

Carestation™ 650

Simple. Smart. Agile.

Carestation 650 is a reliable and agile anaesthesia solution with smart tools to help simplify your daily work and manage non-ordinary events.

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 anaesthesia
- 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

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 cm²/299 in²
Size: 2950 cm²/471 in²
(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)

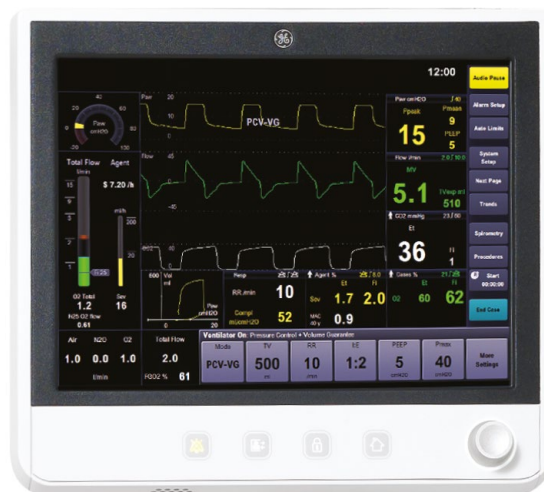
Height:
Top and middle: 8.6 cm/3.4 in
Bottom: 13.3 cm/5.2 in
Width: 34 cm/13 in
Depth: 37 cm/14.6 in

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

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_{inspired}) range: | 5 to 60 cmH ₂ O (increments of 1 cmH ₂ O) above set PEEP |
| Pressure (P_{max}) range: | 12 to 100 cmH ₂ O (increments of 1 cmH ₂ O) |
| Pressure (P_{support}) range: | Off, 2 to 40 cmH ₂ O (increments of 1 cmH ₂ 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 ₂ O (increments of 1 cmH ₂ 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 ₂ O (larger of) |
| PEEP delivery: | ±1.5 cmH ₂ 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 ₂ 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: | Mechanical ventilation ON: < 5 mL breath measured in 30 seconds Mechanical ventilation OFF: < 5 mL breath measured in 30 seconds |
| Low airway pressure: | 4 cmH ₂ O above PEEP |
| High pressure: | 12 to 100 cmH ₂ O (increments of 1 cmH ₂ O) |
| Sustained airway pressure: | Mechanical ventilation ON: $P_{\text{max}} < 30 \text{ cmH}_2\text{O}$, the sustained limit is 6 cmH ₂ O $P_{\text{max}} 30 \text{ to } 60 \text{ cmH}_2\text{O}$, the sustained limit is 20% of P_{max} $P_{\text{max}} > 60 \text{ cmH}_2\text{O}$, the sustained limit is 12 cmH ₂ O PEEP and mechanical ventilation ON: Sustained limit increases by PEEP minus 2 cmH ₂ O Mechanical ventilation OFF: $P_{\text{max}} 12 \text{ to } 60 \text{ cmH}_2\text{O}$, the sustained limit is 50% of P_{max} $P_{\text{max}} > 60 \text{ cmH}_2\text{O}$, the sustained limit is 30 cmH ₂ O |
| Subatmospheric pressure: | $P_{\text{aw}} < -10 \text{ cmH}_2\text{O}$ |
| Audio pause countdown clock: | 120 to 0 seconds |

Ventilator Components

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 |
|-------|---|

Ventilator screen

| | |
|---------------|------------|
| Display size: | 15 inch |
| Pixel format: | 1024 x 768 |

Battery backup

| | |
|---------------|---|
| Backup power: | Demonstrated battery time is 90 minutes when fully charged, which supports full system functionality and ventilation. |
| 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

Delivery

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

Airway Modules

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 CO₂/N₂O and CO₂/O₂ 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 CO₂, O₂ and N₂O):
Maximum effect
on readings: CO₂ < 0.2 vol %; O₂, N₂O < 2 vol %, AA < 0.15 vol%

Carbon dioxide (CO₂)

| | |
|---------------------|---|
| EtCO ₂ : | End-tidal CO ₂ concentration |
| FiCO ₂ : | Inspired CO ₂ concentration |

CO₂ 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 EtCO₂ and FiCO₂

Respiration rate (RR)

Measurement range: 4 to 100 breaths/min
Detection criteria: 1% variation in CO₂
Adjustable low and high alarm limits for respiration rate; alarm for apnea

Patient Oxygen (O₂)

| | |
|--------------------------------------|--|
| FiO ₂ : | Inspired O ₂ concentration |
| EtO ₂ : | End-tidal O ₂ concentration |
| FiO ₂ -EtO ₂ : | Inspired-expired difference |

O₂ Measurement

Measurement range: 0 to 100%
Accuracy: ±1 vol % + 2 % of reading
Datex-Ohmeda differential paramagnetic sensor
Adjustable low and high alarm limits for FiO₂ and EtO₂; alarm for FiO₂ < 18%

Nitrous Oxide (N₂O)

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_{peak}, PEEP_{tot} and MV_{exp}

Alarms for MV_{exp} << MV_{insp} and for MV_{exp} 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 | 5 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 |
|--------------------|---------------|----------------|

Airway pressure

| | |
|--------------------|--|
| Measurement range: | -20 to +100 cmH ₂ O |
| Accuracy**: | ±1 cmH ₂ O |
| Display units: | cmH ₂ O, mmHg, kPa, mbar, hPa |

Flow

| | | |
|--------------------|-------------------|-----------------|
| Measurement range: | -100 to 100 L/min | -25 to 25 L/min |
|--------------------|-------------------|-----------------|

I:E

Measurement range: 1:4.5 to 2:1

Compliance

| | | |
|--------------------|--------------------------------|--------------------------------|
| Measurement range: | 4 to 100 mL/cmH ₂ O | 1 to 100 mL/cmH ₂ O |
|--------------------|--------------------------------|--------------------------------|

Airway resistance

Measurement range: 0 to 200 cmH₂O/L/s

Sensor specifications

| | D-lite/ D-lite(+) | Pedi-lite/ Pedi-lite(+) |
|-------------------|------------------------|----------------------------|
| Dead Space: | 9.5 mL | 2.5 mL |
| Resistance | | |
| at 30 L/min: | 0.5 cmH ₂ O | |
| at 10 L/min: | | 1.0 cmH ₂ 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 1-3A, 2-2A individual breakers, isolation transformer (optional)

220/240 V:
3 outlets on side 1-2A, 2-1A individual breakers, isolation transformer (optional)

120/220-240 V:
No outlets

Pneumatic Specifications

Auxiliary O₂ (optional)

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

Auxiliary O₂+Air (optional)

| | |
|-------------------------------------|---|
| Connection: | 7-10 mm hose barb port |
| O ₂ concentration range: | 100% O ₂ only, or 21% to 100% O ₂ with Air |
| Flow range: | |
| for O ₂ 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 |
|------------|---------------------------|

Gas supply

| | |
|-----------------------|--|
| Pipeline input range: | 280 kPa to 600 kPa (41 psig to 87 psig) |
| Pipeline connections: | DISS-male, DISS-female, AS4059, S90-116, or NIST All fittings available for O ₂ , N ₂ O, and Air, and contain pipeline filter and check valve. Secondary O ₂ 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 ₂ and N ₂ 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 |

O₂ controls

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

Fresh gas

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

| | |
|--|--|
| Pneumatic Total Flow Tube: | 1 to 10 L/min |
| Measurement accuracy for O ₂ , Air and N ₂ O: | ±6% of measured value, or ±25 mL/min (larger of) |
| for Total Flow tube: | ±5% of full scale (larger of) at 100% O ₂ |
| O ₂ concentration range: | 21% to 100% when Air is available |
| O ₂ 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 ₂ /N ₂ O mixture. |

Materials

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

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 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 cmH₂O
Tactile knob indication at: 30 cmH₂O and above
Adjustment range of rotation: 0.5 to 30 cmH₂O (0 to 230°)
30 to 70 cmH₂O (230 to 330°)

Materials

All materials in contact with exhaled patient gases are autoclavable, except O₂ 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/cmH₂O
(filled disposable absorber canister)
1.74 mL/cmH₂O
(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:

| | P_{exp} Absorber canister Installed | P_{exp} Absorber canister Removed |
|------------------|---|---|
| Flow rate | | |
| 5 L/min | 0.57 cmH ₂ O | 0.57 cmH ₂ O |
| 30 L/min | 2.47 cmH ₂ O | 2.47 cmH ₂ O |
| 60 L/min | 5.60 cmH ₂ O | 5.60 cmH ₂ O |

Note: Values include patient circuit tubing and wye piece (0.65 cmH₂O 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 |



Imagination at work

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This document applies to Carestation 650 A1

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