ✓ Simple 90-second extended systems test (EST)
- ✓ Tracheal pressure monitoring
- ✓ Esophageal pressure monitoring
- ✓ Volumetric capnography
- ✓ Custom cart
- ✓ Gas cylinder holder
- ✓ Internal compressor (can run on battery)
- ✓ Internal battery (runs Avea up to one hour without compressor, 30 minutes with internal compressor)
- ✓ External battery (option, increases run time to 4 hours without compressor and 2 with compressor)

# Critical care ventilation

## Avea™ comprehensive ventilator specifications



### Setup

Leak compensation	On/Off
Circuit compliance compensation	0.0–7.5 mL/cmH <sub>2</sub> O*
Humidifier compensation	Active On/Active Off (Passive)
Endotracheal tube	
Diameter	2.0–10.0 mm
Length	2.0–30.0 cm
Artificial airway compensation (AAC)	On/Off
Patient setup	
Patient weight	0.01–300 kg
Patient ID	Alphanumeric 24 characters

### Mode

Mode type	A/C, SIMV, CPAP/PSV, NPPV, nCPAP/IMV**
Breath type	APRV/BiPhasic,* Volume, Pressure, TCPL,** PRVC,* Volume Guarantee**
Apnea backup	Volume, Pressure, TCPL**

### Primary settings

Rate	1–150 bpm (neonatal, pediatric), 1–120 bpm (adult)
Tidal volume	2.0 mL–2.5 L
Inspiratory pressure	0–80 cmH <sub>2</sub> O (neonatal), 0–90 cmH <sub>2</sub> O (adult, pediatric)
Peak flow	0.4–150 L/min
Inspiratory time	0.15–5.0 sec
Pressure support ventilation (PSV)	0–80 cmH <sub>2</sub> O (neonatal), 0–90 cmH <sub>2</sub> O (adult, pediatric)
PEEP	0–50 cmH <sub>2</sub> O
Flow trigger	0.1–20 L/min
O <sub>2</sub>	21–100%
Pressure high* (in APRV/BiPhasic mode)	0–90 cmH <sub>2</sub> O
Time high* (in APRV/BiPhasic mode)	0.2–30 sec
Time low* (in APRV/BiPhasic mode)	0.2–30 sec
Pressure low* (in APRV/BiPhasic mode)	0–45 cmH <sub>2</sub> O

### Manual controls

Manual breath	One breath
Expiratory hold	Max. 20 sec (adult, pediatric), 3 sec (neonatal)
Inspiratory hold	Max. 3 sec
Increase O <sub>2</sub>	Set percentage O <sub>2</sub> + 0–79% O <sub>2</sub>
Synchronized nebulizer	Available when delivered flow ≥ 15 L/min*
Disconnect for suction	Active

### Advanced settings

Bias flow	0.4–5.0 L/min
Volume limit	2.0 mL–2.5 L
Inspiratory rise	1–9
Flow cycle	0 (Off) to 45%
PSV rise	1–9
PSV cycle	5–45%
PSV TMAX	0.15–5.0 sec
Waveform	Square, decelerating
Sigh	On/Off*
Pressure trigger	0.1–20 cmH <sub>2</sub> O
Demand flow	On/Off
Volumetric capnography†	EtCO <sub>2</sub> averaging 1 or 8 breaths, VCO <sub>2</sub> averaging 3, 6, 9 or 12 minutes

### Electrical / pneumatic / input / output

Gas composition FiO <sub>2</sub>	21–100%
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### Pneumatic input

Air/heliox	20–80 psig (1.38–5.52 bar)
Compressor (internal)	3–10 psig (0.21–0.66 bar)
Oxygen	20–80 psig (1.38–5.52 bar)

### Electrical

A/C	100, 120, 230, 240 VAC; 47–65 Hz
D/C (internal/external battery)	20–29 VDC

### Data I/O

Analog inputs (x2)	0–1, 5 VDC
Video output	SVGA
Nurse call	Normally open or normally closed

Specifications subject to change without notice.  
\* Not available in neonatal range

\*\* Available in neonatal range only  
† Available option

## Advanced patient monitoring

Proximal hot wire flow sensor**
Proximal variable orifice flow sensor ( <i>infant, pediatric, adult</i> )
Proximal airway pressure monitoring
Tracheal pressure monitoring
Esophageal pressure monitoring*
Volumetric capnography†

## Maneuvers

AutoPEEP airway	0–50 cmH <sub>2</sub> O ( <i>automated</i> )
MIP/P100	–60 to 120 cmH <sub>2</sub> O ( <i>automated</i> )
Slow flow ( <i>Pflex</i> )	Automated

## Advanced gas blending system

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

## Battery power

1 hr of ventilator use on internal battery ( <i>standard</i> ) or 30 minutes ventilator and compressor
4 hr of ventilator use on external battery† or 2 hr ventilator and compressor

## Environmental temperature

Storage	–20°C to 60°C (–4°F to 140°F)
Operating	5–40°C (41–104°F)
Barometric pressure	760–545 mmHg

## Physical weight

Ventilator ( <i>includes user interface module</i> )	83 lb (37.6 kg)
Ventilator and compressor ( <i>internal</i> )	90 lb (40.8 kg)

## Physical size

Pneumatic module	16.75" 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" ( <i>diagonal</i> )
Resolution	800 x 600

## Internal compressor

Internal scroll pump	7 lb (3.2 kg)
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## 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 sec
Safety valve	Safety valve open
Circuit occlusion	Circuit occlusion
High Ppeak	High peak cmH <sub>2</sub> O
Apnea interval	Apnea interval exceeded
Loss of O <sub>2</sub>	Oxygen supply lost
Loss of air	Air supply lost
Loss of heliox	Heliox supply lost
Low battery	Internal battery—two minutes remaining
Loss of AC	Main AC power lost
Low PEEP	Low PEEP cmH <sub>2</sub> O
Low Ppeak	Low PIP cmH <sub>2</sub> O
Low Vte	Low exhaled tidal volume
Low Ve	Low exhaled minute volume
Low %O <sub>2</sub>	Low FiO <sub>2</sub> delivered
High %O <sub>2</sub>	High FiO <sub>2</sub> delivered
ILV disconnect	Independent lung ventilation lost
Invalid gas ID	Gas type ID defective or missing
High Ve	High exhaled 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 failed
High Vte	High exhaled tidal volume
Volume limit	Volume limit exceeded
Low EtCO <sub>2</sub> †	Low end tidal CO <sub>2</sub>
High EtCO <sub>2</sub> †	High end tidal CO <sub>2</sub>

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† Available option



## Alarms (cont'd)

nCPAP pressure limit**	nCPAP pressure limit exceeded
Low nCPAP pressure**	Low nCPAP cmH <sub>2</sub> O
High nCPAP pressure**	High nCPAP cmH <sub>2</sub> O

## Waveforms

Paw	Airway pressure/CPAP level cmH <sub>2</sub> O
Pinsp	Inspiratory pressure ( <i>machine</i> ) cmH <sub>2</sub> O
Flow	Net flow L/min
Vt	Volume (Vt) mL
Flow insp	Inspiratory flow L/min
Flow exp	Expiratory flow L/min
Analog 0	Analog input channel 0 VDC
Analog 1	Analog input channel 1 VDC
PCO <sub>2</sub> wave†	Capnogram

## Loops

Flow-volume	Airway flow/airway volume
Paw-volume	Airway pressure/airway volume
Pinsp-volume	Inspiratory pressure ( <i>machine</i> )/airway volume
Pes-volume*	Esophageal pressure/airway volume
Ptr-volume*	Tracheal pressure/airway volume
Ptp-volume*	Transpulmonary pressure/airway volume
PCO <sub>2</sub> -Vte†	Exhaled CO <sub>2</sub> /exhaled tidal volume

## Monitored parameters

Vte	Tidal volume, exhaled
Vte/kg	Vte normalized to patient weight
Vti	Tidal volume, inspired
Vti/kg	Vti normalized to patient weight
Spon Vt	Spontaneous exhaled tidal volume
Spon Vt/kg	Spontaneous Vt normalized to patient weight
Mand Vt	Tidal volume, mandatory
Mand Vt/kg	Mandatory Vt normalized to patient weight
Vdel	Volume of gas delivered by the ventilator

## Monitored parameters

% Leak	Difference between Vti and Vte volumes in terms of %
Ve	Exhaled 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
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 <sub>2</sub> inlet	Pressure, oxygen supply
FiO <sub>2</sub>	Percent oxygen content delivered
Cdyn	Dynamic compliance
Cdyn/kg	Dynamic compliance, normalized to patient weight
Cstat	Static compliance
Cstat/kg	Static compliance, normalized to patient weight
C20/C	Compliance ratio
Rrs	Respiratory system resistance
Rpeak	Peak expiratory airway resistance
Rimp	Imposed resistance
Rlung	Lung resistance
PIFR	Peak inspiratory flow
PEFR	Peak expiratory flow
dPaw*	Delta airway pressure
dPes*	Delta esophageal pressure

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### Monitored parameters (cont'd)

Pbaro	Barometric pressure
nCPAP**	MAP while in nCPAP mode
CPAP flow	Mean inspiratory flow while in nCPAP mode
WOBp	Work of breathing, patient
WOBi	Work of breathing, imposed
WOBv†	Work of breathing, ventilator
AutoPEEP	AutoPEEP airway
dAutoPEEP	Delta AutoPEEP airway
MIP	Maximum inspiratory pressure
P100	Respiratory drive
Pbaro	Barometric pressure
nCPAP**	MAP while in nCPAP mode

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### Monitored parameters (cont'd)

CPAP flow	Mean inspiratory flow while in CPAP mode
EtCO <sub>2</sub> †	End tidal CO <sub>2</sub>
VCO <sub>2</sub> †	Exhaled minute volume of CO <sub>2</sub>
VtCO <sub>2</sub> †	Amount of CO <sub>2</sub> exhaled per breath
Vd ana†	Anatomical dead space
% Vd ana/Vt†	Anatomical dead space/tidal volume ratio
Va†	Alveolar ventilation
Vd phy†	Physiological dead space
% Vd phy/Vt†	Physiological dead space/tidal volume ratio
Vd alv†	Alveolar dead space
OI†	Oxygenation index
P/F†	PaO <sub>2</sub> /FiO <sub>2</sub> ratio

### Avea 10-year preventative maintenance and cost of parts (field service charges excluded)\*\*\*

Part no.	Product description	1	2	3	4	5	6	7	8	9	10	Total
16138	PM kit	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$1,500
68289	O <sub>2</sub> sensor	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$1,660
68339K	Internal battery		\$312		\$312		\$312		\$312		\$312	\$1,560
	<b>Subtotal</b>	<b>\$316</b>	<b>\$628</b>	<b>\$316</b>	<b>\$628</b>	<b>\$316</b>	<b>\$628</b>	<b>\$316</b>	<b>\$628</b>	<b>\$316</b>	<b>\$628</b>	<b>\$4,720</b>

\*\*\* The prices above are based on the 2017 list prices in U.S. dollars and may be subject to change.

For more information, call Technical Service at **800.231.2466**.




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

## GLOBAL HEADQUARTERS

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