

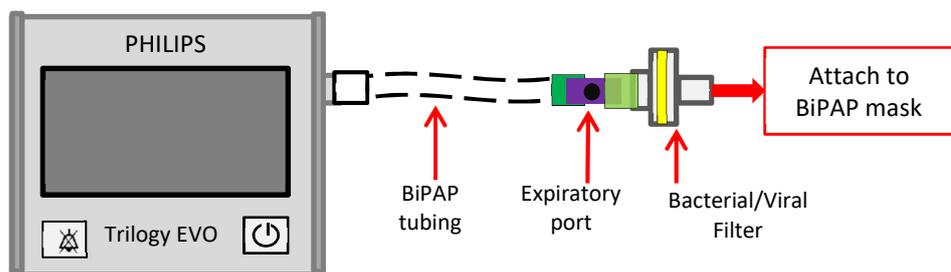
# Trilogy EVO BiPAP machine set-up Guidance for wards and ED

**\*BiPAP device should be visually inspected and all settings checked before connecting patient to BiPAP\***

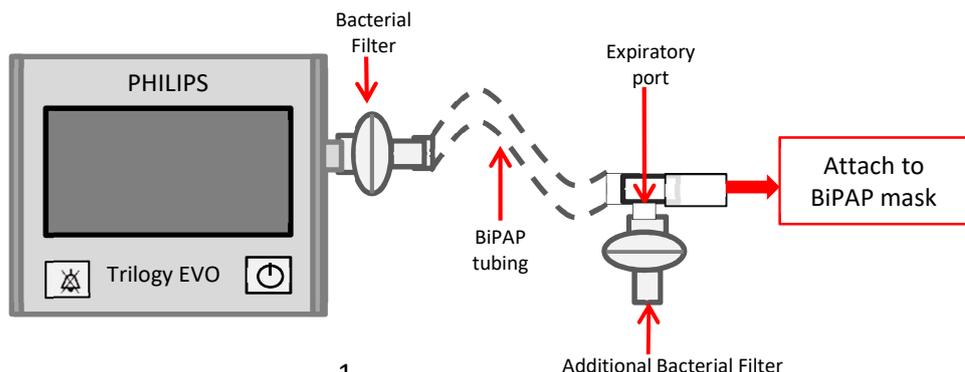
**Confirm the following before starting ventilation:**

<b>ACTION:</b>	<b>Information:</b>
✓ <b>Plug in machine:</b>	Keep on charge even when not in use
✓ <b>Check O2 connection:</b>	Use Schrader valve into wall O <sub>2</sub> or use O <sub>2</sub> cylinder then switch over
✓ <b>Connect BiPAP hose/circuit :</b>	Disposable adult passive circuit
✓ <b>Check expiration port present:</b>	In circuit, at the patient end
✓ <b>Attach Bacterial/Viral Filter:</b>	Attach between expiratory port and patient mask
✓ <b>Switch on machine:</b>	Check internal / external battery
✓ <b>Confirm all settings and alarms before connecting patient:</b>	See details below for programming and alarm settings

**Intersurgical  
 Circuit  
 Set up**



**Respironics  
 Circuit  
 Set up**  
 (remove thin clear tubing and discard)



# Settings and Alarms:

Switch the machine on.

The machine will be in standby mode

## Step 1: → select 'NEW PATIENT'

N.B. if this is not a new patient then check settings are still correct and press 'start ventilation' when ready

→ select 'PRESCRIPTION #'

→ Select 'ACCEPT'

Note the alert to ensure a bacterial/viral filter is attached within the circuit, select

→ 'ACKNOWLEDGE'

**Step 2:** → select **SETTINGS**  tab to set mode and settings

**Circuit:** Confirm → **PASSIVE**,  
 → **ADULT 20-22mm** and switch →  
**ACTIVE HUMIDIFICATION: OFF**

**Mode:** Confirm → 'S/T'  
 (spontaneous/timed = BiPAP),

→ **AVAPS: OFF**

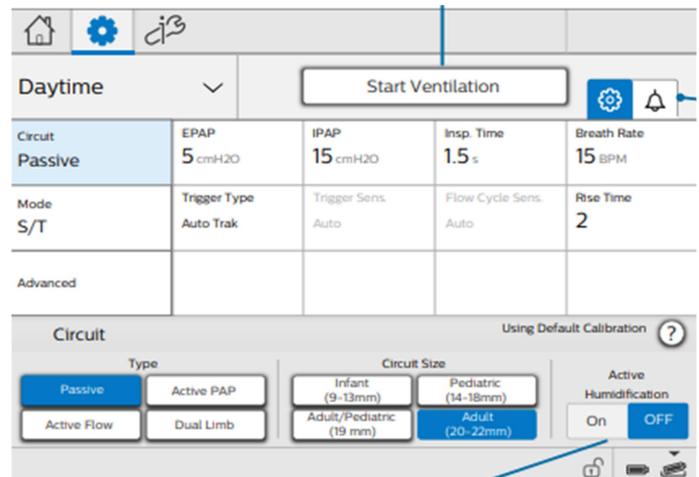
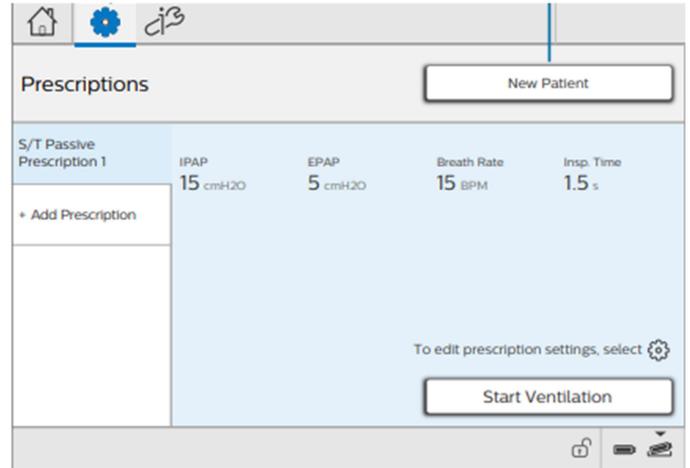
for using CPAP mode in ED, select 'CPAP' and set up accordingly

## Step 3: select → **ALARMS** tab

N.B. -Always ensure alarms are set appropriately to your patient's requirements and once set press apply

See below for alarm settings

**Once settings and alarms are correct select → 'START VENTILATION'**



Setting up Trilogy EVO for BiPAP video guide:



Programming Trilogy EVO for BiPAP video guide:



## Settings



Press 'Accept' to save changes made in settings.

Settings:	Initial value	Comments
Prescription 1	Prescription 1	Ensure only one prescription is set, if more than one, click on spanner icon, select 'prescription preferences' and delete additional prescriptions. Ensure settings are correct BEFORE connecting patient.
Circuit	Passive Adult 20-22mm Humidification OFF	For single use patient tubing with expiratory port.
Mode	S/T AVAPS - OFF	Spontaneous and timed = BiPAP.
FiO <sub>2</sub>	21 – 100 % As required	Start at venturi mask requirement prior to BiPAP starting (e.g. 35%). Aim target sats (usually 88-92%)
EPAP	Start 4 cmH <sub>2</sub> O	<b>Senior review required to change setting.</b>
IPAP	Start 15 cmH <sub>2</sub> O <i>increase up</i>	Initially aim 20 in first 10-30 mins. If pH < 7.25 can start at 20 if patient tolerates. NMD patients may need IPAP < 20. Increase if pCO <sub>2</sub> not falling. <b>Senior review if 26 or more.</b>
Inspiratory time	1.5 s <b>(Minimum 1.0 s)</b>	Only for backup breaths. If patient is not triggering and back up rate is active, <b>pt needs senior review.</b>
Breath Rate	10 BPM	Only for backup breaths, if patient is not triggering/ initiating breaths - <b>needs senior review.</b>
Trigger Type	Auto-trak	Can be adjusted for complex patients, <b>needs senior review.</b>
Set Rise Time	3	Time taken from EPAP to IPAP, the higher the rise time the more gentle the breath but also reduces time for optimum gas exchange.

## Alarms



Alarms:	Suggested value	Comments
Tidal Volume (low / high)	200 / 800 ml	Tidal Volume = size of each breath. Depends on patient size, aiming tidal volume 400-500ml for most patients, adjust alarms accordingly.
MinVent (low / high)	4.0 / 14.0 L/min	MinVent = breath rate x tidal volumes. The total volume of all breaths in one minute.
Resp. Rate (low / high)	12 / 40 BPM	Adjust according to patient, set low value above back up breath rate to identify if patient's rate has dropped. Initially patients RR may be higher and settle once on BiPAP so alarms limits can be adjusted to identify deterioration.
Circuit Disconn	30 s	To identify if the tubing is disconnected or there is a break in the circuit.
FiO <sub>2</sub> Alarms	-10 / +10 % <i>Depends on pt FiO<sub>2</sub></i>	E.g. if your FiO <sub>2</sub> is set to 40% then choose 30% and 50% as your FiO <sub>2</sub> limit alarms.

## Batteries and Storage:

**Keep plugged in and on charge at all times, even when not in use.** There is both an internal and external battery. The batteries will self-discharge if not plugged in even if the machine is not switched on. The EVO BiPAP machine may be left plugged in to AC power without battery degradation. **The battery may take up to 3.5 hours to fully charge once fully discharged, the battery run time will depend on the settings used, the maximum run time is 14 hours.**

Keep out of direct sunlight and do not store or use next to a heating appliance.  
Do not block the cooling air vents located on the base and at the rear of the device.

## Cleaning and Calibration:

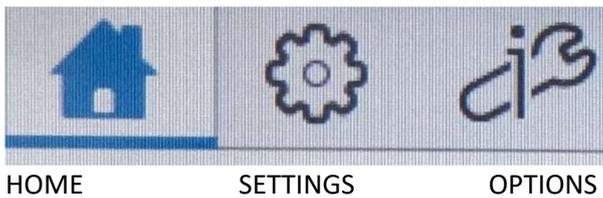
**Wipe clean and disinfect between patients and when required during patient use.** Do not steam autoclave the device. Do not immerse in liquid or allow liquid into the enclosed device or inlet filter. Do not spray water or other solutions directly onto the device. Do not use abrasive cleaners or harsh detergents.

**The foam air inlet filter protects the ventilator from dirt and dust and must be changed between each patient use and/or if damaged or visibly soiled. (See manual for more information).** NB. The white 'particulate filter' disc is NOT required in acute ward settings.

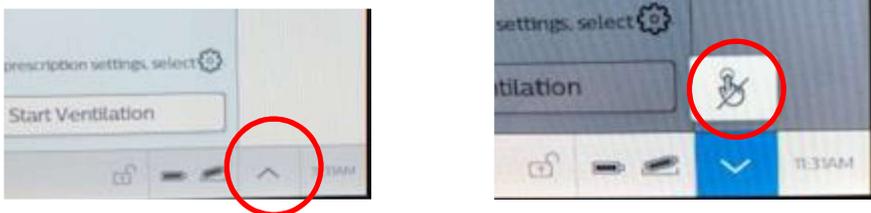
The O2 cell and circuit calibration checks should be completed regularly- suggested weekly. This can be done by either clinical staff or technicians and support staff who are competent to do so. Each ward area should have a record of machine calibration according to the user manual. Any issues with calibration should be highlighted to the Clinical Engineering department.

## Other info:

The machine and all attachments are **latex free**.



**KEYPAD LOCK: Generally not recommended to use.** But may be used for confused patients to prevent the settings from being altered. In most acute settings the keypad lock should not be required. The keypad lock can be accessed in any screen. **TO LOCK:** Press the arrow ^ key on touchscreen – then press the ‘touchscreen off’ button which appears above it. To unlock the touchscreen – touch anywhere on the screen and follow the on-screen prompts.



## Consumables (single patient use):

<b>Bacterial Filter</b>	REF: 1544000	Change every <b>24 hours</b> or earlier if soiled or damaged
<b>BiPAP tubing/circuit</b>	REF: 9624C	Change every <b>7 days</b> or earlier if soiled or damaged
	REF: 5804000	
<b>Mask/interface</b>	(S) REF: FDD611	Change every <b>28 days</b> or earlier if soiled or damaged. Full face masks are also available.
	(M) REF: FDD613	
	(L) REF: FDD614	
<b>Air Inlet Filter (foam)</b>	REF: 1134591	Replace between patients, or earlier if soiled or damaged.

## Troubleshooting:

Problem	Suggestions:
<b>Persistently elevated PaCO<sub>2</sub></b>	<p>Is there an excessive mask leak? Check mask fit.</p> <p>Is the circuit set up correctly? Check connections and identify leaks.</p> <p>Is there rebreathing? Check the expiratory port is patent (you should feel air leaving from the port)</p> <p>Is the patient being over oxygenated?</p> <p>Aim sats 88-92% .Especially consider the aim of oxygen therapy during period off NIV.</p> <p>Consider increase in IPAP (max 30- requires senior review) – look at the tidal volume this should be approx. 400-500ml (or 6-8ml/kg ideal body weight).</p> <p>Is the patient spending sufficient time on BiPAP? Encourage more sustained periods of use (particularly during sleep). Address compliance issues. Consider decrease in EPAP if high level set (&gt;8cmH<sub>2</sub>O)</p>
<b>Persistent Apnoea Alarm</b>	<p>Check patient, is the patient breathing? Is the patient conscious?</p> <p><b>CALL FOR HELP IF REQUIRED</b></p> <p>Check circuit connected.</p> <p>Check mask fitting and leak.</p> <p>Check trigger settings. (auto-Trak should be used unless senior review) .</p> <p>Check backup rate (breath rate) if this is too high it may be preventing the patient breaths from triggering. Consider reducing the set breath rate (minimum 10 unless senior review).</p>
<b>Mask Leaks</b>	<p>Small leaks (20-35L/min) are normal and acceptable but larger leaks (&gt;50L/min) may cause inefficient ventilation, eye irritation, noise, dry mouth and nasal symptoms. Leaks &lt;15L/min may mean the mask is too tight and may reduce compliance with BiPAP.</p> <p>Be prepared to try different mask types</p> <p>Use dressing (e.g. duoderm) on nasal bridge for comfort and to protect skin against pressure damage.</p> <p>Consider facial hair.</p> <p>Consider position of NG tube if present</p>
<b>Asynchrony between patient and ventilator</b>	<p>Check correct tubing (disposable passive) is used in the circuit. The tubing should have a smooth interior to allow air flow to be detected accurately</p> <p>If the patient's respiratory effort is inadequate the machine may not sense inspiration. An increase in EPAP may help.</p> <p>If the patient is tachypnoeic increasing the IPAP may help: ensure rise time is as low as possible (i.e. 1).</p> <p>Changing the TRIGGER setting may improve asynchrony (making the machine MORE or LESS sensitive to the patient's flow), <b>seek senior support for changes to trigger setting.</b></p>
<b>Keypad Lock</b>	<p>The keypad lock/unlock button is on the touchscreen bottom taskbar, in the far right corner: it is a key marked 'Λ' and is next to the battery indicator. Press and then follow screen prompts to unlock screen.</p>
<b>Hypocapnia / alkalosis</b>	<p>Minute ventilation is too high. Reduce IPAP to reduce Tidal Volumes.</p> <p>Is BIPAP still required? Seek senior review and consider trial off BiPAP.</p>

<b>Difficulty inflating the chest</b>	Poor expansion of the chest and desaturation may be due to bronchospasm, mucous plugging, pneumothorax, atelectasis / collapse, consolidation, pulmonary oedema or rarely circuit tube obstruction/ kinking. <b>Clinical examination is required.</b> Chest X-ray may be required.
<b>Nasal problems</b>	Nasal redness / nasal bridge sores- Appropriate padding or change of mask may be necessary. Rhinitis / nasal crusting / bleeding- Ask about nasal symptoms.
<b>Dry mouth</b>	Regular mouth care is essential; consider saline nebs during breaks from BiPAP. Consider humidified circuit – requires a different circuit, contact ICU or CCOT.
<b>Gastric distension</b>	Check for abdominal pain or distension occurring during NIV Try to reduce IPAP if possible Consider nasogastric tube with a nasogastric tube guard accepting a small leak will occur. Small leaks should not cause a problem (20-35L/min) Consider anti-emetics.
<b>Persistent hypoxaemia</b>	Check correct FiO <sub>2</sub> setting on machine. If there is a definite OSA or atelectasis then increasing EPAP may help (remembering to increase IPAP by same level to maintain the same pressure support) Deteriorating clinical condition in the presence of hypoxaemia should lead to an urgent review of the patient and consideration of intubation and mechanical ventilation. <b>CONTACT ITU</b>
<b>Patient position</b>	The patient should be positioned upright with their head up Consider additional support if necessary (pillows, soft collar, rolled up towel)
<b>Patient discomfort / poor compliance with BiPAP</b>	Consider reducing the IPAP, if appropriate, discuss with senior doctor. Consider loosening the mask, aim for leak 20-35L/min. Allow regular comfort breaks, mouth care. Reposition patient. Consider mask size. Make sure the patient is properly fitted with the correct size mask. Use mask packaging to size patient.
<b>Non co-operation / aggressive behaviour</b>	Assess for patient agitation, confusion and not maintaining mask ventilation This may be due to hypoxaemia or hypercapnia. Ensure constant supervision as it may be necessary to hold the mask in place initially until ABG's have corrected themselves before the agitation / confused state settles. This may be lifesaving. Relatives may also be helpful to calm the patient. <b>IV SEDATION MUST BE AVOIDED WITHOUT SENIOR MEDICAL OR ANAESTHETIC INPUT.</b> Haloperidol may be useful to decrease agitation and facilitate tolerance of NIV therapy. Avoid benzodiazepines.

<b>IPAP not achieved</b>	If the measured IPAP is lower than the set IPAP by >0.5cmH <sub>2</sub> O (e.g. IPAP set at 18 but measured IPAP is showing as 17.4) consider changing the Rise Time to a lower setting. E.g. reducing from 3 to 2. Allowing a faster flow during inspiration.
<b>Low tidal volume alarm</b>	Low estimated tidal volume, check alarm settings, Aim tidal volume (ml) = 6 – 8 x ideal body weight (kg) e.g. for 60kg ideal body weight, aim V <sub>t</sub> e 360-480m (or approx. 400-500ml). Check leak – adjust mask if >40L/min. Consider increasing IPAP (maximum 30 – unless senior review). Patients with OSA may tolerate higher IPAP.
<b>High tidal volume alarm</b>	High estimated tidal volume, check alarm settings, Aim tidal volume (ml) = 6 – 8 x ideal body weight (kg) e.g. for 60kg ideal body weight, aim tidal volume 360-480ml (or approx. 400-500ml). Consider decreasing IPAP (requires senior review).
<b>The Device does not turn on.</b>	Check AC power cord is plugged in and internal battery is charged. Contact the Clinical Engineering department if the device still does not switch on. <i>Note: The device requires AC power to charge the internal battery. Keep plugged in even when not in use.</i>

For issues or faults with the machine please contact ward manager/technician and/or Clinical Engineering department.

**For clinical issues using BiPAP please contact:**

**Respiratory team-** RSCH bleep 8398 / 8060. PRH bleep 6048

**Respiratory Consultant** (on call 24/7) – RSCH dect 65201 (in hours)

PRH/RSCH via switchboard (out of hours)

**Critical Care Outreach Team** - RSCH bleep 8495. PRH bleep 6331

**Clinical Site Team** - RSCH bleep 8284. PRH bleep 6014