Gas Consumption in the CV2i+

Since gas consumption is an important topic when considering a transport ventilator, the following will show gas consumption comparisons between the MVP-10 and the Crossvent 2i+ in different modes of ventilation.

First of all, we'll use the same typical patient settings for all scenarios:
Flow rate = 6 lpm, Inspiratory time = 0.4 seconds, and Respiratory rate = 40
(Peak pressure and PEEP settings do not affect gas consumption)

The equation for calculating tank duration on an MVP-10 is as follows:

$$\frac{\text{Cylinder pressure (psi) x tank factor}}{\text{Total flow usage}} = \text{minutes remaining}$$

D-Cyl	E-Cyl	G-Cyl	H-Cyl	M-Cyl
.16	.28	2.41	3.14	1.56

Given an average full e-cylinder has 2200 psi of pressure and the fact that the MVP-10 uses 4 lpm of gas for logic gas (to pneumatically power itself), the equation looks like this:

$$\frac{\text{Cylinder pressure x factor}}{\text{6 lpm + 4 lpm logic gas}} \text{ or } \frac{2200 \times .28}{10} = 61 \text{ minutes}$$

Since the logic gas usage in the CV-2i is only 2 lpm instead of 4 lpm as in the MVP-10, using the CV-2i in the same constant flow mode as the MVP-10

$$\frac{2200 \times .28}{6+2} = 77 \text{ minutes or } 26\% \text{ longer}$$

When using the Crossvent 2i in the flow triggered mode, the ventilator uses two different levels of flow. During inspiration, whatever flow is set, is used (in our example: 6 lpm). During exhalation there is only 2.5 lpm flow. We will still add 2 lpm for the logic gas. So in order to calculate our total flow to use in our equation above, we'll use the following equation:

$$\frac{(\text{Set flow} \times \text{Ti} \times \text{rate})}{60} + \frac{(2.5 \text{ lpm} \times \text{Te} \times \text{rate})}{60} + 2 \text{ lpm} =$$

$$\text{or } \frac{(6 \times .4 \times 40)}{60} + \frac{(2.5 \times 1.1 \times 40)}{60} + 2 = 1.6 + 1.8 + 2 = 5.4 \text{ lpm}$$

Using the 5.4 lpm flow in the above calculation, the tank will last 114 minutes or 86.89% (almost twice as long) longer than an MVP-10 at the same settings.

Note: The above calculations were based on a situation where the vent was being used at either 100% FiO2 or 21% FiO2. These are the worst case scenarios, as they will deplete one tank the quickest. In the case of other FiO2 scenario, these times listed above could actually be doubled in cases where the air and oxygen tanks are providing equal portions of the flow.