

# Carestation™ 650

The Carestation 650 is a compact, versatile and easy to use anesthesia system designed to help clinicians deliver reliable anesthesia care to solve today's toughest challenges.

## Key Features

- Elegant modern design in a slim, compact frame well suited for constrained environments
- Simple and easy to use 15" touchscreen ventilator display
- Intuitive CARESCAPE™ inspired user interface for the unified Carestation user experience
- Integrated CARESCAPE Respiratory Module
- Time saving tools to help streamline clinician workload
- Scalable software and hardware features: "build your own" Carestation
- ecoFLOW display option may help clinicians mitigate the risk of hypoxic mixtures while helping to reduce agent use by using low and minimum flows with continuous gas monitoring

## Ventilation

- Small, compact breathing system specifically designed for low flow anesthesia
- Fast gas kinetics for rapid wash-in and wash-out
- Digitally controlled flow valve ventilator supports all patient types from neonates to adults
- Advanced ventilation options including synchronized PCV-VG with pressure support (SIMV PCV-VG) and minimum rate ventilation (CPAP+PSV)
- Software enabled tools including Vital Capacity and Cycling Procedures to help automate repetitive tasks used during lung ventilation procedures
- Continual fresh gas flow with fresh gas flow compensation during mechanical ventilation



## Design

- Durable wheels, handles and central brake for mobility and stability
- Robust handles and mounting rails
- Easy to clean surfaces
- Movable display arm that rotates and tilts for ideal positioning
- Two vaporizer configuration
- Bi-level work surface illumination
- Absorbent canister designed for ease of use and long life
- Intelligent lighting that highlights active flow controls and auxiliary ports when in use



*Not 510K cleared. Not available for sale in the United States*

## Physical Specifications

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### Product Description

Carestation 650 A1

### Dimensions

Height: 135 cm/53.1 in  
Width: 82.5 cm/32.4 in  
Depth: 75 cm/29.5 in  
Weight: 145 kg/320 lb\*

### Top shelf

Weight limit: 25 kg/55 lb  
Width: 41.3 cm/16.3 in  
Depth: 27.0 cm/10.6 in

### Work surface

Height: 83.6 cm/32.9 in  
Size: 1930 cm<sup>2</sup>/299 in<sup>2</sup>  
Size: 2950 cm<sup>2</sup>/471 in<sup>2</sup>  
(with optional flip shelf)

### Upper left Datex-Ohmeda (DO) dovetail

Dovetail length: 54 cm/21.3 in

### Lower left Datex-Ohmeda (DO) dovetail

Dovetail length: 28 cm/11.0 in

### Right Datex-Ohmeda (DO) dovetail

Dovetail length: 96.4 cm/38.0 in

### Drawers (internal dimensions)

Height:  
Top and middle: 8.6 cm/3.4 in  
Bottom: 13.3 cm/5.2 in  
Width: 34 cm/13 in  
Depth: 37 cm/14.6 in

### Manual ventilation bag arm (optional)

Arm length: 39.8 cm/15.7 in  
Bag arm height  
(adjustable): 53 cm/20.9 in  
136 cm/53.5 in

### Casters

Diameter: 12.5 cm/4.9 in  
Brakes: Central Brake



## Ventilator Operating Specifications

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### Modes of ventilation – included

VCV (Volume Control) Mode with tidal volume compensation

### Modes of ventilation – optional

PCV (Pressure Control Ventilation)  
PCV-VG (Pressure Controlled Ventilation-Volume Guarantee)  
SIMV (Synchronized Intermittent Mandatory Ventilation)  
(volume and pressure)  
PSVPro™ (Pressure Support with Apnea backup)  
CPAP+PSV (Pressure support mode)  
SIMV PCV-VG

### Advanced software options

Spirometry (included)  
Auto alarm limits (included)  
ecoFLOW  
Pause Gas  
Vital capacity and cycling  
VCV Cardiac Bypass

\*Excludes vaporizers, airway gas module, patient monitor and wall mount bracket.

## Ventilator parameter ranges

Tidal volume range:	5 to 1500ml (PCV modes 5 to 1500ml) (Volume Control, PCV-VG and SIMV volume 20 to 1500ml)
Incremental settings:	20 to 50 mL (increments of 1 mL) 50 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:	Less than 0.1 to 99.9 L/min
Pressure ( $P_{\text{inspired}}$ ) range:	5 to 60 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O) above set PEEP
Pressure ( $P_{\text{max}}$ ) range:	12 to 100 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O)
Pressure ( $P_{\text{support}}$ ) range:	Off, 2 to 40 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O)
Respiratory Rate:	4 to 100 breaths per minute for Volume Control and Pressure Control; 2 to 60 breaths per minute for SIMV, PSVPro and SIMV PCV-VG; 4 to 60 bpm for CPAP+PSV (increments of 1 breath per minute)
Inspiratory/ expiratory ratio:	2:1 to 1:8 (increments of 0.5) (VCV, PCV, PCV-VG)
Inspiratory time:	0.2 to 5.0 seconds (increments of 0.1 seconds) (SIMV, PSVPro and CPAP PSV)
Trigger window:	Off, 5 to 80% of Texp (SIMV, PSVPro) (increments of 5%)
Flow trigger:	1 to 10 L/min (increments of 0.5 L/min) 0.2 to 1 L/min (increments of 0.2 L/min)
Inspiration termination level:	5 to 75% (increments of 5%)
Inspiratory Pause range:	Off, 5-60% of Tinsp

## Positive End Expiratory Pressure (PEEP)

Type:	Integrated, electronically controlled
Range:	OFF, 4 to 30 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O)

## Ventilator performance

Peak gas flow:	120 L/min + fresh gas flow
Flow valve range:	1 to 120 L/min
Flow compensation range:	100 mL/min to 15 L/min

## 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 cmH <sub>2</sub> O (larger of)
PEEP delivery:	±1.5 cmH <sub>2</sub> O
Volume monitoring:	> 210 mL = better than 9% ≤ 210 mL = better than 18 mL < 60 mL = better than 10 mL
Pressure monitoring:	±5% or ±2.4 cmH <sub>2</sub> O (larger of)

### Alarm settings

Tidal volume ( $V_{TE}$ ):	Low: OFF, 1 to 1500 mL High: 20 to 1600 mL, OFF
Minute volume ( $V_E$ ):	Low: OFF, 0.1 to 10 L/min High: 0.5 to 30 L/min, OFF
Inspired oxygen ( $FiO_2$ ):	Low: 18 to 99% High: 19 to 100%, OFF
Apnea alarm:	<b>Mechanical ventilation ON:</b> < 5 mL breath measured in 30 seconds <b>Mechanical ventilation OFF:</b> < 5 mL breath measured in 30 seconds
Low airway pressure:	4 cmH <sub>2</sub> O above PEEP
High pressure:	12 to 100 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O)
Sustained airway pressure:	<b>Mechanical ventilation ON:</b> $P_{\text{max}} < 30$ cmH <sub>2</sub> O, the sustained limit is 6 cmH <sub>2</sub> O $P_{\text{max}} 30$ to 60 cmH <sub>2</sub> O, the sustained limit is 20% of $P_{\text{max}}$ $P_{\text{max}} > 60$ cmH <sub>2</sub> O, the sustained limit is 12 cmH <sub>2</sub> O <b>PEEP and mechanical ventilation ON:</b> Sustained limit increases by PEEP minus 2 cmH <sub>2</sub> O <b>Mechanical ventilation OFF:</b> $P_{\text{max}} 12$ to 60 cmH <sub>2</sub> O, the sustained limit is 50% of $P_{\text{max}}$ $P_{\text{max}} > 60$ cmH <sub>2</sub> O, the sustained limit is 30 cmH <sub>2</sub> O
Subatmospheric pressure:	$P_{\text{aw}} < -10$ cmH <sub>2</sub> O
Audio pause countdown clock:	120 to 0 seconds

## Ventilator Components

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### Flow transducer

Type:	Variable orifice flow sensor (autoclavable)
Location:	Inspiratory outlet and expiratory inlet

### Oxygen sensor

Type:	Optional galvanic fuel cell or paramagnetic with Airway Module option
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### Ventilator screen

Display size:	15 inch
Pixel format:	1024 x 768

### Battery backup

Backup power:	Demonstrated battery time is up to 90 minutes when fully charged. Battery time under extreme conditions is 30 minutes.
Battery type:	Internal rechargeable sealed lead acid

### Communication ports

RS-232C compatible serial interface
Ethernet
Datex-Ohmeda device interface solutions port
USB port
VGA Output

## Anesthetic Agent Delivery

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### Delivery

Vaporizers:	Tec™ 6 Plus, Tec 7
Number of positions:	2
Mounting:	Tool-free installation Selectatec™ manifold interlocks and isolates vaporizers

## Airway Modules

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### General

E-sCAiO, E-sCAiOV, N-CAiO	
Size (HxWxD), excluding water trap:	113 x 38 x 205 mm/4.4 x 1.5 x 8.1 in
Weight:	0.7 kg/1.5 lb
Sampling rate:	120 mL/min ±20 mL
Automatic compensation for atmospheric pressure variation (495 to 795 mmHg) temperature and CO <sub>2</sub> /N <sub>2</sub> O and CO <sub>2</sub> /O <sub>2</sub> collision broadening effect. Parameter display update interval typically breath-by-breath. Functional alarms for blocked sample line, D-fend check and D-fend replacement.	

### Non-disturbing gases:

Ethanol, acetone, isopropanol, methane, nitrogen, nitric oxide, carbonmonoxide, water vapor, freon R134A (for CO <sub>2</sub> , O <sub>2</sub> and N <sub>2</sub> O):	
Maximum effect on readings:	CO <sub>2</sub> < 0.2 vol %; O <sub>2</sub> , N <sub>2</sub> O < 2 vol %, AA < 0.15 vol%

### Carbon dioxide (CO<sub>2</sub>)

EtCO <sub>2</sub> :	End-tidal CO <sub>2</sub> concentration
FiCO <sub>2</sub> :	Inspired CO <sub>2</sub> concentration

### CO<sub>2</sub> waveform

Measurement range:	0 to 15% (0 to 15 kPa, 0 to 113 mmHg)
Accuracy:	±0.2 vol % + 2 % of reading
Datex-Ohmeda infrared sensor	
Adjustable low and high alarm limits for EtCO <sub>2</sub> and FiCO <sub>2</sub>	

### Respiration rate (RR)

Measurement range:	4 to 100 breaths/min
Detection criteria:	1% variation in CO <sub>2</sub>
Adjustable low and high alarm limits for respiration rate; alarm for apnea	

### Patient Oxygen (O<sub>2</sub>)

FiO <sub>2</sub> :	Inspired O <sub>2</sub> concentration
EtO <sub>2</sub> :	End-tidal O <sub>2</sub> concentration
FiO <sub>2</sub> -EtO <sub>2</sub> :	Inspired-expired difference

### O<sub>2</sub> Measurement

Measurement range:	0 to 100%
Accuracy:	±1 vol % +2 % of reading
Datex-Ohmeda differential paramagnetic sensor	
Adjustable low and high alarm limits for FiO <sub>2</sub> and EtO <sub>2</sub> ; alarm for FiO <sub>2</sub> < 18%	

## Nitrous Oxide (N<sub>2</sub>O)

Measurement range: 0 to 100%  
Accuracy: ±2 vol % +2 % of reading

## Anesthetic Agent (AA)

### Halothane, Isoflurane, Enflurane

Measurement range: 0 to 6%  
Accuracy: ±(0.15 vol% +5% of reading)

### Sevoflurane

Measurement range: 0 to 8%  
Accuracy: ±(0.15 vol% +5% of reading)

### Desflurane

Measurement range: 0 to 20%  
Accuracy: ±(0.15 vol% +5% of reading)

Waveform displayed

MAC value displayed (Airway Gas Option modules)

MACage value displayed (CARESCAPE modules)

Identification threshold: 0.15 vol%\*\*

Agent mixture detection

Adjustable high and low alarm limits for EtAA, FiAA

## Patient Spirometry™

Pressure-volume loop

Pressure-flow loop

Flow-volume loop

Airway pressure and flow waveforms

Adjustable low and high alarm limits for P<sub>peak</sub>, PEEP<sub>tot</sub> and MV<sub>exp</sub>

Alarms for MV<sub>exp</sub> << MV<sub>insp</sub> and for MV<sub>exp</sub> low. Detection through D-lite™ or Pedi-lite™ flow sensor and gas sampler with following specifications:

## CARESCAPE Airway Modules

	D-lite(+)	Pedi-lite(+)
Respiration rate:	4 to 35 breaths/min	4 to 70 breaths/min

### Tidal volume

Measurement range:	150 to 2000 mL	15 to 300 mL
Accuracy**:	±6% or 30 mL	±6% or 4 mL

### Minute volume

Measurement range:	2 to 20 L/min	0.1 to 5 L/min
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### Airway pressure

Measurement range: -20 to +100 cmH<sub>2</sub>O  
Accuracy\*\*: ±1 cmH<sub>2</sub>O  
Display units: cmH<sub>2</sub>O, mmHg, kPa, mbar, hPa

### Flow

Measurement range:	-100 to 100 L/min	-25 to 25 L/min
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### I:E

Measurement range: 1:4.5 to 2:1

## Compliance

Measurement range:	4 to 100 mL/cmH <sub>2</sub> O	1 to 100 mL/cmH <sub>2</sub> O
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## Airway resistance

Measurement range: 0 to 200 cmH<sub>2</sub>O/L/s

## Sensor specifications

	D-lite/ D-lite(+)	Pedi-lite/ Pedi-lite(+)
Dead Space:	9.5 mL	2.5 mL
<b>Resistance</b>		
at 30 L/min:	0.5 cmH <sub>2</sub> O	
at 10 L/min:		1.0 cmH <sub>2</sub> O

## Electrical Specifications

### Current leakage

100/120 V:	< 300µA
220/240 V:	< 500µA

### Power

Power input: 100-120 Vac, 50/60 Hz  
220-240 Vac, 50/60 Hz  
120/220-240 Vac ± 10%, 50-60 Hz

Power cord:

Length:	5 m/16.4 ft
Rating:	10A @ 220-240 Vac or 15A @ 100-120 Vac 10A @ 120/220-240 Vac

### Inlet modules

100/120 V:	
Without outlets:	2A
With outlets:	10A
220/240 V:	
Without outlets:	1A
With outlets:	5A

### Outlet modules (optional)

100/120 V:  
3 outlets on side 3-2A individual breakers, isolation transformer (optional)

220/240 V:  
3 outlets on side 3-1A individual breakers, isolation transformer (optional)

120/220-240 V:  
No outlets

## Pneumatic Specifications

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### Auxiliary O<sub>2</sub> (optional)

Connection:	7-10 mm hose barb port
O <sub>2</sub> concentration range:	100% O <sub>2</sub>
Flow range:	0 to >10 L/min

### Auxiliary O<sub>2</sub>+Air (optional)

Connection:	7-10 mm hose barb port
O <sub>2</sub> concentration range:	100% O <sub>2</sub> only, or 21% to 100% O <sub>2</sub> with Air
Flow range:	
for O <sub>2</sub> and Air:	0 and 100 mL/min to 15 L/min

### Auxiliary common gas outlet (optional)

Connector:	ISO 22 mm OD and 15 mm ID
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### Gas supply

Pipeline input range:	280 kPa to 600 kPa (41 psig to 87 psig)
Pipeline connections:	DISS-male, DISS-female, AS4059, BSPP 3/8, S90-116, or NIST All fittings available for O <sub>2</sub> , N <sub>2</sub> O, and Air, and contain pipeline filter and check valve. Secondary O <sub>2</sub> pipeline inlet available.
Cylinder input:	Pin indexed in accordance with CGA-V-1 or DIN-477 (nut and gland); contains input filter and check valve. Large cylinder kit available for O <sub>2</sub> and N <sub>2</sub> O (with DIN-477).

**Note:** Maximum 3 cylinders

Primary regulator diaphragm minimum burst pressure:	2758 kPa/400 psig
Primary regulator nominal output:	≤ 345 kPa/50 psig Pin indexed cylinder connections ≤ 414 kPa/60 psig DIN-477 cylinder connections

### O<sub>2</sub> controls

Method:	N <sub>2</sub> O shut off with loss of O <sub>2</sub> pressure
Supply failure alarm:	< 252 kPa (36.55 psig)
O <sub>2</sub> flush:	Range: 25 to 75 L/min

### Fresh gas

Flow range:	
for O <sub>2</sub> and Air:	0 and 100 mL/min to 15 L/min (minimal flow capable)
for N <sub>2</sub> O:	0 and 100 mL/min to 10 L/min

Pneumatic Total Flow Tube:	1 to 10 L/min
Measurement accuracy for O <sub>2</sub> , Air and N <sub>2</sub> O:	±6% of measured value, or ±25 mL/min (larger of)
for Total Flow tube:	±5% of full scale (larger of) at 100% O <sub>2</sub>
O <sub>2</sub> concentration range:	21% to 100% when Air is available
O <sub>2</sub> Cell accuracy:	±2.5% plus 2.5% of reading
Compensation:	Temperature and atmospheric pressure compensated to standard conditions of 20°C and 101.3 kPa
Hypoxic guard:	Mechanical Link-25: Provides a nominal minimum 25% concentration of oxygen in O <sub>2</sub> /N <sub>2</sub> O mixture.

### Materials

All materials in contact with patient breathing gases are not made from natural rubber latex.

## Environmental Specifications

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### 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 60°C (-13° to 140°F)
Humidity:	15 to 95% relative humidity (non-condensing)
Altitude:	-440 to 4880 m (425 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 applicable requirements of EN 60601-1-2
Emissions:	CISPR 11 group 1 class A
Approvals:	AAMI ES60601-1, CSA C22.2 #601.1, EN/IEC 60601-1, ISO 80601-2-13
European Notified Body CE Mark:	CE0197

## Breathing Circuit Specifications

### Carbon dioxide absorbent canister

Absorbent capacity: Reusable canister 1370 mL/1150 g  
Disposable canister 1437 mL/1200 g

### Ports and connectors

Exhalation: 22 mm OD ISO  
15 mm ID taper  
Inhalation: 22 mm OD ISO  
15 mm ID taper  
Bag port: 22 mm OD (15 mm ID), ROW  
22 mm ID, Australia

### Bag-to-Ventilator switch

Type: Bi-stable  
Control: Controls ventilator and direction of breathing gas within the circuit

### Integrated Adjustable Pressure Limiting (APL) valve

Range: 0.5 to 70 cmH<sub>2</sub>O  
Tactile knob indication at: 30 cmH<sub>2</sub>O and above  
Adjustment range of rotation: 0.5 to 30 cmH<sub>2</sub>O (0 to 230°)  
30 to 70 cmH<sub>2</sub>O (230 to 330°)

### Materials

All materials in contact with exhaled patient gases are autoclavable, except O<sub>2</sub> cell, and Airway Modules. All materials in contact with patient gas are not made from natural rubber latex.

### Breathing circuit parameters

Compliance:  
Bag mode: 1.81 mL/cmH<sub>2</sub>O (filled disposable absorber canister)  
1.74 mL/cmH<sub>2</sub>O (filled reusable absorber canister)  
Mechanical mode: Automatically compensates for compression losses within the absorber and bellows assembly  
Volume: 2006 mL Ventilator side  
500 mL Bag side  
1004 mL Reusable canister  
985 mL Disposable canister

Expiratory resistance in bag mode:

Flow rate	$P_{exp}$	$P_{exp}$
	Absorber canister Installed	Absorber canister Removed
5 L/min	0.57 cmH <sub>2</sub> O	0.57 cmH <sub>2</sub> O
30 L/min	2.47 cmH <sub>2</sub> O	2.47 cmH <sub>2</sub> O
60 L/min	5.60 cmH <sub>2</sub> O	5.60 cmH <sub>2</sub> O

**Note:** Values include patient circuit tubing and wye piece (0.65 cmH<sub>2</sub>O at 60 L/min)

### Anesthetic gas scavenging

AGSS Type	Hospital extract system required	Machine connection
High vacuum, low flow:	High vacuum 36 L/min @ 12 in Hg (305 mmHg)	SIS evac
High vacuum, low flow:	High vacuum 25- 30 L/min @ 12 inHg (305 mmHg)	DISS evac
Low vacuum, high flow:	Low vacuum 55 to 65 L/min	BSI 30 mm threaded
Low vacuum, low flow:	36 L/min	12.7 mm hose barb, 25 mm hose barb, or 30 mm ISO taper
Passive:	Passive system with air break	30 mm/1.2 in M ISO taper

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Please check with your sales representative.

Always refer to the complete instructions manuals before use.

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**This document applies to Carestation 650 A1**

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GE provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems.

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