

HAMILTON-MR1

Technical specifications

The HAMILTON-MR1 guarantees uncompromised continuous ventilation care from the ICU to the MRI scanner and back. Its reliability and high performance, with advanced lung-protective strategies and patient-adaptive modes, make the HAMILTON-MR1 the ideal choice for any critical care department that needs to transport ventilated patients to the MRI department.

- MRI Conditional (up to 50 mT)
- Integrated TeslaSpy gaussmeter
- Adult, pediatric, and neonatal ventilation
- More than 9 h of battery operating time
- Independent air supply
- Advanced ventilation modes including ASV®

For more information, visit our website: www.hamilton-medical.com/MR1



Technical specifications

Ventilation Cockpit

| | |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Dynamic Lung | Real-time visualization of the lungs with representations of tidal volume, lung compliance, resistance, and patient activity |
| Vent Status | Visual representation of ventilator dependency, grouped into oxygenation, CO2 elimination, patient activity |
| ASV target graphics | Graphic display of target and actual parameters for tidal volume, frequency, pressure, patient activity, and minute ventilation |
| Monitoring | Display of more than 30 monitoring parameters |
| Real-time waveforms | Paw, Flow, Volume |
| Others ¹⁾ | Loops: P-V, V-Flow, P-Flow, Trends: 1, 6, 12, 24, and 72 hours |

Alarms

| | |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operator adjustable | Low/high minute volume, low/high pressure, low/high tidal volume, low/high rate, apnea time, low/high oxygen, high flow ¹⁾ |
| Special alarms | O ₂ cell, disconnection, exhalation obstructed, loss of PEEP, pressure not released, flow sensor, expiratory valve, pressure limitation, performance limited, battery, power supply, gas supply, oxygen concentration |
| Loudness | Adjustable (1 – 10) |

Ventilation Modes

| Type | Mode | Description | Adult/Ped. | Neonatal ¹⁾ |
|---------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------|------------|------------------------|
| Closed-loop control | ASV | Adaptive Support Ventilation. Guaranteed minute volume based on user settings and application of lung-protective rules. | ✓ | |
| Pressure | PCV+ | Pressure-controlled ventilation. Biphasic breathing | ✓ | ✓ |
| | PSIMV+ | Pressure-controlled synchronized intermittent mandatory ventilation | ✓ | ✓ |
| | SPONT | Pressure support ventilation | ✓ | ✓ |
| | APRV ¹⁾ | Airway pressure release ventilation | ✓ | ✓ |
| Volume | DuoPAP ¹⁾ | Duo positive airway pressure | ✓ | ✓ |
| | (S)CMV+/APVcmv | (Synchronized) controlled mandatory ventilation | ✓ | ✓ |
| | SIMV+/APVsimv | Synchronized intermittent mandatory ventilation | ✓ | ✓ |
| Noninvasive | NIV ¹⁾ | Noninvasive ventilation: optional | ✓ | ✓ |
| | NIV-ST ¹⁾ | Spontaneous / timed noninvasive ventilation | ✓ | ✓ |
| | nCPAP ¹⁾ | Nasal continuous positive airway pressure | | ✓ |
| | nCPAP-PC ¹⁾ | Nasal continuous positive airway pressure - pressure control | | ✓ |

Maintenance

| | |
|-----------------|--------------------------------------------------------------------|
| Blower lifetime | Dynamic lifetime surveillance; typically 8 years. 5 year warranty. |
|-----------------|--------------------------------------------------------------------|

¹⁾ optional - not available in all markets

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Standards IEC 60601-1, IEC 60601-1-2, ISO 80601-2-12, CAN/CSA-C22.2 No. 60601-1, UL 60601-1

Configurations

Trolley accessories Cylinder holder, auto-lock brake

Options ¹⁾ DuoPAP/APRV, NIV/NIV-ST, Trends/Loops, Neonatal application, nCPAP/nCPAP-PC

Electrical and gas supplies

Input voltage 100 to 240 V AC -15%/+10%, 50/60 Hz

Power consumption 50 W typical, 120 W maximum

Backup battery time Typical 8 h, maximum 9 h 25 min²⁾ with two internal batteries

Oxygen supply 280 to 600 kPa (41 to 87 psi), V' max 200 l/min

Air supply Integrated blower

Degree of protection IP21

Environment

Temperature Operating: 5°C to 40°C

Storage: -20°C to 60°C

Humidity 10% to 95%, noncondensing (operating and storage)

Altitude Up to approx. 3,000 m (9842 ft), 1,100 to 700 hPa

Interface connectors USB

Event log Storage and display of up to 1,000 events with date and time stamp

IntelliTrig

Leak compensation Automatic response to varying leaks and configurable trigger sensitivity in all modes

Inspiratory leakage up to 85 l/min, expiratory leakage up to 40 l/min

¹⁾ Optional - not available in all markets

²⁾ Reduced display brightness

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Controls

| Type | Adult / Pediatric | Neonatal ¹⁾ |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Special functions | Manual breath, O ₂ enrichment, standby, sigh, screen lock, apnea backup ventilation, inspiratory hold, print screen, suctioning tool, dimmable screen, configurable quick-start settings, start up settings based on patient height and gender, integrated pneumatic nebulizer, O ₂ consumption display | Manual breath, O ₂ enrichment, standby, screen lock, apnea backup ventilation, inspiratory hold, print screen, dimmable screen, configurable quick-start settings, start up settings based on body weight, O ₂ consumption display |
| Ventilation modes | See page 2, Ventilation modes | See page 2, Ventilation modes |
| Patient groups | adult / pediatric | neonatal |
| Patient height | 30 to 250 cm | - |
| Patient gender | male / female | - |
| Patient weight | - | 0.2 to 30 kg |
| Respiratory rate | | |
| (S)CMV+/APVcmv | 4 to 80 b/min | 15 to 80 b/min |
| SIMV+/APVsimv+ | 1 to 80 b/min | 1 to 80 b/min |
| PCV+ | 4 to 80 b/min | 15 to 80 b/min |
| NIV-ST | 5 to 80 b/min | 15 to 80 b/min |
| PSIMV+ | 5 to 80 b/min | 15 to 80 b/min (without IntelliSync 5 to 80 b/min) |
| DuoPAP | 1 to 80 b/min | 1 to 80 b/min |
| APRV | 1 to 80 b/min | 1 to 80 b/min |
| nCPAP-PC | - | 10 to 80 b/min |
| Tidal volume | 20 to 2,000 ml | 2 to 300 ml |
| PEEP/CPAP | 0 to 35 cmH ₂ O | 3 to 25 cmH ₂ O |
| Oxygen | 21% to 100% | 21% to 100% |
| I:E ratio | 1:9 to 4:1 (DuoPAP 1:599 to 149:1) | 1:9 to 4:1 (DuoPAP 1:599 to 149:1) |
| %MinVol (ASV) | 25% to 350% | - |
| Inspiratory time (TI) | 0.1 to 12 s | 0.1 to 12 s |
| Flow trigger | off, 1 to 20 l/min | off, 0.1 to 5 l/min |
| Pressure control | 5 to 60 cmH ₂ O, added to PEEP/CPAP | 0 to 45 cmH ₂ O, added to PEEP/CPAP |
| Pressure support | 0 to 60 cmH ₂ O, added to PEEP/CPAP | 0 to 45 cmH ₂ O, added to PEEP/CPAP |
| Pressure ramp | 0 to 2,000 ms | 0 to 600 ms |
| P high (APRV/DuoPAP) | 0 to 60 cmH ₂ O | 0 to 45 cmH ₂ O |
| P low (APRV) | 0 to 35 cmH ₂ O | 0 to 25 cmH ₂ O |
| T high (APRV/DuoPAP) | 0.1 to 40 s | 0.1 to 40 s |
| T low (APRV) | 0.2 to 40 s | 0.2 to 40 s |
| Expiratory trigger sensitivity (ETS) | 5% to 80% of peak inspiratory flow | 5% to 80% of peak inspiratory flow |
| Peak flow | up to 260 l/min | up to 40 l/min |

¹⁾ Optional - not available in all markets

Technical specifications

Monitoring parameters

| Type | Parameter | Unit | Description | Numeric monitoring | Wave-forms | Vent Status | Dynamic Lung |
|----------------|----------------------|-----------------------------|--------------------------------------------------------------------------|--------------------|------------|-------------|--------------|
| Pressure | Paw | cmH ₂ O;mbar;hPa | Real-time airway pressure | | ✓ | | |
| | Ppeak | cmH ₂ O;mbar;hPa | Peak airway pressure | ✓ | | | |
| | Pmean | cmH ₂ O;mbar;hPa | Mean airway pressure | ✓ | | | |
| | Pinsp | cmH ₂ O;mbar;hPa | Inspiratory pressure | | | ✓ | |
| | PEEP/CPAP | cmH ₂ O;mbar;hPa | Positive end expiratory pressure/ continuous positive airway pressure | ✓ | | ✓ | |
| | Pplateau | cmH ₂ O;mbar;hPa | Plateau or end inspiratory pressure | ✓ | | | |
| Flow | Flow | l/min | Real-time inspiratory flow | | ✓ | | |
| | Insp Flow | l/min | Peak inspiratory flow | ✓ | | | |
| | Exp Flow | l/min | Peak expiratory flow | ✓ | | | |
| Volume | Volume | ml | Real-time tidal volume | | ✓ | | ✓ |
| | VTE | ml | Expiratory tidal volume | ✓ | | | |
| | VTI/VTI NIV | ml | Inspiratory tidal volume | ✓ | | | |
| | ExpMinVol/MinVol NIV | l/min | Expiratory minute volume | ✓ | | ✓ | |
| | MVSpont/MVSpont NIV | l/min | Spontaneous expiratory minute volume | ✓ | | | |
| | Leak/MV Leak | %;l/min | Leakage minute volume Leakage percentage at the airway | ✓ | | | |
| | I:E | | Inspiratory-expiratory ratio | ✓ | | | ✓ |
| Time | fTotal | b/min | Total breathing frequency | ✓ | | | ✓ |
| | fSpont | b/min | Spontaneous breathing frequency | ✓ | | | |
| | TI | s | Inspiratory time | ✓ | | | ✓ |
| | TE | s | Expiratory time | ✓ | | | ✓ |
| | %fSpont | % | Percentage of spontaneous breathing rate | ✓ | | ✓ | |
| | Cstat | ml/cmH ₂ O | Static compliance | ✓ | | | ✓ |
| Lung mechanics | AutoPEEP | cmH ₂ O;mbar;hPa | AutoPEEP or intrinsic PEEP | ✓ | | | |
| | RCexp | s | Expiratory time constant | ✓ | | | |
| | Rinsp | cmH ₂ O*s/l | Inspiratory flow resistance | ✓ | | | ✓ |
| | RSB | 1/l*min | Rapid shallow breathing index | ✓ | | ✓ | |
| | PTP | cmH ₂ O*s;mbar*s | Pressure-time product | ✓ | | | |
| | PO.1 | cmH ₂ O;mbar;hPa | Airway occlusion pressure | ✓ | | | |
| Oxygen | O ₂ | % | Airway oxygen concentration (FiO ₂) | ✓ | | ✓ | |

¹⁾ Optional - not available in all markets

Technical specifications

MR clearance

| | |
|--------------------------|-------------------------------------|
| MRI Conditional | 1.5 and 3.0 T static magnetic field |
| Proximity to MRI scanner | 50 mT |
| Gaussmeter | TeslaSpy |

Physical dimensions

| | |
|---------------------|------------------------------------------|
| Size | See illustrations below |
| Weight | 6.8 kg (15 lb) without trolley |
| Display | 8.4 in, TFT color, backlit, touch screen |
| Main patient outlet | ISO 5356-1; 22M/15F |
| Oxygen inlet | DISS or NIST male |



¹⁾ Optional - not available in all markets