

# HAMILTON-T1

## Technical specification for SW version 3.1.x

### Ventilation modes

Standard: ✓ Option: O Not applicable: --

| Mode form                                           | Mode name            | Mode                                                                                                                                                                                                         | Adult/Ped | Neonatal |
|-----------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|
| Volume-targeted modes, adaptive pressure controlled | APVcmv / (S)CMV+     | Breaths are volume targeted and mandatory.                                                                                                                                                                   | ✓         | ✓        |
|                                                     | APVsimv / SIMV+      | Volume-targeted mandatory breaths can be alternated with pressure-supported spontaneous (patient-triggered) breaths.                                                                                         | ✓         | ✓        |
|                                                     | VS                   | Breaths are flow cycled and deliver a set tidal volume to support patient-initiated breaths.                                                                                                                 | ✓         | ✓        |
| Pressure-controlled modes                           | PCV+                 | All breaths, whether triggered by the patient or the ventilator, are pressure controlled and mandatory.                                                                                                      | ✓         | ✓        |
|                                                     | PSIMV+               | Mandatory breaths are pressure controlled. Mandatory breaths can be alternated with pressure-supported spontaneous (patient-triggered) breaths.                                                              | ✓         | ✓        |
|                                                     | DuoPAP               | Mandatory breaths are pressure controlled. Spontaneous breaths can be triggered at both pressure levels.                                                                                                     | O         | O        |
|                                                     | APRV                 | Spontaneous breaths can be continuously triggered. The pressure release between the levels contributes to ventilation.                                                                                       | O         | O        |
|                                                     | SPONT                | Every breath is spontaneous, with or without pressure support.                                                                                                                                               | ✓         | ✓        |
| Intelligent ventilation                             | ASV                  | Operator sets %MinVol, PEEP, and oxygen. Rate, tidal volume, inspiratory pressure, and I:E ratio are based on physiological input from the patient.                                                          | ✓         | --       |
|                                                     | INTELLiVENT-ASV      | Ventilator management of CO <sub>2</sub> elimination and oxygenation is based on clinician-defined target ranges and parameter limits, and physiological input from the patient. The underlying mode is ASV. | O         | --       |
| Noninvasive modes <sup>1</sup>                      | NIV                  | Every breath is spontaneous.                                                                                                                                                                                 | O         | O        |
|                                                     | NIV-ST               | Every breath is spontaneous as long as the patient is breathing above the set Rate. A backup Rate can be set for mandatory breaths.                                                                          | O         | O        |
|                                                     | nCPAP                | Demand flow nasal continuous positive airway pressure.                                                                                                                                                       | --        | O        |
|                                                     | nCPAP-PC             | Breaths are pressure controlled and mandatory.                                                                                                                                                               | --        | O        |
|                                                     | HiFlowO <sub>2</sub> | High flow oxygen therapy. No supported breaths.                                                                                                                                                              | O         | O        |

<sup>1</sup> When the NIV-only option is installed and enabled, only noninvasive modes and features are supported. All invasive modes are disabled.

## Standard configuration and options (in alphabetical order)

Standard: ✓ Option: O Not applicable: --

| Functions                                                                                                                                                                                                                                                           | Adult/Ped | Neonatal |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|
| Capnography, mainstream (volumetric) and sidestream                                                                                                                                                                                                                 | O         | O        |
| Communication board:                                                                                                                                                                                                                                                | O         | O        |
| CO <sub>2</sub> , CO <sub>2</sub> /Nurse Call/COM1, CO <sub>2</sub> /SpO <sub>2</sub> /COM1 <sup>2</sup> , CO <sub>2</sub> /SpO <sub>2</sub> /Humidifier & COM1 <sup>2,3</sup>                                                                                      |           |          |
| Communication protocols. For details, see the <i>HAMILTON Communication Interface User Guide</i> (PN 627052)                                                                                                                                                        | O         | O        |
| CPR ventilation                                                                                                                                                                                                                                                     | ✓         | ✓        |
| Dynamic Lung                                                                                                                                                                                                                                                        | ✓         | --       |
| Event log (up to 10,000 events with date and time stamp)                                                                                                                                                                                                            | ✓         | ✓        |
| Hamilton Connect Module (connectivity) <sup>4</sup>                                                                                                                                                                                                                 | O         | O        |
| HAMILTON-H900 humidifier integration                                                                                                                                                                                                                                | O         | O        |
| IntelliSync®+ (inspiratory and expiratory trigger synchronization) <sup>5</sup>                                                                                                                                                                                     | O         | --       |
| IntelliTrig (leak compensation)                                                                                                                                                                                                                                     | ✓         | ✓        |
| Languages (English, US English, Chinese, Croatian, Czech, Danish, Dutch, Finnish, French, German, Greek, Hungarian, Indonesian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian, Slovak, Spanish, Swedish, Turkish, Ukrainian) | ✓         | ✓        |
| Manual breath/prolonged inspiration                                                                                                                                                                                                                                 | ✓         | ✓        |
| Mounting options (trolley, carrying case, and a variety of wall, bed, ceiling, and shelf mounts)                                                                                                                                                                    | O         | O        |
| NBC filter compatibility (only for HAMILTON-T1 MIL PN 161009)                                                                                                                                                                                                       | O         | O        |
| Nebulization, pneumatic                                                                                                                                                                                                                                             | ✓         | --       |
| Night vision compatibility (NVG)                                                                                                                                                                                                                                    | O         | O        |
| NIV-only                                                                                                                                                                                                                                                            | O         | --       |
| O <sub>2</sub> assist <sup>6</sup>                                                                                                                                                                                                                                  | O         | O        |
| O <sub>2</sub> enrichment                                                                                                                                                                                                                                           | ✓         | ✓        |
| On-screen help                                                                                                                                                                                                                                                      | ✓         | ✓        |
| Patient group                                                                                                                                                                                                                                                       | ✓         | O        |
| Print screen                                                                                                                                                                                                                                                        | ✓         | ✓        |
| RJ-45 Ethernet port <sup>7</sup>                                                                                                                                                                                                                                    | ✓         | ✓        |
| Screen lock                                                                                                                                                                                                                                                         | ✓         | ✓        |
| Second battery                                                                                                                                                                                                                                                      | O         | O        |
| Speak valve compatibility                                                                                                                                                                                                                                           | O         | --       |
| SpO <sub>2</sub> monitoring                                                                                                                                                                                                                                         | O         | O        |
| Standby with timer                                                                                                                                                                                                                                                  | ✓         | ✓        |

<sup>2</sup> Applies only to devices with serial number > 3000

<sup>3</sup> Only available with the HAMILTON-H900 Y-cable

<sup>4</sup> Available for HAMILTON-T1 PN 1610060 and 1610090.

Available for the HAMILTON-T1 PN 161006, 161009 with SN > 3000 and higher with the Hamilton Connect Module (HCM) Upgrade kit.

<sup>5</sup> Available for HAMILTON-T1 PN 1610060 and 1610090.

<sup>6</sup> O<sub>2</sub> assist is NOT intended to be used with pre-term infants (gestational age < 37 weeks).

<sup>7</sup> Only available for use if the Hamilton Connect module is activated.

| Functions                                                              | Adult/Ped | Neonatal |
|------------------------------------------------------------------------|-----------|----------|
| Suctioning tool                                                        | ✓         | --       |
| Trends/Loops                                                           | O         | O        |
| USB port                                                               | ✓         | ✓        |
| Vent Status (visual representation of patient's ventilator dependence) | ✓         | ✓        |

## Technical performance

| Description                          | Specification                                                                                                                                                                    |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Automatic expiratory base flow       | <i>Adult/Ped:</i> Fixed at 3 l/min<br><i>Neo:</i> Fixed at 4 l/min                                                                                                               |
| Inspiratory pressure                 | 0 to 60 cmH <sub>2</sub> O                                                                                                                                                       |
| Maximum limited pressure             | 60 cmH <sub>2</sub> O                                                                                                                                                            |
| Maximum working pressure             | <i>Adult/Ped:</i> 60 cmH <sub>2</sub> O (total inspiratory pressure); ensured through pressure limiting<br><i>Neo:</i> 45 cmH <sub>2</sub> O (limitation depending on frequency) |
| Maximum inspiratory flow             | 260 l/min (120 l/min with 100% O <sub>2</sub> )                                                                                                                                  |
| Means of inspiratory triggering      | Flow trigger control                                                                                                                                                             |
| Minimum expiratory time              | 20% of cycle time; 0.2 to 0.8 seconds                                                                                                                                            |
| Minute volume capability             | Up to 60 l/min                                                                                                                                                                   |
| Oxygen mixer accuracy                | ± (volume fraction of 2.5% + 2.5% of actual reading)                                                                                                                             |
| Tidal volume                         | <i>Adult/Ped:</i> 20 to 2000 ml<br><i>Neo:</i> 2 to 300 ml                                                                                                                       |
| Preoperational checks                | Leak test, flow sensor/circuit/O <sub>2</sub> sensor calibration, CO <sub>2</sub> sensor zero calibration <sup>8</sup>                                                           |
| Display device                       | Display of settings, alarms, and monitored data<br><i>Type:</i> Color TFT<br><i>Size:</i> 640 x 480 pixels, 8.4 in (214 mm) diagonal                                             |
| Brightness setting for display       | The range is 10% to 100% brightness. By default, Day = 80%; Night = 40%.                                                                                                         |
| Brightness with NVG option           | The range is 1 to 10. The default is 5.                                                                                                                                          |
| Alarm volume (loudness) <sup>9</sup> | The range is 1 to 10. The default setting is 5.                                                                                                                                  |
| Sound power level <sup>10</sup>      | 51 dB(A) ± 3dB(A)                                                                                                                                                                |
| Sound pressure level <sup>10</sup>   | 43 dB(A) ± 3dB(A)                                                                                                                                                                |

<sup>8</sup> CO<sub>2</sub> option required.

<sup>9</sup> Volume at 1 meter distance from ventilator. A setting of 1 = 62 dB(A), 5 = 76 dB(A), and 10 = 85 dB(A), with accuracy of ±3 dB(A).

<sup>10</sup> Per ISO 80601-2-12.

## Approvals

| Description                   | Specification                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Classification                | Class IIb, continuously operating according to Regulation (EU) 2017/745                                                                                                                                                                                                                                                                                             |
| Declaration                   | The HAMILTON-T1 was developed in accordance with pertinent international standards and FDA guidelines. The ventilator is manufactured under a QMS system as required by EN ISO 13485, ISO 9001, and article 10(9) of Regulation (EU) 2017/745. The ventilator meets the general safety and performance requirements according to Regulation (EU) 2017/745, Annex I. |
| Electromagnetic compatibility | According to IEC 60601-1-2:2014                                                                                                                                                                                                                                                                                                                                     |
| Safety class                  | Class II, Type BF applied part (ventilator breathing system, VBS, CO2 sensor including CO2 module connector, and SpO2 sensor including adapter), continuous operation according to IEC 60601-1                                                                                                                                                                      |

## Pneumatic performance

| Component                  | Specifications                                |                                                                                                                                                        |
|----------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| High-pressure oxygen inlet | Pressure:                                     | 2.8 to 6 bar / 41 to 87 psi                                                                                                                            |
|                            | Flow:                                         | Maximum of 200 l/min                                                                                                                                   |
|                            | Connector:                                    | DISS (CGA 1240) or NIST                                                                                                                                |
| Low-pressure oxygen inlet  | Pressure:                                     | Maximum 6 bar / 87 psi                                                                                                                                 |
|                            | Flow:                                         | ≤ 15 l/min                                                                                                                                             |
|                            | Connector:                                    | Quick-coupling system, compatible with Colder Products Company (CPC) PMC series                                                                        |
| Air supply                 | Integrated blower                             |                                                                                                                                                        |
| Gas mixing system          | Delivered flow                                | <ul style="list-style-type: none"> <li>&gt; 260 l/min ±10% against ambient pressure (at sea level)</li> <li>&gt; 200 l/min with 100% oxygen</li> </ul> |
|                            | Delivered pressure:                           | <i>Adult/Ped</i> : 0 to 60 cmH2O<br><i>Neo</i> : 0 to 45 cmH2O                                                                                         |
|                            | Flow accuracy:                                | ±10% or ±300 ml/min (whichever is greater)                                                                                                             |
|                            | Inspiratory outlet ( <i>To patient</i> port)  | Connector: ISO ID15/OD22 conical                                                                                                                       |
|                            | Expiratory outlet ( <i>From patient</i> port) | Connector (on expiratory valve): ISO ID15/OD22 conical                                                                                                 |

## Electrical specifications

| Element           | Specifications                                                                                                                                                                                                                                                          |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input power       | 100 to 240 VAC, 50/60 Hz                                                                                                                                                                                                                                                |
|                   | 12 to 28 VDC (total range 10.2 to 30.3 VDC)                                                                                                                                                                                                                             |
| Power consumption | 50 VA typical, 150 VA maximum                                                                                                                                                                                                                                           |
| Battery           | Hamilton Medical provides a high-capacity battery <sup>11</sup> . An optional second battery is available.                                                                                                                                                              |
|                   | Electrical specifications: 10.8 VDC, 6.7 Ah, 72 Wh                                                                                                                                                                                                                      |
|                   | Type: Lithium-ion, supplied by Hamilton Medical only                                                                                                                                                                                                                    |
|                   | Recharge time: While the ventilator is connected to primary power, approximately 3.25 h to fully recharge one battery, approximately 6.25 h to fully recharge two batteries.                                                                                            |
|                   | Storage: -20°C to 60°C, ≤ 85% relative humidity. The storage location should be free from vibration, dust, direct sunlight, moisture, and corrosive gases, and with a recommended temperature range < 21°C.                                                             |
|                   | Extended exposure to temperatures above 45°C can degrade battery performance and life.                                                                                                                                                                                  |
|                   | Normal operating time: Typically 4 hours with one battery, 8 hours with two batteries.                                                                                                                                                                                  |
|                   | Operating times are measured with one or two fully charged battery, the blower in use, without communication board, and with the following settings: Mode = PCV+, Rate = 10 b/min, ΔPcontrol = 10 cmH2O, I:E = 1:4, PEEP = 5 cmH2O, Flow trigger = 5 l/min, FiO2 = 40%. |
|                   | Approximate operating times under these conditions are as follows:                                                                                                                                                                                                      |
|                   | <ul style="list-style-type: none"><li>• One battery, display brightness = 80%: 4 h</li><li>• One battery, display brightness = 20%: 4.5 h</li><li>• Two batteries, display brightness = 80%: 8 h</li><li>• Two batteries, display brightness = 20%: 9.25 h</li></ul>    |
|                   | This operating time applies to new, fully charged Li-ion batteries that have not been exposed to extreme temperatures. The actual operating time depends on battery age and on how the battery is used and recharged.                                                   |

## Graphical patient data

| Graphic type/tab name | Options                                                                                                                                                                           |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Waveforms             | Pressure, Volume, Flow, PCO2 <sup>12</sup> , FCO2 <sup>12</sup> , Plethysmogram <sup>13</sup> , Capnogram <sup>12</sup>                                                           |
| Intelligent panels    | Dynamic Lung <sup>14</sup> , Vent Status, ASV Graph <sup>15</sup> , INTELLiVENT-ASV Oxygenation and CO2 elimination maps and horizons <sup>16</sup> , O2 assist <sup>17, 18</sup> |
| Trends                | 1-, 6-, 12-, 24-, or 72-h trend data for a selected parameter or combination of parameters                                                                                        |
| Loops                 | Pressure/Volume, Pressure/Flow, Volume/Flow, Volume/PCO2 <sup>12</sup> , Volume/FCO2 <sup>12</sup>                                                                                |

<sup>11</sup> PN 369108, revision 4 and later.

<sup>12</sup> CO2 option required.

<sup>13</sup> SpO2 option required.

<sup>14</sup> Only for adult/pediatric patients.

<sup>15</sup> Only in ASV mode.

<sup>16</sup> INTELLiVENT-ASV required

<sup>17</sup> If option is installed.

<sup>18</sup> The o2 assist panel can only be displayed if o2 assist is turned on.

## Alarms

| Priority        | Alarm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High priority   | <p>Apnea, Blower fault, Buzzer defective, Check flow sensor, Check flow sensor tubing, Check patient interface, Device temperature high, Disconnection on patient/ventilator side, Exhalation obstructed, ExpMinVol high/low, External flow sensor failed, Flow sensor calibration needed (during ventilation), High Pressure during Sigh, Loudspeaker defective, Minute volume high/low, Obstruction, Options not found, Oxygen high/low, Oxygen supply failed, Pressure high/low, Pressure not released, Replace O2 sensor, Self test failed, Vent outlet temperature high</p> <p>Battery 1,2: Defective, Battery 1,2: Temperature high, Battery communication error, Battery low, Battery power loss, Battery totally discharged</p> <p><i>INTELLiVENT-ASV:</i><sup>19</sup> Oscillation %MinVol, Oscillation PEEP/CPAP</p> <p><i>O2 assist:</i><sup>20</sup> Low SpO2</p> <p><i>SpO2:</i><sup>21</sup> SpO2 low</p>                                                                                                                                                                                                                                                                                                                                                  |
| Medium priority | <p>Battery low, Check for blockage, Check flow sensor for water (Neo), Circuit calibration needed, External connections disabled, Fan failure, Flip the flow sensor, Frequency high/low, fTotal high/low, Function key not operational, High Flow, High PEEP, Inspiratory volume limitation, Loss of PEEP, Performance limited by high altitude, Pressure limitation, Real-time clock failure, Vt high/low, Wrong expiratory valve</p> <p><i>CO2:</i><sup>22</sup> PetCO2 high/low</p> <p><i>INTELLiVENT-ASV:</i><sup>19</sup> FiO2 set to 100% due to low SpO2, Oxygen control limit exceeded, Oxygenation adjustment off, Ventilation adjustment off</p> <p><i>O2 assist:</i><sup>20</sup> Low SpO2, Oxygen adjustment OFF, Oxygen alert limit exceeded</p> <p><i>SpO2:</i><sup>21</sup> SpO2: Adapter missing, SpO2: Light interference, SpO2: Low perfusion index, SpO2: Patient disconnected, SpO2: Poor signal, SpO2: Probe missing, SpO2: Sensor error, PI low/high, PVI low/high, Pulse low/high, SpO2 low</p>                                                                                                                                                                                                                                                   |
| Low priority    | <p>Apnea ventilation/Apnea ventilation ended, ASV: Cannot meet the target, Blower service required, Check Plimit, Check settings, CPR ON, External connections disabled<sup>23</sup>, Flow sensor calibration needed (in Standby), Invalid communication board, IRV (inverse ratio ventilation), JTAG not working, Loss of external power, Maximum leak compensation, Preventive maintenance required, Pressure limit has changed, Release valve defective, Replace HEPA filter, SpeakValve ON/OFF, Suctioning maneuver, Touch not functional,</p> <p>Battery 1,2: Calibration required, Battery 1,2: Replacement required, Battery 1,2: Wrong battery, Battery low</p> <p>O2 sensor calibration needed, O2 sensor defective, O2 sensor missing, O2 sensor not system compatible</p> <p><i>CO2:</i><sup>22</sup> CO2 calibration needed, CO2 sensor disconnected, CO2 sensor faulty, CO2 sensor over temperature, CO2 sensor warmup, Check CO2 airway adapter, Check CO2 sampling line, CO2: Poor signal</p> <p><i>INTELLiVENT-ASV:</i><sup>19</sup> Oxygen controller at limit, PetCO2 target range changed, Ventilation controller at limit</p> <p><i>O2 assist:</i><sup>20</sup> High SpO2, Oxygen controller at limit</p> <p><i>SpO2:</i><sup>21</sup> SpO2 high</p> |

<sup>19</sup> If INTELLiVENT-ASV is installed.

<sup>20</sup> If option is installed.

<sup>21</sup> If the SpO2 option is installed and enabled.

<sup>22</sup> If the CO2 option is installed and enabled.

<sup>23</sup> If the Hamilton Connect module is installed and enabled.

## Control settings and ranges

| Parameter (units)              | Range Adult/Ped <sup>24</sup>                                             | Range Neonatal <sup>24</sup>                                                                                              |
|--------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| %MinVol (%) <sup>25</sup>      | 25 to 350                                                                 | --                                                                                                                        |
| Apnea backup                   | On, Off                                                                   | On, Off                                                                                                                   |
| ETS (%) <sup>26,27</sup>       | 5 to 80<br><i>NIV-only: OFF<sup>28</sup> / 5–80</i>                       | 5 to 80                                                                                                                   |
| Flow (l/min) <sup>29</sup>     | 2 to 100 <sup>30</sup>                                                    | 2 to 30                                                                                                                   |
| I:E <sup>31</sup>              | 1:9 to 4:1                                                                | 1:9 to 4:1                                                                                                                |
| IBW (kg) ( <i>calculated</i> ) | 3 to 139                                                                  | --                                                                                                                        |
| O2 assist: Emerg-Hi (%)        | 80 to 100                                                                 | 80 to 100                                                                                                                 |
| O2 assist: Emerg-Lo (%)        | 60 to 92                                                                  | 60 to 92                                                                                                                  |
| O2 assist: SpO2 Target (%)     | 65 to 97                                                                  | 65 to 97                                                                                                                  |
| O2 assist: Target-Hi (%)       | 67 to 99                                                                  | 67 to 99                                                                                                                  |
| O2 assist: Target-Lo (%)       | 63 to 95                                                                  | 63 to 95                                                                                                                  |
| Oxygen (%)                     | 21 to 100                                                                 | 21 to 100                                                                                                                 |
| Oxygen alert (%)               | 40 to 100/Off                                                             | 40 to 100/Off                                                                                                             |
| P high (cmH2O) (in APRV)       | 0 to 60                                                                   | 0 to 45                                                                                                                   |
| P high (cmH2O) (in DuoPAP)     | 0 to 60                                                                   | 3 to 45                                                                                                                   |
| P low (cmH2O) (in APRV)        | 0 to 35                                                                   | 0 to 25                                                                                                                   |
| Pat. height                    |                                                                           |                                                                                                                           |
| (cm)                           | 30 to 250                                                                 | --                                                                                                                        |
| (in)                           | 12 to 98                                                                  |                                                                                                                           |
| PEEP/CPAP (cmH2O)              | 0 to 35                                                                   | 3 to 25                                                                                                                   |
| Plimit (cmH2O)                 | 5 to 60                                                                   | 5 to 45                                                                                                                   |
| P-ramp (ms) <sup>32</sup>      | 0 to 2000<br><i>ASV, NIV, NIV-ST, SPONT, VS: max = 200</i>                | 0 to 600<br><i>NIV, NIV-ST, SPONT, nCPAP-PC, VS: max = 200</i>                                                            |
| Rate (b/min) <sup>33</sup>     | 1 to 80<br><i>APVcmv, PCV+: 4 to 80</i><br><i>PSIMV+, NIV-ST: 5 to 80</i> | 1 to 80<br><i>PSIMV+: 5 to 80</i><br><i>APVcmv, PCV+, PSIMV+PSync, nCPAP-PC, NIV-ST, APVsimv + Apnea backup: 10 to 80</i> |
| Set temp (°C)                  | INV: 35 to 41<br>NIV: 30 to 35<br>HiFlowO2: 33 to 37                      | INV: 35 to 41<br>NIV: 30 to 35<br>HiFlowO2: 33 to 37                                                                      |
| Sex                            | Male, Female                                                              | --                                                                                                                        |
| Sigh                           | On, Off                                                                   | --                                                                                                                        |

<sup>24</sup> Parameter settings and ranges can vary depending on the selected mode.

<sup>25</sup> Only in ASV mode.

<sup>26</sup> Expiratory trigger sensitivity, in % of inspiratory peak flow.

<sup>27</sup> When selecting a noninvasive mode, the device uses the ETS value used in the previous mode, if available. If the previous mode did not use ETS, the device sets ETS to default values.

<sup>28</sup> ETS can be set to OFF only in the *NIV-only* option. The ability to set ETS to OFF can be disabled. For details, contact your Hamilton Medical technical representative.

<sup>29</sup> Only for high flow oxygen therapy.

<sup>30</sup> In some markets, the maximum possible Flow setting may be limited.

<sup>31</sup> In PCV+, (S)CMV+, and APVcmv modes, mandatory breath timing can be controlled by using a combination of inspiratory time (TI) and Rate, or by the I:E ratio; set the method in Configuration. All other modes are controlled by using a combination of inspiratory time (TI) and Rate.

<sup>32</sup> P-ramp is limited to one-third (1/3) of TI time. Adjustment of TI time can override the P-ramp setting.

<sup>33</sup> Startup setting derived from IBW (adult/pediatric), body weight setting (neonatal). Does not apply in ASV mode.

| Parameter (units)                                            | Range Adult/Ped <sup>24</sup>                  | Range Neonatal <sup>24</sup>                 |
|--------------------------------------------------------------|------------------------------------------------|----------------------------------------------|
| SpeakValve                                                   | On, Off                                        | --                                           |
| T gradient (°C)                                              | -2 to 3                                        | -2 to 3                                      |
| T high <sup>33</sup> (s) (in APRV and DuoPAP)                | 0.1 to 40.0                                    | 0.1 to 40.0                                  |
| T low (s) (in APRV)                                          | 0.2 to 40.0                                    | 0.2 to 40.0                                  |
| TI (s) <sup>31,33</sup>                                      | 0.1 to 12.0                                    | 0.1 to 12.0                                  |
| TI max (s)                                                   | 0.5 to 3.0                                     | 0.25 to 3.0                                  |
| Trigger, expiratory: ETS<br>(Expiratory trigger sensitivity) | ETS, IntelliSync+ <sup>34</sup>                | ETS                                          |
| Trigger, flow (l/min) <sup>35</sup>                          | 0.5 to 20.0<br>APVcmv, PCV+: 0.5 to 20.0 / Off | 0.1 to 5.0<br>APVcmv, PCV+: 0.1 to 5.0 / Off |
| Trigger, inspiratory: flow                                   | Flow trigger, IntelliSync+ <sup>34</sup>       | Flow trigger                                 |
| Vt (ml)                                                      | 20 to 2000                                     | 2 to 300                                     |
| Vt/IBW                                                       | 5 to 12                                        | 5 to 12                                      |
| Vt/Weight (ml/kg) <sup>36</sup>                              |                                                |                                              |
| Weight (kg)                                                  | --                                             | 0.2 to 30.0                                  |
| ΔPcontrol (cmH <sub>2</sub> O) <sup>37</sup>                 | 5 to 60                                        | 3 to 45<br>nCPAP-PC: 0 to 45                 |
| ΔPinsp (cmH <sub>2</sub> O) <sup>37</sup>                    | 3 to 60                                        | 3 to 45                                      |
| ΔPsupport (cmH <sub>2</sub> O) <sup>37</sup>                 | 0 to 60                                        | 0 to 45                                      |

<sup>34</sup> Not available in all markets.

<sup>35</sup> Flow trigger is leak compensated.

<sup>36</sup> IBW is calculated using height and sex, for adult and pediatric patients. Actual body weight is used for neonates.

<sup>37</sup> ΔPcontrol: Control pressure, added to PEEP/CPAP. ΔPinsp: Inspiratory pressure, added to PEEP/CPAP. ΔPsupport: Pressure support, added to PEEP/CPAP.

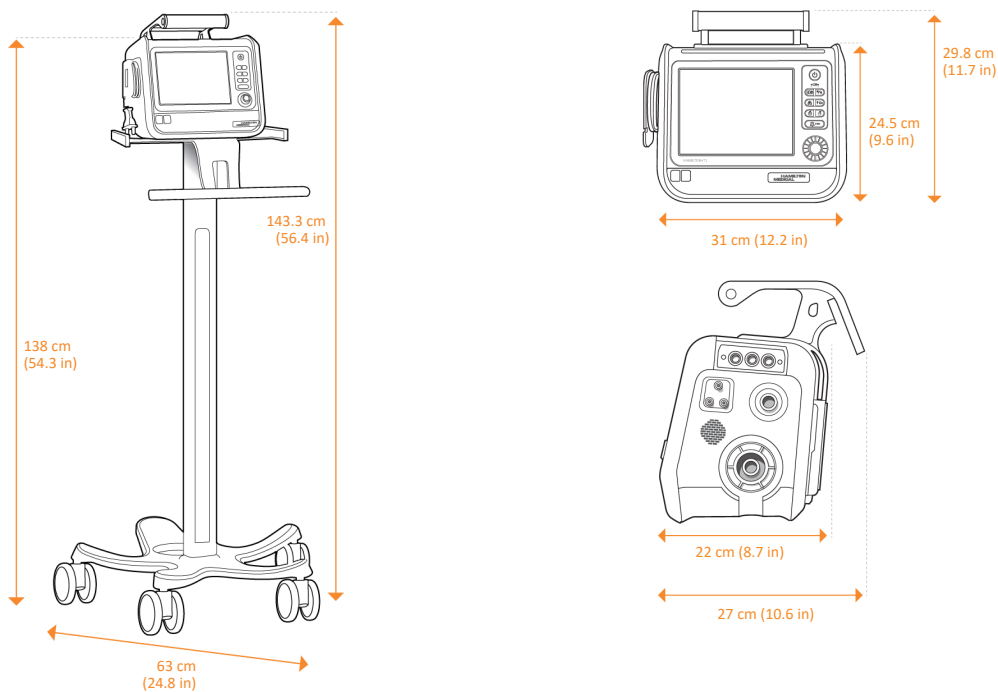
## Monitoring parameters

| Parameter (units) |                                      | Description                                                                                                          |
|-------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Pressure          | AutoPEEP (cmH2O)                     | Unintended positive end-expiratory pressure                                                                          |
|                   | PEEP/CPAP (cmH2O)                    | PEEP (positive end-expiratory pressure) and CPAP (continuous positive airway pressure)                               |
|                   | Driving pressure, $\Delta P$ (cmH2O) | Driving pressure, calculated value reflecting the difference between Pplateau and PEEP                               |
|                   | $\Delta P_{\text{insp}}$ (cmH2O)     | Inspiratory pressure                                                                                                 |
|                   | Pmean (cmH2O)                        | Mean airway pressure                                                                                                 |
|                   | Ppeak (cmH2O)                        | Peak airway pressure                                                                                                 |
|                   | Pplateau (cmH2O)                     | Plateau or end-inspiratory pressure                                                                                  |
|                   | Pprox (cmH2O)                        | Airway pressure at proximal patient interface                                                                        |
| Flow              | Flow (l/min)                         | HiFlowO2: The set flow of gas to the patient                                                                         |
|                   |                                      | nCPAP: The average flow updated every second                                                                         |
|                   |                                      | nCPAP-PC: The average flow during expiration, updated every breath                                                   |
|                   | Insp Flow (peak) (l/min)             | Peak inspiratory flow, spontaneous or mandatory                                                                      |
|                   | Exp Flow (peak) (l/min)              | Peak expiratory flow                                                                                                 |
| Volume            | ExpMinVol or MinVol NIV (l/min)      | Expiratory minute volume                                                                                             |
|                   | MVSpont or MVSpont NIV (l/min)       | Spontaneous expiratory minute volume                                                                                 |
|                   | VTE or VTE NIV (ml)                  | Expiratory tidal volume                                                                                              |
|                   | VTESpont (ml)                        | Spontaneous expiratory tidal volume                                                                                  |
|                   | VTI (ml)                             | Inspiratory tidal volume                                                                                             |
|                   | VLeak (%)                            | Leakage percent or total minute volume leakage                                                                       |
|                   | MVLeak (l/min)                       | Leakage percent or total minute volume leakage                                                                       |
|                   | Vt/IBW or Vt/Weight (ml/kg)          | Tidal volume is calculated by ideal body weight (adult/pediatric patients) or actual body weight (neonatal patients) |
| Oxygen            | Oxygen (%)                           | Oxygen concentration of the delivered gas                                                                            |
|                   | O2 consumption (l/min)               | The current oxygen consumption rate                                                                                  |
| Time              | CPR timer                            | MMP during CPR ventilation showing duration of CPR ventilation                                                       |
|                   | I:E                                  | Ratio of the patient's inspiratory time to expiratory time for every breath cycle                                    |
|                   | fControl (b/min)                     | Mandatory breath frequency                                                                                           |
|                   | fSpont (b/min)                       | Spontaneous breathing frequency                                                                                      |
|                   | fTotal (b/min)                       | Total breathing frequency                                                                                            |
|                   | TI (s)                               | Inspiratory time                                                                                                     |
|                   | TE (s)                               | Expiratory time                                                                                                      |
|                   |                                      |                                                                                                                      |
| Lung mechanics    | Cstat (ml/cmH2O)                     | Static compliance                                                                                                    |
|                   | P0.1 (cmH2O)                         | Airway occlusion pressure                                                                                            |
|                   | PTP (cmH2O*s)                        | Pressure time product                                                                                                |
|                   | RCexp (s)                            | Expiratory time constant                                                                                             |
|                   | Rinsp (cmH2O / l/s)                  | Inspiratory flow resistance                                                                                          |
|                   | RSB (1 / l*min))                     | Rapid shallow breathing index                                                                                        |

| Parameter (units)        |                   | Description                                                                                                                                           |
|--------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO2                      | FetCO2 (%)        | Fractional end-tidal CO2 concentration                                                                                                                |
|                          | PetCO2 (mmHg)     | End-tidal CO2 pressure                                                                                                                                |
|                          | slopeCO2 (%CO2/l) | Slope of the alveolar plateau in the PetCO2 curve, indicating the volume/flow status of the lungs                                                     |
|                          | Valv (l/min)      | Alveolar minute ventilation                                                                                                                           |
|                          | Vtalv (ml)        | Alveolar tidal ventilation                                                                                                                            |
|                          | VCO2 (ml/min)     | CO2 elimination                                                                                                                                       |
|                          | VDaw (ml)         | Airway dead space                                                                                                                                     |
|                          | VDaw/VTE (%)      | Airway dead space fraction at the airway opening                                                                                                      |
|                          | VeCO2 (ml)        | Exhaled CO2 volume                                                                                                                                    |
|                          | ViCO2 (ml)        | Inspired CO2 volume                                                                                                                                   |
| SpO2                     | SpO2 (%)          | Oxygen saturation                                                                                                                                     |
|                          | Pulse (1/min)     | Pulse                                                                                                                                                 |
|                          | SpO2/FiO2 (%)     | The SpO2/FiO2 ratio (%) is an approximation of the PaO2/FiO2 ratio, which, in contrast to PaO2/FiO2, can be calculated noninvasively and continuously |
|                          | OSI               | Oxygen saturation index                                                                                                                               |
|                          | PI (%)            | Perfusion index                                                                                                                                       |
|                          | PVI (%)           | Pleth variability index                                                                                                                               |
| Humidifier <sup>38</sup> | T Y-piece (°C)    | Measured temperature at the Y-piece                                                                                                                   |
|                          | T humidifier (°C) | Measured temperature at water chamber exit                                                                                                            |

<sup>38</sup> If HAMILTON-H900 humidifier integration is enabled, and a humidifier is connected and turned on.

Physical characteristics



| Dimension           | Specifications                                                                                                          |
|---------------------|-------------------------------------------------------------------------------------------------------------------------|
| Weight              | 6.5 kg (14.3 lb)                                                                                                        |
|                     | 18.5 kg (40.8 lb) with trolley                                                                                          |
|                     | The trolley can accommodate a maximum safe working load <sup>39</sup> of 44 kg (97 lb).                                 |
| Dimensions          | See figures above                                                                                                       |
| Monitor             | Type: Color TFT                                                                                                         |
|                     | Size: 640 x 480 pixels, 8.4 in (214 mm) diagonal                                                                        |
| Trolley accessories | HAMILTON-H900 mounting kit, optional O2 bottle holding system, optional tubing support arm, water bottle holder, basket |
| <b>Gas cylinder</b> |                                                                                                                         |
| Diameter            | 100 to 140 mm (3.9 to 5.5 inches)                                                                                       |
| Height              | ≤ 820 mm (32 inches)                                                                                                    |
| Weight              | ≤ 8 kg (17.6 lb)                                                                                                        |

<sup>39</sup> The maximum safe working load applies to a stationary, properly load-balanced trolley.



Hamilton Medical AG  
Via Crusch 8, 7402 Bonaduz, Switzerland  
☎ +41 58 610 10 20  
info@hamilton-medical.com  
www.hamilton-medical.com



medin Medical Innovations GmbH  
Adam-Geisler-Straße 1  
DE – 82140 Olching  
Germany

10101903/03  
2024-09-30

Specifications are subject to change without notice. Some features are options. Not all features/products are available in all markets. For all proprietary trademarks and third-party trademarks used by Hamilton Medical AG, see [www.hamilton-medical.com/trademarks](http://www.hamilton-medical.com/trademarks). © 2024 Hamilton Medical AG. All rights reserved.