

Gas Usage for the Impact Model 754 Eagle Ventilator

Use the following formulas to determine the amount of Oxygen and Air usage for a given transport time with the Impact Model 754 Eagle Ventilator.

CAUTION: These formulas do not incorporate any safety factors:

The Model 754 Ventilator needs an oxygen source at 50 PSI +/- 5 PSI for proper oxygen ventilation. Allowances must be made to keep an adequate reserve of oxygen to maintain this operating pressure.

These formulas only calculate usage, not overall requirement

Example Values Included: BPM = 12; Vt = 800 ml/breath; 10 hour transport; 50% O2 required;

1) Finding Total Liters of Gas Mixture Usage During a given transport:

Formula:
$$\text{BPM} \times \text{Vt (ml)} \times \frac{\text{Transport (HRS/TRIP)}}{60 \text{ MIN/HR}} \times .001 \text{ Liter/ml} = \text{Liters of Gas Mixture Used per Transport}$$

example: $12 \text{ BPM} \times 800 \text{ ml} \times \frac{10 \text{ hrs}}{60 \text{ MIN/HR}} \times .001 \text{ Liter/ml} = 5760 \text{ Liters/Transport}$

2) Finding Liters of 100% Oxygen Used during a given transport:

PER = Percentage of Oxygen Mixture Required (50% in example)

MIX = Liters of Mixture Used during Transport (Results from Formula 1)

X = Liters of 100% Oxygen Used during Transport

Formula:
$$X = ((\text{PER}/100) - .21) \times \text{MIX} / .79$$

example: $X = (.5 - .21) \times 5760 / .79$

example: $X = 2114 \text{ Liters of 100\% Oxygen Used during Transport}$

3) Finding Liters of Air Used during a given transport:

A = Liters of Air Used during Transport

Formula:
$$A = \text{MIX} - X$$

example: $A = 5760 - 2114 = 3646 \text{ Liters of Air Used during Transport}$

Note: The Internal Compressor on the Impact Model 754 Ventilator can supply the required liters of Air up to 60 LPM.

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These formulas only calculate usage, not overall requirement

Use the following Formulas to determine required amount of Oxygen and Air for a given transport time with the model 754 Eagle.

Example Values Included: BPM = 12; Vt = 800 ml/breath; 10 hour transport; 50% O2 required;

CAUTION: These formulas do not incorporate any safety factors.

Note: An Oxygen source at 50 PSI is required for these calculations

1) Finding Total Liters of Mixture Required for a given transport:

Formula: BPM x Vt (ml) x (HRS/TRIP) x 60 MIN/HR x .001 Liter/ml = $\frac{\text{TRANS}}{\text{LITERS OF MIXTURE}} \frac{\text{NEEDED PER TRANS}}$

example: 12 BPM x 800 ml x 10 hrs x 60 MIN/HR x .001 Liter/ml = 5760 Liters

2) Finding Liters of 100% Oxygen Required for a given transport:

PER = Percentage of Oxygen Mixture Required (50% in example)

MIX = Liters of Mixture Required for Transport (Results from Formula 1)

X = Liters of 100% Oxygen Required for Transport

$$\text{PER} = \text{Oxygen liters} / \text{Total liters}$$

$$\text{PER} = (X + .21A) / (X + A)$$

$$\text{PER} = (X + .21(\text{MIX} - X)) / \text{MIX}$$

$$\text{MIX} \times \text{PER} = (X + .21(\text{MIX} - X))$$

$$\text{MIX} \times \text{PER} = X + .21\text{MIX} - .21X$$

$$\text{MIX} \times \text{PER} = .79X + .21\text{MIX}$$

$$(\text{MIX} \times \text{PER}) - .21\text{MIX} = .79X$$

$$((\text{PER}/100) - .21) \times \text{MIX} / .79 = X$$

$$\text{Formula: } X = ((\text{PER}/100) - .21) \times \text{MIX} / .79$$

754 Uni-Vent Eagle Guidelines

Tidal Volumes should be adjusted for Patient Comfort and also based on blood gases.

Tidal Volumes **Over 400**-Use the Adult Circuit.

Tidal Volumes **Under 400**-Use the Pediatric Circuit.

Neonates: Use the 10mm Reusable Circuit.

With Tidal Volumes below 200, both Air and Oxygen is needed.

Formula: Divide patient weight in pounds by 2.2, this will give Weight in kilograms. Multiply Kg weight x 10 for Tidal Volume.

Example: 100 pounds divided by 2.2 = 45
 $45 \times 10 = 450$; Set Tidal Volume at 450

This gives you an estimate as to where to set the Tidal Volume.

Tidal Volumes should be adjusted for Patient Comfort and also based on blood gases.

SIGH OFF/ON Pushbutton Switch: Default value is "OFF". When set to "ON", first breath delivered is a SIGH, then once every 100-breaths or 7-minutes thereafter (whichever occurs first). Each SIGH equals 150% of Inspiration Time setting, delivered volume is increased by 50%. Status displayed in LCD (beneath Pushbutton Switch).

ALARM MESSAGE CENTER (AMC): A centralized location for displaying up to 4-lines of alarm message information. Up to 2-alarms with, short messages, may be displayed simultaneously. If more than 2-alarms occur simultaneously, only the name of each alarm is displayed (as shown below in boldface).

BATTERY LOW/FAIL-RECHARGE/REPLACE BATTERY PACK

EXTERNAL POWER LOW-CHECK

POWER SOURCE/CONNECTIONS

O2 LOW/FAIL-CHECK OXYGEN

SOURCE/CONNECTIONS

EXT AIR LOW/FAIL-CHECK AIR

SOURCE/CONNECTIONS

LOW PRESSURE-PEAK INSPIRATORY

PRESSURE TOO LOW

DISCONNECT-CHECK CIRCUIT

CONNECTIONS

HIGH PRESSURE-PEAK INSPIRATORY

PRESSURE TOO HIGH

APNEA-CHECK PATIENT FOR

SPONTANEOUS BREATHING

APNEA-CPAP AVERAGE RATE LESS

THAN 6-BPM

HIGH PEEP-INSPIRATION BEGAN

BEFORE END PRESSURE PLATEAU

FI02-GAS MIX ERROR. CHECK

SOURCE/SETTINGS/CONNECTIONS

PRESSURE ALARM SETTINGS-ALARM

SETTINGS REVERSED

VT-DELIVERED TIDAL VOLUME DOES

NOT EQUAL SET TIDAL VOLUME

COMP-COMPRESSOR OUTPUT

LOW/FAIL

INSPIRATION TIME TRUNCATED

TO 3-SEC - NOTE I:TIME & I:E

PLATEAU VOLUME-DELIVERED

VOLUME LESS THAN SET VOLUME

VT SETTINGS - I:TIME X FLOW

UNABLE TO DELIVER SET VOLUME

EXT PWR FAIL/DISCONNECT - CHECK

POWER SOURCE/CONNECTIONS

TOTAL FLOW BACKUP -

CONTACT CUSTOMER SERVICE

INVERSE I:E-INSPIRATORY TIME

LONGER THAN EXHALATION TIME

TRANSDUCER CALIBRATION ABORT

RECALIBRATE TRANSDUCER

The following alarm overrides any of the above messages when activated:

VENTILATOR FAILURE DETECTED

* this alarm is followed by one of the following *

FAILURE CODE 1

• SELF-CHECK FAILURE!

FAILURE CODE 2

• NO GAS AND COMPRESSOR FAILURE!

FAILURE CODE 3

• EXCESSIVE AIRWAY PRESSURE!

FAILURE CODE 4

• MEMORY CHECK FAILURE!

FAILURE CODE 5

• EXHALATION VALVE FAILURE!

FAILURE CODE 6

• EXCESSIVE NEGATIVE PRESSURE!

FAILURE CODE 7

• RUN-TIME CALIBRATION FAILURE!

PEEP OFF/ON-SET Pushbutton Switch: Sets internally-generated PEEP setpoint. Default value is "OFF". Range is from 0 to 20 cmH₂O. Value increases by 1, each time pushbutton is pressed. Value displayed in LCD (beneath Pushbutton Switch).

EXTERNAL AIR OFF/ON

Pushbutton Switch: Uses with nominal 50-PSI compressed gas source. Default value is "OFF". Status displayed in LCD (beneath Pushbutton Switch).

MODE Indicator: Displays current setting the MODE Selector Switch

V_M Indicator: Displays Minute Volume (in liters), in the A/C mode.

INSPIRATION/EXHALATION Indicator: Alternately displays the inspiration and exhalation phase of mechanical and/or spontaneous breaths.

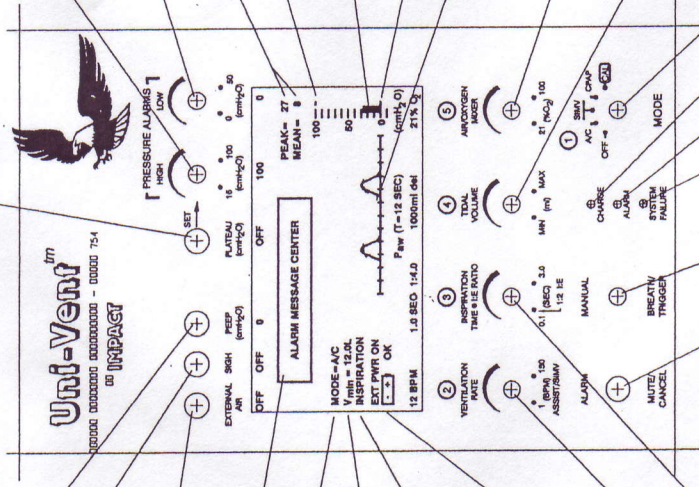
POWER INFORMATION CENTER: A 2-line area that displays current status of external power, internal power, and fuses. The EXT PWR line blanks when the ventilator is not connected to an external power source.

VENTILATION RATE Control: Sets mechanical ventilation rate for A/C and SIMV modes. Range is 1 to 150 BPM. Default is current position of Control. Value displayed in LCD (above Control).

INSPIRATION TIME I:E RATIO Control: Sets inspiratory duration for all ventilator-generated breaths. Range 0.1 to 3.0-seconds maximum. Usable range is limited by VENTILATION RATE Control setting (inverse I:E is not permitted). Fully counterclockwise position enables fixed 1:2 I:E Ratio. Default is current position of Control. Combination of inspiration time and I:E Ratio is displayed in LCD (above Control).

MANUAL BREATH/TRIGGER: Delivers a Manual Breath equal to one complete ventilatory cycle in A/C and SIMV. In CPAP, the Manual Breath delivers gas at a 30 LPM flow rate, for 1.67-seconds, pressure limited to 40 cmH₂O. The Manual Trigger is operational when a System Failure has occurred. Gas will flow at a rate of 30 LPM, pressure limited to 40 cmH₂O, for as long as the Pushbutton Switch is pressed.

PRESSURE PLATEAU OFF/ON Pushbutton Switch: Default value is "OFF". When switch is pressed, PLATEAU value is automatically referenced 10 cmH₂O less than HIGH PRESSURE ALARM/PEAK INSPIRATORY PRESSURE RELIEF Control setpoint. Plateau range is 5 to 90 cmH₂O. Value displayed in LCD (beneath Pushbutton Switch).



HIGH PRESSURE ALARM/PEAK INSPIRATORY PRESSURE RELIEF Control: Sets threshold value for High Pressure Alarm/Peak Inspiratory Pressure Relief. Range is 15 to 100 cmH₂O. Default is current position of Control. Activates when inspiratory pressure exceeds setpoint any time during 4-consecutive ventilations. Value displayed in LCD (beneath Control).

LOW PRESSURE ALARM Control: Sets threshold value for Low Pressure Alarm. Range is 0 to 50 cmH₂O. Default is current position of Control. Activates when inspiratory pressure does not exceed setpoint at any time during 2-consecutive ventilations. Value displayed in LCD (beneath Control).

PEAK and MEAN AIRWAY PRESSURE Indicators: Display the Peak and MEAN Airway Pressure of the previous breath.

HIGH AIRWAY PRESSURE ALARM Setpoint Indicator: Indicates current setting of HIGH PRESSURE ALARM Control adjacent to Digital Bar Graph.

DIGITAL BAR GRAPH Indicator: Provides continuous display of airway pressure. Range is from -10 to +100 cmH₂O, vertical resolution 2 cmH₂O/bar.

LOW AIRWAY PRESSURE ALARM Setpoint Indicator: Indicates current setting of LOW PRESSURE ALARM Control adjacent to Digital Bar Graph.

P_i Indicator: Displays the most recent 12-seconds of airway pressure information. Vertical axis is calibrated to coincide with adjacent DIGITAL BAR GRAPH. Horizontal axis is calibrated in 1-second intervals.

AIR/OXYGEN MIXER Control: Sets FI0₂ when ventilator is connected to external 50-PSI oxygen source. Range is 21 to 100%. Default is current position of Control. FI0₂ value displayed in LCD (above Control).

TIDAL VOLUME Control: Sets Tidal Volume. Range is based on gas flow not exceeding 60 LPM (1000 ml/sec). Default value is current position of Control. Set and delivered Tidal Volume alternately displayed in LCD (above Control).

MODE Selector Switch: Applies operating power to ventilator for Assist-Control (A/C), Synchronized Intermittent Mandatory Ventilation (SIMV), Continuous Positive Airway Pressure (CPAP), or Transducer Calibration (CAL) modes.

CHARGE Indicator: Green LED, illuminates when battery recharging current is flowing. LED does not remain illuminated when battery is fully charged.

ALARM Indicator: Activates for all alarm conditions except a System Failure Alarm. Red LED flashes on/off when alarm is not muted; stays on continuously when alarm is muted. The LED Indicator is accompanied by a pulsing tone that remains on until the alarm is muted.

SYSTEM FAILURE Indicator: Activates when CPU is forced to stop operation or a CPU failure has occurred. Red LED illuminates continuously and is accompanied by a continuous audible tone that cannot be muted. A System Failure will cause the LCD to blank.