

Bedside guide to make life easier!



Quick reference

LTV Guide

FOR

CHILD HEALTH

**6 GUIDES
IN 1**

- ✓ Nippy
- ✓ Nippy Junior
- ✓ Trilogy
- ✓ Circuits
- ✓ LTV Flow Chart Help Guide



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With thanks to Long Term Ventilation Team for source material

Nippy Ventilator

On/Off
button



High and
Low
Alarms

Set
Button

Turning ventilator on and off

- To start ventilator press Start/Stop button.
- To turn ventilator off press the Start/Stop button. The “Switch Ventilator off” message will appear onscreen. Press the Start/Stop button again.

Cooling
vent. Do
not cover!



Filter – cover pulls
off and pushes on.

Throw old filter
away

Cleaning routine.

- Filter on the back is changed monthly.
- Circuit is changed weekly.
- If on NIV – Mask should be cleaned daily. Headgear should be hand washed monthly.

Silencing the alarm



**Alarm
Mute
Button**

- Press alarm silence button once to silence alarm
- Always reset the alarm after problem has been sorted out. Press and hold alarm silence button.

Checking Battery Life.

- To check how much internal battery there is, press SET button twice – this will display a screen informing you of how much internal battery there is.

Alarms

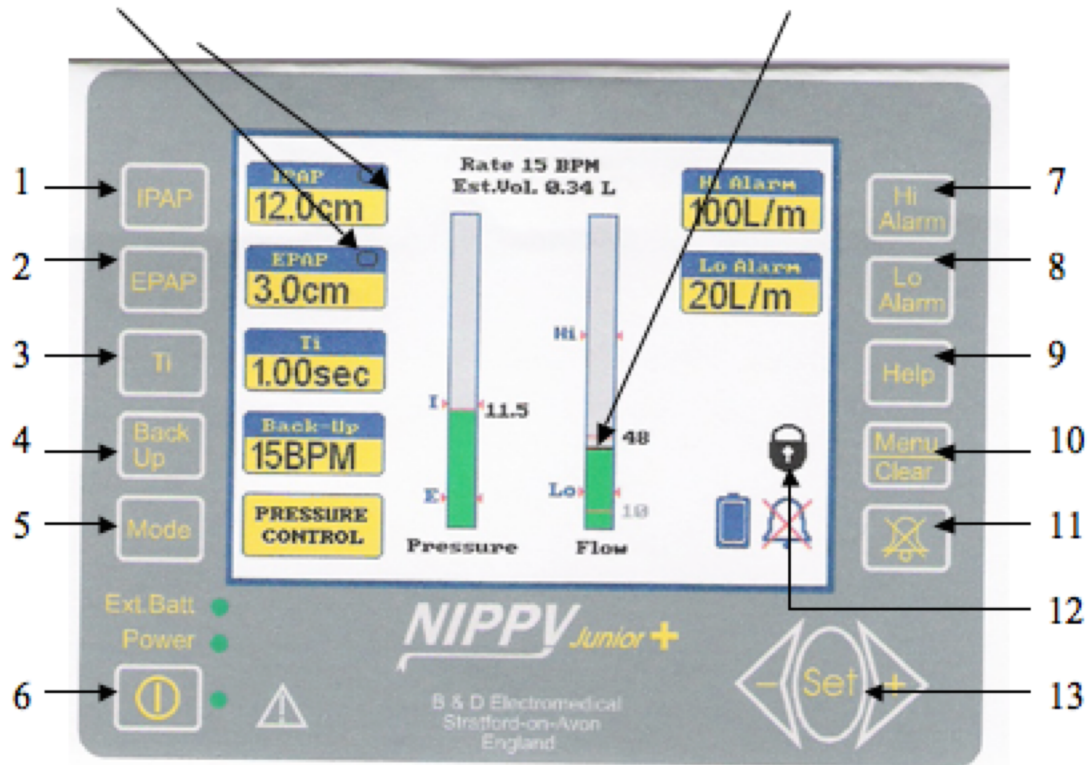
When the ventilator alarms:

- **Always check the child first**
- HI ALARM – Check for disconnection or leak
- LO ALARM – Check for blockage/ secretions

Nippy Junior+ and Nippy 3

Trigger Sensitivity

Flow measurement



1. **IPAP** = Inspiratory Positive Airway Pressure (equivalent to PAP on the PICU ventilators).
2. **EPAP** = Expiratory Positive Airway Pressure (equivalent to PEEP but provided throughout the expiratory period). This is used also as CPAP when the CPAP mode is selected.
3. **Ti** = Inspiratory time. This is set for back up breaths only when in the pressure support mode or for all breaths when in the pressure control mode and equates to the length of time the ventilator will provide inspiratory pressure before cycling into expiration.
4. **Back up rate** = the respiratory rate that will be delivered by the ventilator should the patient not trigger
5. **Mode selector**
 - a. **CPAP** – Continuous positive airway pressure – Generally used to maintain airway patency and splint open alveoli to increase gas exchange. Patient needs to have sufficient respiratory drive.
 - b. **PS** – Pressure support. Essentially BIPAP – will provide a set positive pressure (EPAP) and in addition augment the patient's inspiratory effort (IPAP) to increase tidal volumes and decrease work of breathing. Patient can trigger into inspiration and expiration therefore does not provide a controlled inspiratory time. This mode will provide a back up

rate should the patient not trigger and these back up breaths will have a timed inspiration therefore TI needs to be set realistically.

- c. **PC** – Pressure Control similar to BiPAP but provides a “controlled breath” i.e. a timed inspiration whereby the patient only triggers inspiration to deliver the IPAP with a set inspiratory time. There is no expiratory trigger in this mode. This is generally used more for patients with significant muscle weakness i.e. spinal injuries.
6. **On/Off** button
7. **High Flow alarm** – set once the patient is on the ventilator and settled. High flow alarms when activated generally mean there is a leak in the circuit
8. **Low flow alarm** – as above. Low flow alarms when activated generally mean there is a blockage in the system which could be as a result of airway position, secretions, interface position, blocking of the expiratory port or tracheostomy blockage, or compression of the ventilator tubing. One other potential cause could be that the oxygen has been turned up to higher levels (i.e. during a desaturation).
9. **Help** button
10. **Menu/Clear** button – this is where the trigger sensitivity settings can be found and changed, along with compliance data that will tell you the percentage of triggered breaths
11. **Alarm silence** button – can be pressed to give you a 2 minute period of silencing the alarms. Pressing and holding this button will cancel the alarm silence should you need it (i.e. if you were leaving the bed space)
12. **Padlock** sign to indicate whether the ventilator is locked or not.
13. **Function buttons** = “set” is used to select and the + or – buttons used to change the parameters.

Set-up guide.

Equipment needed should be in the LTV cupboard on PMU (there are “Grab bags” with equipment you need to set up a patient on NIV when LTV team are not available.)

- Check if you require a 15MM or 22MM circuit, if it is wet or dry and if it is TIV or NIV.
- Mask interface if needed and appropriate connectors.
- Humidifier (LTV cupboard)
- Temperature wires (respiratory cupboard)
- Water for irrigation (Fluid cupboard)
- Green oxygen tubing (respiratory cupboard) – attached to the green oxygen entrainer within the circuit tubing and then turned up to appropriate litres.
- Tpiece if required for nebulisers (Tpiece should be in the respiratory cupboard.)

Connect circuit to tracheostomy or mask ready for ventilation.

If the ventilator is locked – unlock by pressing and holding the + and – buttons together until the padlock icon changes to indicate unlock.

Press the “mode” button (number 5) to bring up the options. Use the + or – keys to highlight the desired mode. Once the correct mode is highlighted press the set button to select.

To change IPAP – press the IPAP button (number 1), which will highlight the IPAP with a purple square. Use the + or – buttons to change to the desired level and then press set to save the changes.

Repeat above for setting the EPAP except you will need to press button number 2.

Set the Ti by pressing button number 3 to highlight and using the + and – buttons followed by the set button to save the changes. The TI selected depends of the respiratory rate of the child.

Back up rate can be selected by pressing button number 4. This needs to be realistic to the patient’s age and needs to take into account the respiratory drive of the patient.

Trigger sensitivity can be selected by accessing the menu function. In the majority of cases trigger sensitivity can be set to 1 in the acute setting which is the easiest. If the number in the corner of the IPAP/EPAP box is not correct then it will need to be changed. This can be done by pressing the menu button (number 10), which brings up a number of options – the 1st of which is trigger sensitivity. Press set to select this option, which will take you into a screen where you can change the triggers. Use the + or – buttons to change and the set button to save and move onto the expiratory trigger. Once both have been set press the menu button again to come out of this screen (this will return you to the main menu) and then press the menu button again to return to the normal screen.

Nippy 3 has the same settings as the Nippy junior however, is generally used for patients above 7kg.

Alarm setting

Alarms – the NIPPY ventilator has 3 alarms to ensure safety of the patient receiving ventilation. These are High and low flow alarms and a disconnection alarm. These alarms will only function effectively if they are set correctly. Incorrect setting will either result in no alarms going off or the alarms going off excessively. Both scenarios pose a risk to the

High and Low Flow alarms (button 7 and 8)

These are set around the flows needed to provide the set inspiratory pressure. The flows are seen in the right hand column marked “flow” on the screen (see diagram above). High flow means leak and low flow means a blockage. These need to be set realistically so that the ventilator will alarm if the mask or trachy are dislodged or if the tubing/airway is blocked in anyway meaning the patient will not be receiving ventilation effectively.

Before putting the mask or trachy mount onto the patient you need to check what the flows are when the circuit is completely off and unsealed. Note what the flows are at this point – your high flow alarm will need to be set below this value. Next completely occlude the end of the circuit or the mask and cover the expiratory port. Note what the flow is now. Your low alarm will need to be set above this value.

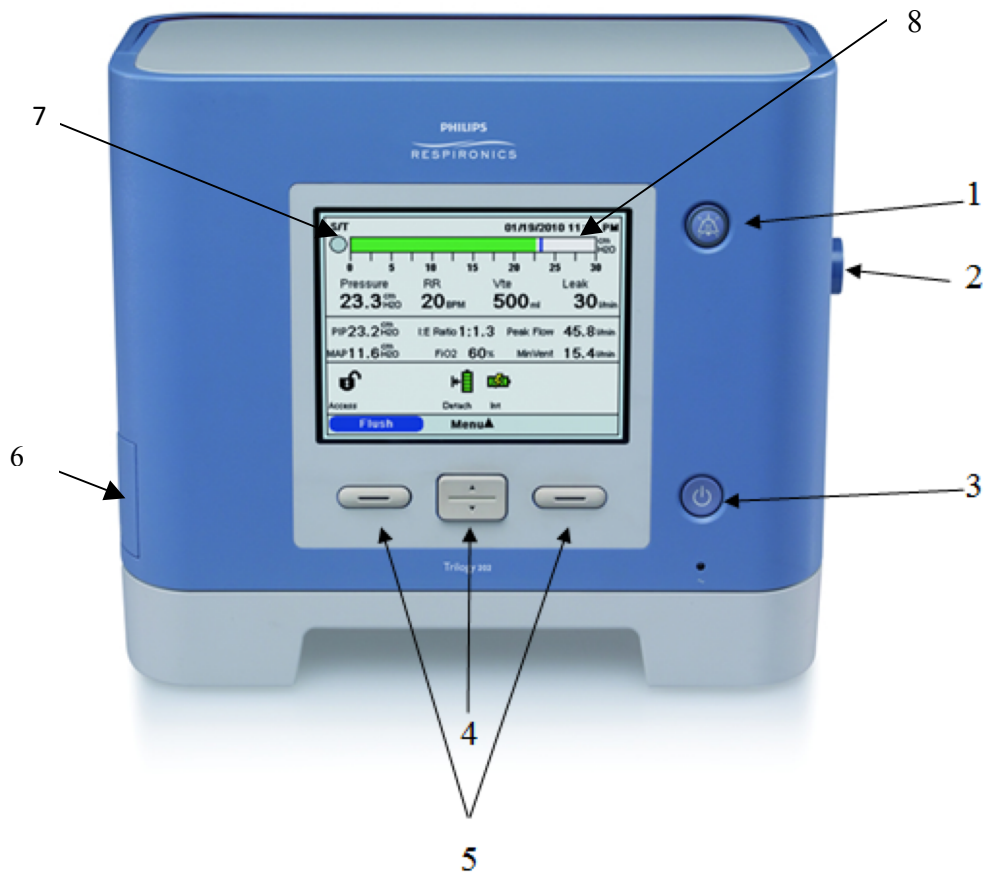
Next attach the ventilator circuit/mask to the patient and ensure that a good seal is achieved and the patient is settled. Note what the flows are going up to during the inspiratory part of the breath. The high and low flow alarms need to be set above and below this value but not above or below the values for complete disconnection or occlusion.

e.g. if the flow is 120 when the mask is completely off and 40 when the mask is occluded but flowing between 60 and 70 when the mask is on the patient then the high flow alarm can be set at 100 and the low flow set at 50.

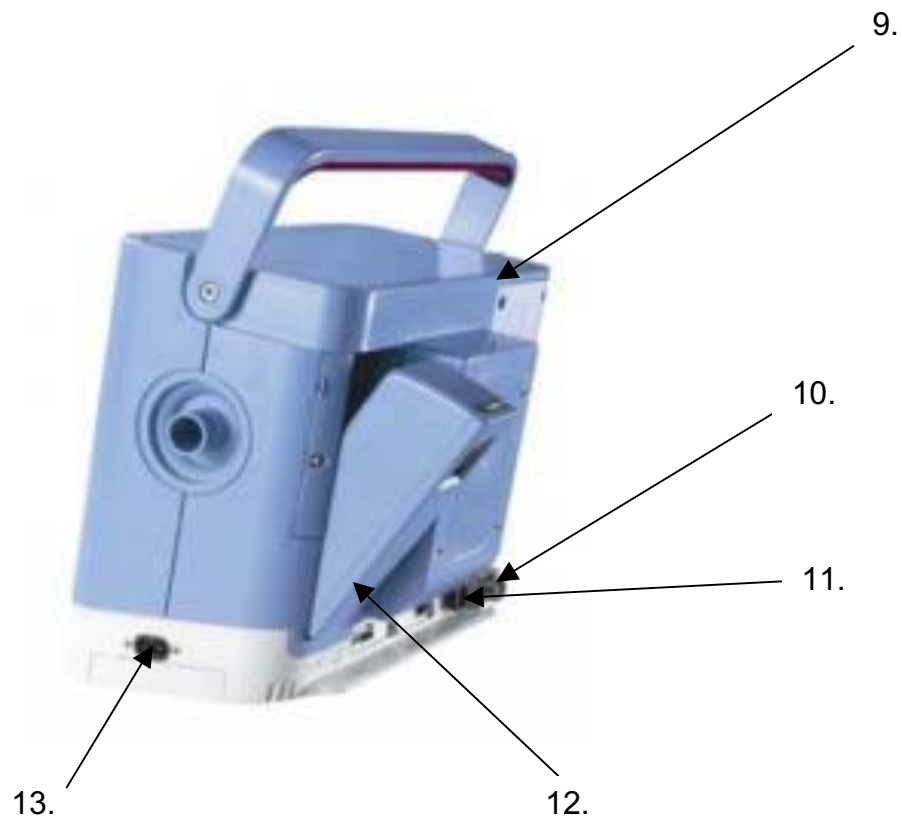
Disconnection alarm

This alarm is based around whether or not the ventilator can detect resistance/effort on the end of the circuit. For safety the guidelines are it should be set at low sensitivity for mask use and high sensitivity for tracheostomy use. To set this you press and hold the hi and lo flow buttons (7 and 8) together until it beeps and a menu comes up with the options for disconnection alarm. Select hi or lo using the + or – button and press set to save. A lilac triangle with Di Lo or Di Hi will then appear on the front screen. If there is no purple triangle it means this alarm is on the standard setting and needs to be changed.

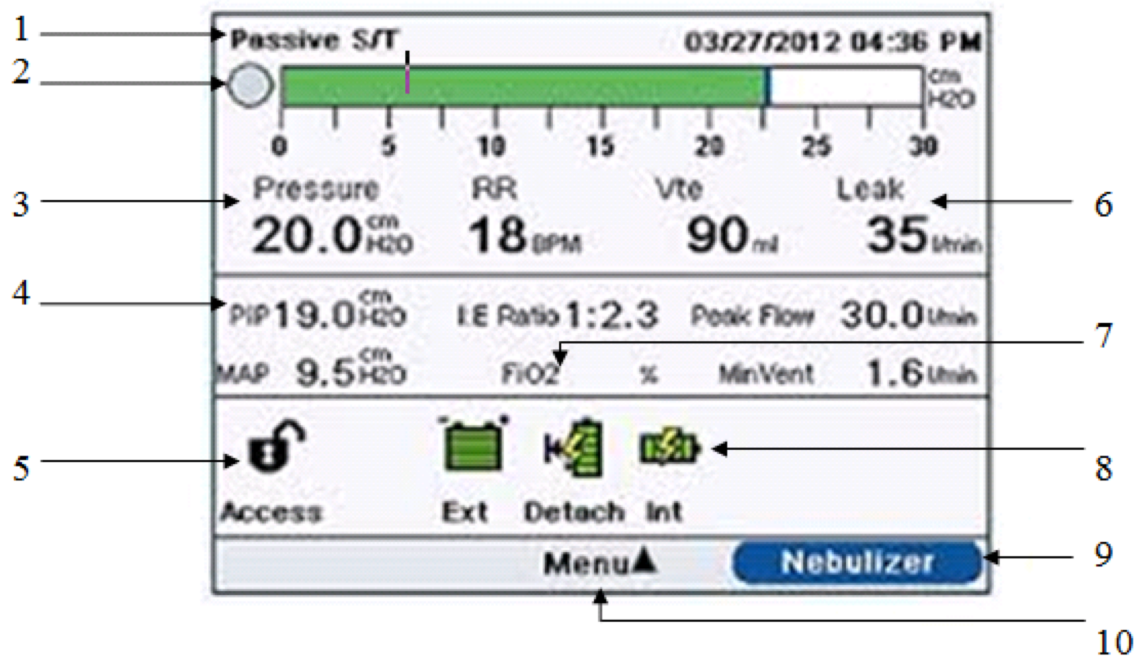
Trilogy Ventilator



1. Alarm silence button
2. Inlet port for circuit
3. On off button
4. Arrow button for navigating through menu
5. Function buttons to select options
6. SD card
7. Mode of ventilation
8. Pressure bar



- 9. Internal battery- it has 3 hours of battery run time.
- 10. Oxygen port
- 11. Air filter – Change monthly
- 12. External battery – it has 3 hours of battery run time (when fully charged)
- 13. Mains plug point.



1. Mode – for BiPAP this will display Passive ST
2. Trigger symbol – if a breath is triggered this circle will flash as the green bar moves. If the breath is a back up breath the green bar will move but no circle will appear
3. Pressure value – this will change throughout the respiratory cycle
4. PIP – peak inspiratory pressure – measures what pressure is actually being delivered to the patient – can sometimes be below what is actually set therefore this should be taken into account
5. Padlock sign to indicate whether the ventilator is locked or not
6. Leak measurement
7. FiO2 indicator (PICU version only)
8. Battery life indicators
9. Nebulizer function to reduce alarming whilst neb is on
10. Menu button

Unlocking

There are 2 levels of locking which may be used on the Trilogy home ventilators. For ease of use PICU's ventilator is generally not locked. However children on Trilogy at home will have their ventilators locked. If a ventilator is locked, then it can be unlocked by pressing and holding the alarm silence (button number 1 in the 1st picture) and the arrow down button (number 4) together until you hear a beep.

If the ventilator is triple locked then when you press any button you will see a message requesting you to press and hold the right function button (number 5 in 1st picture) which will then allow you to unlock using the alarm silence and arrow down buttons. To relock, use the arrow up key to enter the menu, scroll down to “**options**” and select this using the right hand menu key. In this menu you will find “keypad lock” and “limited access” options, which can be selected to on.

Problem solving, Interpreting alarms and front screen data

Low leak alarm: This is an automatic alarm which will be triggered if the leak value (number 6) drops below 12l/minute. This means that there is insufficient leak and you should be looking for a blockage in the system. This could be as a result of a blocked expiratory port, the mask covering the nostrils, or compression of the ventilator tubing. Other causes may include secretions/ airway positioning.

High leak levels: although there is not a specific alarm for this it is ideal to know roughly what leak measurement is normal for the patient. If this becomes overly increased compared to normal then it is likely that there is a leak in the system. This may be due to mask position, heater wires/oxygen tubing falling out, or disconnection at any point in the circuit.

Low pressure alarms Inspiratory or expiratory: this is a default alarm which will be triggered if the pressures achieved are less than 5 below what is set. This tends to be due to excessive leak around mask/trachy which is preventing pressure being achieved.

Low minute ventilation alarm: can be due to reduced respiratory rate or tidal volumes or maybe due to alarm being set incorrectly. Check for mask position, patient position, chest expansion, secretions, respiratory rate/sedation levels, and circuit leaks/blockages. If no problems are identified and all other patient parameters remain stable it maybe that this alarm needs to be set lower. However, if this alarm has not normally been going off there should be a cause for why it has started.

High Expiratory Pressure Alarm

This is a high priority alarm. It occurs when the delivered pressure exceeds the target patient pressure during the expiratory phase by 5 cmH₂O. This may be due to pinched tubing or the patient having a fast breath rate. The device continues to operate. The alarm will automatically terminate when the delivered pressure comes within 5 cmH₂O of the target patient pressure during the expiratory phase.

Circuit Disconnect Alarm

This is a high priority alarm. It occurs when the breathing circuit is disconnected or has a large leak. The device continues to operate. The alarm will automatically terminate when the circuit is reconnected or the leak is fixed.

Set IPAP not being achieved: On occasion, it has been known that the PIP has not been achieving what is set (1 or 2 below). If this is the case then it may be necessary to set the IPAP higher to compensate. Always record the set pressures as well as the PIP that is being achieved so this can be identified and addressed if needed. It is worth checking the rise time and setting this at 1 if it is not to see if this solves the problem.

To view ventilator settings

Press MENU button



**Scroll down to
INFORMATION**

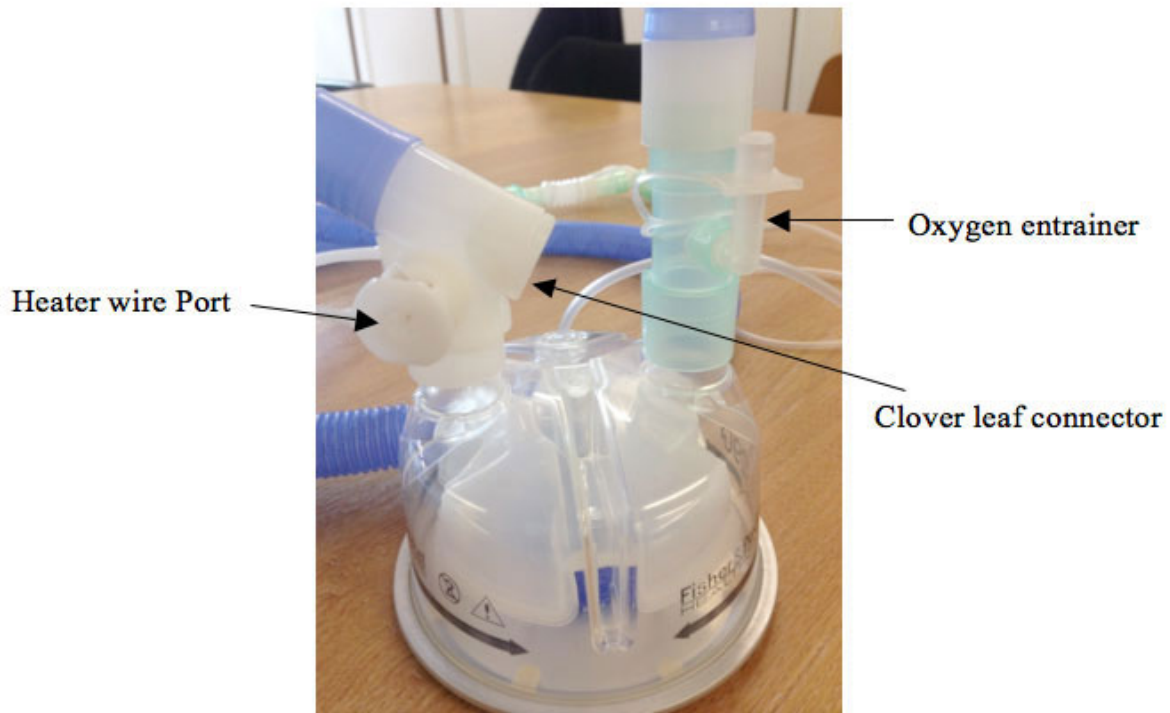


Press SELECT



**Press down arrow to
scroll through settings**

Humidifier Chamber



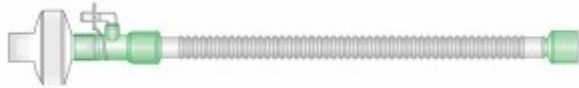
Circuit Tubing

When deciding what tubing you need, try follow these steps:

1. Always check what size of tubing you require (15mm or 22mm)
2. If it is NIV or TIV tubing you need
3. Is it a wet or dry circuit?

15MM circuits are generally used for those under 7 years old where are
22MM are for over 7 years old.

All tubing should be on G Level in the LTV Cupboard. Please inform the LTV team if any equipment is getting low i.e. only 3 left so more can be ordered.



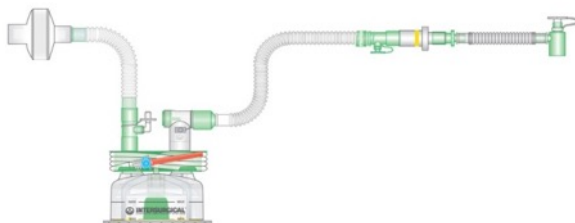
This circuit comes in two sizes, 15MM and 22MM. It is a dry circuit and used for NIV as it has no exhalation port.



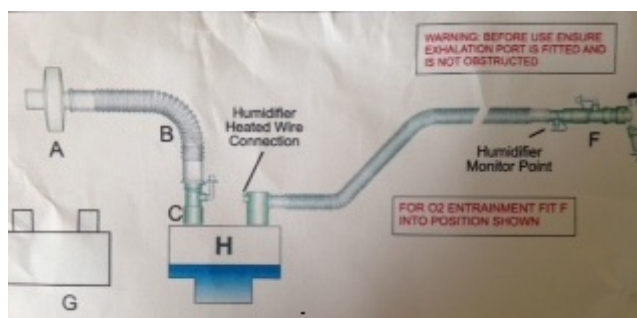
This circuit comes in two sizes 15MM and 22MM. It is a wet circuit and also used for NIV as it has no exhalation port.



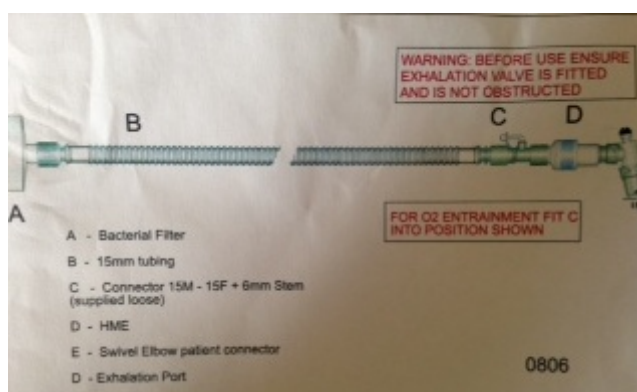
This circuit comes in 15MM circuit. It is a TIV circuit and is a dry circuit. This is only to be used with the Nippy. It has a **yellow** exhalation port.



This circuit is in 15mm circuit. It is a TIV circuit and is a wet circuit. This is only to be used with the Nippy. It has a **yellow** exhalation port.

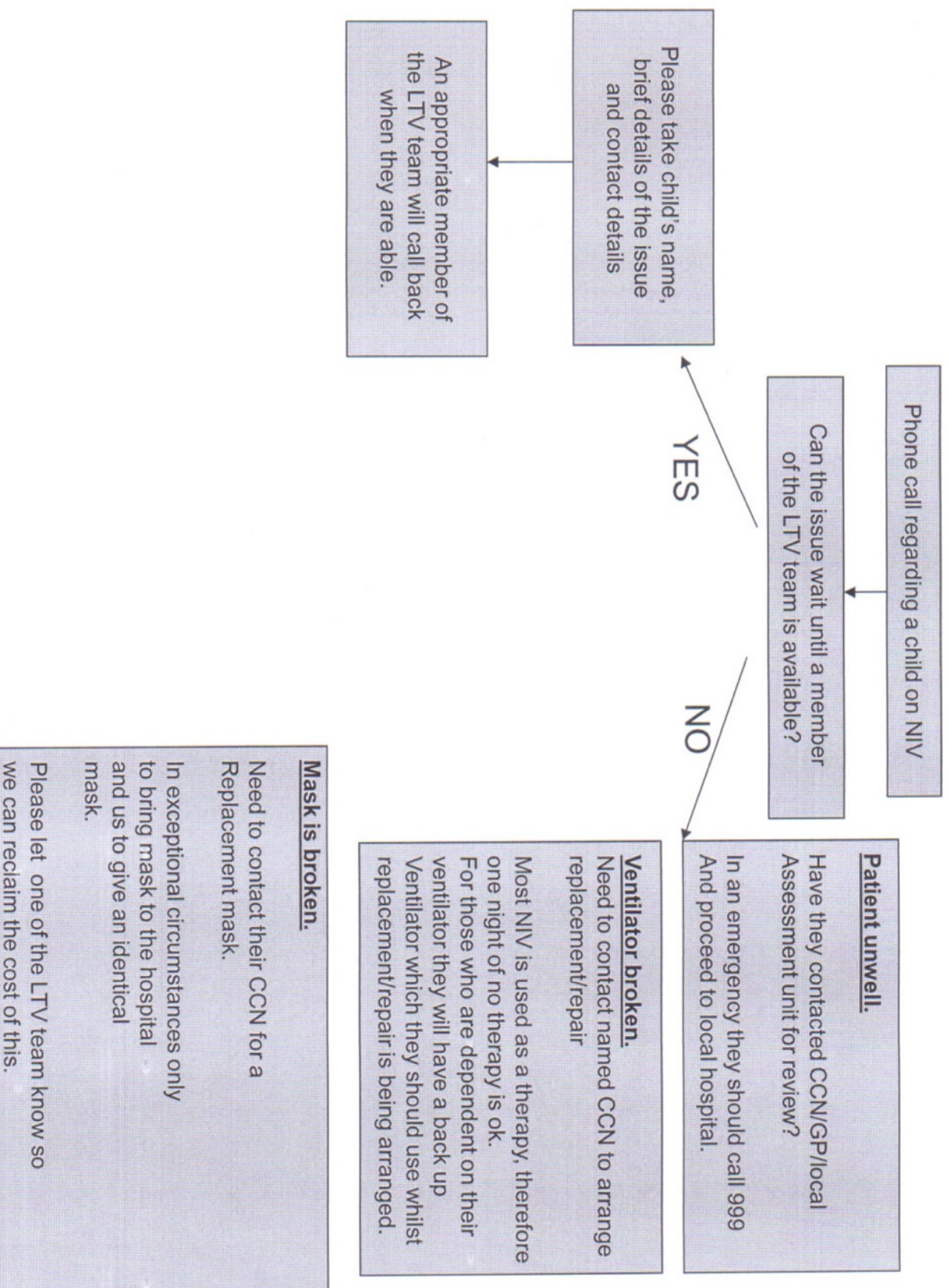


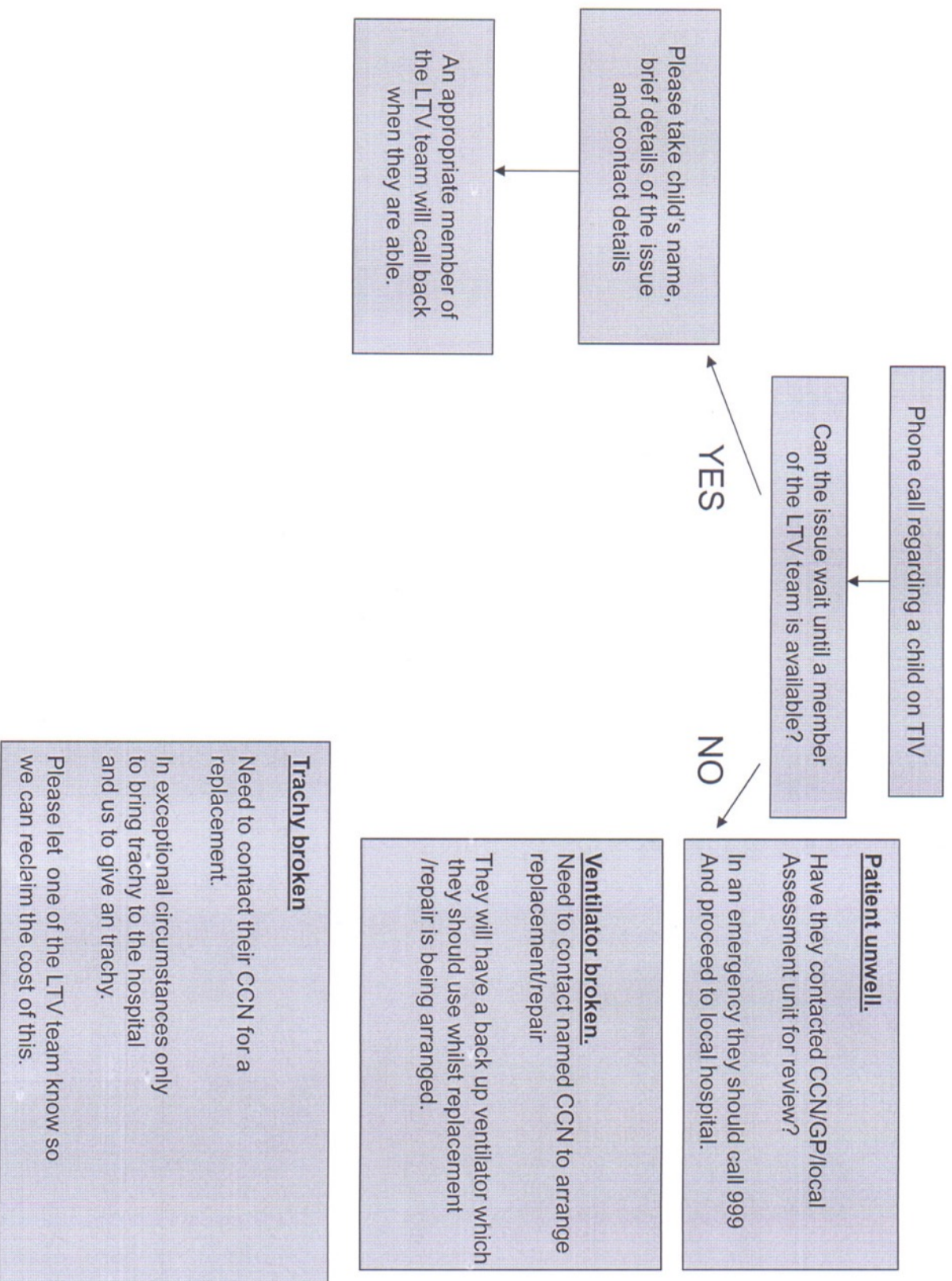
This circuit is 15MM. It is a TIV circuit and is a wet circuit. It is to be used with the Trilogy. It has a black exhalation port



This circuit is 15MM. It is a TIV circuit and it a dry circuit. It is to be used with the Trilogy. It has a black exhalation port.

LTV FLOW CHART HELP GUIDES





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