Dependable ventilation and a user-friendly design

Features the SmartVent™ ventilator

The easy-to-use SmartVent ventilator offers Pressure and Volume modes, and can ventilate neonates, trauma and compromised patients.

The Smart Vent now features SIMV (Synchronized Intermittent Mandatory Ventilation) with Pressure Support and Pressure Support with Apnea backup mode (PSVPro®), which expands the Aestiva/5's clinical capabilities to help meet your patients' needs. Featuring electronic PEEP, apnea backup mode and an adjustable flow trigger, both the PSVPro and SIMV modes can help simplify efforts for providing care to spontaneously breathing patients. Examples of persons who can benefit from these modes include patients with LMAs, pediatric patients and patients unable to tolerate certain anesthetic agents.

- **Pressure Control mode:** You can choose a target pressure and deliver the maximum tidal volume for the pressure selected and desired time.

- **Volume Control mode:** Delivers the tidal volume that you set, regardless of changes in the fresh gas flow and airway pressure, up to the user selectable pressure limit.

- **Low flow delivery techniques:** Optimized by the innovative compensation system, which provides more consistent delivery of set tidal volumes by automatically adjusting for changes in small system leaks, fresh gas flows, changing lung compliance or compression losses in the bellows, absorber and ventilator.

Common features
- SmartVent ventilator
- O_2 and N_2O gas delivery
- Lockable drawer
- Light strip
- Patient breathing system with circle module

Optional features, as available
- Frame style-two or three in-line vaporizers, left or right-handed, trolley or pendant-mounted
- Additional gases: Air and heliox or CO_2
- Air-flow tube: Single or dual
- Cylinder yokes: Up to four on a two-vaporizer system, five on a three-vaporizer system
- Auxiliary common gas outlet
- Bain module
- Integrated suction (central or Venturi)
- Integrated auxiliary O_2 flowmeter
- Silicone breathing circuit kits

Physical Specifications

Dimensions

	2 vaporizers	3 vaporizers
Height:	135.8 cm/53.4 in	135.8 cm/53.4 in
Width:	75 cm/29.5 in	93 cm/36.6 in
Depth:	83 cm/32.7 in	83 cm/32.7 in
Weight:	136 kg/300 lb	154 kg/340 lb
	(Approximation)	*(Approximation)*

Top shelves (optional)

	2 vaporizers	3 vaporizers
Weight limit:	46 kg/100 lb	46 kg/100 lb
Width:	47.5, 67.5 or 87.5 cm/	87.5 or 67.5 cm/
	18.7, 26.6 or 34.4 in	34.4 or 26.6 in
Depth:	41 cm/16.1 in	41 cm/16.1 in

Work surface
Height: 87.6 cm/34.5 in
Width: 47 cm/18.5 in
Depth: 31.5 cm/12.4 in

Folding side shelf (optional)
Height: 87.5 cm/34.5 in
Width: 26.5 cm/10.4 in
Depth: 31.5 cm/12.4 in
Weight limit: 11.3 kg/25 lb

DIN rail (optional)
Side of tabletop: 30 cm/12 in
Side of machine: 23.5 cm/9.25 in

Top drawer (1 standard)—locking (internal dimensions)
Height: 10.5 cm/4.1 in
Width: 38.5 cm/15.2 in
Depth: 26 cm/10.2 in

Lower drawers (optional)*
Height: 14.5 cm/5.7 in
Width: 38.5 cm/15.2 in
Depth: 26 cm/10.2 in

Lower shelves (optional)*

Heights:	9.2 cm/3.7 in	13.2 cm/5.2 in
	20.6 cm/8.2 in	24.6 cm/9.8 in
	28.6 cm/11.4 in	36 cm/14.4 in
Width:	42.5 cm/16.75 in	42.5 cm/16.75 in
Depth:	36 cm/14 in	36 cm/14 in

Absorber arms

	Adjustable	Non-adjustable
Arm length:	30.5 cm/12 in	25.4 cm/10 in
Bag arm height:	87 cm/34.3 in	91.5 cm/36 in
	104 cm/40.9 in	
Absorber rotation:	85°	85°

Ventilator screen
Height: 7.6 cm/3 in
Width: 15.2 cm/6 in

Integrated breathing system
- Helps improve patient safety and simplify cable management
- Protects components from getting disconnected or damaged
- Uninterrupted communication between the breathing circuit and the SmartVent ventilator provided by smart sensors and switches

Open architecture
- Can easily fit with existing equipment
- Configurations available with a wide variety of lower cabinet combinations of drawers and shelves, and with top shelving options that are configurable
- Configurations available with an integral dovetail rail that can be used to incorporate additional accessories

Additional features
- Built-in service diagnostics and durable components can make service support more cost-effective and easier
- It is an effective, safe unit when practicing low flow and minimal flow anesthesia, as it can minimize agent consumption, helping reduce anesthetic agent costs
- Can provide intensive care ventilation features, which can save on cost of bringing an additional ICU ventilator into your operating room

Ventilator Operating Specifications

Ventilation operating modes
Volume Control and Pressure Control
Synchronized Intermittent Mandatory Ventilation (SIMV)
Pressure Support (PSVPro) with Apnea Backup ventilation — (optional)

Ventilator (V_T) parameter ranges

Tidal volume range:	20 to 1500 mL (Volume Control and SIMV modes)
	5 to 1500 mL (Pressure Control Mode)
Incremental settings:	20 to 100 mL (increments of 5 mL)
	100 to 300 mL (increments of 10 mL)
	300 to 1000 mL (increments of 25 mL)
	1000 to 1500 mL (increments of 50 mL)
Minute volume range:	0 to 99.9 L/min
Pressure ($P_{Inspired}$) range:	5 to 60 cm H_2O (increments of 1 cm H_2O)
Pressure (P_{limit}) range:	12 to 100 cm H_2O (increments of 1 cm H_2O)
Pressure ($P_{support}$) range:	Off, 2 to 40 cm H_2O (increments of 1 cm H_2O)
Rate:	4 to 100 breaths per minute for Volume Control and Pressure Control;
	2 to 60 breaths per minute for SIMV, PSVPro and SIMV–PC+PSV (increments of 1 breath per minute)
Inspiratory/expiratory ratio: 2:1 to 1:8 (increments of 0.5)	
Inspiratory time:	0.2 to 5.0 seconds (increments of 0.1 seconds) (SIMV and PSV Pro)
Trigger window:	0 to 80% (increments of 5%)
Flow trigger:	0.2 to 1.0 L/min (increments of 0.2 L/min)
	1 to 10 L/min (increments of 0.5 L/min)
Inspiration termination level: 5 to 75% (increments of 5%)	
Backup mode delay:	10 to 30 seconds (increments of 5 seconds)

*Lower cabinet can be configured with a variety of shelf and drawer combinations

Ventilator Operating Specifications, continued

Positive End Expiratory Pressure (PEEP)
Type: Integrated, electronically controlled
Range: OFF, 4 to 30 cm H_2O (increments of 1 cm H_2O)

Ventilator performance
Pressure range at inlet: 240 kPa to 700 kPa/35 psig to 100 psig
Peak gas flow: 120 L/min + fresh gas flow
Flow valve range: 1 to 120 L/min
Flow compensation range: 200 mL/min to 15 L/min

Ventilator monitoring
Expiratory minute volume range: 0 to 99.9 L/min
Expiratory tidal volume range: 0 to 1500 mL
O_2 %:   5 to 110%
Peak pressure: −20 to 120 cm H_2O
Mean pressure: −20 to 120 cm H_2O
Plateau pressure: 0 to 120 cm H_2O
Pressure waveform sweep speed: 4-25 breaths per minute (0 to 15 seconds)
                     26 to 75 breaths per minute (0 to 5 seconds)
                     75 breaths per minute (0 to 3 seconds)

Ventilator Accuracy

Delivery/monitoring accuracy
Volume delivery: > 210 mL = better than 7%
                     < 210 mL = better than 15 mL
                     < 60 mL = better than 10 mL
Pressure delivery: ±10% or ±3 cm H_2O
PEEP delivery: ±1.5 cm H_2O
Volume monitoring: > 210 mL = better than 9%
                     < 210 mL = better than 18 mL
                     < 60 mL = better than 10 mL
Pressure monitoring: ±5% or ±2 cm H_2O

Alarm settings
Tidal volume (V_{TE}): Low: OFF, 0 to 1500 mL
                     High: 20 to 1600 mL, OFF
Minute volume (V_E): Low: OFF, 0 to 10 L/min
                     High: 0 to 30 L/min, OFF
Inspired oxygen (FiO_2): Low: 18 to 100%
                     High: 18 to 100%, OFF
Apnea alarm: Mechanical ventilation ON:
                     < 5 mL breath measured in 30 seconds
                     Mechanical ventilation OFF:
                     < 5 mL breath measured in 30 seconds
Low airway pressure: 4 cm H_2O above PEEP
High pressure: 12 to 100 cm H_2O (increments of 1 cm H_2O)
Sustained airway pressure: Mechanical ventilation ON:
                     P_{limit} < 30 cm H_2O, sustained limit is 6 cm H_2O
                     P_{limit} 30 - 60 cm H_2O, sustained limit is 20% of P_{limit}
                     P_{limit} > 60 cm H_2O, the sustained limit is 12 cm H_2O
                     PEEP and mechanical ventilation ON:
                     Sustained limit increases by PEEP minus 2 cm H_2O
                     Mechanical ventilation OFF:
                     P_{limit} 60 cm H_2O, sustained limit is 50% of P_{limit}
                     P_{limit} > 60 cm H_2O, the sustained limit is 30 cm H_2O
Subatmospheric pressure: Paw < -10 cm H_2O
Alarm silence countdown timer: 120 to 0 seconds

Ventilator Components
Flow transducer
Type: Variable orifice flow sensor
Dimensions: 22 mm OD and 15 mm ID
Location: Inspiratory outlet and expiratory inlet
Optional autoclavable sensor available

Oxygen sensor
Type: Galvanic fuel cell
Life cycle: Approximately 18 months (dependent on usage)

Anesthetic agent delivery
Vaporizers: Tec 4, Tec 5, Tec 6 Plus, Tec 7
Number of positions: 2 or 3
Mounting: Tool-free installation Selectatec® manifold interlocks
                     and isolates vaporizers

Electrical Specifications
Current leakage
120 V: < 300µA

Light package
Task light: 12 V, 3 lamps, type 194, .270A each
Goose neck (optional): 12 V, type 1815, .200A

Power and battery backup
Power input: 120 Vac, 60 Hz, 10A
Backup power: Demonstrated battery backup time under typical
                     operating conditions is 45 minutes when fully charged
Battery type: Internal rechargeable sealed lead acid
Power cord: Length: 5 m/16.4 ft
                     Rating: 15A @ 120 Vac

Communication Port
Serial interface: Isolated RS-232C compatible port

Inlet/outlet modules (120 V)
System circuit breakers: No outlets 5A w/outlets 10A
Outlets (optional): 4 outlets on back, 3-2A, 1-3A individual breakers and
                     1-5A combined outlet breaker, optional isolation
                     transformer
Auxiliary outlet box (optional): 5 NEMA outlets on dovetail-mounted box,
                     5-2A breakers, isolation transformer
Tec 6 Plus outlet: 1 IEC 320 located above vaporizer backbar

Pneumatic Specifications

Internal common gas outlet
Connector: ISO 22 mm OD and 15 mm ID

Auxiliary common gas outlet (optional)
Connector: ISO 22 mm OD and 15 mm ID

Gas supply
Pipeline input range: 240 kPa to 600 kPa/35 psig to 88 psig
Pipeline connections: DISS-male
All fittings available for O_2, N_2O, and Air, and contain pipeline filter and check valve
Cylinder input: Pin indexed in accordance with CGA-V-1; contains input filter and check valve
Note: Maximum 5 cylinders total; one oxygen required.
Primary regulator diaphragm minimum burst pressure: 2758 kPa/400 psig
Primary regulator nominal output: < 338 kPa/49 psig
Pin indexed cylinder connections

Gas power outlet (optional)
Connector: DISS indexed in accordance with CGA-V-5
Gas: Oxygen
Pressure and flow characteristics: Varies with source

O_2 controls
Method: Proportionate decrease of N_2O, CO_2, O_2/He with reduction in O_2 pressure
Supply failure alarm: Range: 193 kPa to 221 kPa/28 psig to 32 psig
Sounds at maximum volume every 10 seconds
O_2 flush: Range: 35 to 50 L/min

Flowmeters

O_2 ranges: Two tubes: 0.05 to 0.95 L/min and 1 to 15 L/min
Minimum O_2 flow: 50 mL/min ±25 mL
N_2O ranges: Two tubes: 0 to 0.95 L/min and 1 to 10 L/min
Air range: One tube option: 1 to 15 L/min
Two tube option: 0 to 0.95 and 1 to 15 L/min (low flow tube optional)
CO_2 (optional): One tube: 0 to 0.5 L/min
Heliox range (optional): One tube: 0 to 15 L/min

Calibration:

Percent of full scale flow	Accuracy (% of flowrate)
100	±2.5%
90	±2.5%
80	±2.6%
70	±2.7%
60	±2.9%
50	±3.1%
40	±3.4%
30	±4.0%
20	±5.0%
10	±8.1%

Calibration conditions:* 20°C/68°F
101.3 kPa/760 mmHg

* Different breathing circuit pressures, barometric pressures or temperatures change flowtube accuracy.

Flowmeters, continued

Hypoxic guard system
Type: Mechanical Link-25™
Range: Provides a nominal 25% concentration of oxygen in any O_2/N_2O mixture

Environmental Specifications

System operation
Temperature: 10° to 40°C/50° to 104°F
Humidity: 15 to 95% relative humidity (non-condensing)
Altitude: –440 to 3565 m/500 to 800 mmHg
System storage
Temperature: –25° to 65°C/–13° to 149°F
Humidity: 10 to 100% relative humidity (including condensing)
Altitude: –440 to 5860 m/375 to 800 mmHg
Oxygen cell storage: –15° to 50°C/5° to 122°F
10 to 95% relative humidity
500 to 800 mmHg

Electromagnetic compatibility
Immunity: Complies with all requirements of EN 60601-1-2
Emissions: CISPR 11 group 1 class B
Approvals: UL 2601-1,
CSA C22.2 #601.1
IEC 601-1
EN 60601-1