

BSUH CRITICAL CARE UNIT

TRILOGY *EVO* BiPAP machine set-up – Checklist

This guideline is for use by Critical Care staff *only*

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

Plug in (battery on charge). – KEEP ON CHARGE EVEN WHEN NOT IN USE.

Check O2 connection.

Switch on – check internal battery.

Connect **BiPAP hose**

disposable adult passive circuit – REF 9624C / REF 5804000

Attach **Bacterial Filter** – REF 1544000

(attach to machine, furthest from patient for NON-COVID. Attach between mask and expiratory port for COVID)

Check **expiration port** present
(nearest to patient)

Power Off : will put machine into 'standby' or 'power off' - confirm with touch screen choice

'100% Oxygen': **touch screen key on BOTTOM LEFT of screen** This is to give a BOLUS of 2 minutes of 100% FiO₂, this is not usually required for BiPAP in ward settings.

'Leak': Leak should be between 20-35L/min. A leak of <15L/min may mean the mask is unnecessarily tight, a leak of >50L/min may cause inefficient ventilation.

Storage:

Keep plugged in and on charge at all times, even when not in use.

The batteries will self-discharge if not plugged in even if the machine is not switched on.
The Trilogy Evo BiPAP machine may be left plugged in to AC power without battery degradation.
The Battery may take up to 8 hours to fully charge once fully discharged.

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:

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.
Wipe clean with Clinell wipes between patients and when required during patient use.

There is a reusable foam inlet filter to protect the ventilator from dirt and dust.
This requires cleaning every week and replacing every 6 months and/or if damaged or visibly soiled (by technologist)

Other info:

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

Settings may be completed without the machine starting - press the 'COG WHEEL (settings)' button next to the 'HOME' key to access the settings/alarms menu whilst in standby. This can also be accessed when therapy in use.

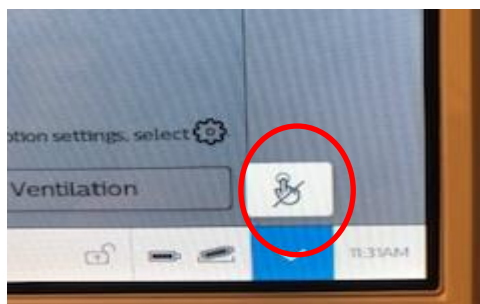
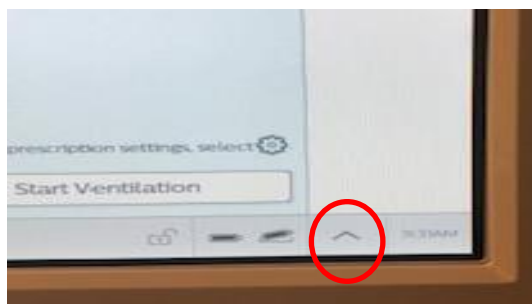


HOME key

COGWHEEL (settings) KEY

OPTIONS key

Keypad lock: this 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.

STARTING THERAPY: choosing mode and settings

1: Turn power on: main screen will open after machine boot. The LAST settings used will appear on screen. If you are setting for a NEW patient – press ‘new patient’ on touchscreen. If this is not a new patient – check settings are correct and then press ‘start ventilation’.

NB: when pressing ‘new patient’ – you will be asked to ‘select prescription name’: **Choose ‘Prescription (#)’ ONLY. Press ‘accept’ and then press ‘acknowledge’ to confirm that you have a bacterial filter in situ.**

2: Press COGWHEEL ‘settings’ button to access settings screen (next to ‘HOME’ key)

3: PRESS ‘CIRCUIT’ key on touchpad:

CONFIRM CIRCUIT: ensure ‘passive’ circuit is selected.

CONFIRM CIRCUIT SIZE: ensure ‘Adult 20-22mm’ is selected.

ACTIVE HUMIDIFICATION: set to ‘off’.

4: PRESS ‘MODE’ key – choose either:

S/T (spontaneous/timed mode) for BiPAP. Turn AVAPS ‘off’ on touch screen.

CPAP (continuous positive airways pressure) for CPAP (PEEP only).

PLEASE NOTE:

- Both the HOME and the SETTINGS screen will display the words ‘prescriptions’ and/or ‘Prescription 1’
- You should NOT set more than ONE prescription (set of ventilation settings).
- If you accidentally press ‘Add prescription’ – please press cancel.
- Having MORE than one prescription may lead to the patient getting incorrect therapy.

SETTING S/T MODE:

Setting	Initial value	comments
FIO2	As required	Can be increased/decreased as per SaO2/ABGs. Start at previous facemask FIO2
EPAP	Start at 4cmH2O	Can increase as per senior review
IPAP	Start at 15cmH2O	Aim 20. Can increase >20 by increments of 2 every 10mins with senior review if PaCO2 remains elevated
Breath rate	Set at 10 per min	These are 'backup' breaths only (safety feature)
Insp Time	Set 1.5 – 2.0 secs (minimum 1 sec)	This applies only to 'backup' breaths
Trigger type	Autotrak	Can be adjusted for complex patients, needs senior review.
Rise time	Set at 2-3	Measured in 0.1 sec (i.e. 3 = 0.3 sec). Can set from 0 to 6. Very tachypnoeic patients will need QUICKER rise time (1-2)

SETTING S/T MODE ALARMS:

Set **TIDAL VOLUME** alarm high/low, **MINUTE VOLUME** alarm high/low as appropriate for patient size. Aiming tidal volume 6-8mls/kg.

Set **LOW RESP RATE** alarm 1-2 breaths ABOVE backup breath rate number. IE: if breath rate (backup) is 10breaths per min, the LOW resp rate alarm should be 11-12pm. Set **HIGH** resp rate alarm as appropriate for patient.

Set **CIRCUIT DISCONNECT** alarm at 30 seconds.

NB: there is nothing you need to set in the 'Advanced' tab for S/T mode

Once all settings and alarms are set, press 'accept' and then 'start ventilation' if appropriate.

You cannot start ventilation until you have accepted all settings.

If you change settings during operation, you must press 'accept' to enable new settings to be applied

SETTING CPAP MODE:

Setting	Initial value	comments
FIO2	As required	Can be increased/decreased as per SaO2/ABGs. Start at previous facemask FIO2
CPAP	Start at 5cms	This can be increased if indicated by ongoing hypoxia (low SaO2/PaO2) – seek senior review. MUST have senior review if CPAP goes >8cms
Trigger type	Autotrak	Can be adjusted for complex patients, needs senior review.

ADVANCED SETTINGS IN CPAP MODE:

Press 'ADVANCED' key – turn 'backup ventilation' to 'on' and then set the following

Setting	Initial value	comments
Backup Rise time	Start at 2	To ensure backup breath pressure support delivered quickly
Backup PS	Start at 15cmH2O	Pressure support to create tidal volume on backup ventilation breath
Backup rate	Set at 10 per min	These are 'backup' breaths only (safety feature)
Backup Insp Time	Set 1.5-2.0 secs	With rate 10pm, this will give IE roughly 1:2 on backup breaths

SETTING CPAP MODE ALARMS:

Set **TIDAL VOLUME** alarm high/low, **MINUTE VOLUME** alarm high/low as appropriate for patient size. Aiming tidal volume 6-8mls/kg.

Set **LOW RESP RATE** alarm 1-2 breaths ABOVE backup breath rate number. IE: if breath rate (backup) is 10breaths per min, the LOW resp rate alarm should be 11-12pm. Set **HIGH** resp rate alarm as appropriate for patient.

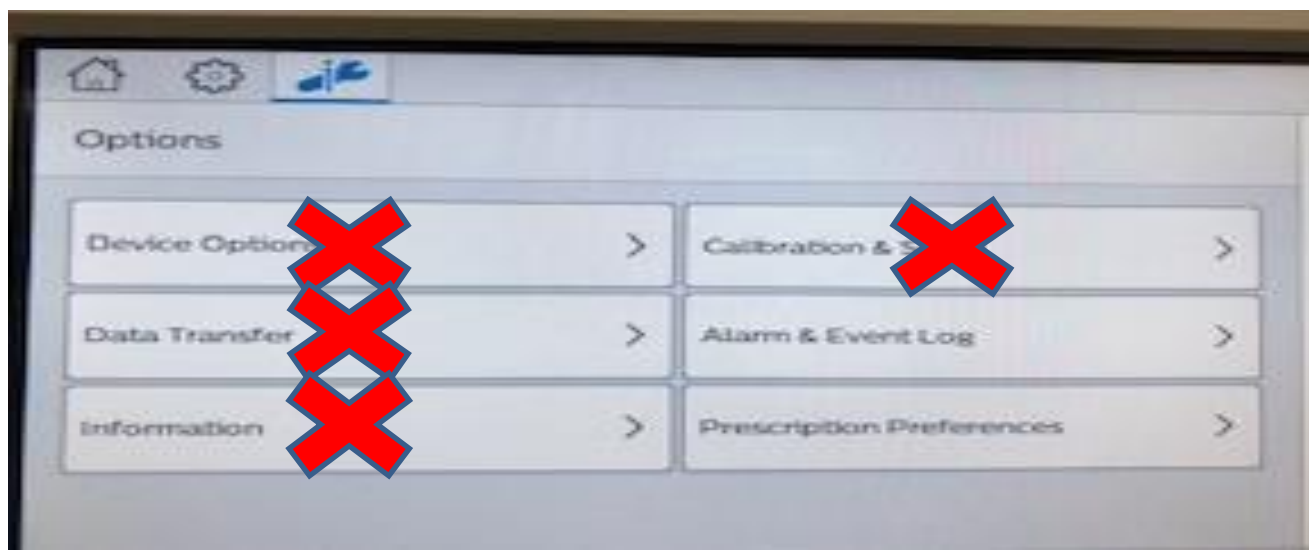
Set **CIRCUIT DISCONNECT** alarm at 30 seconds.

Once all settings and alarms are set, press 'accept' and then 'start ventilation' if appropriate. You cannot start ventilation until you have accepted all settings.

If you change settings during operation, you must press 'accept' to enable new settings to be applied

'OPTIONS' KEY (spanner icon)

Most things in this screen, you do not need to access. The things you should not access are marked with a



ALARM & EVENT LOG

This will show all alarms and events since machine switched on.

PRESCRIPTION PREFERENCES

You should ONLY access this tab to DELETE multiple prescriptions. We should only have ONE prescription ('Prescription 1'). If you see that there are more than one on the home screen, access 'prescription preferences' and delete the erroneous ones. You will be asked to confirm before you delete any settings.

BSUH CRITICAL CARE UNIT

TRILOGY *EVO* BiPAP machine set-up: mask and tubing/filter

Use our standard BiPAP mask: either a full face mask or nasal/oral mask. Ensure you size and fit mask correctly.



The tubing used for both S/T (BiPAP) and CPAP via the Trilogy EVO will be our STANDARD NIV/BiPAP tubing.

Connect one end to the machine as shown. During COVID we are NOT attaching the bacterial filter between the machine and tubing at this connection point.



The PATIENT end of the tubing has the **PURPLE EXPIRATORY PORT** at the end.

Place the bacterial filter BETWEEN the expiratory port and the patient mask. This will ensure that expired air goes through the filter before being expelled into the atmosphere.

NB: we may from time to time have DIFFERENT BiPAP tubing. Any tubing MUST have an expiratory port for safety. If you are unsure – you must ask!

PHILLIPS RESPIRONICS TRILOGY EVO

BiPAP TROUBLESHOOTING GUIDE:

Please note: these hints & tips are intended as a guide only. If the patient is uncomfortable/not improving/deteriorating whilst on NIV/BiPAP, a senior review should be sought.

Problem:	Suggestions:
Persistently elevated PaCO₂	<p>Is there an excessive mask leak? Check mask fit. Is the circuit set up correctly? Check connections and identify leaks. Is there rebreathing? Check the expiratory port is patent. Is the patient being over oxygenated? Aim sats 88-92% .Especially consider the aim of oxygen therapy during period off NIV. Consider the acceptable level of PaO₂ to be aimed for. Consider increase in IPAP (max 30 unless senior review) – look at the Vte (tidal volume) this should be 6-8ml/kg ideal body weight. 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 (>8cmH₂O)</p>
Persistent Apnoea Alarm	<p>Check patient, is the patient breathing? Is the patient conscious? CALL FOR HELP IF REQUIRED Check circuit connected. Check mask fitting and leak. Check trigger settings. (auto-Trak should be used.) 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>
Mask Leaks	<p>If not using FULL FACE mask, consider using this to improve fit. Small leaks (20-35L/min) are normal and acceptable but larger leaks (>50L/min) may cause inefficient ventilation, eye irritation, noise, dry mouth and nasal symptoms. Leaks <15L/min may mean the mask is too tight and may reduce compliance with BiPAP. Be prepared to try different mask types Use duoderm on nasal bridge for comfort and to protect skin against pressure damage. Consider facial hair. Consider position of NG tube</p>
Asynchrony between patient and ventilator	<p>Check correct tubing (disposable passive) is used in the circuit. The tubing should have a smooth interior</p>

	<p>to allow air flow to be detected accurately If the patient's respiratory effort is inadequate the machine may not sense inspiration. An increase in EPAP may help. If the patient is very tachypnoeic increasing the IPAP may help: ensure rise time is as quick as possible (1).</p>
Keypad Locked	<p>The keypad lock/unlock button is on the touchscreen bottom taskbar, in the far right corner: it is a key marked '▲' and is next to the battery indicator. Press and then follow screen prompts to unlock screen</p>
Hypocapnia / alkalosis	<p>Minute ventilation (MV) is too high. Reduce IPAP to reduce Tidal Volumes (Vte). Is BIPAP still required?</p>
Difficulty inflating the chest	<p>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. Clinical examination is required. Chest X-ray may be required.</p>
Nasal problems	<p>Use FULL FACE style mask wherever possible (gold standard for BiPAP) Nasal redness / nasal bridge sores- Appropriate padding or change of mask may be necessary. Rhinitis / nasal crusting / bleeding- Ask about nasal symptoms.</p>
Dry mouth	<p>Regular mouth care is essential; consider saline nebs during breaks from BiPAP. Consider humidified circuit – requires a different circuit, contact ICU or CCOT.</p>
Gastric distension	<p>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.</p>
Persistent hypoxaemia	<p>Check correct FiO₂ 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. CONTACT ITU</p>
Patient position	<p>The patient should be positioned upright with their head up – may need support with pillows/rolled up towels, etc</p>
Patient discomfort / poor	<p>Ensure RISE time is quick enough to support</p>

<p>compliance with BiPAP</p>	<p>patient's respiratory effort – check that IPAP is being achieved on each breath and reduce RISE time if needed. Consider reducing the IPAP, if appropriate, discuss with senior nurse/doctor. Use FULL FACE mask if not doing so already. Or change to nasal/oral mask if full face style is not tolerated. 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.</p>
<p>Non co-operation / aggressive behaviour</p>	<p>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. SEDATION MUST BE AVOIDED WITHOUT SENIOR MEDICAL OR ANAESTHETIC INPUT. Haloperidol may be useful to decrease agitation and facilitate tolerance of NIV therapy. Avoid benzodiazepines.</p>
<p>IPAP not achieved</p>	<p>If the measured IPAP is lower than the set IPAP by >0.5cmH₂O (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.</p>
<p>Low Vte alarm</p>	<p>Low estimated tidal volume, check alarm settings, Aim Vte (ml) = 6 – 8 x ideal body weight (kg) e.g. for 60kg ideal body weight, aim Vte 360-480ml. Check leak. Consider increasing IPAP (maximum 30 – unless senior review). Patients with OSA may tolerate higher IPAP.</p>
<p>High Vte alarm</p>	<p>High estimated tidal volume, check alarm settings, Aim Vte (ml) = 6 – 8 x ideal body weight (kg) e.g. for 60kg ideal body weight, aim Vte 360-480ml. Consider decreasing IPAP (minimum 15 – unless senior review).</p>
<p>The Device does not turn on.</p>	<p>Chest AC power cord is plugged in and internal battery is charged. Contact EME 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></p>

BSUH Critical Care
Respironics Trilogy EVO set up
Practice Education Team
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