



# Quick guide to initiate Invasive Ventilation in (A)CV with Astral

Covid19 epidemic period

23/03/2020

# Introduction

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- (A)CV mode is commonly used in invasive ventilation
- The purpose of this guide is to describe the different steps to initiate (A)CV ventilation mode with Astral
- You will find the procedure to ensure a correct Astral configuration regarding circuit assembly, filters positioning, oxygen administration and monitoring
- This guide is not conceived as a settings recommendation
- For additional information, please refer to the Astral user guide and the instructions for any other devices that are included in the circuit

# Double limb circuit assembly

- Use the double limb circuit adapter

## Fitting the circuit adapter

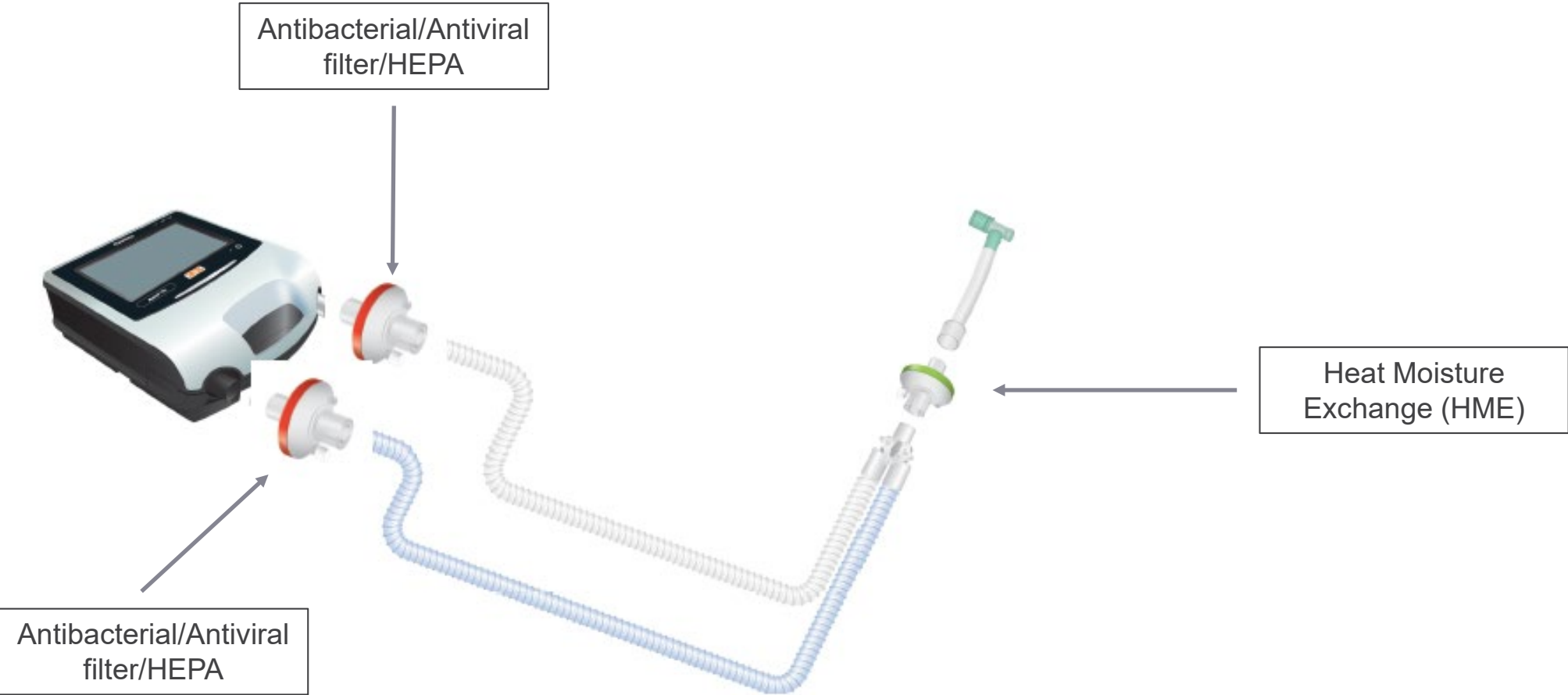
Before connecting the patient circuit, the adapter specific to the required circuit type must be fitted.

### To fit the adapter:

1. Turn over the device and place on a soft surface (to protect the LCD screen).
2. Press and hold the eject button. Pull the cover out towards you.
3. Lift the adapter out of the socket.
4. Replace with the new adapter, ensuring it sits firmly in the socket.
5. Place the cover over the enclosure, ensuring the runners on the device and the cover are aligned. Slide the cover back into place until the latch clicks.

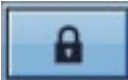


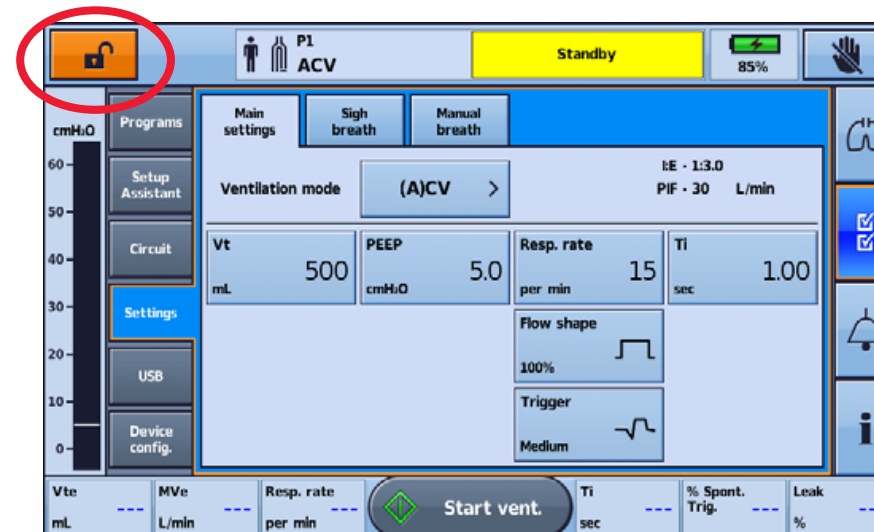
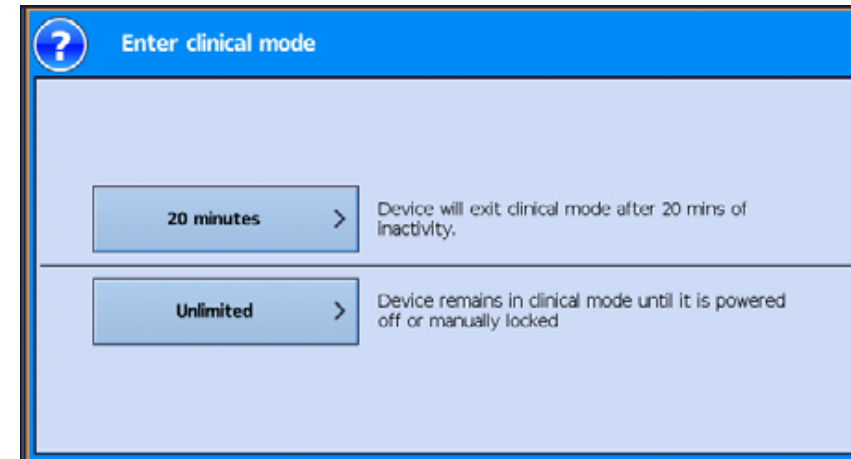
# Example of Double limb circuit assembly



HEPA: high-efficiency particulate air

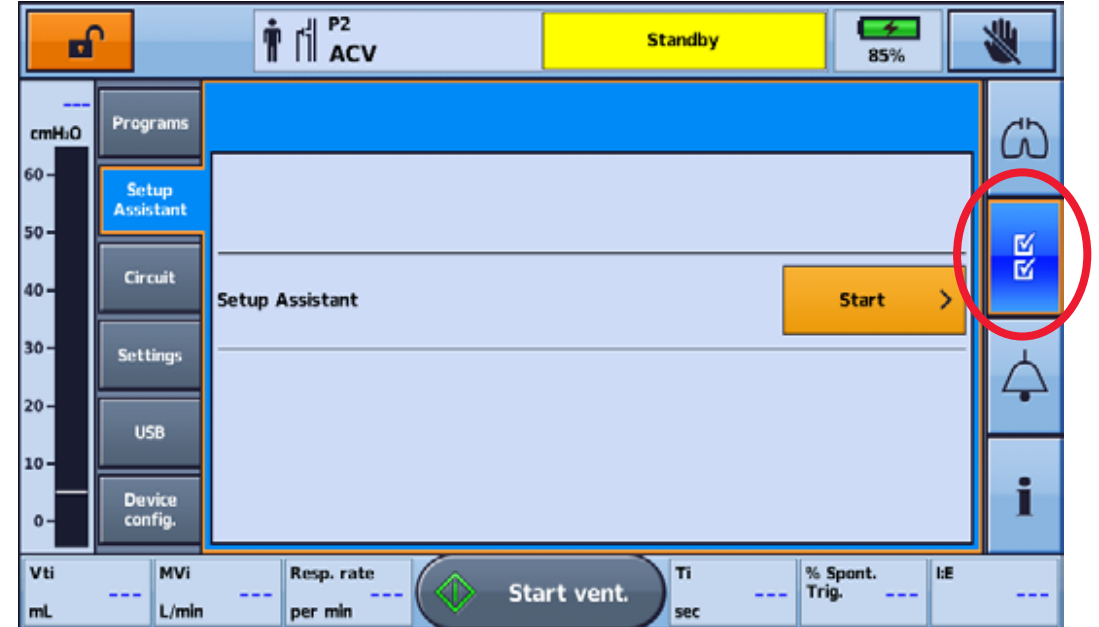
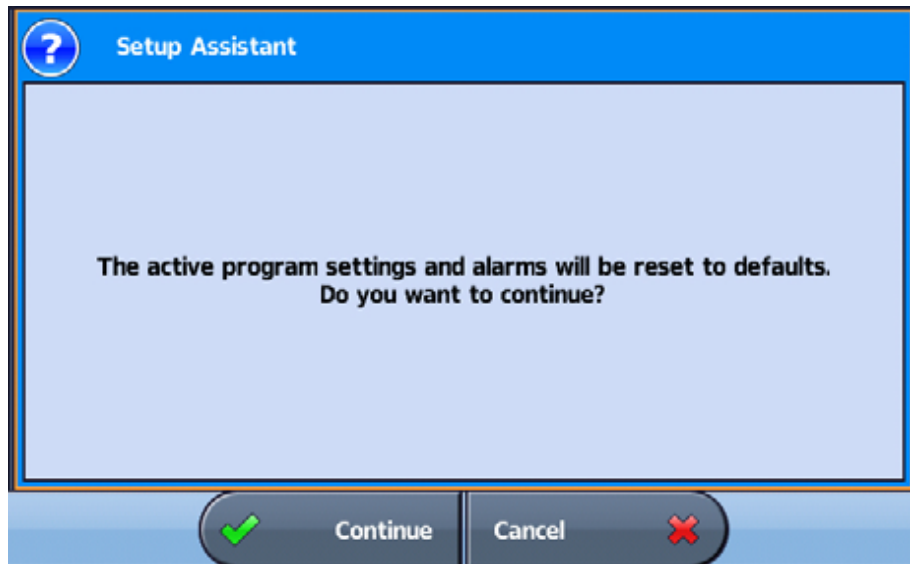
# Accessing Clinical Mode

- From the patient home screen, press and hold for 3 seconds, then release 
- Select:
  - 20 minutes—the device will return to patient mode after 20 minutes of inactivity, or
  - Unlimited—the device will remain unlocked until powered off or manually locked.



# Using the Setup Assistant


- From the Main menu press Setup Menu
- Select Setup Assistant and press Start
- A warning message will display. Select **Continue**




*NB: This procedure will reset ventilation and alarms settings*


# Select the Patient type and Circuit type


**Select Patient type**


 **Adult** >


 **Paediatric** >

**Select Circuit type**

 **Double circuit** Double limb circuit. Exhalation returns to the device.

 **Single circuit** > Single limb circuit with expiratory valve.

 **Single with leak** > Single limb circuit with intentional leak.

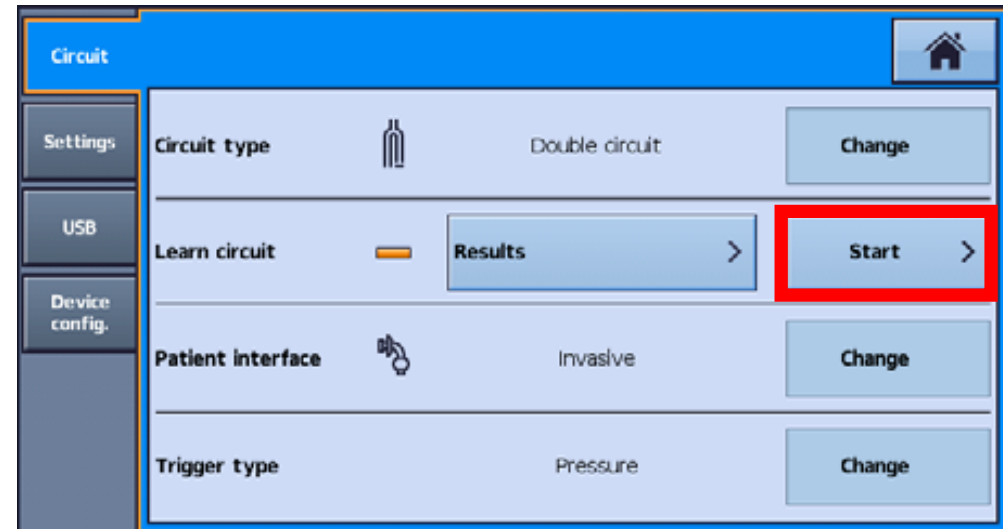
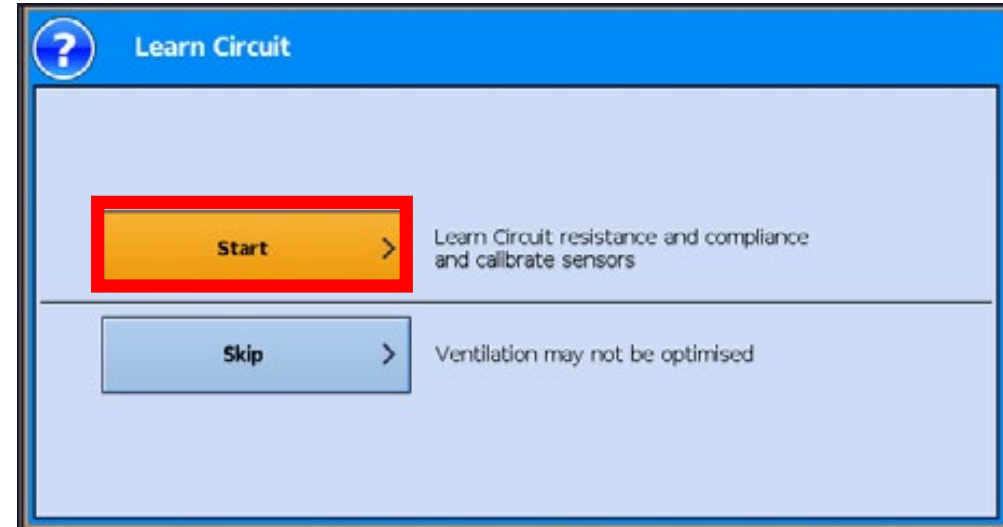
 **Mouthpiece circuit** > Single limb circuit with mouthpiece interface.

# Perform the Learn Circuit

To connect a double limb circuit:

1. Ensure the device is fitted with the double limb adapter (otherwise change the adapter).
2. Start the test and follow the instructions on the screen
3. Select the type of circuit
4. Connect all required circuit accessories (e.g. humidifier or filters) and perform a Learn Circuit
5. Select the interface type: Mask

*\* Oxygen flow must be turned off during the Learn Circuit procedure*





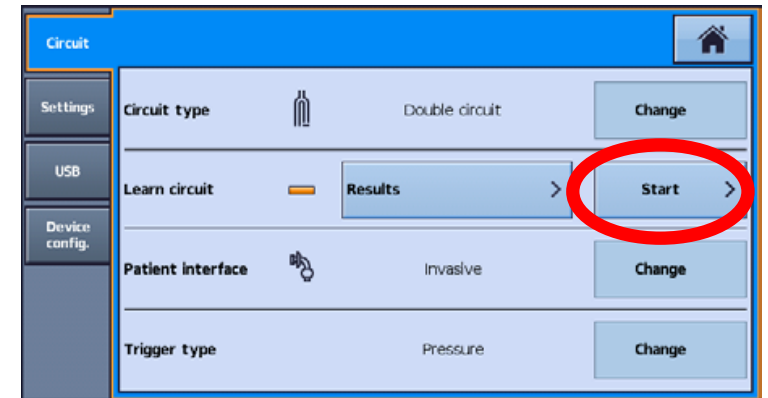
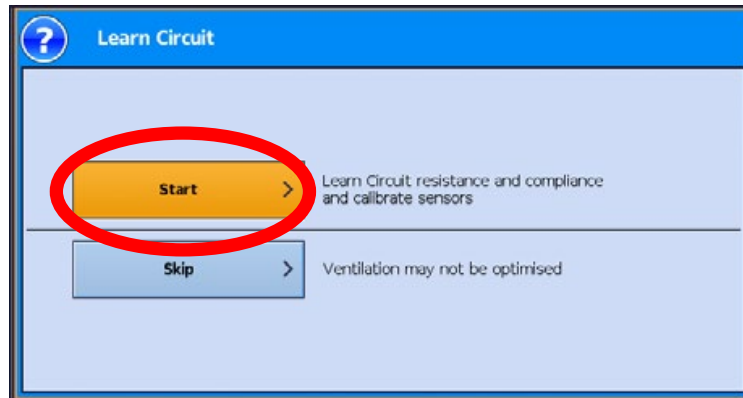
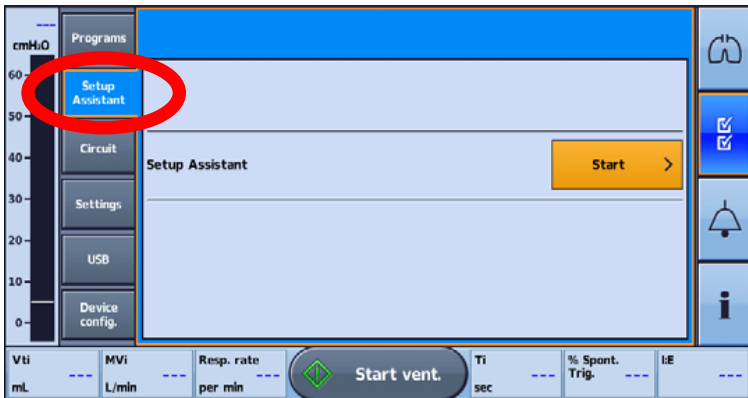
# Perform the Learn Circuit

It is required to perform:

- When starting a new patient
- When changing the circuit configuration

2 paths:

- Setup Assistant for a new patient
- Circuit for a patient already being ventilated



# Learn Circuit Results

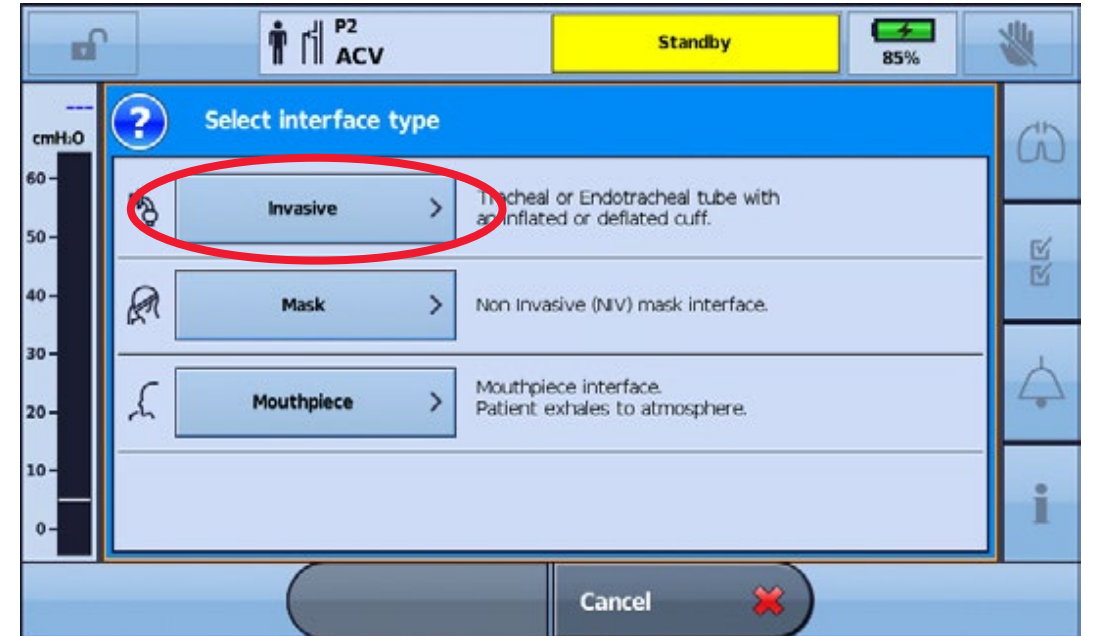
Results	
Learn circuit	✔ OK
Device test	✔ OK
Oxygen sensor	✔ OK
Expiratory flow sensor	✔ OK

## Learn Circuit Results

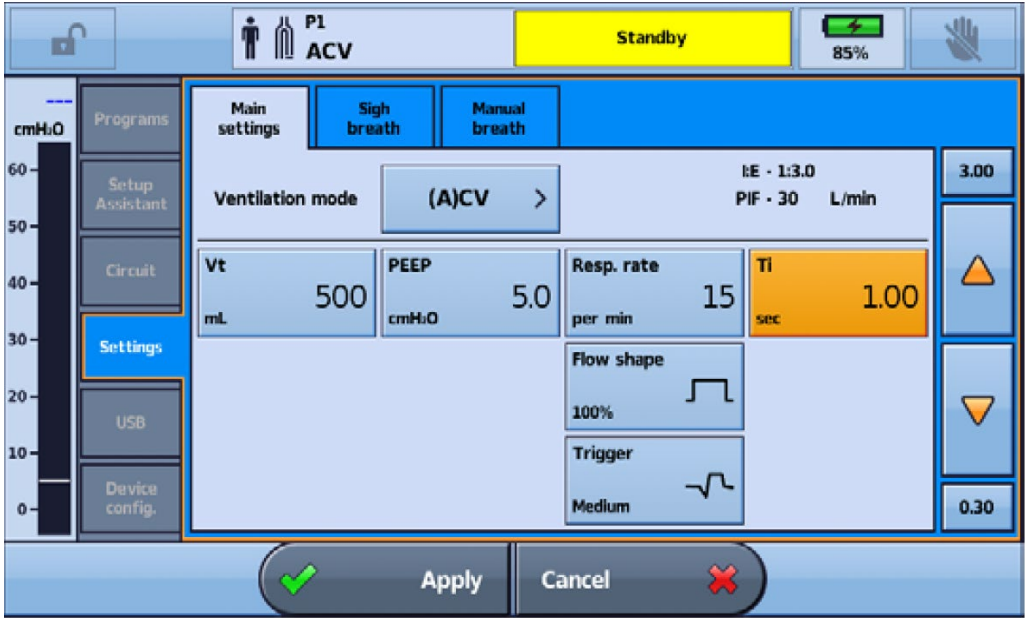
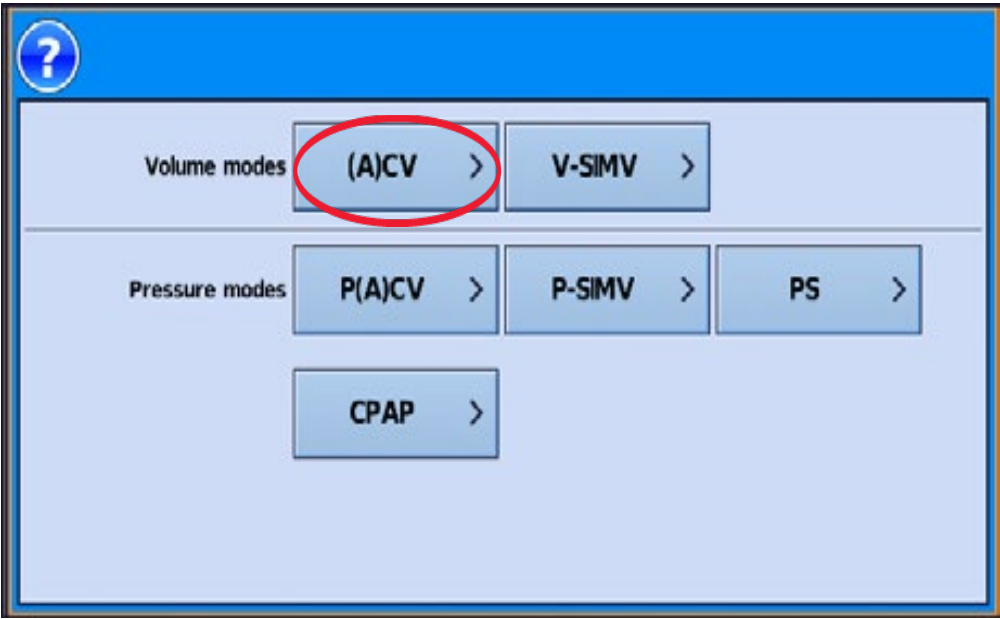
Icon	Description
✔	Learn Circuit completed
—	Learn Circuit not tested. Default circuit characteristics will be applied. Accuracy of control and monitoring may not be met. Ensure that ventilation and alarms are effective before proceeding further.
?	<p>Learn Circuit completed. Circuit resistance is high.* The device will use the learned circuit characteristics. Accuracy of control and monitoring may not be met. Ensure that ventilation and alarms are effective before proceeding further.</p> <p>*The International Standards Organisation (ISO) has judged that patients ventilated with tidal volumes in excess of 300 mL (Adult range) should use breathing circuits with a resistance no more than 6 cmH<sub>2</sub>O pressure drop at a flow rate of 30 L/min and 6 cmH<sub>2</sub>O at 15 L/min for tidal volumes less than 300 mL (Paediatric range).</p> <p><b>This circuit configuration may be appropriate for particular patients and hence clinical discretion is required.</b> Should ventilation cease for any reason, the patient must overcome this resistance in order to breath.</p> <p><b>Note:</b> Patient/carer should be informed that this icon will appear each time Learn Circuit is performed using this configuration.</p>
✘	<p>Learn Circuit has failed. Default circuit characteristics will be applied.</p> <p>Below are general steps to resolve the Learn Circuit issue. Refer to Learn Circuit Troubleshooting (see page 160) for suggested actions on the error code.</p> <ol style="list-style-type: none"><li>1. Inspect the circuit and proximal lines for disconnection or excessive leak.</li><li>2. Check that the circuit is correctly connected and matches the selected circuit type.</li><li>3. Check that the correct circuit adapter is installed for the selected circuit type.</li><li>4. Check the module, the blue membrane and sensor are pressed all the way in and sit flush with the enclosure.</li></ol> <p>Accuracy of control and monitoring will be degraded. Ensure that ventilation and alarms are effective before proceeding further.</p>

# Select Interface Type

- Both for Tracheal or Endotracheal tube with inflated cuff



# Select Ventilation Mode



Default Settings

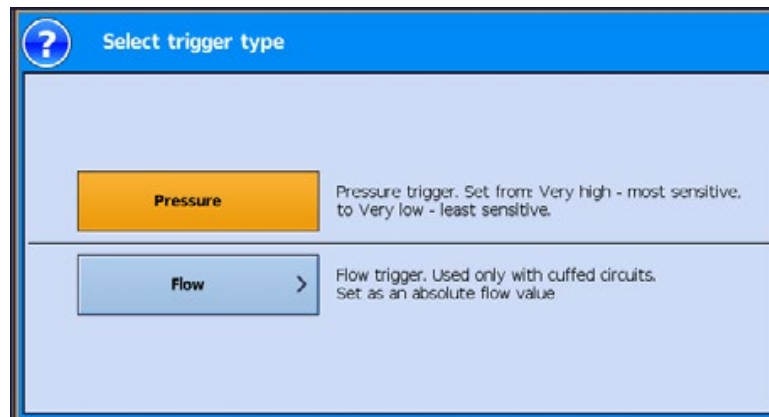
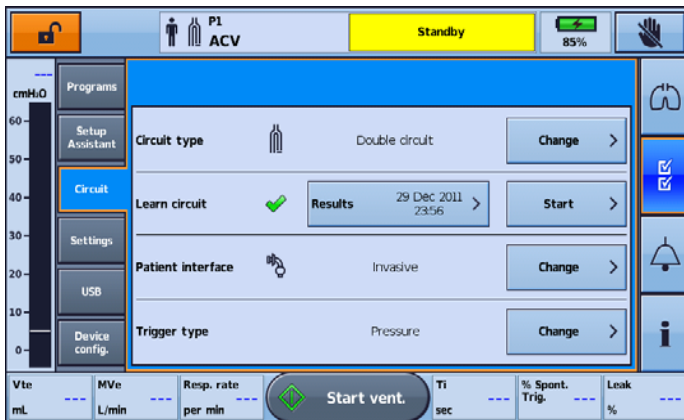
- Adjust the setting according to the patients needs

Then

- Press  to start ventilation
- To stop ventilation press and hold  If oxygen is connected, turn off the oxygen

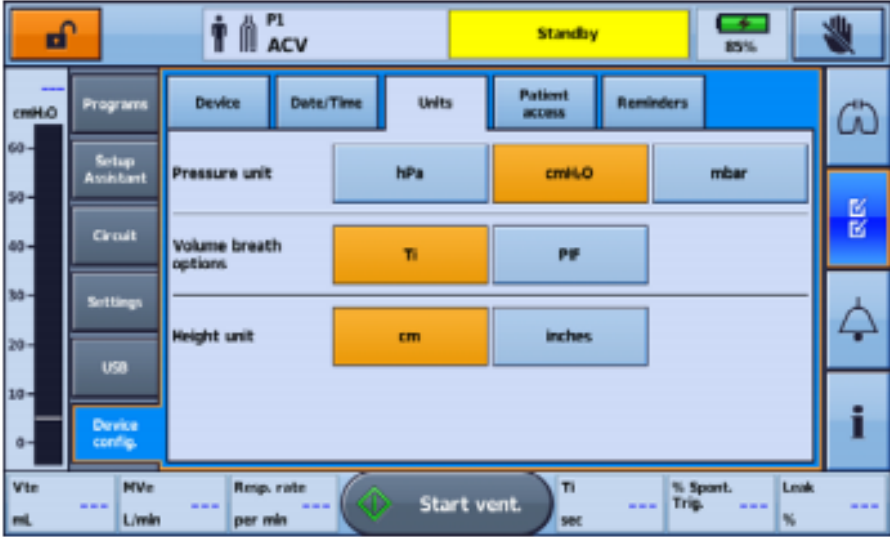
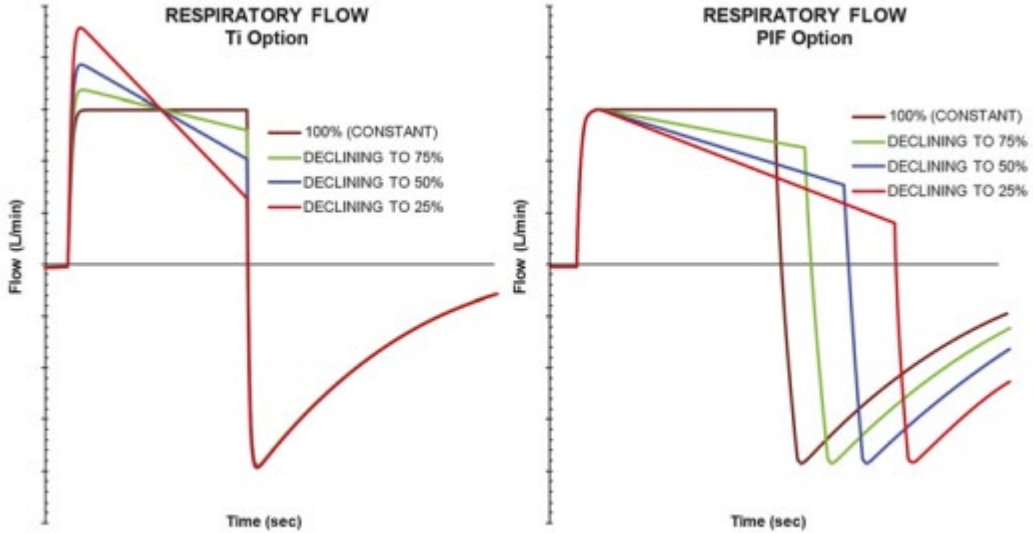
# Selecting the Trigger Type

- For double limb circuits, changing Trigger type can be done while the device is ventilating or in Standby
- From the Setup menu, select **Circuit** → from the Trigger type option, press **Change**
- 2 types:
  - Pressure trigger from **Very High** to **Very Low** sensitivity
  - Flow trigger from **0.5 to 15 l/min**



# Flow Shape settings

- The Astral device supports four flow shape settings:
  - 100% (Constant)
  - 75%
  - 50%
  - 25%

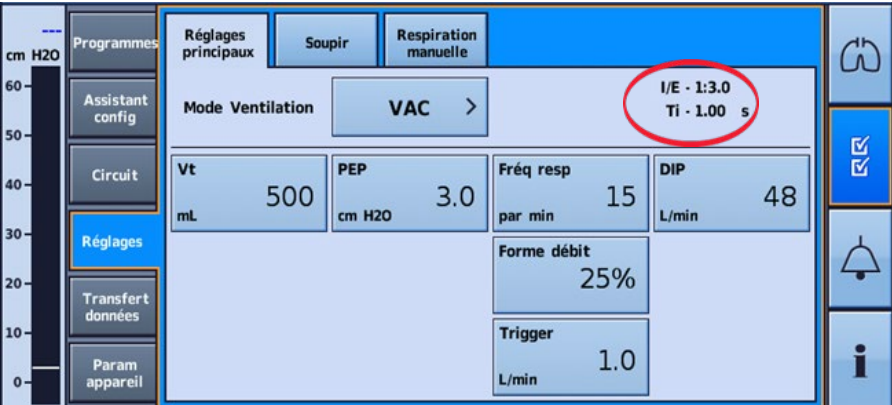
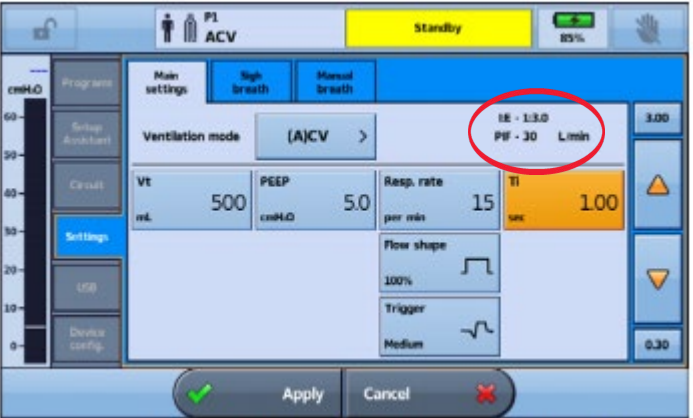
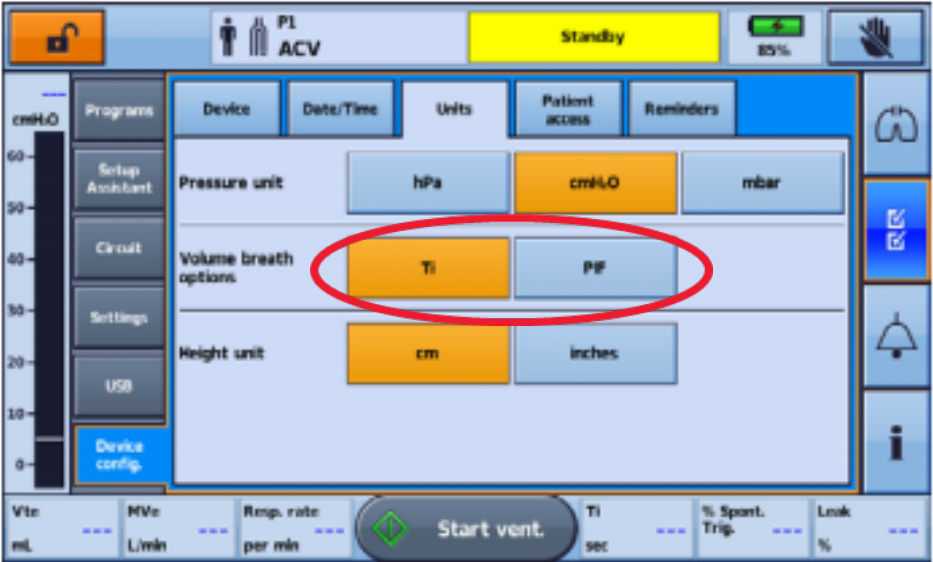


Effective flow shape setting with Volume breath option set to Ti and PIF for a fixed volume



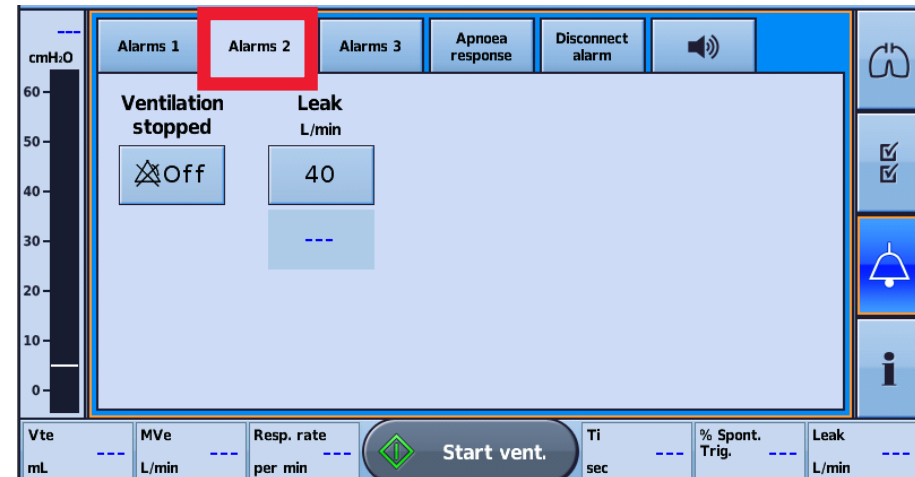
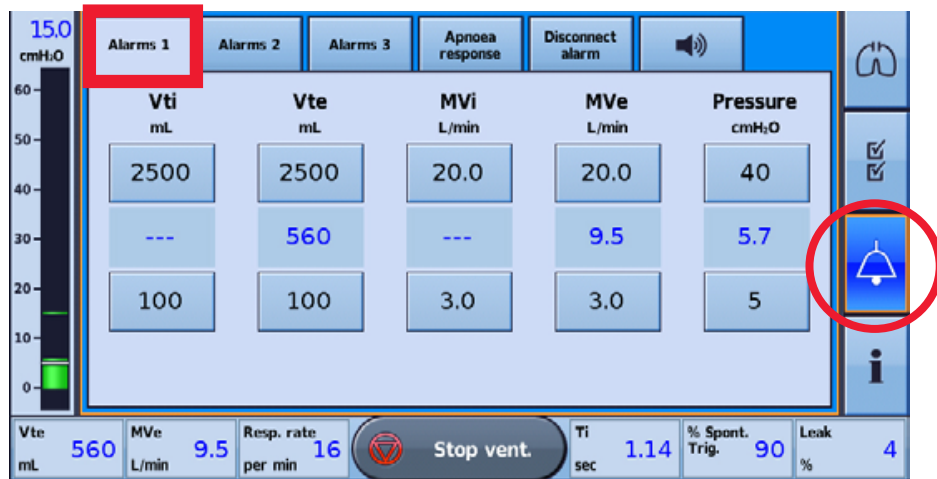
# Ti or Flow settings

- The user can set either Ti or Flow:
  - **Ti setting:** the flow is adjusted automatically to deliver the Vt in the set time
  - **Flow setting:**
    - Adult: from 10 to 120 l/min
    - Pediatric: from 5 to 60 l/min



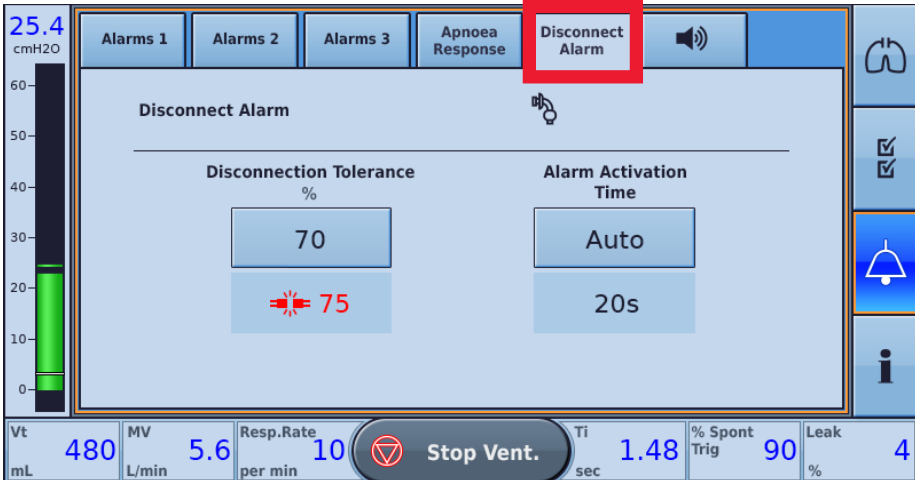
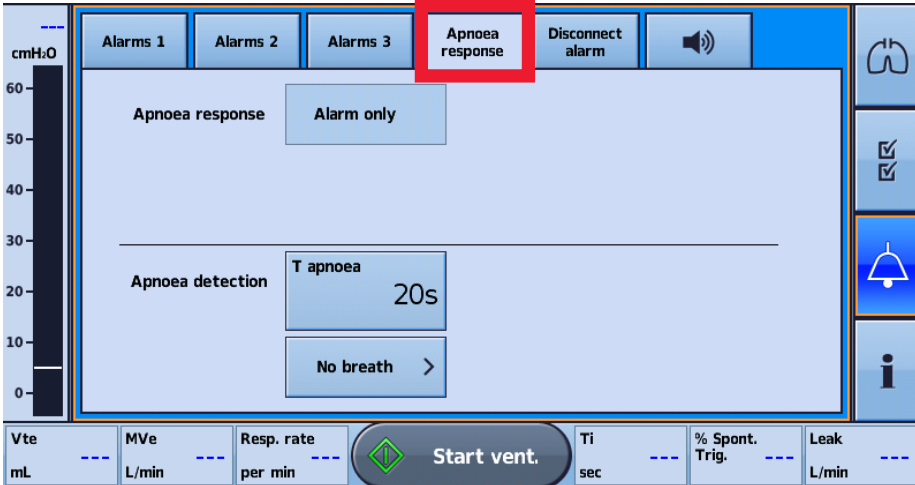
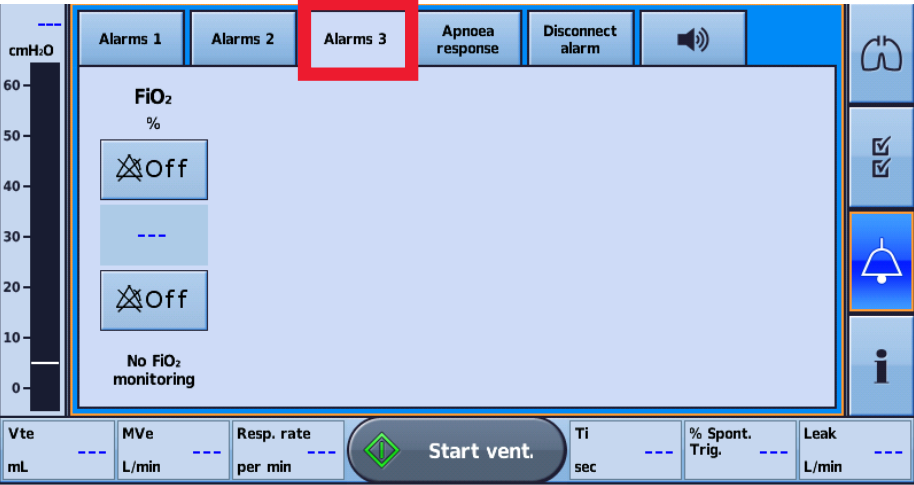
# Accessing the Alarms Menu (Alarm 1 and 2)

- Display the Alarms menu to view/update the individual thresholds for each alarm to trigger
- Real-time values are displayed between the upper and lower thresholds



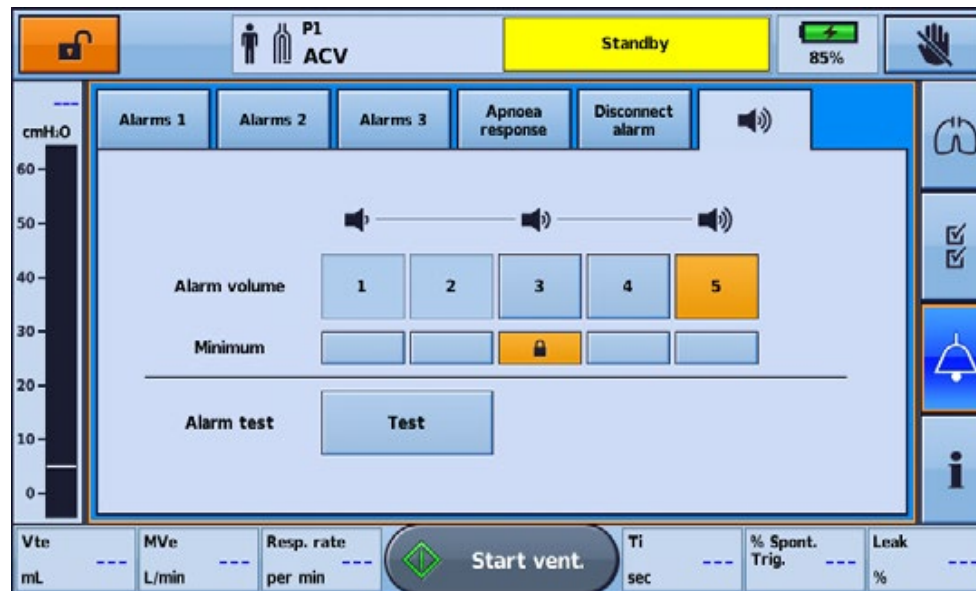


# Accessing the Alarms Menu (Alarm 3, Apnoea response and Disconnection alarm)



# Setting the Alarm Volume

- The volume level of the Astral device can be set from one to five (with five being the loudest and the default being three)
- Alarm volume cannot be adjusted separately for individual alarms. **Adjusting the alarm volume will change the volume of all alarms**, independent of alarm priority level
- When adjusting alarm volume, **ensure that the alarm can be heard above the ambient noise levels that the patient may experience in a variety of settings, including use in noisy environments**



# Adding supplemental oxygen

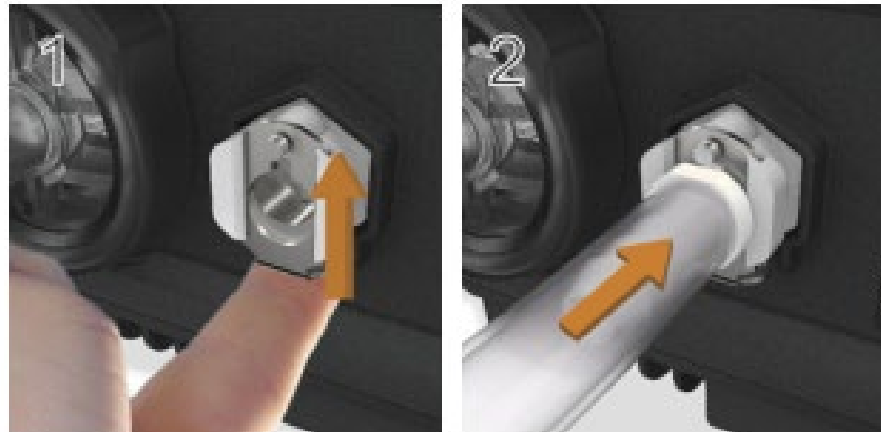
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- The Astral device is designed to be compatible with levels of **supplemental oxygen up to 30 L/min**
- At a fixed rate of supplemental oxygen flow, the inhaled oxygen concentration will vary depending on the Ventilation mode and settings, patient breathing pattern, mask selection, and leak rate

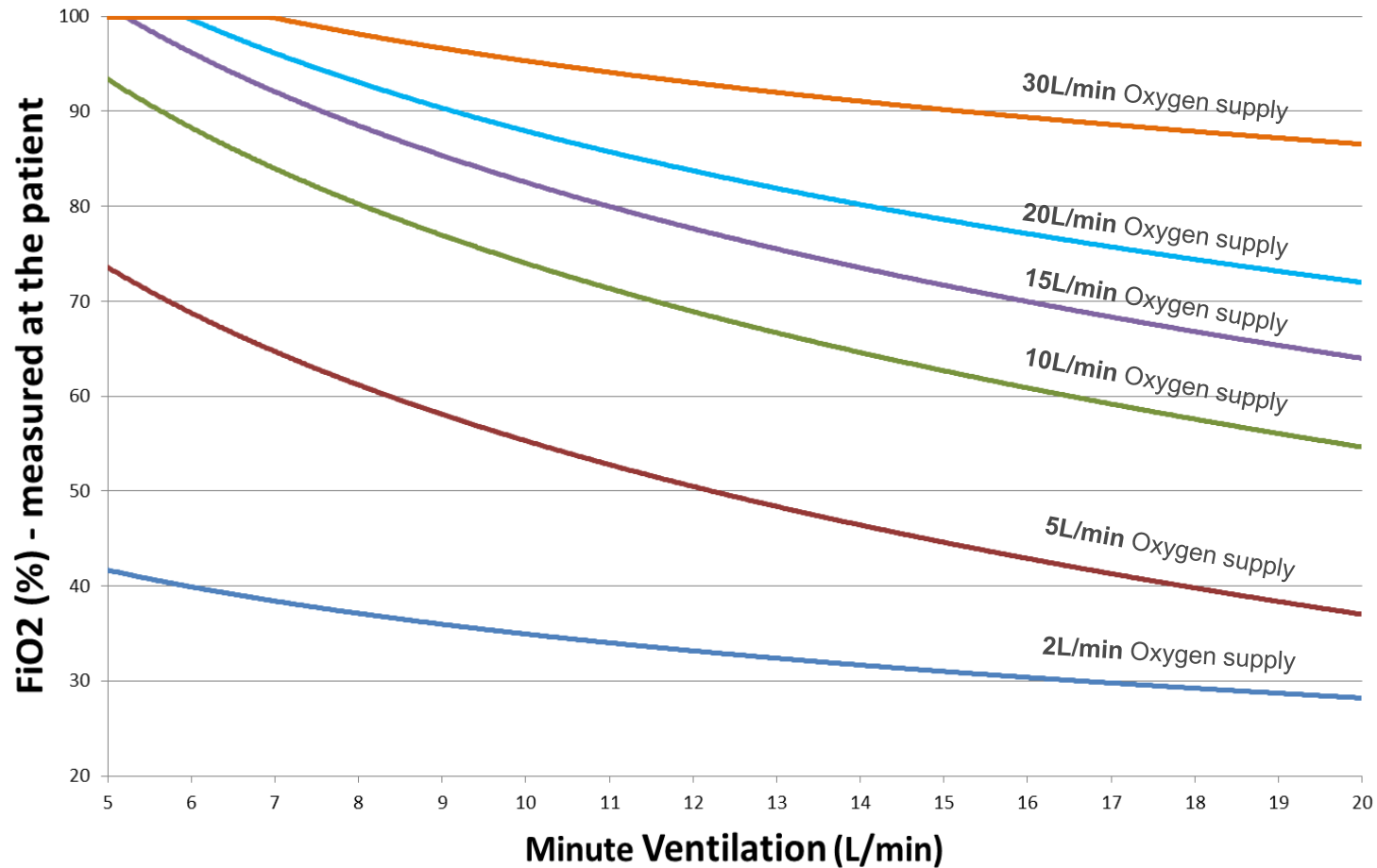


# Adding supplemental oxygen

- To add supplemental oxygen:
  1. Unlock the low flow oxygen inlet at the rear of the device by pushing up on the locking clip
  2. Insert one end of the oxygen supply tubing into the oxygen port connector. The tubing will automatically lock into place
  3. Attach the other end of the oxygen supply tubing to the oxygen supply
  4. Start ventilation
  5. Turn on oxygen and adjust (at the oxygen supply) to the prescribed flow rate or FiO<sub>2</sub> level
  6. Turn off oxygen when you stop ventilation



# Adult – Non Vented circuit



## For a Minute Ventilation of 10L/min:

- Almost 100% FiO<sub>2</sub> can be achieved with additional 30 L/min supplemental O<sub>2</sub>
- More than 80% FiO<sub>2</sub> can be achieved with additional 15 L/Min supplemental O<sub>2</sub>




# Monitoring the delivered $\text{FiO}_2$ with oxygen sensor



# Monitoring the delivered $\text{FiO}_2$ with oxygen sensor

- The oxygen sensor is a standard inclusion on the Astral 150 (hospital) and an optional accessory on the Astral 150 and 100 for homecare. The sensor measures the average of percentage of oxygen delivered to the circuit through the inspiratory limb
- Prior to using the  $\text{FiO}_2$  monitor, a Learn Circuit needs to be performed to calibrate the sensor
- The oxygen sensor performance can be adversely affected by relative humidity, condensation on the sensor or unknown gas mixtures

## Oxygen ( $\text{FiO}_2$ ) Sensor Results

Icon	Description
	Oxygen sensor calibration has passed.
	Oxygen sensor not tested or not installed. <ol style="list-style-type: none"><li>1. If your device was supplied without an oxygen sensor, ignore this message and proceed with therapy.</li><li>2. If possible, check that the oxygen sensor is securely attached as described in Replacing the oxygen sensor (see page 134).</li><li>3. Repeat Learn Circuit. If the oxygen sensor is still not detected, return the device for servicing by an authorised ResMed Service Centre.</li></ol>
	Oxygen sensor calibration has failed. <p>Below are general steps to resolve the oxygen sensor calibration issue. Refer to Learn Circuit Troubleshooting (see page 160) for suggested actions on the error code.</p> <ol style="list-style-type: none"><li>1. If possible, replace the oxygen sensor as described in Replacing the oxygen sensor (see page 134).</li><li>2. Repeat Learn Circuit. If problem persists, return the device for servicing by an authorised ResMed Service Centre.</li></ol> <p>If you choose to proceed with ventilation, <math>\text{FiO}_2</math> alarms will be disabled. An alternate method for monitoring <math>\text{FiO}_2</math> is required.</p>



# Replacing the oxygen sensor

To remove and replace the oxygen sensor (O<sub>2</sub> cell):


Before replacing the O<sub>2</sub> sensor, turn off the device and remove from mains power and/or external battery.

1. Unscrew the cover of the O<sub>2</sub> enclosure.
2. Remove the cover of the O<sub>2</sub> enclosure.
3. Holding on to the tab of the O<sub>2</sub> cell, gently pull the cell up and out of the enclosure. Gently pull the wire to remove it from the connector in the device.

The device is now ready for the new O<sub>2</sub> cell to be installed.

4. Carefully insert the connector of the new O<sub>2</sub> cell into the socket. This connector can only be inserted one way with the flat section to the wall of the enclosure. Press into place using a blunt tool (eg, a flat-bladed screwdriver).
5. Holding on to the tab of the O<sub>2</sub> cell, gently place the O<sub>2</sub> cell into the enclosure ensuring the wires are tucked into place.
6. Replace the cover and screw into place.



 CAUTION

Following the replacement of the Oxygen sensor, you must run a Learn Circuit to calibrate the new sensor and ensure accurate therapy and monitoring.



# Mentions & disclaimer

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24/03/20

COVID-19

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