

# Paediatric Application

## Using the appropriate circuit

The aim of artificial ventilation is to encourage the patient to breathe unassisted at the earliest opportunity by supporting the lungs while the underlying disease is treated or until the lungs mature. Adequate ventilation is vital to maintain efficient gas exchange and minimise work of breathing. The chosen ventilation strategy should reflect this and allow the patient to breathe through his/her own efforts at any time. The weaning process should begin from the time ventilation is established.

It is important to ensure that the correct circuit size is chosen for your delivery system as this will affect the ventilation that is delivered which in turn will affect gas exchange, work of breathing and ability to wean.

There are a number of factors to consider when choosing the appropriate delivery system for a patient receiving mechanical ventilation. The decision must take into consideration the stage of lung development, underlying disease affecting the patient and its effect on constantly changing lung compliance, the size and age of the patient and the ventilation strategy preferred.

When setting the recommendations to use a Fisher & Paykel Healthcare neonatal or adult circuit a guideline based on volume was tested. This allows for variation in ventilation strategies followed by each unit.

A tidal volume range between 25ml and 250ml was used. This equates to a patient weight range of approximately 4 to 35kg (using 6-7ml/kg).<sup>1</sup> The Siemens Servo 300C, Dräger Evita 2, 4 and Bird VIP ventilators were used in pressure control mode with typical ventilator settings.

The tidal volume was varied (as above) however all other ventilator settings were kept constant.

One of the key factors of circuit performance is rise time. Generally the rise time should be no more than 33% so that the patient receives the desired pressure for at least 2/3rds of the inspiratory time.

The rise time is the limiting factor for the neonatal circuit tested (Fisher & Paykel Healthcare RT226), as it limits how much gas will get through. The rise time was observed to increase at tidal volumes above 120ml.

Humidity delivery and circuit size were compromised at tidal volumes below 120ml with the adult circuit (Fisher & Paykel Healthcare RT200).

***A tidal volume of 120ml is the recommended change point to ensure ventilation is preserved when switching from the neonatal to the adult circuit.***

# Paediatric Circuit Application

When to change over



<4kg

15kg

>30kg

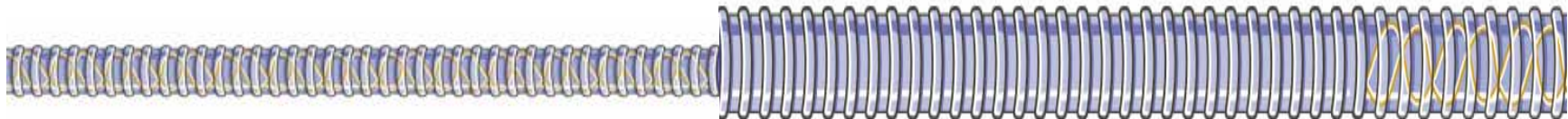
<25ml

Tidal volume

120ml

Tidal volume

>250ml



Neonatal

Adult

- The neonatal and adult circuit combination provides adequate ventilation and humidity throughout the tidal volume range from infant to adult
- The optimum point to change from the neonatal to adult circuit is 120ml tidal volume or about 12-15kg depending on your ventilation strategy<sup>1</sup>

Respiratory

HUMIDIFICATION

1. Results based on laboratory testing using the Dräger Evita 2 & 4, Siemens Servo 300C and Bird VIP ventilators

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