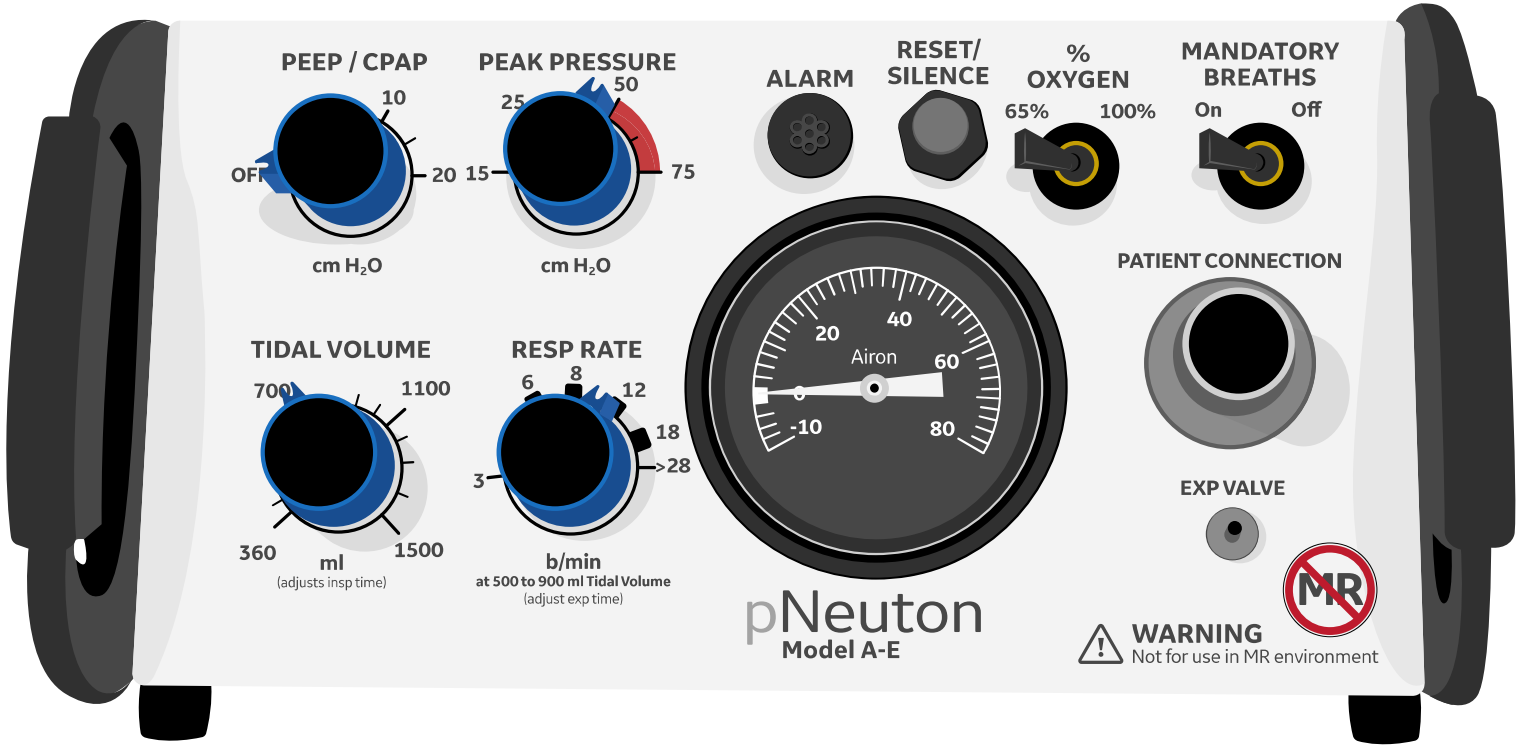
pNeuton® Ventilator

Model A-E Self-Guided Tour



The ventilator has not been cleared or approved by the FDA.

The ventilator has been authorized by FDA under an Emergency Use Authorization (EUA).

The ventilator is authorized only for the duration of the U.S. declared health emergency.

pNeuton is a registered trademark of the Airon Corporation.

pNeuton® Ventilator Model A-E

Manufactured by Ford Motor Company for

GE Healthcare
3000 N. Grandview Blvd.
Waukesha, WI 53188 USA
Assembled in USA

Distributed by GE Healthcare.
For Customer Service, call GE Healthcare at (800) 345-2700.
Do not contact Airon. Direct all inquiries to GE Healthcare.

The design of the device is based on a design from Airon Corporation.

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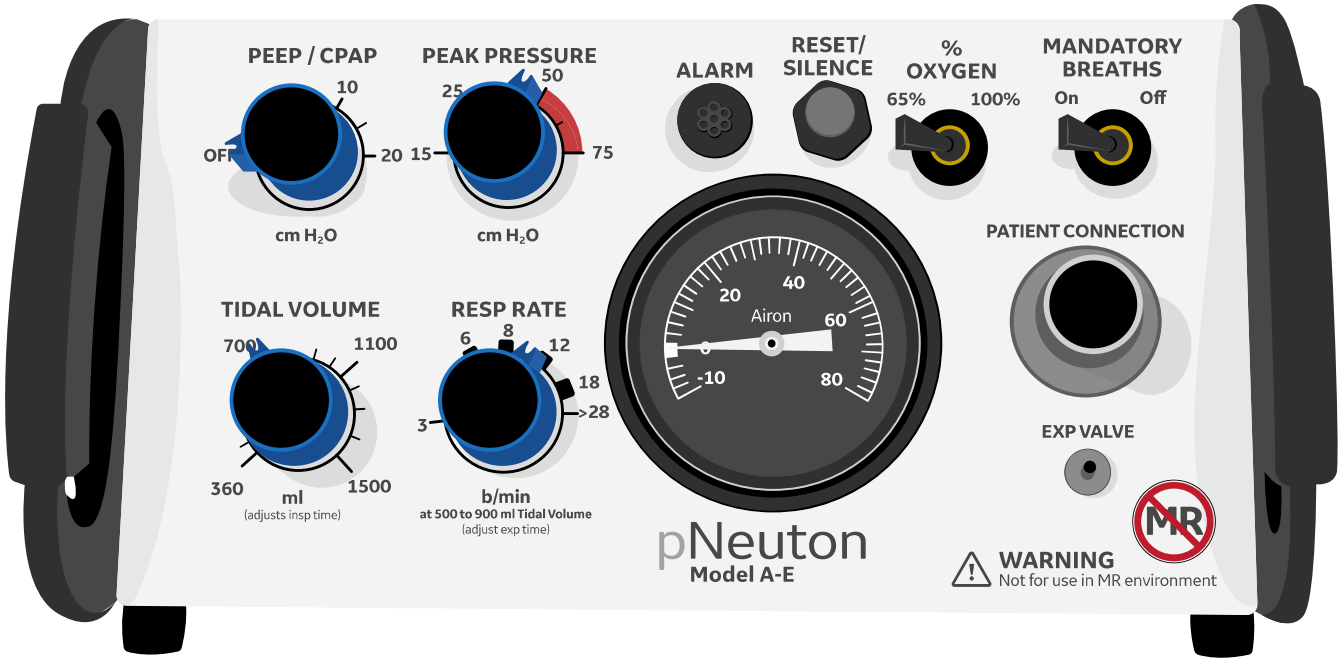
pNeuton® Ventilator

The pNeuton Model A-E Ventilator provides critical care ventilation and CPAP

- Invasive ventilation (ET-Tube)
  - Controlled Ventilation with PEEP
  - Intermittent Mandatory Ventilation with PEEP
  - CPAP
- Non-invasive ventilation (Mask)
  - CPAP



Objectives

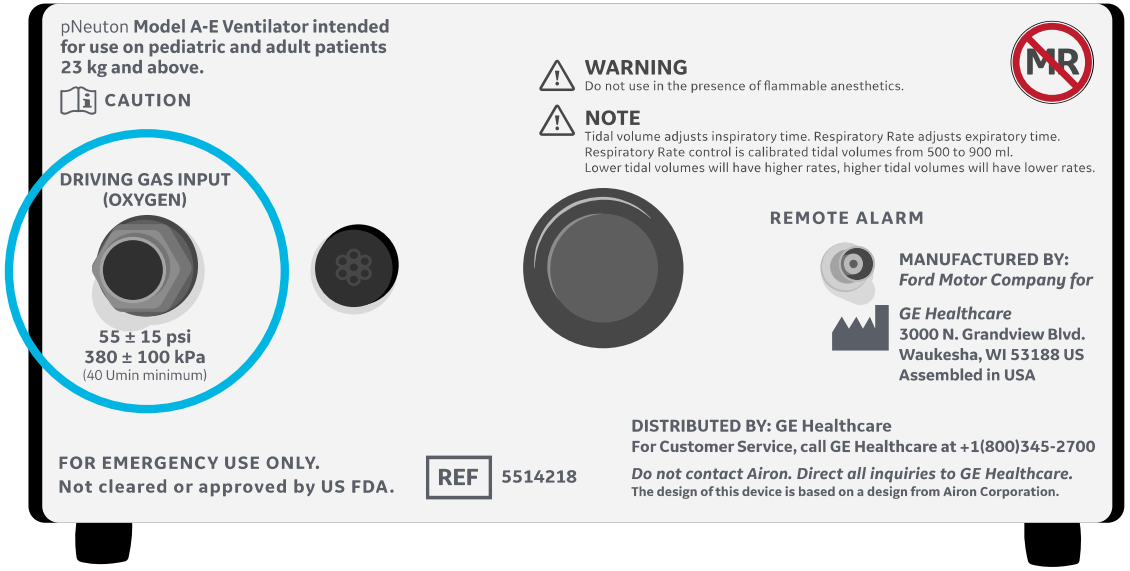
This program is a self-guided tour of the pNeuton Ventilator Model A-E. At the end of this tour you will be able to:

- Describe the main operating features of the ventilator
- Identify the controls and connections
- Describe the patient breathing circuit
- Set-up the ventilator for patient operation
- Define various clinical environments for ventilator/CPAP application
- Clean and maintain the ventilator

Features and Controls – Rear Panel

Driving Gas Input

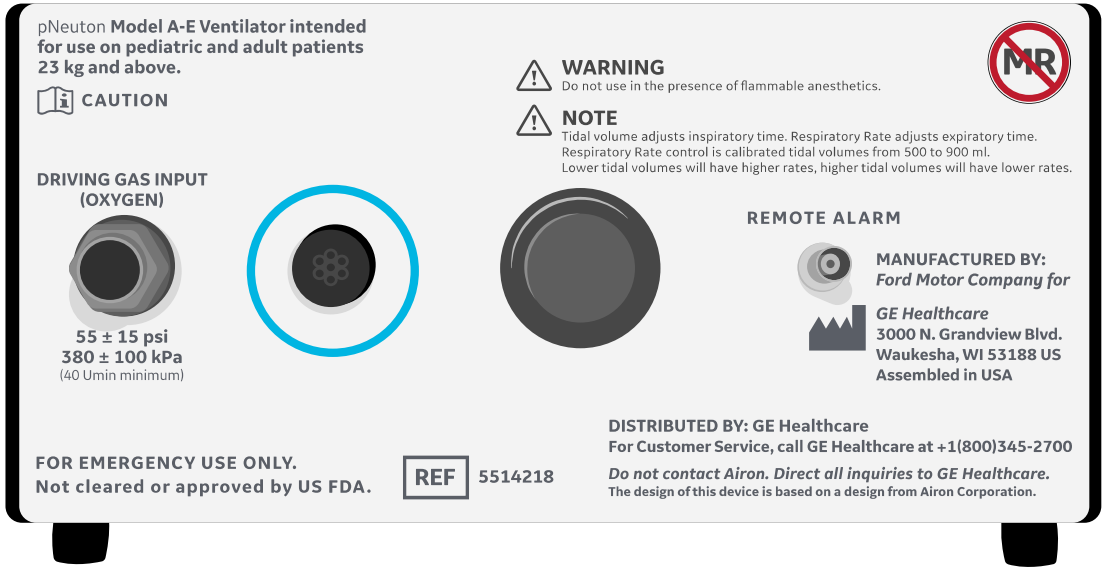
- Connection for 55 psi (3.8 bar) oxygen source gas
- Always use a high flow gas source that can provide 55 ± 15 psi pressure at a minimum of 40 L/min



Features and Controls – Rear Panel

Alarm, low driving gas

- Audible alarm sound generator
- Factory preset alarm



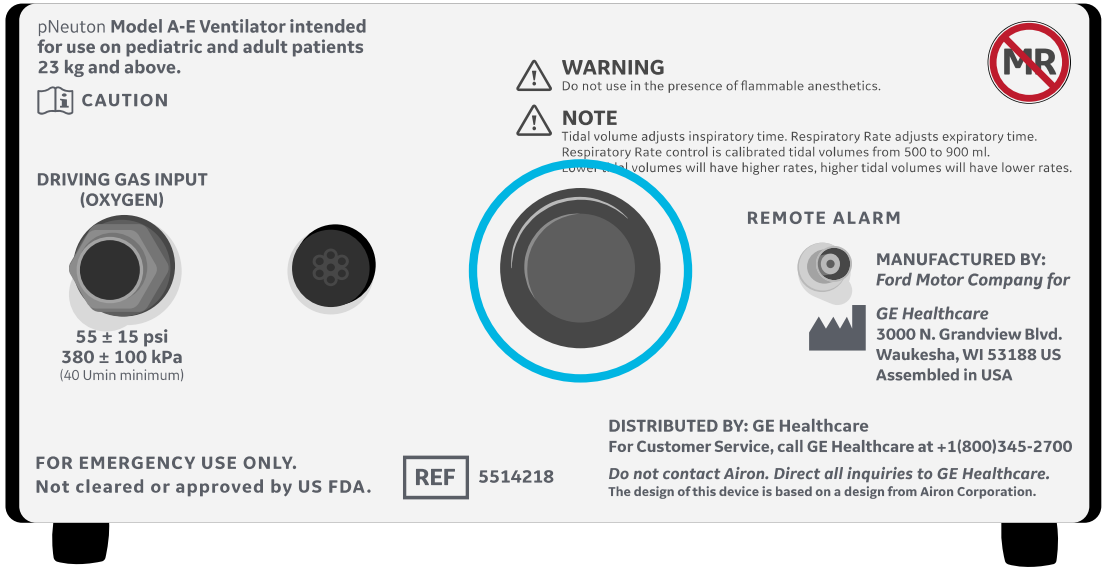
WARNING:

- Do NOT put tape over the holes, push sharp objects into the alarm or, interfere, in any way, with the alarm.
- The alarm is for patient protection and, if, for any reason, you suspect the alarm is not operating properly, have the unit serviced immediately.

Features and Controls – Rear Panel

Ambient air inlet filter

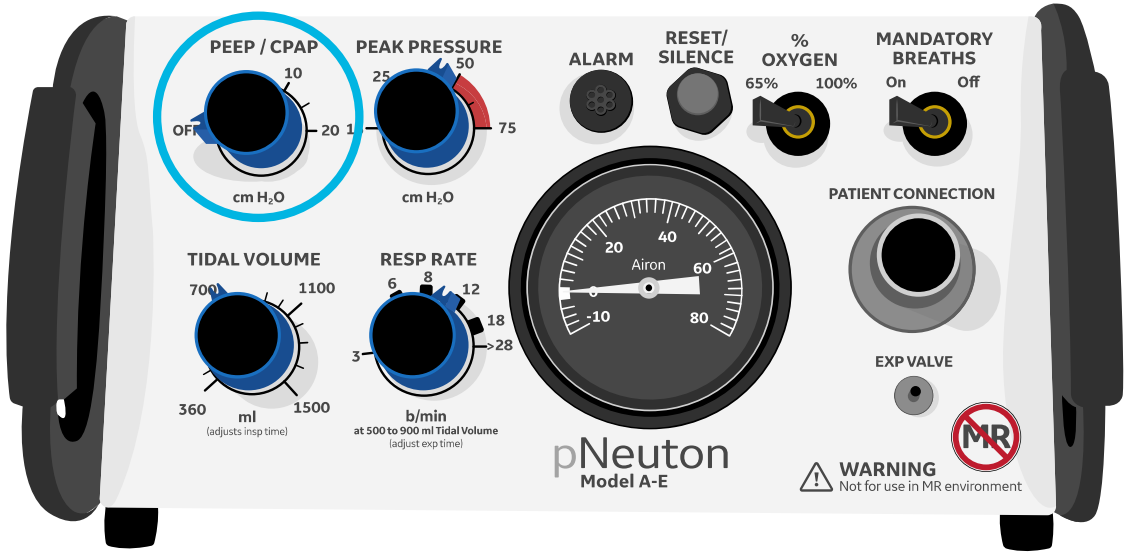
- Ambient air is entrained for internal gas mixing
- External housing contains air filter
- Air filter replacement is part of the preventative maintenance



Features and Controls – Front Panel

PEEP/CPAP control

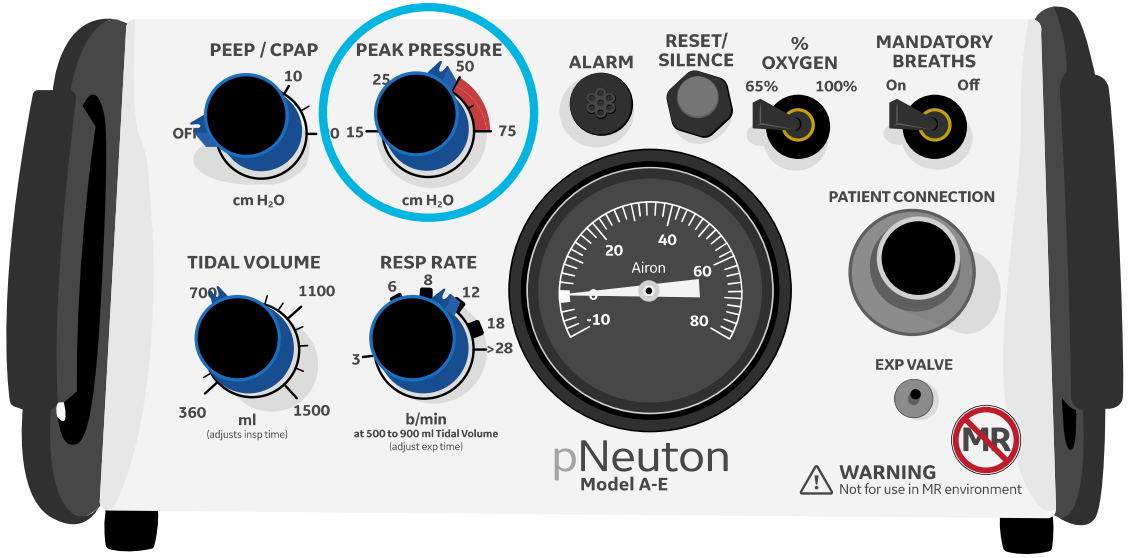
- Adjusts the PEEP/CPAP from 0 to 20 cm H_2O
- Automatic sensitivity
- Flow adjusts automatically to meet patient demand up to 140 L/min
- Oxygen concentration is maintained at set % Oxygen control



Features and Controls – Front Panel

Peak Pressure control

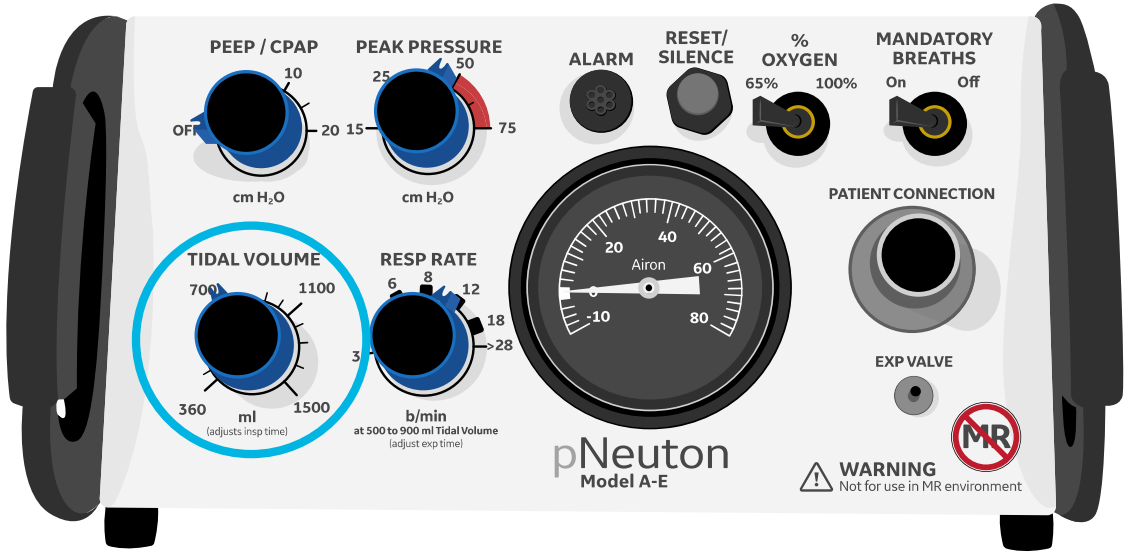
- Limits peak airway pressure from 15 to 75 cm H_2O for mandatory breaths
- Alert with “honking” noise when delivered pressure rapidly exceeds set pressure (e.g. cough)



Features and Controls – Front Panel

Tidal Volume control

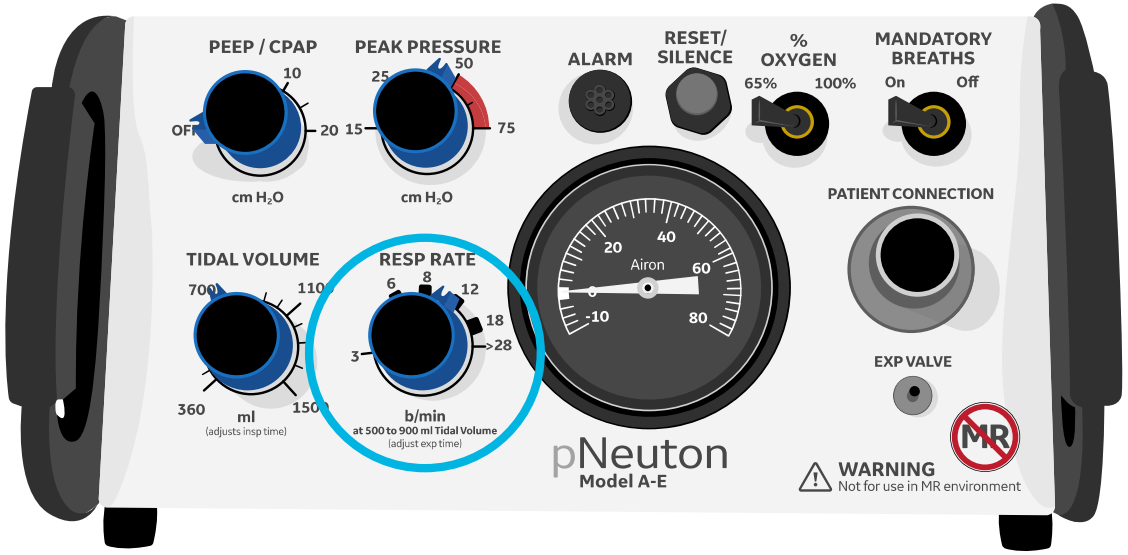
- Sets delivered Tidal Volume for mandatory breaths from 360 to 1,500 ml
- Calibrated control for volume delivery
- Delivered flow rate equals 600 ml/sec (36 L/min) for all mandatory breaths
- Operating range sets inspiratory time of 0.6 to 2.5 seconds



Features and Controls – Front Panel

Respiratory Rate control

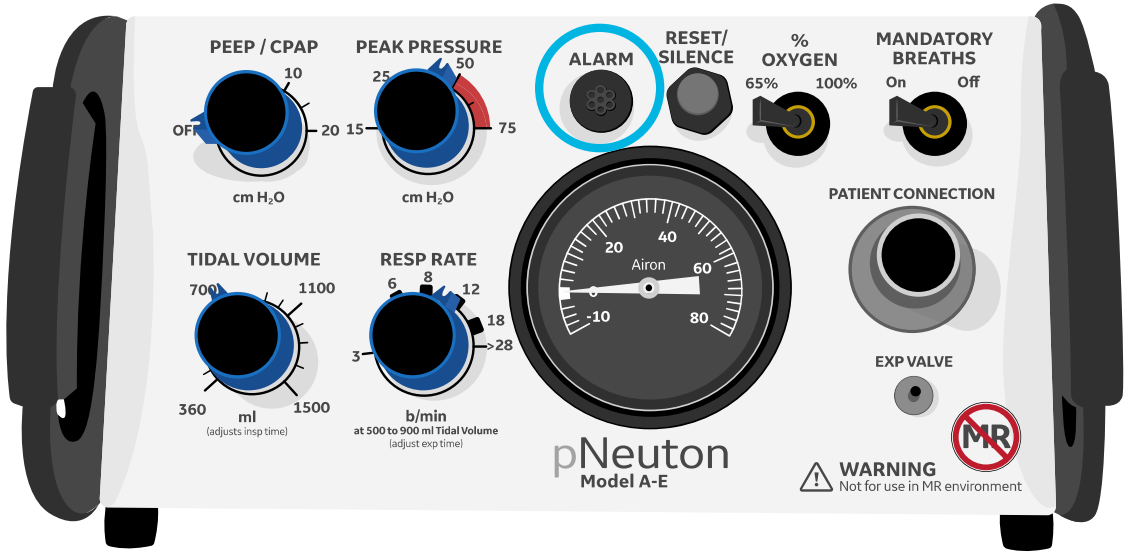
- Sets mandatory breath Respiratory Rate from 3 to >28 breaths/min
- Control adjusts expiratory time with a range of 0.6 to 20 seconds
- Calibrated control is accurate for tidal volumes from 500 to 950 ml. Lower volumes will have faster rates, higher volumes will have slower rates
- Respiratory Rate may vary slightly as the Tidal Volume (inspiratory time) is changed



Features and Controls – Front Panel

Visual alarm indicator

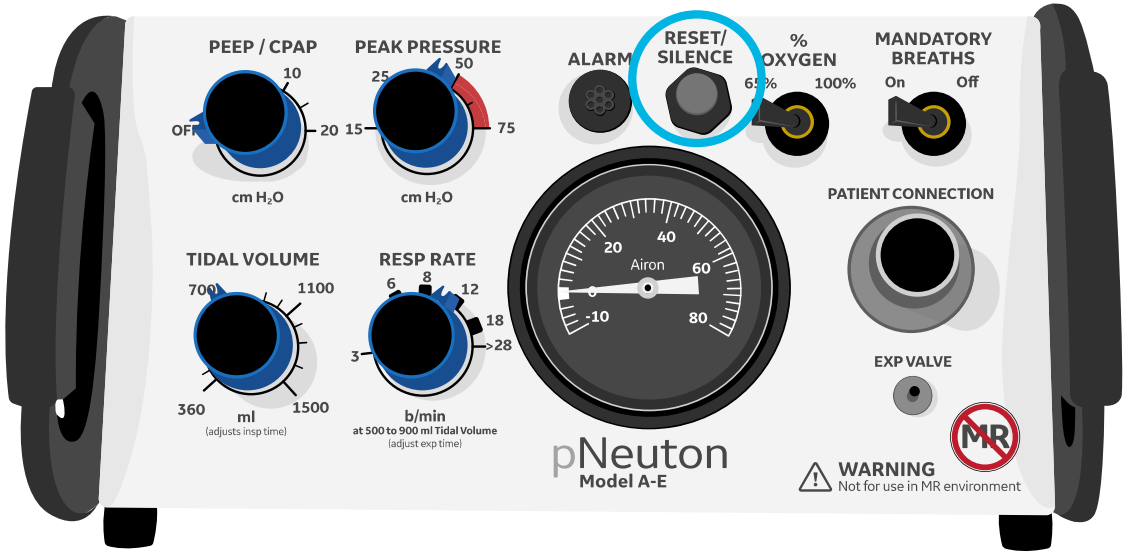
- Illuminates for an active alarm condition
- Alarm warns of patient disconnect after approximately 22 seconds
- Alarms for low gas supply
- Will turn off when alarm is corrected or Reset/Silence button is pressed



Features and Controls – Front Panel

Alarm Reset/Silence button

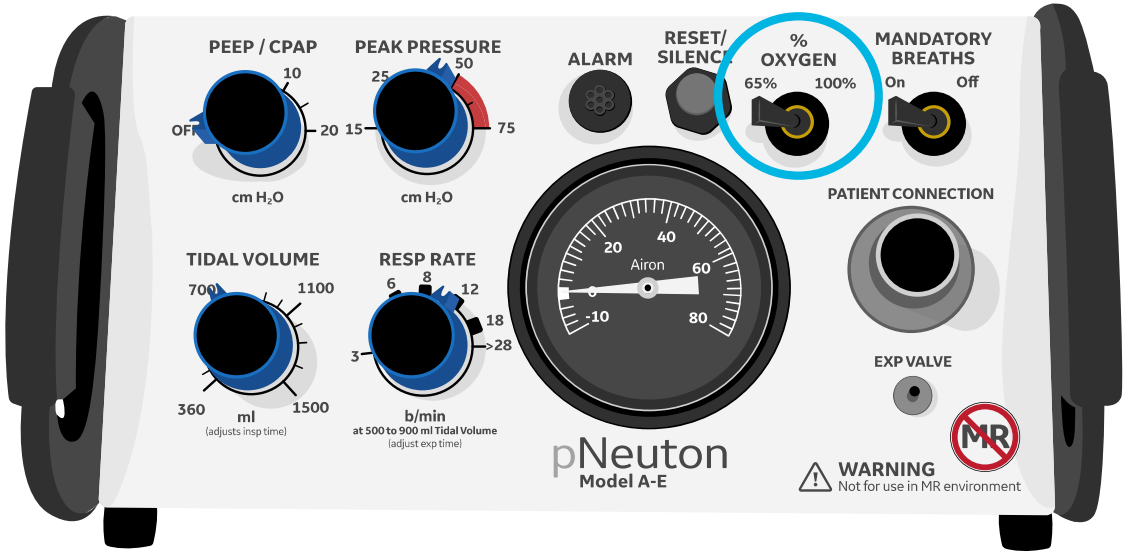
- Press button to silence the alarm system for 1 minute
- Every time the button is pressed the alarm silence period will reset for 1 minute



Features and Controls – Front Panel

% Oxygen control

- Delivered oxygen choice
  - 65%
  - 100%
- Sets both mandatory breath and spontaneous breath oxygen concentration



Features and Controls – Front Panel

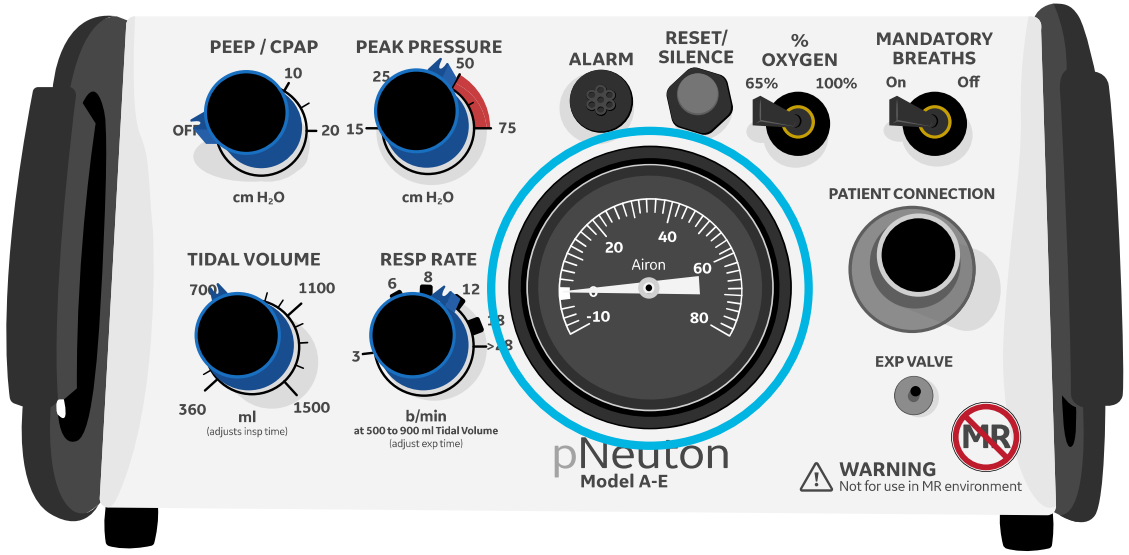
Mandatory Breath control

- Activates ventilation mode
- Switch for mandatory breaths
  - On or Off
- Ventilator operates in CPAP mode with switch in “Off” position

Features and Controls – Front Panel

Pressure gauge

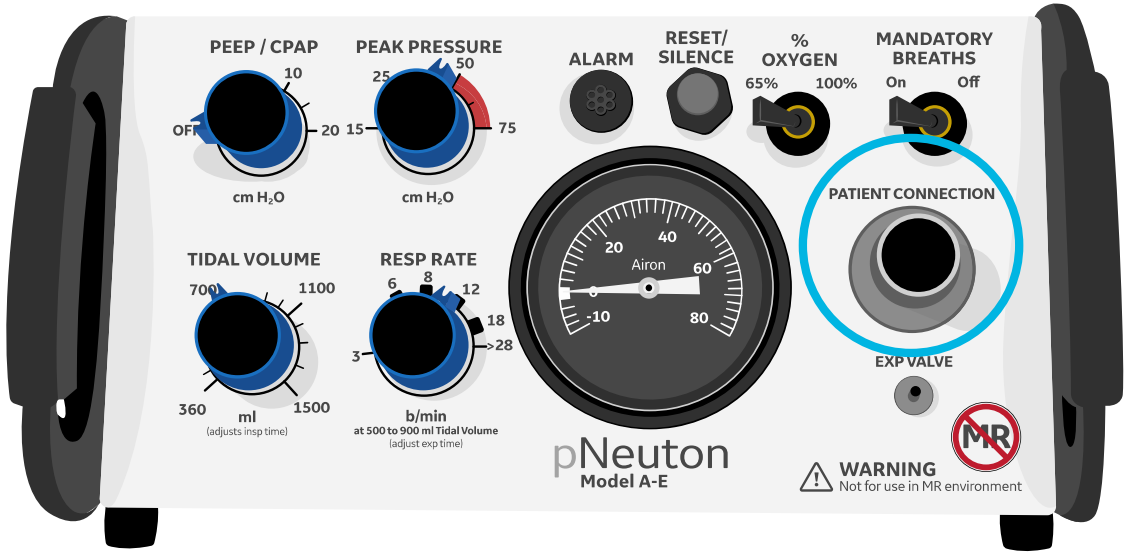
- Represents pressure in the patient circuit at the output of the ventilator



Features and Controls – Front Panel

Patient Connection

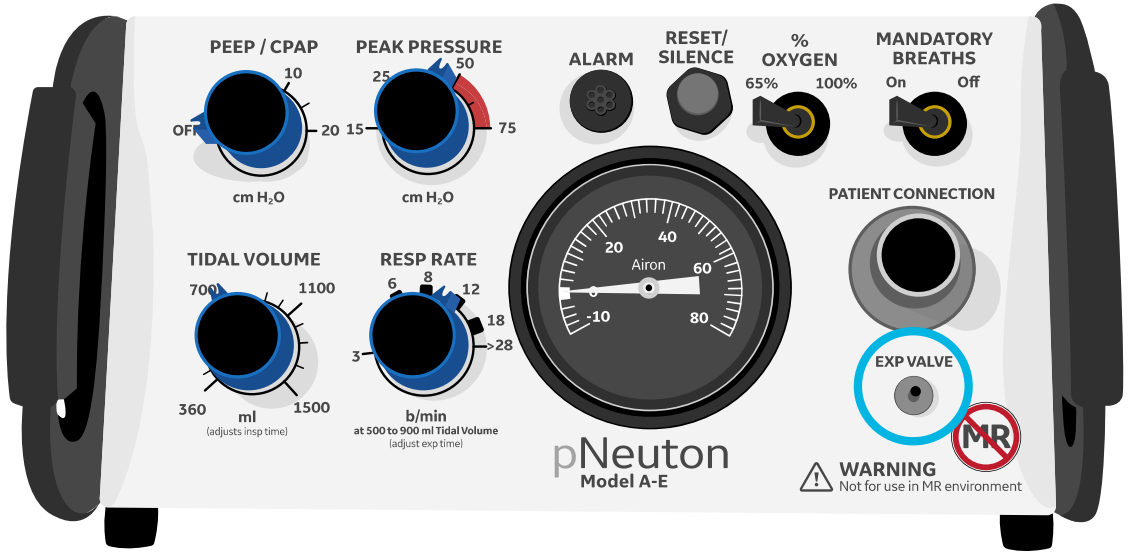
- Connection for the large bore hose of the patient circuit



Features and Controls – Front Panel

Expiratory Valve

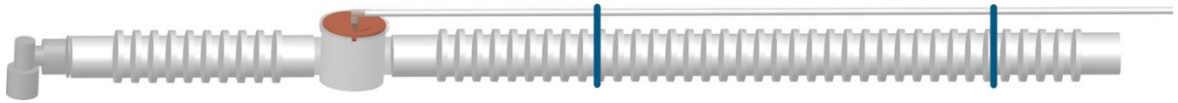
- Patient circuit small hose connection
- Connects to the expiratory valve on the patient circuit



Patient Breathing Circuit

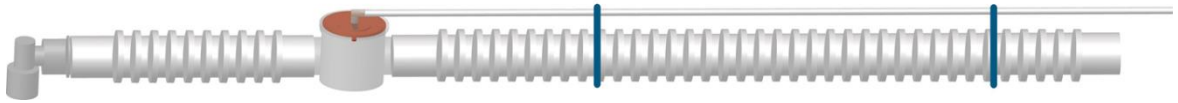
Patient circuit is a single limb system

- Connect large hose end to Patient Connection port and small hose end to the Exp Valve port on the front of the ventilator
- Patient end connects for clinical intervention
  - Directly to an endotracheal tube (invasive)
  - Face mask (noninvasive)



Patient Breathing Circuit

⚠ Use ***ONLY*** the recommended patient circuits



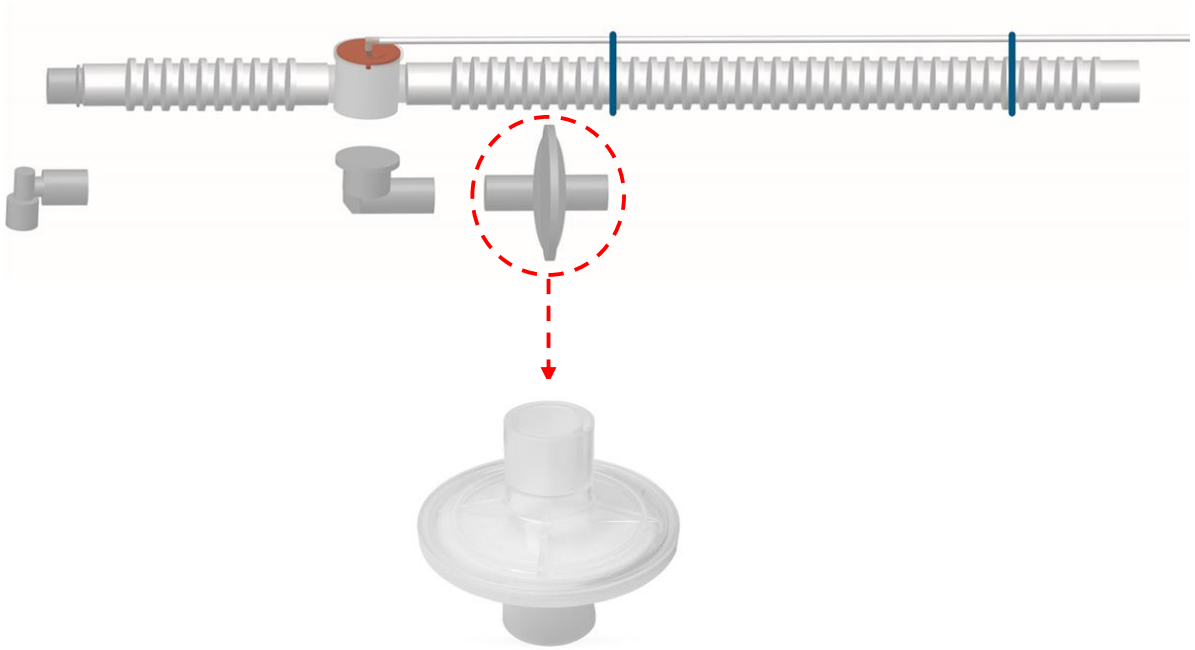
- Calibration of the PEEP/CPAP and Peak Pressure controls are based upon the recommended patient circuit
- Using other manufacturers circuits may cause:
  - Errors in pressure delivery
  - High expiratory flow resistance
  - Interference with CPAP sensitivity
  - Increased oxygen usage

NOTE: Order the single-use, patient circuit from this web site:
https://services.gehealthcare.com/gehcstorefront/p/5514234?catalogCode=01

Patient Breathing Circuit

Accessories to optimize patient care

- CO_2 monitoring
  - For In-line sampling place the tee between the mask and patient circuit
  - Or use the nasal prongs under the mask
- Use the expiratory bacteria/viral filter provided in the patient circuit kit. This can be added using the 90 degree elbow



If the bacterial/viral filter must be replaced, GE Healthcare recommends using a filter with the following specification:

- *Resistance @ 30 LPM: equal or below 75.5 pa (0.77 cm H_2O)*
- *Connector: 22M/15F - 22F*

Model A-E CPAP performance mode cannot be validated if a filter with higher flow resistance is used.

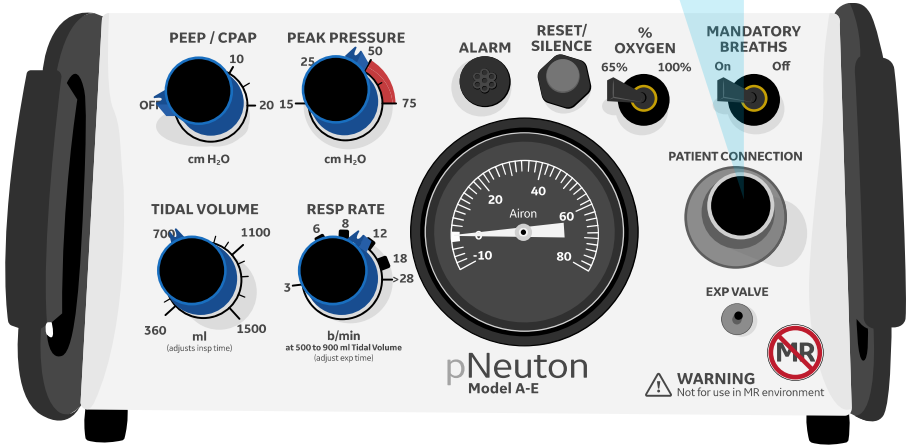
A reference for a commercial product available in the market is:

- *Manufacturer: MEDLINE*
- *Product SKU#: DYNJAABV1*
- *Additional info:* http://www.medline.com/sku/item/MDPDYNJAABV1?skuIndex=S1&question=DYNJAABV!&flowType=search&indexCount=1

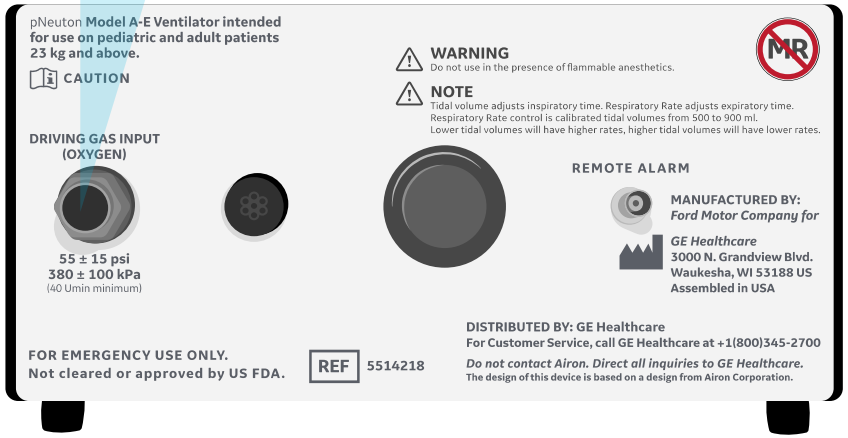
Patient Application

Initial set-up

1. Attach the recommended patient circuit to ventilator



2. Attach a high pressure oxygen hose to the rear of the ventilator



3. Attach the other end of the high pressure hose to the oxygen source

Patient Application

Set main controls

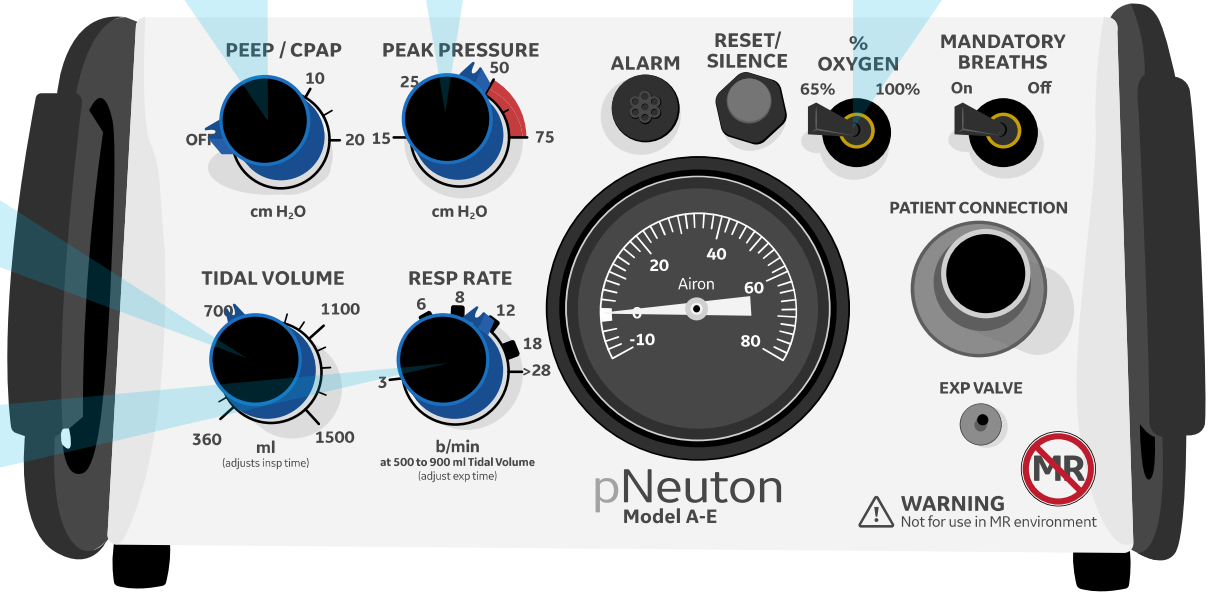
Determine Peak Pressure maximum

PEEP/CPAP can be set to minimum

Choose % Oxygen

Set Tidal Volume

Set Respiratory Rate



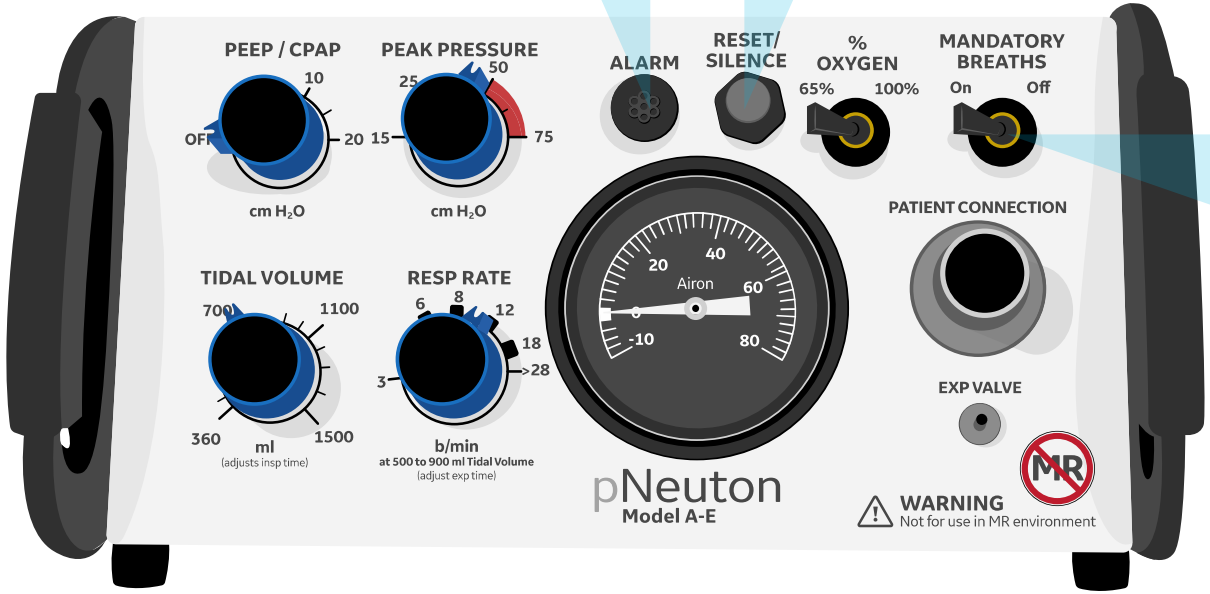
Patient Application

Begin ventilation

1 Turn “On” oxygen supply

Alarm system will immediately activate

2 Press Alarm Silence button, if desired



For ventilation, turn Mandatory Breaths control “On”

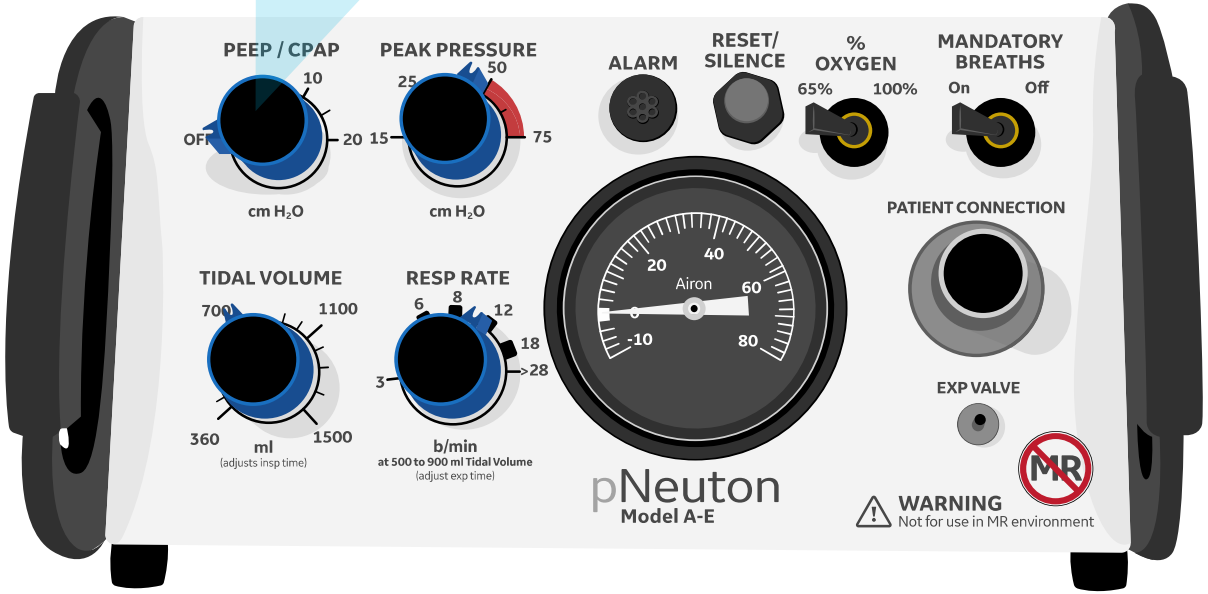
3

Ventilator will start to provide breaths at the settings on the controls

Patient Application

Set PEEP/CPAP

Adjust the PEEP/CPAP control to the level desired



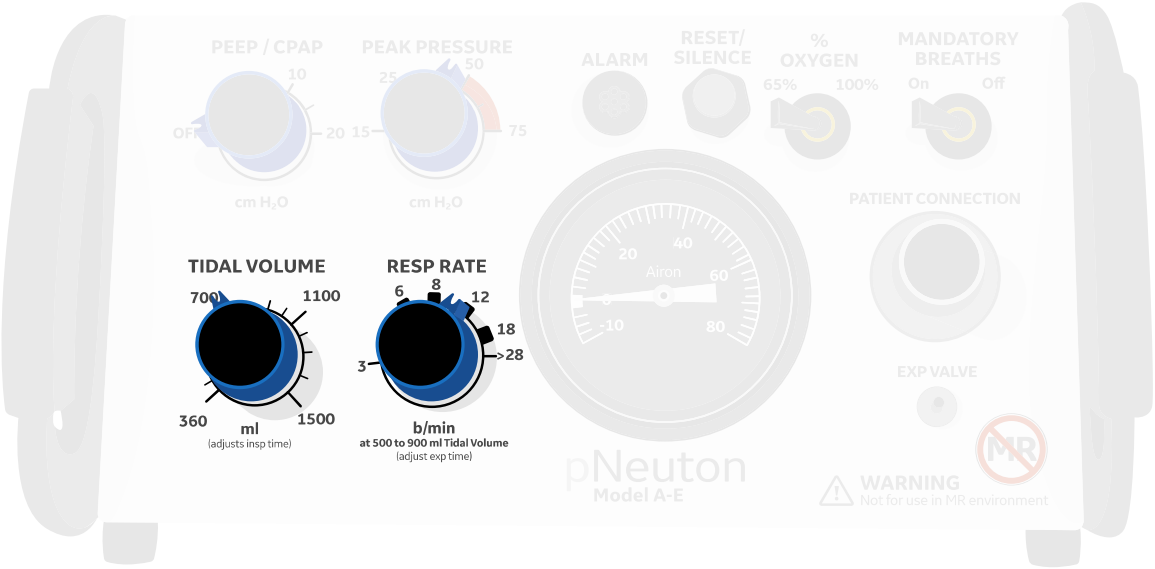
If a test lung or patient is not attached to the circuit, a high flow of gas will occur

With Mandatory Breaths control “Off”, set at least 4 cm H_2O to optimize performance in CPAP mode

Patient Application

Tidal Volume and Respiratory Rate interchange

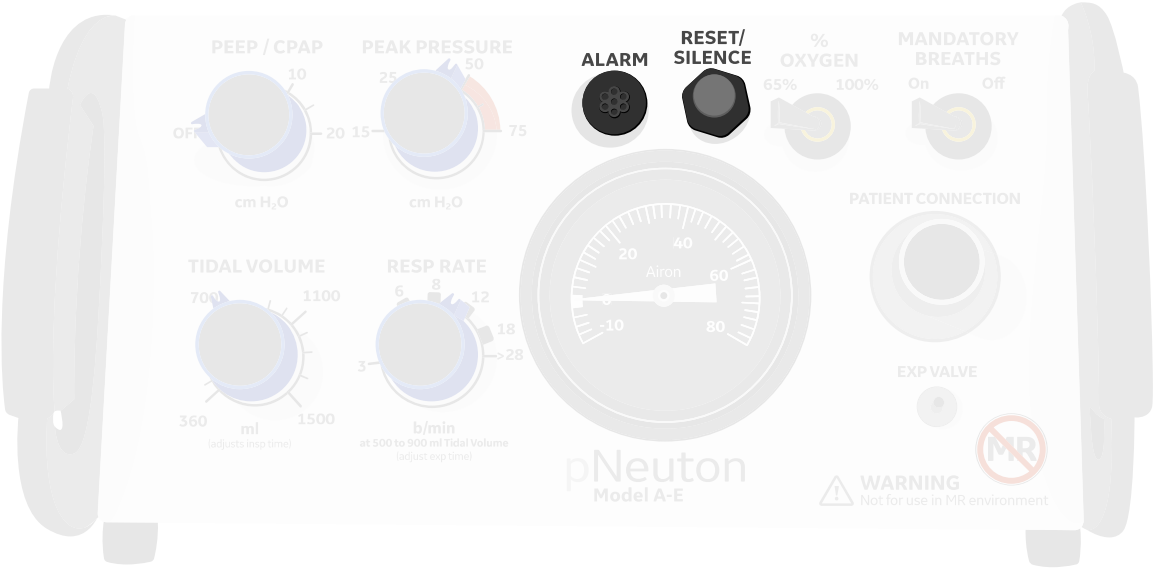
- Tidal Volume control is calibrated and sets the inspiratory time
- Respiratory Rate control sets the expiratory time and is calibrated for tidal volumes between 500 and 900 ml
- Set desired Tidal Volume first, then adjust the rate as desired
- Tidal volumes less than 500 will have higher respiratory rates, tidal volumes greater than 900 will have lower rates
- Always recount the respiratory rate after tidal volume adjustments



Ventilator Operation

Alarm system functionality

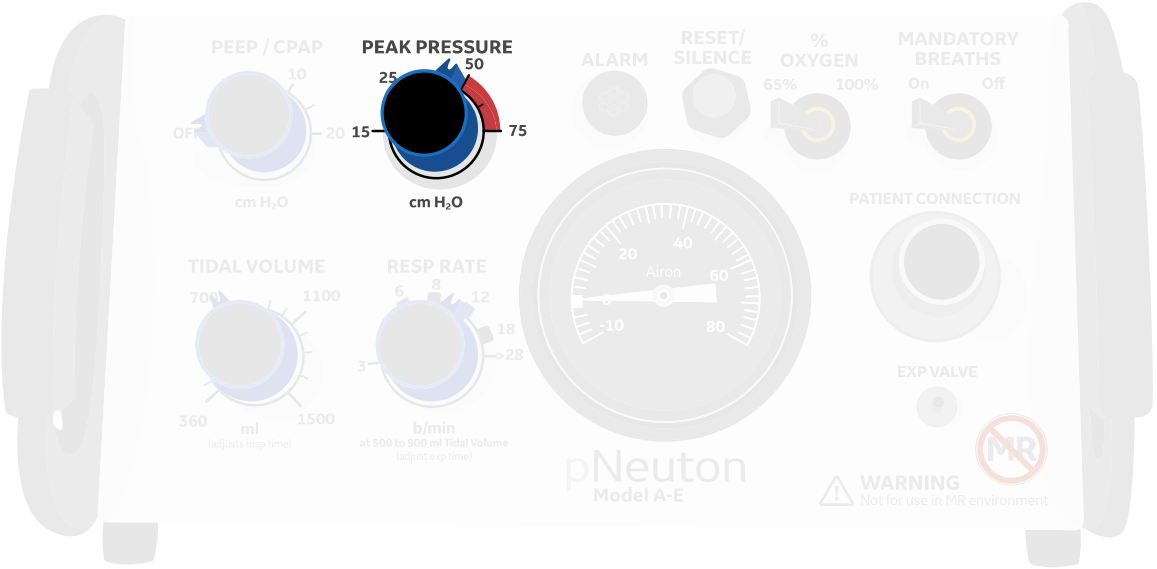
- Alarm preset to activate within approx. 22 seconds
- Disconnect alarm is looking for a specific minimum pressure
  - Mandatory Breaths “On”, breath must generate a minimum 15 cm H_2O
  - Mandatory Breaths “Off”, minimum CPAP level of 4 cm H_2O is needed
- For example, if there is not at least 15 cm H_2O pressure for Mandatory Breaths or 4 cm H_2O for CPAP the alarm will sound
- Pressing the Alarm Silence button equals 1 minute delay
- Input gas pressure below 30 psi (2 bar), will also activate the alarm



Ventilator Operation

Peak Pressure limit

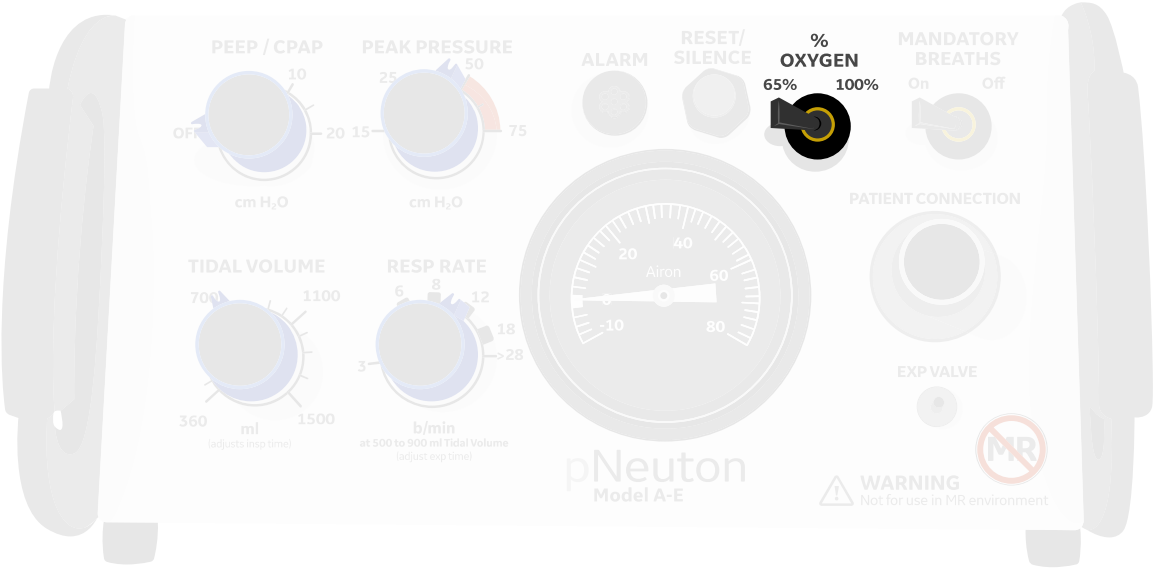
- Operates to limit the peak airway pressure during mandatory breaths
- For volume ventilation, set the Peak Pressure 10 cm H_2O above the pressure needed to deliver the set Tidal Volume
- Peak Pressure control is not an alarm
  - During rapid patient exhalation, as seen during coughs, the expiratory valve will make a “honking” noise to alert you that the patient is reaching the peak pressure setting



Ventilator Operation

% Oxygen control

- Set % Oxygen control to the desired oxygen level
- Both mandatory breaths and spontaneous breaths receive set oxygen level
- Oxygen tank time almost doubles with 65% setting
- Caution – with rapid, large tidal volumes on 100% oxygen, the actual delivered percentage for spontaneous breaths may be less than 100%



Clinical Issues

Let’s look at various clinical environments for ventilator/CPAP application

Pediatric ventilation

Medication nebulization

CO_2 monitoring

Altitude operation

Clinical Issues

Pediatric ventilation

- The tidal volume setting of 360 to 1,500 ml is used on patients from 23 kg (50 pounds) and higher
- pNeuton is not approved for neonatal or small children due to mandatory breath flow of 36 L/min
- Monitor pediatric patients closely to ensure ventilation synchrony

Clinical Issues

Providing nebulized medications

- A medication nebulizer may be placed between the patient connection and the patient
- Patient will inhale medication during every breath and exhale back out through patient circuit
- Expiratory filter may be added for personnel safety

Clinical Issues

CO_2 monitoring

- Any type of CO_2 analyzer may be used
- With in-line style analyzers place the sensor tee between the patient circuit connection and the patient

Clinical Issues

Altitude operation

- Ventilator used for air transports in unpressurized cabins up to 15,000 feet
- Delivered Tidal Volume will increase and Respiratory Rate will decrease as altitude increases
- Pressure settings will not change as altitude changes
- Always use an external spirometer to check the delivered tidal volume
- Do not use the ventilator in hyperbaric chambers – the delivered Tidal Volume will drop rapidly as pressure increases
- Do not use the ventilator in an MRI environment

Patient Safety

pNeuton Model A-E: Patient safety features

- Audible and visual alarms are for patient disconnect and gas supply pressure below 30 psi (2 bar)
- High Pressure Release – pressure is relieved at the Peak Pressure control setting
- Internal Safety Pressure Release – limits circuit pressure to 80 cm H_2O, regardless of the setting of the Peak Pressure control
- Anti-Suffocation System – in the event of ventilator malfunction, an internal valve will allow ambient air to enter the patient circuit

Cleaning and Maintenance

- Clean ventilator between patient use applications using a soft cloth and a mild detergent/disinfectant
- Do not immerse the ventilator in water
- Disposable patient circuit is for single use application and should not be cleaned, disinfected or reused

Conclusion

This concludes the pNeuton Ventilator Model A-E self-guided presentation

In this course, you learned about:

- The main operating features of the ventilator
- The pNeuton Ventilator Model A-E controls and connections
- The patient breathing circuit
- The ventilator set-up for patient operation
- Various clinical environments for ventilator/CPAP application
- Ventilator cleaning and maintenance

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