HUMIDIFIED HIGH FLOW NASAL CANNULA THERAPY: ADMINISTRATION DURING RETRIEVAL USING NETS SYSTEMS

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- Respiratory distress and respiratory failure are among the most common presentations in childhood requiring retrieval
- Various modes of oxygen delivery and respiratory support are used at NETS
- Humidified High Flow Nasal Cannula (HHFNC) delivers gas under optimal humidification conditions. This emulates the balance of temperature and humidity that occurs in healthy lungs, maintaining mucociliary clearance and inhibiting a nasopulmonary bronchoconstriction reflex triggered by cold air
- HHFNC therapy can be used in the 2012 series neonatal systems and on the 2020 series paediatric systems using the Hamilton T1 ventilator. HHFNC is not possible on Bridges 5, 8 and 9, as they do not have a humidifier
- NETS will only transfer patients already established on HHFNC therapy. F&P Optiflow™ circuit and Optiflow™ nasal cannula are obtained from the referring hospital for the Neonatal system
- The 2012 series neonatal systems are specific to NETS and is used for the transport of babies weighing 6kg or less
- For the 2020 series paediatric systems, HHFNC therapy is only used via the MR950 adult circuits supplied by NETS using the Hamilton T1 ventilator. The neonatal mode on the Hamilton T1 is limited to 12L/minute total flow, so is unsuitable for HHFNC
- CPAP should be considered for any patients requiring greater than 2L/kg/min flow
- The circuits (excluding MR950 nasal prong circuit adapter, MR850 & MR950 heater wire and temperature probe) are disposable and for single patient use
- The MR950 nasal prong circuit adapter and the MR850 humidifier heater wire and temperature probe are reusable and are sent to Inhalation Therapy for cleaning

Approved by:	SCHN Policy, Procedure and Guidelines Committee	
Date Effective:	1st March 2022	**Review Period**: 3 years
Team Leader:	CNC and CNE	**Area/Dept**: NETS

CHANGE SUMMARY

- Review and update of NETS guideline for 2012 series neonatal systems
- Review and update nasal cannula sizing and fitting instructions
- New content for the 2020 series paediatric systems

READ ACKNOWLEDGEMENT

- All clinical staff working at NETS are to read and acknowledge this document and indicate they understand the contents of this guideline

Purpose

- This guideline outlines how to set up and use the two NETS systems that can provide HHFNC in retrieval. It should be read in conjunction with the SCHN Guideline Humidified High Flow Nasal Cannula Therapy Practice Guideline (2020)
- **2012 series Neonatal system** – NETS retrieval ICU system for infants 6kg or less
- **2020 series Paediatric system** - NETS retrieval ICU system for infants and children greater than 3.5 kg
- For indications, contraindications and detailed information on HHFNC, please refer to the SCHN Guideline, available here (SCHN ePolicy (nsw.gov.au)

Instructions for use

- For neonates being retrieved on the 2012 series Neonatal systems, HHFNC therapy can only be used if the patient has already been started on this respiratory support therapy. Owing to limitations with the retrieval pack weights, the HHFNC circuits and cannula are unable to be carried by NETS.
- For infants and children being retrieved on the 2020 series Paediatric systems, HHFNC is provided via the Fisher & Paykel (F&P) adult MR950 circuit for the Hamilton T1 ventilator and is supplied by NETS. Owing to limitations with the retrieval pack weight the HHFNC cannula are unable to be carried in the Paediatric retrieval packs. Optiflow™ nasal cannula will need to be provided by the referring unit.
- Only use if the patient is showing improvement in their condition. Escalation of respiratory support therapy should be considered if there is no improvement in vital signs or work of breathing within 90 minutes since the commencement of HHFNC therapy OR if an FiO_2 above 60% is required to maintain SpO_2 >92%.

1 Equipment Setup

1.1 2012 series Neonatal system: MR850 Optiflow™ circuits

1. Any 2012 series Neonatal system (Picture 1)
2. Air and oxygen hoses connected to wall outlets
3. Humidifier circuit. Infant Respiratory Care System RT330 – use with preterm/neonatal/ infant size cannula.
4. Nasal Cannula – see sizing guide Section 1.2 below
5. Humidifier base and heater wire (only the MR850 base is compatible with the current circuit- Picture 1)
6. Flow meter / Blended gases (in-built on neonatal module – Picture 1)
7. Green Bubble Oxygen tubing cut to required size 1 x 40cm
8. Sterile bottled Water for irrigation

Picture 1

1.1.1 Fit humidifier chamber

- Slide humidification chamber onto the humidifier base on N2012 series neonatal system
- Remove blue cap.

1.1.2 Fill humidifier chamber

- Use sterile bottled water for irrigation to fill the chamber to the level line indicator.
- Leave the water feed line with spike cover firmly attached as this filling line is not attached to a water bag during transport.

1.1.3 Connect the circuit *(Picture 2)*

- Connect the white air entrainer to the humidification chamber.
- Connect green Oxygen tubing to top of white air entrainer.
- Connect the elbow of the blue breathing circuit to the humidification chamber.
- Connect correct size nasal prong to connector at patient end of breathing circuit.

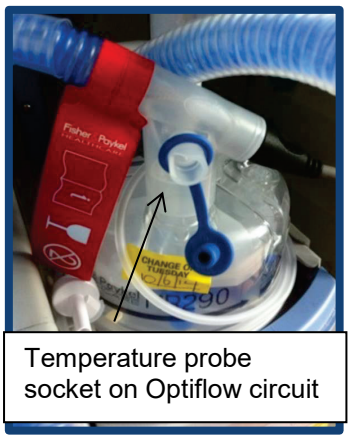
Picture 2

1.1.4 Connect the temperature probe

- Connect the blue temperature probe plug into the blue socket on the side of the humidifier. (Picture 3)
- Insert the two-pronged temp probe plug into the socket on the elbow of Optiflow™ circuit. (Picture 4)
- Insert the other end of the blue probe into the port at the patient end of the Optiflow™ circuit. (Picture 5)

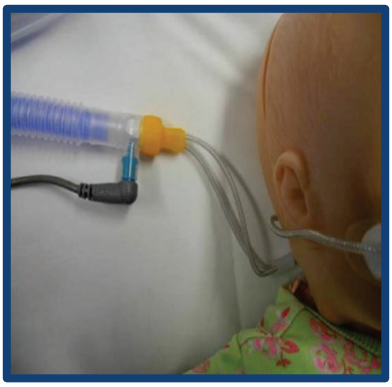
Picture 3

Picture 4



Temperature probe socket on Optiflow circuit

Picture 5



1.1.5 Connect the heater wire *(Picture 6)*

- Connect the yellow heater wire plug into the yellow socket on the side of the humidifier.
- Insert the other end into the socket on the back of the Optiflow™ circuit elbow above the chamber.

Picture 6

1.1.6 Turn humidifier on (Picture 7)

- Turn humidifier on by pressing button on lower right hand side of humidifier.

  Ensure ETT mode (37 degrees) is selected (default setting when turned on) as highlighted by the green light next to button on top right hand side of humidifier. (picture 7)

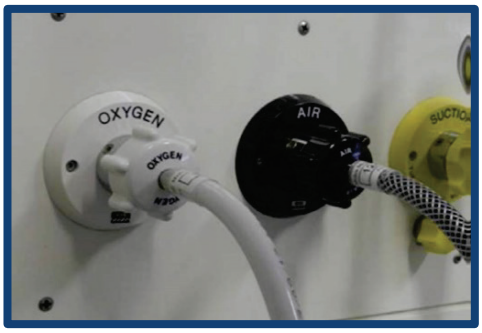
Picture 7

- The system is ready when the temperature has reached mid 30's (can take up to 30 minutes to reach optimal temperature).
- If system alarms, a light will appear on the front of the humidifier indicating where within the system the error is occurring.
  (Refer to section 7 – Troubleshooting).

1.1.7 Ensure air and oxygen hoses from 2012 system are connected to wall outlets

(Picture 8)

Picture 8

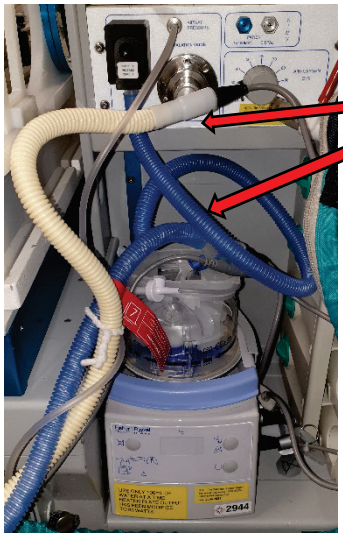


1.1.8 Set blender and gas flow meter (Picture 9)

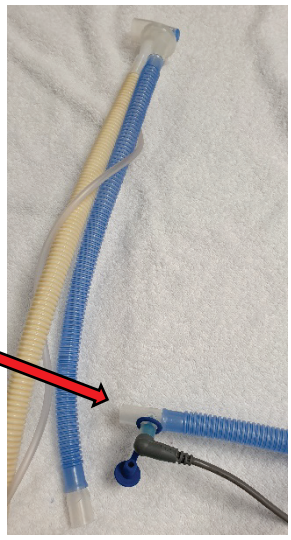
- Set blender to desired FiO_2 (21%-100%)
- Dial up flow meter – starting flow 2L/kg/min to a maximum of 20L /min through infant prongs.
- Check for gas flow exiting through prongs.

Picture 9

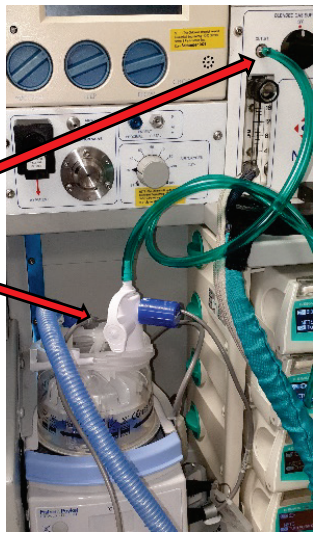
1.2 2012 series Neonatal system: MR950→MR850 Optiflow™ circuits



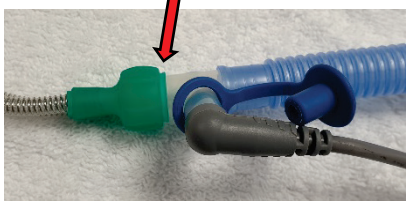
1. Remove the MR850 blue pre-humidification tubing and white expiratory tubing. Could also remove the orange flange and metal housing
2. Put water for irrigation into the MR850 humidifier base and turn on ready for use
3. Separate the MR850 blue inspiratory circuit, keeping the blue tubing with the humidifier temperature probe for use
4. Place the unused circuit parts in the retrieval pack to bring back to Base or to reassemble full ventilation circuit if required



5. Take the white MR950 flow connector + O_2 tubing from the MR950 humidifier base. Cap the FiO_2 analyser port as required
6. Place the white connector onto the MR850 base, in place of the pre-humidification tubing and connect the O_2 tubing to the NETS system O2/air blender nipple
7. Set the desired therapeutic flow and FiO_2 as prescribed

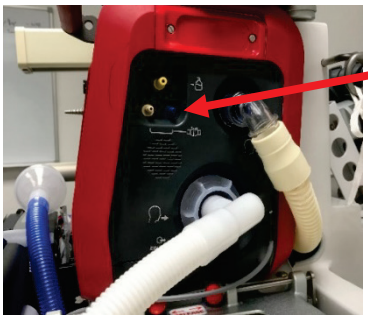


8. Separate the Optiflow™ Junior nasal prongs, together with the prong adapter, from the MR950 HHFNC circuit and connect straight onto the MR850 blue inspiratory limb
9. If the prong adaptor is not available, it is possible to separate the white connector of the Optiflow™ Junior prongs and connect straight onto the MR850 blue inspiratory circuit
10. Reconfirm correct flow, FiO_2 and humidification to the patient



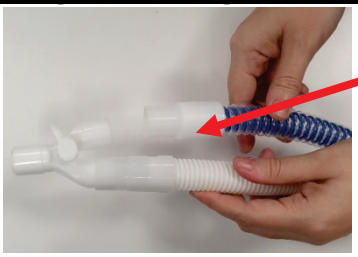
1.3 2020 series Paediatric System - MR950 Optiflow™ Therapy

Use the adult circuit only to deliver Optiflow

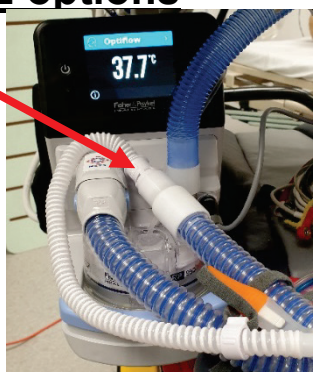


The flow sensor is not required when delivering Optiflow therapy. Remove the clean flow sensor from the circuit to re-use when a new clean circuit is attached during verification

Using the larger Optiflow nasal prongs – 2 options

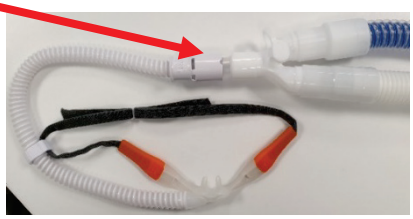


1. Separate the blue inspiratory limb and attach the nasal prong connector directly onto the blue limb

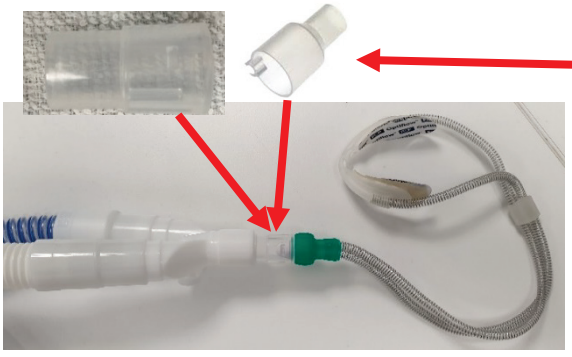


OR

2. Use the dual limb circuit with the connector, or flow sensor, adapter to connect the nasal prongs onto the circuit



Using the Optiflow Junior nasal prongs



Use the connector, or flow sensor, adapter to attach the Optiflow Junior nasal prongs to the dual limb circuit

2 Nasal Cannula Size and Application

The following codes should be used as per the current manufacturer's instructions and should be utilised as a rough guide when selecting nasal cannula.[3,4]

SPECIFICATION SHEET

F&P Optiflow™ junior

Nasal Cannula

	OPT312 PREMATURE	OPT314 NEONATAL	OPT316 INFANT	OPT318 PEDIATRIC
PERFORMANCE SPECS				
Max Flow Rate (L/Min)	8	8	20	25
Cannula Weight	9 g	9 g	13 g	13 g
Approximate Age Range	‹ 26 ga – 37 ga weeks	32 ga – 6 months	37 weeks – 3.5 years	1 year – 6 years
Approximate Weight Range	‹ 1 – 3 kg	2 – 8 kg	3 – 15 kg	12 – 22 kg

Larger Paediatric & adult sized prongs - Optiflow™+ nasal cannula

Nasal Cannula

OPT942 (S) = Small
OPT944 (M) = Medium
OPT946 (L) = Large

(en)

Intended Use:

Nasal cannula patient interface for delivery of humidified respiratory gases.

Setup:

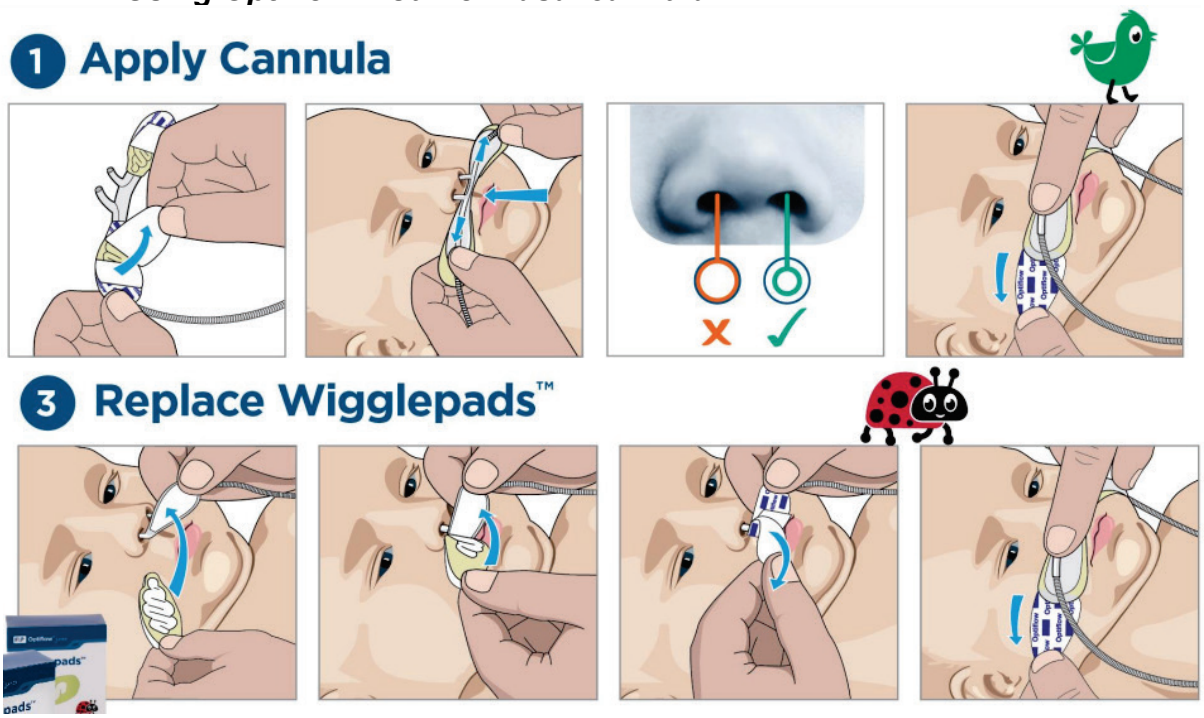
AIRVO/AIRVO 2/myAIRVO/myAIRVO 2 Humidifier with 900PT50x/55x-series tube; or tube and chamber kit (e.g. 900PT501)

Flow Range: OPT942 10 – 50 L/min
OPT944 10 – 60 L/min
OPT946 10 – 60 L/min

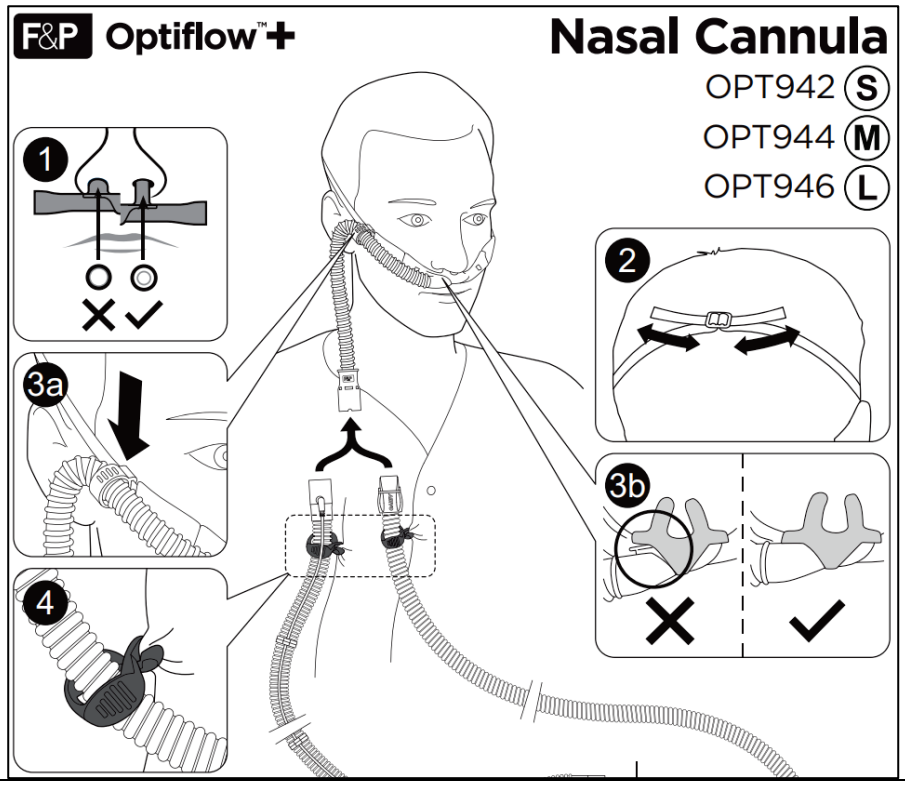
2.1 Nasal Cannula – securing on patient

Prepare patient skin as required prior to applying nasal cannula, ensuring skin is clean and dry.

2.1.1 Using Optiflow™ Junior nasal cannula[5]



2.1.2 Using Optiflow™+ nasal cannula4



3 Clinical Care

- Prior to commencement of HHFNC therapy, secretion clearance (nasopharyngeal suction) should be undertaken and may negate the need for HHFNC initiation
- Continuous monitoring and 15 minutely recording of skin colour, respiratory rate, heart rate SpO_2 and hourly recording of BP on the vital signs observation chart
- 15 minutely observations of flow rate, FiO_2 and recording of cannula position - It is especially important to check nasal cannula position as dislodgement will result in a loss of respiratory support
- Hourly observation of humidifier water level and refill as required
- If the patient's clinical state deteriorates the patient should be assessed for consideration of escalation of respiratory support (see Failure Criteria below)
- A gastric tube must be in situ for decompressing the stomach. Aspirate air regularly. If using a NGT, secure with tape above or below the nasal cannula onto the face; avoid taping over the nasal cannula so that they remain easily removable with hook and loop tape
- Nasopharyngeal suctioning is required prn to prevent secretions blocking airways

4 Failure Criteria

HHFNC may be inadequate if:

- There is an increase in respiratory distress or chest appears hyperinflated
- Episodes of desaturation / apnoea / bradycardia occur
- PCO_2 measured by venous or capillary blood gas >60mmHg and / or pH < 7.25
- Oxygen requirement of greater than 60%

5 Rapid clinical deterioration

- Bag and mask CPAP or manual breaths can be applied while the nasal cannula remain in situ, however the nasal cannula are easily removed with the hook and loop tape attachment and the wiggle pads can remain on the face
- Notify the NETS consultant
- Exclude pneumothorax in the event of rapid deterioration

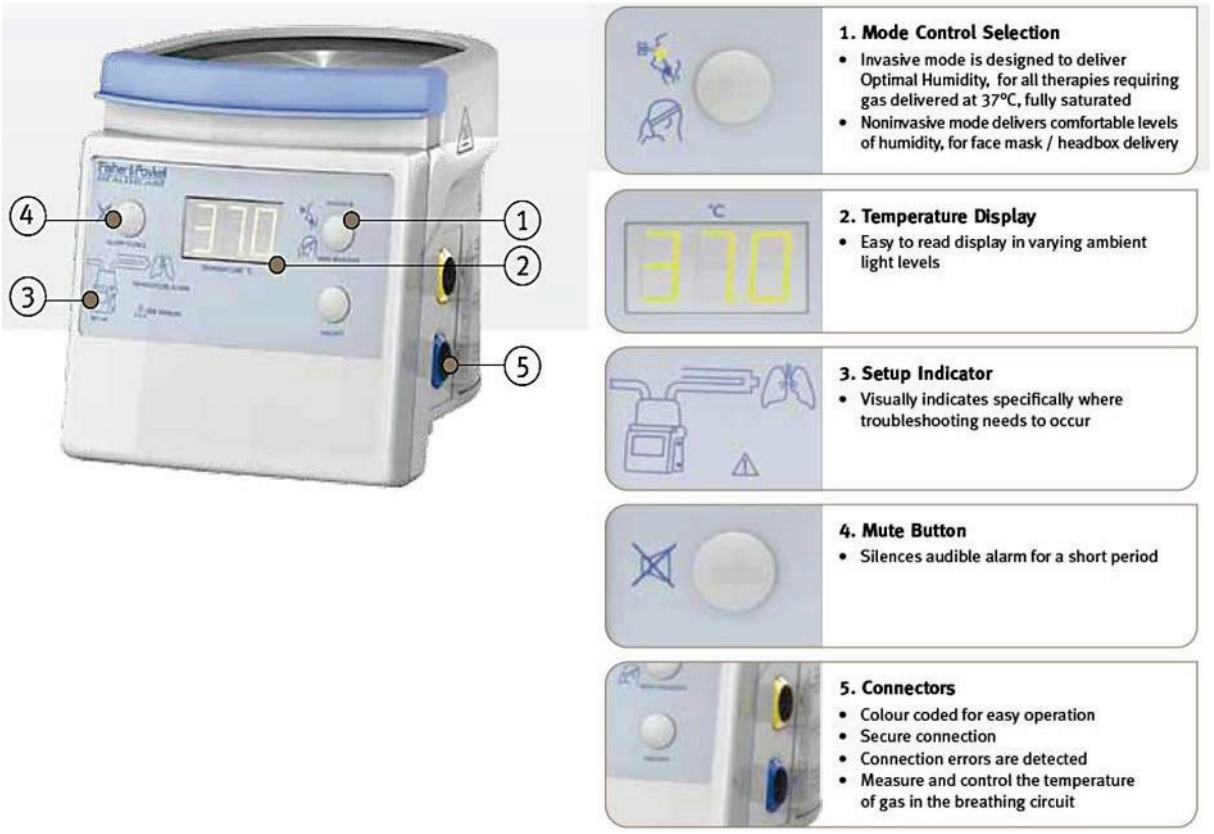
6 Cleaning

- The circuit including humidification chamber is disposable and should be discarded if the infant does not continue on the same circuit at the receiving unit.
- The heater wire and temperature probe are reusable and should be brought back to NETS and sent with the appropriate documentation to Inhalation Therapy department at CHW for cleaning.

7 Troubleshooting

The humidifier will sound an audible alarm to alert clinical staff to any problems.

- A light will illuminate on the setup indicator (See Diagram A below) to indicate where the problem is occurring.



8 References

Paediatric Research in Emergency Departments International Collaborative (PREDICT) (2016) Australasian Bronchiolitis Guideline http://www.predict.org.au/publications/2016-pubs/

2. Fisher & Paykel. Optiflow™ Junior Nasal Cannula Specification Sheet (cited January 29, 2021]; Available from: https://resources.fphcare.com/resources/corporate/media/resources/resources/pm-185047413-b.pdf
3. Fisher & Paykel. Optiflow™+ Nasal Cannula User Instructions (cited January 29, 2021]; Available from: https://resources.fphcare.com/content/optiflow-nasal-cannula-user-instructions-ui-185048241.pdf
4. Fisher & Paykel. Optiflow™ Junior Nasal Cannula User Instructions (cited January 29, 2021]; Available from: https://resources.fphcare.com/resources/corporate/media/resources/resources/ui-185047115-f.pdf
5. Lin J, Zhang Y, Xiong L, Liu S, Gong C, & Dai J. (2019) High-flow nasal cannula therapy for children with bronchiolitis: a systematic review and meta-analysis. Archives of Disease in Children 104 p564-576
6. SCHN Practice Guideline (2018) Humidified High Flow Nasal Cannula Therapy SCHN ePolicy (nsw.gov.au)

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