Engström Carestation™
Breathing life into critical care

Features
• Simplified user interface
• Paramagnetic O₂ sensing
• Non-Invasive ventilation (Optional)
• Secure access to central stations
• Sophisticated power management control with battery backup
• Auxiliary pressure sensor
• Airway Resistance Compensation

Integrated Ventilation and Monitoring
• Advanced ventilation
• INview™ Suite: SpiroDynamics™ and FRC INview
• Plug and play modules
• Patient Spirometry
• Gas monitoring with metabolics and energy expenditure
• Optional use of proximal Neo Flow Sensor with Neonatal ventilation

Exceptional Design
• Adaptable to your environment
• Flexible and moveable display
• Transferable module bay
• Quick-release expiratory valve
• Multiple trolley configurations

Aerogen Aeroneb® Pro
• Built-in advanced nebulization system
• Operated in-line or independently for infants through adults
Physical Specifications

Dimensions

Height:
- 44.5 cm/17.5 in (Display down)
- 67.5 cm/26.6 in (Display up)

Height including cart:
- 122 cm/48 in (Display down)
- 145 cm/57.1 in (Display up)

Width:
- 38 cm/15 in

Depth:
- 36 cm/14 in

Weight:
- 31 kg/68.3 lb (not including cart)
- 76 kg/167.6 lb (including cart)

Display motion

Vertical tilt:
- 160° in raised position
- 60° in lowered position

Height adjustment:
- 23 cm/9.1 in

Modes of Ventilation

Volume Controlled (VCV)
Pressure Controlled (PCV)
Pressure Controlled, Volume Guaranteed (PCV-VG)
Synchronized Intermittent Mandatory Ventilation, Volume Controlled (SIMV-VC)
Synchronized Intermittent Mandatory Ventilation, Pressure Controlled (SIMV-PC)
Synchronized Intermittent Mandatory Ventilation, Pressure Controlled, Volume Guaranteed (SIMV-PCVG) (optional)
BiLevel Airway Pressure Ventilation (APRV capable)
BiLevel with Volume Guaranteed (BiLevel-VG) (optional)
Non-Invasive Ventilation (NIV) (optional); nCPAP available with Neonatal option
Constant Positive Airway Pressure/Pressure Support Ventilation (CPAP/PSV)
Apnea backup available in SIMV-VC, SIMV-PC, BiLevel, SIMV-PCVG, BiLevel-VG, CPAP/PSV and VG-PS (institutionally selectable defaults)
Volume Guarantee Pressure Support (VG-PS) available with Neonatal option

Control and Ranges

Maximum peak flow: 200 L/min
Flow:
- 0.2 to 30 L/min (0.004 to 0.5 L/sec)
- 2 to 90 L/min (0.04 to 1.5 L/sec)
- 2 to 160 L/min (0.04 to 2.6 L/sec)

Incremental settings:
- 0.2 to 5 L/min (increments of 0.1 L/min)
- 5 to 30 L/min (increments of 0.5 L/min)
- 2 to 40 L/min (increments of 1 L/min)
- 40 to 90 L/min (increments of 5 L/min)
- 40 to 160 L/min (increments of 5 L/min)

FiO₂:
- 21 to 100% O₂

Rate:
- 3 to 150 breaths per minute for VCV, PCV, PCV-VG and BiLevel (increments of 1 breath per minute)
- 3 to 120 breaths per minute for VCV, PCV, PCV-VG and BiLevel (increments of 1 breath per minute)
- 2 to 60 breaths per minute for SIMV-VC, SIMV-PC, SIMV-PCVG, BiLevel-VG (increments of 1 breath per minute)
- 1 to 60 breaths per minute for SIMV-VC, SIMV-PC, SIMV-PCVG and BiLevel-VG (increments of 1 breath per minute)

Key:
- Available only when Adult patient type is selected
- Available only when Pediatric patient type is selected
- Available only when Neonatal patient type is selected

Note: Neonatal software is an optional feature. If not specified with the ✈️ icon, features listed in this specifications sheet apply to Adult/Pediatric units and patient population selections.

Note: Ranges and Settings without an icon pertain to both Adult and Pediatric patient types.
Control and Ranges (continued)

Minimum rate: 2 to 60 breaths per minute for VG-PS
(increments of 1 breath per minute) 0 to 60 breaths per minute for CPAP/PSV
and 0 to 40 breaths per minute for NIV
(increments of 1 breath per minute)

Inspiratory time: 0.1 to 10 sec
0.1 to 1 sec (increments of 0.01)
1 to 4 sec (increments of 0.1)
4 to 10 sec (increments of 0.25)
0.25 to 15 sec
0.25 to 1 sec (increments of 0.05)
1 to 4 sec (increments of 0.1)
4 to 15 sec (increments of 0.25)

Expiratory time: 0.25 to 59.75 sec
0.25 to 29.9 sec for Invasive vent modes

Rise time: 0 to 500 ms of inspiratory period for either flow or pressure depending on the mode selected. Active in VCV, PCV, PCV-VG, SIMV-VC, SIMV-PCVG, BiLevel-VG, NIV and BiLevel (increments of 50 ms)

Trigger window: 0 to 80% of expiration time (increments of 5%) Flow trigger: 0.2 to 1 L/min (increments of 0.05 L/min) 1 to 3 L/min (increments of 0.1 L/min) 3 to 9 L/min (increments of 0.5 L/min)

Pressure trigger: –10 to –3 cm H₂O (increments of 0.5 cm H₂O)
–3 to –0.25 cm H₂O (increments of 0.25 cm H₂O)

Inspiratory pressure (Pinsp) range: 1 to 98 cm H₂O (increments of 1 cm H₂O)

Pressure limit (Pmax) limit: 7 to 100 cm H₂O for VCV and SIMV-VC
(increments of 1 cm H₂O)

Max. inspiratory pressure (Pinsp) limit: 7 to 100 cm H₂O (increments of 1 cm H₂O)
9-100 cm H₂O (increments of 1 cm H₂O)
in NIV and nCPAP

PEEP: Off, 1 to 50 cm H₂O (increments of 1 cm H₂O)
2-15 cm H₂O (increments of 1 cm H₂O)
in nCPAP
2-20 cm H₂O (increments of 1 cm H₂O) in NIV

T high: 0.1 to 10 sec
0.1 to 1 sec (increments of 0.01)
1 to 4 sec (increments of 0.1)
4 to 10 sec (increments of 0.25)
0.25 to 15 sec
0.25 to 1 sec (increments of 0.05)
1 to 4 sec (increments of 0.1)
4 to 15 sec (increments of 0.25)

T low: 0.25 to 18 sec
0.25 to 1 sec (increments of 0.01)
1 to 4 sec (increments of 0.1)
4 to 18 sec (increments of 0.25)
0.25 to 18 sec
0.25 to 1 sec (increments of 0.05)
1 to 4 sec (increments of 0.1)
4 to 18 sec (increments of 0.25)

T sup: 0.1 to 0.8 sec (increments of 0.01)
0.25 to 4 sec for NIV
0.25 to 1 sec (increments of 0.05)
1 to 4 sec (increments of 0.1)

Expiratory time: 0.25 to 59.75 sec
0.25 to 29.9 sec for invasive vent modes

Rise time: 0 to 500 ms of inspiratory period for either flow or pressure depending on the mode selected. Active in VCV, PCV, PCV-VG, SIMV-VC, SIMV-PC, SIMV-PCVG, BiLevel, BiLevel-VG, NIV and BiLevel (increments of 50 ms)

PSV rise time: 0 to 500 ms of inspiratory period for pressure supported breaths only. Active in SIMV-VC, SIMV-PC, SIMV-PCVG, BiLevel-VG, NIV and BiLevel (increments of 50 ms)

Patient weight: 0.25 to 1 kg (increments of 0.01 kg)
1 to 7 kg (increments of 0.1 kg)
0.5 to 2 lb (increments of 0.02 lb)
2 to 15 lb (increments of 0.2 lb)
5 to 15 kg (increments of 0.5 kg)
15 to 100 kg (increments of 1 kg)
100 to 200 kg (increments of 2 kg)
30 to 34 lb (increments of 1 lb)
34 to 220 lb (increments of 5 lb)

Pressure limit (Pmax) range: 7 to 100 cm H₂O for VCV and SIMV-VC
(increments of 1 cm H₂O)

Max. inspiratory pressure (Pinsp) limit: 7 to 100 cm H₂O (increments of 1 cm H₂O)
9-100 cm H₂O (increments of 1 cm H₂O)
in NIV and nCPAP

PEEP: Off, 1 to 50 cm H₂O (increments of 1 cm H₂O)
2-15 cm H₂O (increments of 1 cm H₂O)
in nCPAP
2-20 cm H₂O (increments of 1 cm H₂O) in NIV

T high: 0.1 to 10 sec
0.1 to 1 sec (increments of 0.01)
1 to 4 sec (increments of 0.1)
4 to 10 sec (increments of 0.25)
0.25 to 15 sec
0.25 to 1 sec (increments of 0.05)
1 to 4 sec (increments of 0.1)
4 to 15 sec (increments of 0.25)

T low: 0.25 to 18 sec
0.25 to 1 sec (increments of 0.01)
1 to 4 sec (increments of 0.1)
4 to 18 sec (increments of 0.25)
0.25 to 18 sec
0.25 to 1 sec (increments of 0.05)
1 to 4 sec (increments of 0.1)
4 to 18 sec (increments of 0.25)

T sup: 0.1 to 0.8 sec (increments of 0.01)
0.25 to 4 sec for NIV
0.25 to 1 sec (increments of 0.05)
1 to 4 sec (increments of 0.1)

Expiratory time: 0.25 to 59.75 sec
0.25 to 29.9 sec for invasive vent modes

Rise time: 0 to 500 ms of inspiratory period for either flow or pressure depending on the mode selected. Active in VCV, PCV, PCV-VG, SIMV-VC, SIMV-PC, SIMV-PCVG, BiLevel-VG, NIV and BiLevel (increments of 50 ms)

PSV rise time: 0 to 500 ms of inspiratory period for pressure supported breaths only. Active in SIMV-VC, SIMV-PC, SIMV-PCVG, BiLevel-VG, NIV and BiLevel (increments of 50 ms)

Trigger window: 0 to 80% of expiration time (increments of 5%) Flow trigger: 0.2 to 1 L/min (increments of 0.05 L/min) 1 to 3 L/min (increments of 0.1 L/min) 3 to 9 L/min (increments of 0.5 L/min)

Pressure trigger: –10 to –3 cm H₂O (increments of 0.5 cm H₂O)
–3 to –0.25 cm H₂O (increments of 0.25 cm H₂O)

Bias flow rate: 2 to 15 L/min (increments of 0.5 L/min) for nCPAP
2 to 10 L/min (increments of 0.5 L/min)
8 to 20 L/min for NIV (increments of 0.5 L/min)
Control and Ranges (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Low:</th>
<th>High:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insp. pause:</strong></td>
<td>0 to 75% of inspiration time (increments of 5%)</td>
<td>0 to 7.5 sec</td>
</tr>
<tr>
<td><strong>T</strong> pause:</td>
<td>0 to 1 sec (increments of 0.05)</td>
<td>1 to 4 sec (increments of 0.1)</td>
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<tr>
<td></td>
<td>4 to 7.5 (increments of 0.25)</td>
<td>0 to 11 sec</td>
</tr>
<tr>
<td></td>
<td>0 to 1 sec (increments of 0.05)</td>
<td>1 to 4 sec (increments of 0.1)</td>
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<tr>
<td></td>
<td>4 to 11 (increments of 0.25)</td>
<td></td>
</tr>
<tr>
<td><strong>Pressure support</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from PEEP level:</td>
<td>0 to 60 cm H₂O for SIMV-VC, SIMV-PC,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIMV-PCV, BiLevel, BiLevel-VG and</td>
<td></td>
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<tr>
<td></td>
<td>CPAP/PSV (increments of 1 cm H₂O)</td>
<td></td>
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<tr>
<td></td>
<td>0 to 30 cm H₂O for NIV (increments of 1 cm H₂O)</td>
<td></td>
</tr>
<tr>
<td><strong>End flow level:</strong></td>
<td>5 to 80% of peak flow for NIV, SIMV-VC,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIMV-PC, SIMV-PCV, BiLevel, BiLevel-VG,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VG-PS and CPAP/PSV (increments of 5%)</td>
<td></td>
</tr>
</tbody>
</table>

**Alarms Settings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Low:</th>
<th>High:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tidal volume:</strong></td>
<td>Off, 1 to 345 mL</td>
<td>3 to 350 mL, Off</td>
</tr>
<tr>
<td></td>
<td>10 to 2000 mL, Off</td>
<td></td>
</tr>
<tr>
<td><strong>Minute volume:</strong></td>
<td>0.01 to 10 L/min</td>
<td>0.02 to 40 L/min</td>
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<tr>
<td></td>
<td>0.4 to 99 L/min</td>
<td></td>
</tr>
<tr>
<td><strong>Respiratory rate:</strong></td>
<td>Off, 1 to 99/min</td>
<td>2 to 150/min, Off</td>
</tr>
<tr>
<td></td>
<td>2 to 120/min, Off</td>
<td></td>
</tr>
<tr>
<td><strong>Inspired oxygen (FiO₂):</strong></td>
<td>18 to 99%</td>
<td>24 to 100%, Off</td>
</tr>
<tr>
<td><strong>P</strong> max:</td>
<td>7 to 100 cm H₂O</td>
<td>9-100 cm H₂O (increments of 1 cm H₂O)</td>
</tr>
<tr>
<td></td>
<td>in NIV and nCPAP</td>
<td></td>
</tr>
<tr>
<td><strong>P</strong> peak:</td>
<td>1 to 97 cm H₂O</td>
<td></td>
</tr>
<tr>
<td><strong>PEEP</strong> e:</td>
<td>Off, 1 to 20 cm H₂O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 to 50 cm H₂O, Off</td>
<td></td>
</tr>
<tr>
<td><strong>PEEP</strong> i:</td>
<td>1 to 20 cm H₂O, Off</td>
<td></td>
</tr>
<tr>
<td><strong>P</strong> limit:</td>
<td>7 to 100 cm H₂O</td>
<td></td>
</tr>
<tr>
<td><strong>Apnea alarm:</strong></td>
<td>User adjustable: 5 to 20 sec</td>
<td>10 to 60 sec</td>
</tr>
<tr>
<td><strong>Circuit leak:</strong></td>
<td>10 to 90%, Off</td>
<td></td>
</tr>
</tbody>
</table>

**Alarm System**

Escalating alarms: High priority alarms escalate to a higher pitch if unattended for specified time

Adjustable to: 0, 10, 20 and 30 sec, Off

Auto limits: Alarm limits calculated on the current measured values for selected parameters

**Procedures**

**Suction**

Program routine: Automatic

Pre-oxygenation: ≤ 2 minutes with 100% O₂ with automatic disconnection detection*

Standby pause: ≤ 2 minutes with automatic patient (re-connection) detection

Post-oxygenation: ≤ 2 minutes with 100% O₂ *

Note: FiO₂ can be set to level other than 100%

*Note: 5 to 75% above current FiO₂ setting

**Manual breath**

Intrinsic PEEP (includes PEEP, Volume)

Lung Mechanics: P0.1

Vital Capacity

Inspiratory hold: 2 to 15 sec (increments of 1 sec)

Expiratory hold: 2 to 20 sec (increments of 1 sec)

Spontaneous Breathing Trial (SBT)

(Adjustable range: 2 to 120 minutes)
**Spirometry**

Data source: Ventilator or Compact Airway Module* (M-COV, M-COVX, M-CAiOV, M-CAiOVX; E-COV, E-COVX, E-CAiOV, E-CAiOVX)

Loop types: Pressure-Volume, Pressure-Flow and Flow-Volume

Saved loop: Up to six loops can be saved

Reference loop: A saved loop can be selected as the reference loop to compare with the current loop being displayed

Cursor: Freezes current loops and provides numeric display of X and Y axis as cursor moves across loops

Pulmonary mechanics: P$_{peak}$, P$_{plat}$, P$_{mean}$, PEEP$_e$, PEEP$_i$, TV$_{insp}$, TV$_{exp}$, MV$_{insp}$, MV$_{exp}$, Compliance and Resistance

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**Auxiliary Pressure**

Auxiliary pressure (P$_{aux}$): Measured range: -20 to +120 cm H$_2$O

Alarm range: 12 to 100 cm H$_2$O

Purge flow: Low flow to clear the P$_{aux}$ line, can be turned Off

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**SpiroDynamics (optional)**

*For complete specifications, see product specification sheets.

Note: Not available when Neonatal patient type is selected

- Tracheal Pressure – Volume loop displayed
- Dynostatic Curve displays calculated alveolar pressure
- Tracheal pressure measured via GE’s intratracheal pressure sensor* – Connects directly to Engström’s auxiliary pressure port
- 3 point compliance measurement
  - at 5-15% of the breath
  - at 45-55% of the breath
  - at 85-95% of the breath
- Store up to 6 SpiroDynamic loops
- Store up to 6 Dynostatic curves
- Overlay up to 2 separate loops and/or curves over current loop
- Cursor available across all displayed loops and curves
  - Pressure and volume values displayed at cursor position
- P$_{peak}$, PEEP$_e$ and Raw displayed

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**FRC INview (optional)**

Note: Not available when Neonatal patient type is selected

- Functional Residual Capacity measurement
  - Wash-in and Wash-out method provides 2 separate FRC measurements
- FRC displayed both numerically and graphically
- The most recent 5 FRC procedures displayed
- PEEP$_e$ and PEEP$_i$ displayed with each FRC
- FRC Event Log records:
  - FRC measurements
  - Ventilator settings and procedures that may affect the FRC procedure
- Programmable time intervals for automatic FRC measurements

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**PEEP INview (available with FRC INview)**

Note: Not available when Neonatal patient type is selected

- Measures FRC at up to 5 different PEEP levels
- Graphic and numeric display of FRC values
- User selectable beginning and ending PEEP levels
  - Ventilator evenly spaces additional PEEP levels
  - PEEP levels can either increase or decrease
- PEEP$_e$ and PEEP$_i$ displayed during each FRC measurement

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**Lung INview (available with SpiroDynamics and FRC INview)**

Note: Not available when Neonatal patient type is selected

- Integrates SpiroDynamics and FRC INview within the PEEP INview procedure
- Measures the amount of volume between the Dynostatic curves at each FRC measurement
- Estimate of recruitment volume

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**INview Vent Calculations (optional)**

Note: Not available when Neonatal patient type is selected

Data from Engström Care station and external lab results are used to provide the following values:

- PAO$_2$ – Alveolar partial pressure of oxygen
- AaDO$_2$ – Alveolar arterial oxygen difference
- Pa/FiO$_2$ – Oxygenation index
- Po$_2$/PAO$_2$ – Alveolar arterial oxygen pressure difference
- CO – Cardiac output
- Vd/Vt – Dead space ventilation
- Vd – Dead space volume
- VA – Alveolar ventilation
Non-Invasive Ventilation (NIV) (optional)
- Mask ventilation: Yes
- Integrated unique leak recognition algorithm

Automatic Patient Detection (APD)
- Patient re-connection: Automatic detection in standby
- Detection by: Back pressure to Bias-flow

100% $O_2$ ($\uparrow O_2$)
- Delivers 5 to 75% above current FiO$_2$ setting for ≤ 2 minutes
- Delivers 100% $O_2$ for ≤ 2 minutes
- Can be adjusted to other $O_2$ %

Take Snapshot
- Immediate capture and storage of critical data currently on the Engström’s display
- Stored data:
  - 3 waveform segments
  - Alarm messages (up to 5, currently active)
  - All measured parameters
  - All set ventilator parameters
- Maximum stored Snapshots: 10 most recent
- Cursor: Ability to cursor across waveforms for specific measured values

Ventilator Preferences
- Back-up Mode: Establishes the specific ventilator mode and parameters used in the event that the ventilator switches to Back-up ventilation
- ARC: Allows control and setting of the airway resistance compensation
- Assist Control: Allows the user to turn the Assist Control capability On or Off
- Leak Compensation: Allows the user to turn the Leak Compensation capability On or Off
- Trigger Compensation: Allows the user to turn On or Off compensation for flow triggering
- TV Based Conditions: Allows setting between ATPD (Ambient Temperature Pressure Dry) or BTPS (Body Temperature Pressure Saturated)

Airway Resistance Compensation (ARC)
- Note: Not available in Neonatal option
- Type of compensation: Electronic tube compensation
- Compensation for: Endotracheal and tracheostomy tubes
- Tube diameter: 5 to 10 mm
- Level of compensation: 25 to 100%

Mode Families
- Allows user adjustment to specify certain parameters that align with the hospital’s current ventilator usage.
- Adjustable parameters: Flow and Inspiratory timing
- Family 1: Flow control is On/Insp. Timing is I:E
- Family 2: Flow control is Off/Insp. Timing is I:E
- Family 3: Flow control is On/Insp. Timing is $T_{\text{insp}}$
- Family 4: Flow control is Off/Insp. Timing is $T_{\text{insp}}$
- Family 5: Flow control is On/Insp. Timing is $T_{\text{pause}}$

Ventilator Monitoring
- Airway pressure: -20 to +120 cm H$_2$O
- Patient flow: 0.1 to 32 L/min
  - 1 to 200 L/min
- Tidal volume: 0.5 to 1,000 mL with Neonatal Flow Sensor
  - 1 to 1,000 mL without the Neonatal Flow Sensor
  - 5 to 2,500 mL
- Minute volume: 0 to 99.9 L/min
- CO$_2$: 0 to 30%/0 to 225 mmHg
- Compliance: 0.1 to 150 mL/cm H$_2$O
- Resistance: 1 to 500 cm H$_2$O/L/s
- RQ: 0.6 to 1.3
- VO$_2$: 50 to 1000 mL/min
- VCO$_2$: 50 to 1000 mL/min
- Rate: 0 to 150 breaths per minute (increments of 1 breath per minute)
  - 0 to 120 breaths per minute (increments of 1 breath per minute)
- FiO$_2$: 10 to 100%
- Rapid Shallow Breathing Index (RSBI): 1 to 999 bpm/L

Note: Not available in Neonatal option
**Nebulization**

- **Nebulizer:** Aeroneb Nebulizer System built-in
- **Nebulizer technology:** Electronic micro pump
- **Nebulizer run time:** 10, 15, 20 or 30 minutes
- **Auto-repeat capability:**
  - Cycles: 1 to 10
  - Pause Time: 30 sec to 8 hr
  - 1 to 5 minutes (increments of 1 minute)
  - 5 to 55 minutes (increments of 5 minutes)
  - 1 to 8 hours (increments of 0.5 hour)
- **Nebulizer volume setting:** 2.5, 3, 5 or 6 mL
- **Particle size:**
  - Aeroneb Pro: average 2.1 microns MMAD (Mean Mass Aerodynamic Diameter)
  - Aeroneb Solo: 3.4 microns MMAD
- **Residual volume:**
  - Aeroneb Pro: average 0.3 mL
  - Aeroneb Solo: average < 0.1 mL

Performance may vary depending upon the type of drug used. For additional information contact Aerogen or drug supplier.

**Pneumatic nebulizer**

- **Flow compensation:**
  - 1 to 4 L/min (increments of 0.5 L/min) ➕
  - 1 to 12 L/min (increments of 0.5 L/min)

**Monitor Module**

- **Module capacity:** 4 single slot or 2 double slot modules
- **Compact airway module compatibility:**
  - M-C, M-CO, M-COV, M-COVX, M-CAiO, M-CAiOV, M-CAiOVX, E-CO, E-COV, E-COVX, E-CAiO, E-CAiOV, E-CAiOVX, M-miniC, E-miniC

**Note:** The Engström Carestation does not utilize the Ai (inhaled anesthesia) feature of the compact airway modules at this time.

**Trends**

- **Trend data:** Set parameters and measured data
- **Trend styles:** Measured and graphic
- **Maximum trending:** 14 days (336 hours)
- **Trend scaling:**
  - 12 min, 1h, 2h, 4h, 6h, 8h, 10h, 12h, 24h, 36h, 48h and 72h
- **Resolution:** 1 minute intervals for most recent 12 hours, 5 minute intervals for 12 to 48 hours, 30 minute intervals after 48 hours
- **Mini-Trends:** Waveform values can be displayed as a trend in a split screen view

**Note:**
- The Engström Carestation does not utilize any of the compact airway modules when the Neonatal Option is in use.

**Oxygen Monitoring**

- **Technology:** Dynamic Paramagnetic Oxygen monitoring system
- **Life span:** Unlimited operating life due to the use of non-depleting technology

**Screen**

- **Display type:** 30.5 cm/12 inch touch screen full color LCD adjustable viewing angle
- **Waveforms in screen:** Three at a time
- **Waveform parameters:** Pressure, flow, volume, CO₂, O₂ and auxiliary pressure
- **Graphic scaling:** Automatic scaling for optimal size or independent scaling
- **Data:** Control parameters, patient data, alarm settings and messages
- **Status indicator:** Ventilation mode, battery level, clock
- **Favorites:** 23 Hyperlink shortcuts to choose from 7 selectable at one time

**Monitoring Accuracy**

- **Pressure readings:** ±2 cm H₂O
- **Volume readings:**
  - 10% or ±1 mL, whichever is greater (with proximal neonatal flow sensor)
  - ±10% or ±5 mL, whichever is greater (inCPAP)
  - ±10% or ±15 mL, whichever is greater
- **O₂ concentration monitor:** ±3%

**Delivery Accuracy**

- **Inspired pressure control:** ±2 cm H₂O
- **Oxygen – Air mixing:** ±3% V/V of setting
- **Tidal volume delivery:**
  - ±10% of setting or ±1 mL, whichever is greater (with proximal neonatal flow sensor)
  - ±10% of setting or ±5 mL, whichever is greater

**Resolution:** 1 minute intervals for most recent 12 hours, 5 minute intervals for 12 to 48 hours, 30 minute intervals after 48 hours

**Mini-Trends:** Waveform values can be displayed as a trend in a split screen view

**Note:**
- Ventilation delivery specifications requirements:
  - Operating at EN794 and ASTM F1100 patient conditions
  - Operating at 21°C and at 1000 mbar ambient pressure
  - All volumes are at ambient temperature and pressure, dry (ATPD)
Trends (continued)

Mini-Trends parameters are based on the waveform displayed:
- Paw \( (P_{peak}, P_{plat}, \text{or Leak}) \)
- Flow \( (MV_{exp}, RR) \)
- Volume \( (\text{Spont MV or Mech MV, Spont RR or Mech RR}) \)
- \( P_{aux} \) \( (P_{peak}) \)
- \( CO_2 \) \( (ETCO_2) \)
- \( O_2 \) \( (ETO_2, FI_O_2) \)

External Communications

Communication ports: Serial port (RS-232), RS-485 port, RS-422 port, 1 USB port, Ethernet port, Compact flash card socket, nurse call

EView (optional)

Data Available: 10 snapshots
- 7 days of vent data
- Optional breath to breath waveform data

Electrical Specifications

Line supply
- Line voltage: 85 to 132 Vac, 47/63 Hz
- 190 to 264 Vac, 47/63 Hz
- Power consumption: < 200 W

Battery supply
- Back-up battery: Built-in
- Type: Lead acid gel
- Battery back-up time: 120 minutes typical, 30 minute minimum, battery fully charged

Gas supply
- Single gas operation: Yes
- Emergency air valve: Built-in

Oxygen supply
- Pressure range: 240 to 641 kPa/35 to 94 psi
- Flow: 160 L/min

Air supply
- Pressure range: 240 to 641 kPa/35 to 94 psi
- Flow: 160 L/min

Environmental Specifications

Thermal
- Operating range: 10° to 40°C
- Storage range: −20° to 65°C

Humidity
- Operating range: 15 to 95% RH Non-condensing
- Storage range: 15 to 95% RH Non-condensing
- In accordance with IEC 68-2-3

Vibration and shock
- Random vibration: 9.5 grms @ 30 min unpacked
- 2 to 5000 Hz

Altitude
- Operating range: −440 to 3565 m/500 to 800 mmHg
- Storage range: −440 to 5860 m/375 to 800 mmHg

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