Calculating oxygen consumption for Hamilton Medical ventilators

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As at June 2020, many hospitals are housing far more ICU beds than normal. Many may also be using new makes or models of ventilators they are unfamiliar with. In order to work out the total amount of oxygen required under these changed circumstances, it is necessary to know how to calculate the oxygen consumption for a particular ventilator.

While the basic principle applies to most makes and models, the calculation depends on several parameters that may differ.

To calculate the estimated oxygen consumption for your Hamilton Medical ventilator, you need to take these parameters into account:

- Fraction of inspired oxygen (%Oxygen)
- Expiratory minute volume (ExpMinVol) (x2 for patients < 8 kg)
- Base flow (see table below)
- In the case of leaks: leak flow (Mvleak)

The calculation is as follows:

(ExpMinVol + Base flow + MVleak) * ((%Oxygen – 20.9) / 79.1)

Base flow rates for Hamilton Medical ventilators

Patient group	HAMILTON-C1/T1/MR1	HAMILTON-C2/C3/C6	HAMILTON-G5/S1
Adult/pediatric	3 l/min	6 l/min	Flow trigger setting ≤ 2 l/min: 4 l/min Flow trigger setting > 2 l/min: 2*Flow trigger IntelliSync+: variable Range: 2 to 30 l/min
Neonatal	4 l/min	6 l/min	Flow trigger setting ≤ 1 l/min: 2 l/min Flow trigger setting > 1 l/min: 2*Flow trigger (max. 6 l/min) Range: 2 to 6 l/min
All	Not applicable	Not applicable	Pressure trigger or trigger off: 1 l/min

Note: This calcuation provides you with an estimate only and the actual consumption may be higher.

Tip: HAMILTON-C1/T1/MR1 ventilators offer oxygen consumption as a measured parameter. When activated, the O2 consumption is displayed in the System > Info window.

Example: Calculation of the estimated oxygen requirement for a HAMILTON-C1 ventilator based on the following parameters:

Expiratory minute volume (ExpMinVol)	8 l/min
Total minute volume leakage (MVleak)	1 l/min
Base flow	3 l/min
Set duration (FiO2)	60%
Planned duration of transport	120 min

O2 consumption (in l/min): (8.0 l/min + 3.0 l/min + 1.0 l/min) * (60.0 – 20.9) / 79.1 = 5.93 l/min

Total oxygen requirement (in liters) for 120 minutes: 5.93 l/min * 120 = 711.6 liters

Therefore, the estimated oxygen consumption for the planned transport duration of 2 hours is approximately 712 liters.