



Critical Care Operational Delivery Networks
England, Wales & Northern Ireland

noeccn



North of England
Critical Care Network

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NEASUS Critical Care Transfer Trolley & Equipment

CASCADE BOOKLET

Jan 2024

Version 3



FERNO CCT-PX Critical Care Transfer Trolley

<https://ferno.com/uk/product/cct-px-critical-care-trolley?hl=en-us>

Specifications

Width 57 cm, Length 193 cm, Height 80 cm (non-adjustable).

Patient load limit 250kg (Total trolley limit = 250kg patient + 80kg for base equipment).

Two oxygen holders for 'E' or 'CD' (with foam inserts) cylinders.

Storage cabinet (non-lockable).

Wipe clean with anti-bacterial wipes.

Stowage net beneath head-end – note this is for 'lightweight items' only and should not be used during ambulance transfer.

Individual wheel brakes.



Picture above: Trolley in side-profile in NEAS ambulance.

Trolley Features

Please note, this is a brief overview of the important features. Consult the Ferno information via the above link.

The trolley has a master plug for the mains electric connection, which will charge all the equipment on the trolley via an extension lead located under the patient rack. The trolley should be plugged in to the mains at all times, when not manoeuvring. The spare sockets on the extension lead can be utilised.



Picture above: Load-bearing cotsides. Velcro straps attach cushion to cotside.

Pushing upwards on the red button below the 'x' on the cotside lowers it to two positions:



1. Full lowered – should be used when laterally transferring a patient.
2. Partially lowered to specific angles – permits extra width for bariatric patients. Note. the cotsides must be symmetrical (i.e. in the same position) when manoeuvring the trolley, to prevent tipping. On the ambulance, once the trolley is locked in to place it is safe to have the left cotside vertical to permit trolley positioning in the ambulance.



Picture above: Winged headrest.

The headrest must always be attached for transfer. It can be moulded to restrain a patient's head by folding it in at the sides like 'wings'. The head-end of the trolley can be elevated using the red push lever on the underside of the head-end:



Picture: Head-end lever. Note. the defib bracket, below the lever, with signage 'Do not use in vehicle' is not in use for critical care transfers, and does not refer to head-end elevation.

The bottom-end of the trolley permits two changes to the patient's leg position:

1. Elevation at the hips, with straight legs.



Pictures above: Elevation of the bottom-end is achieved by pushing upwards on the 2 side levers ('like horns') beneath the bottom-end.

2. Bending at the knee.

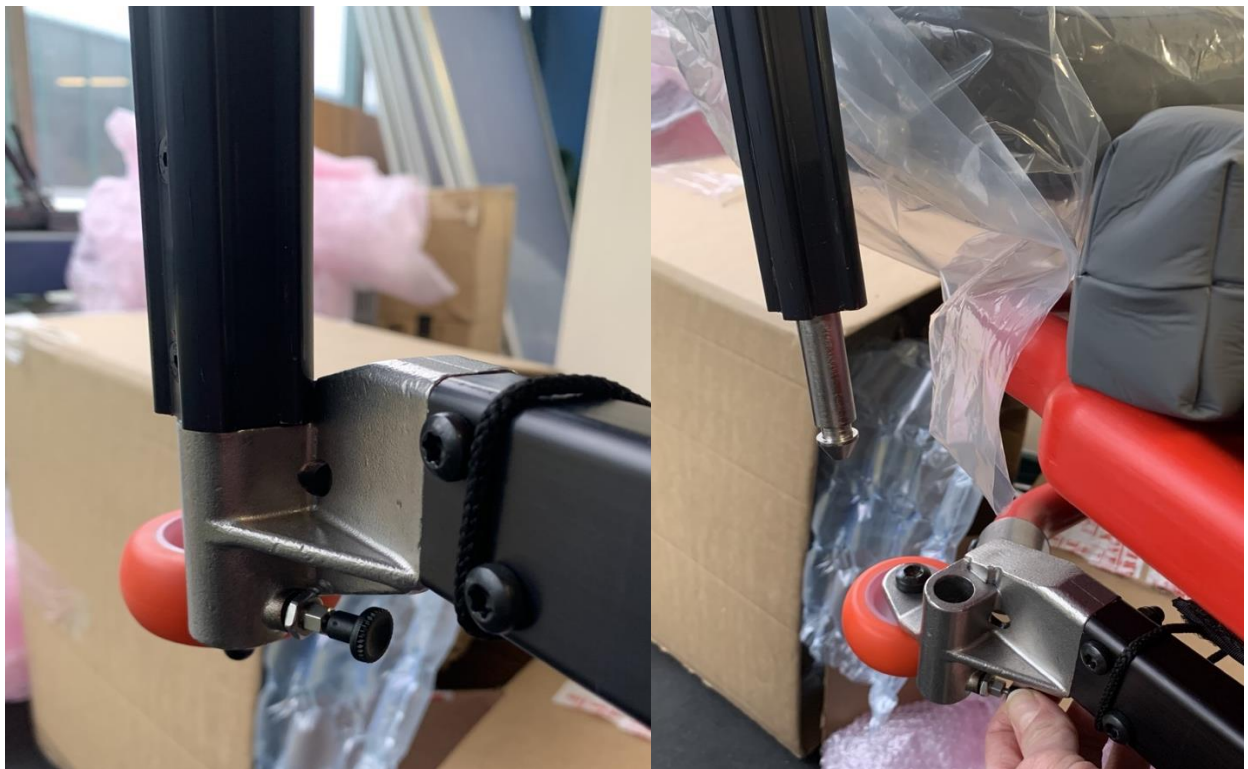


Pictures above: the patient's knees can be flexed by pushing upwards on the central red lever beneath the bottom-end.

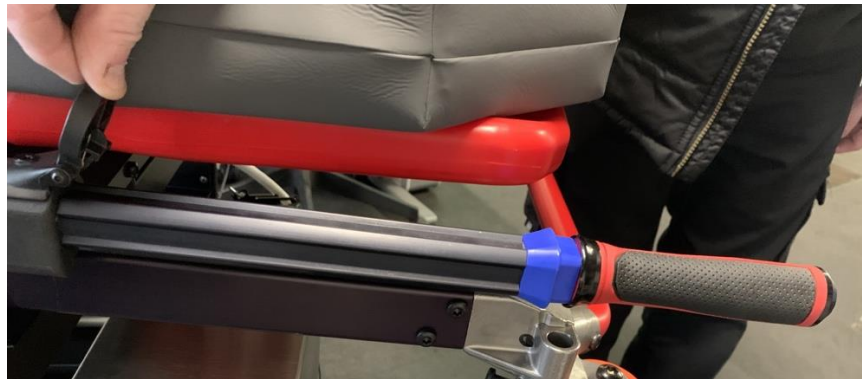
Manoeuvring the trolley is assisted with the 4 vertical poles (see below), one at each corner of the trolley. These are removable to assist patient transfer on to the trolley, but must be in place for transfer:



Picture above: Head-end vertical poles.



Pictures above: the vertical poles can be removed by pulling on the black toggle underneath the pole, then lifting it out of position.



Pictures above: The bottom-end poles can be stored in the trolley frame as seen above.



Picture above: Each trolley will have an adjustable drip stand, located towards the left bottom-end of the trolley. This trolley position is the least compromising for the patient and the ambulance, and it is strongly suggested that it is not removed/changed to prevent loss of the drip stand. The pole height can be extended by lifting the red tabs, which are then closed to lock it into position.

There are two harnesses with the Ferno trolley:

1. Adult 5-point harness.

This harness will be permanently attached to the trolley and adjustment works in a similar way to the old trolley harness i.e. non-slip material. All straps must be closed for safe transfer. The grey over-shoulder straps attach in to the red hip strap, then a separate plain grey chest strap is closed over the top. There are two leg straps.



Picture above: 5-point adult harness.



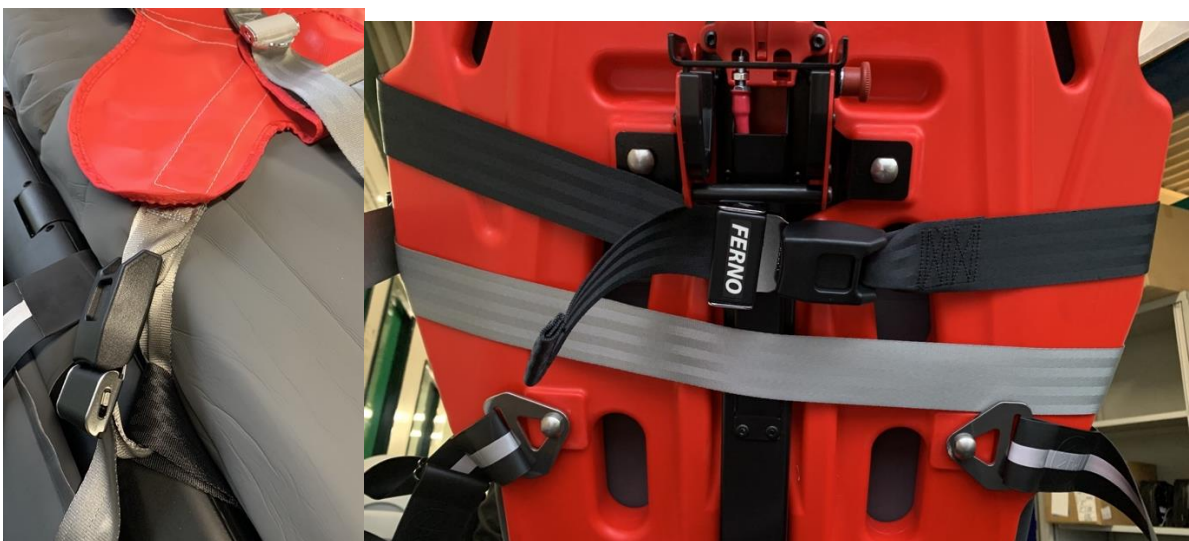
Picture above: Bariatric harness extensions. These are not routinely attached and simply clip into the hip strap.

2. Pedimate Plus paediatric harness.

This harness is a 5-point system for patients 4.5 – 45kg. It will be in a separate bag located with the transfer trolley.



Picture above: Pedimate in situ. Note. the adult harness remains on the trolley. To secure a patient, the black chest strap is closed first (unlike from adult harness), then the grey over-shoulder and hip straps clip in to the locking device on the crotch strap.



Pictures above: The Pedimate is attached to the trolley as demonstrated above. The lower straps on either side pass through a loop on the inside of the cot sides. The upper straps loop around the back of the trolley head-end.

HAMILTON T1: Training Resources

Hamilton T1 overview:

https://www.hamilton-medical.com/en_GB/Products/HAMILTON-T1.html

Hamilton T1 Training videos:

https://www.hamilton-medical.com/en_GB/Academy/HAMILTON-T1-training.html

Also includes contact details for individual site training, e-learning module links, FAQs.

Contact:

If you would like further face-face training, please contact Hamilton directly.

Stephen Cartwright - SCartwright@hamilton-medical.com

COMPETENCY SELF CERTIFICATION - HAMILTON T1

Date of training:

Scope of training delivered:

Please complete the following on the HAMILTON - T1	Done
I have completed the predefined e-learning module/s (Hamilton Medical College)	

Know your ventilator (Physical description)	Done
Ventilation unit externally - connectors, inlets, outlets, filters, ports, alarm lamp	
How to connect to power supply and confirmation	
How to turn the ventilator on / off	
Battery life and how to swap battery	
How to connect to gas supply	
How to mount the expiratory valve set	
How to connect a breathing circuit (whichever is applicable): <ul style="list-style-type: none"> - Breathing circuit coaxial adult/paed - Breathing circuit dual lib neonatal 	
Flow sensor - purpose and correct positioning	
Hard keys <ul style="list-style-type: none"> - Standby, Day & Night, Screen Lock, Manual breath, Inspiratory hold, O₂ enrichment, Print Screen, Nebulizer, Silence button - O₂ enrichment – the difference on neonatal & Adult/Paed software 	
Nebulizer - connection, setup and working principles	
Humidification: HMEF/ HME	
Demonstration lung	
How to disconnect the ventilator from the trolley	
Aware on how to connect ventilator to transfer trolley using a certified Hamilton Medical mounting solution (HAMILTON-T1 ventilator only)	
How to clean and disinfect the ventilator	

Pre-operational check	Done
How to select patient software – Neonatal or Adult/Paed	
How to perform a Leak test (note. this is called ‘tightness’ in some documents)	
How to perform a Flow sensor calibration	
How to perform a O2 sensor calibration	
How to Check Loss of External Power alarm	

Basic ventilator settings	Done
How to set patient data - patient group, height and gender	
How to use a Quick setup setting	
How to select the ventilation mode to start / Mode overview	
How to check and adjust the controls	
How to check and adjust the alarm settings	
How to start ventilation	
How to assess the settings during ventilation	
How to interact with graphical elements	

Basics of the ventilator user interface	Done
Where to see patient type and ventilation mode in use	
How to change the ventilation mode during ventilation	
Where to find directly accessible controls	
Where to find the Control tab	
Where to find the Alarms tab	

Understand difference between the red and blue line on the pressure waveform.	
Where to find the System tab and what it includes - Info, Test & Calibration, Sensor on/off, settings – time, brightness	
Where to find the Events, how to review them.	
Where to find the Tools tab and what it includes - Utilities, Configuration	
How to adjust the Waveform panels	
Where to find and how to use the Freeze and cursor button	
Where to find and how to select the Graphic panels - Trends, Loops, Graphics	
How to set and change ventilator settings	
How to change the patient's height (Adult/Paed) or actual body weight (Neonatal)	
Understanding of ASV mode of ventilation	
Awareness of Last Patient tab	

Responding to alarms	Done
Where to find the Message bar	
Where to find the Alarm lamp	
Alarm priorities and their meaning	
Where to find the Alarm buffer	
Where to find and how to use the Alarm silence key	
How to adjust alarm volume	
How to recognize Safety ventilation and ambient states	

Maintenance and cleaning	Done
Elements of basic maintenance	
How to clean the ventilator exterior	

Statement – I confirm I have received the training outlined in this document in accordance with the manufacturer recommendation for the specific Hamilton Medical device documented. I confirm I am competent to use this device safely, in accordance with the functionality defined in the ‘scope of training’ section without further instruction at this time.

PRINT NAME:

Signature:

Date:

Designation:

Statement – I require further training before I can use this product in a competent manner.

PRINT NAME:

Signature:


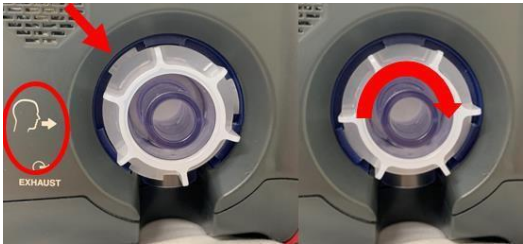


Date:





Designation:


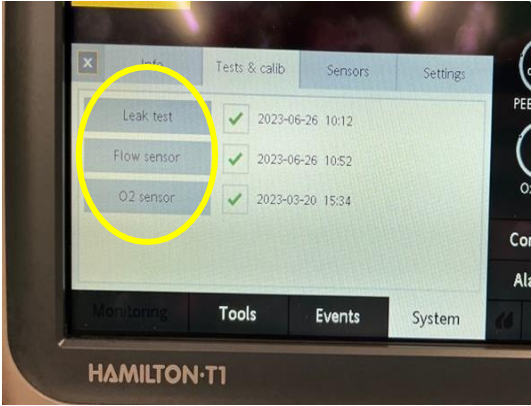
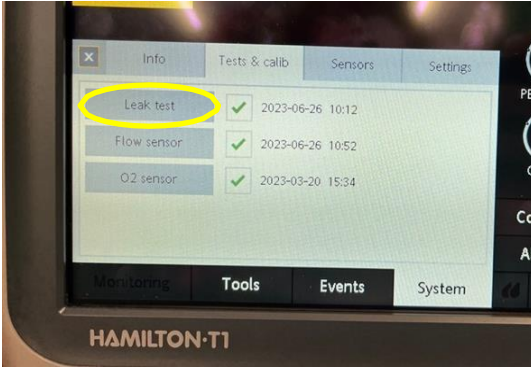
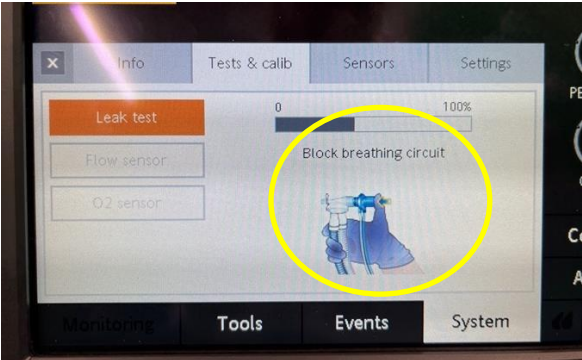
HAMILTON T1: QUICK GUIDE


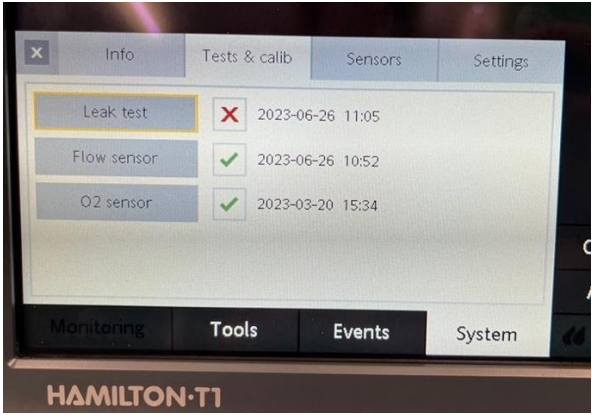


STANDARD OPERATING PROCEDURE

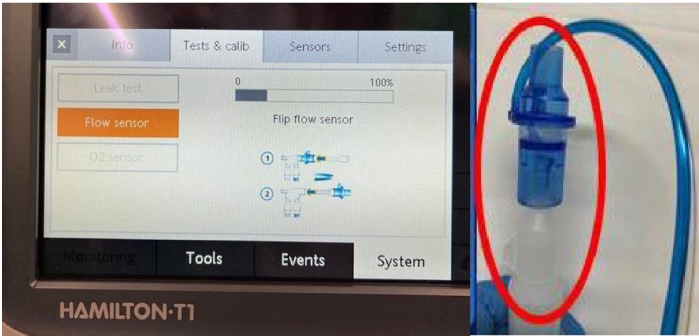
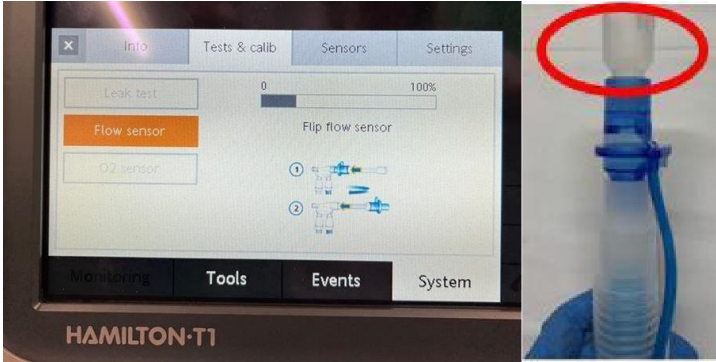


Title	HAMILTON T1 dry circuit set-up and preop checks	
Instruction	Photograph/Diagram	
1.	<p>Adult/Paed circuit – over 10kg Neonatal circuit – ~0.2 - 10kg</p>	
2.	<p>What you will need:</p> <p>Suitable circuit (as above), which includes tubing, expiratory valve, flow sensor and flow restrictor.</p> <p>HMEF</p> <p>Note. Both are dry circuits.</p>	<div data-bbox="584 752 919 920" data-label="Image"> </div> <p data-bbox="660 1055 906 1088">Adult/Paed coaxial</p> <div data-bbox="1091 741 1458 909" data-label="Image"> </div> <p data-bbox="1209 1055 1458 1088">Neonatal dual limb</p>
3.	<p>Left side of the ventilator = inputs:</p> <p>Plug in the AC power cord plug.</p> <p>Attached oxygen hose, then connect to the wall O2 port or O2 cylinder.</p> <p>There are two batteries in the ventilator (below screen) lasting up to 8 - 9 hrs, depending on screen brightness.</p> <p>Check air filter for electric cooling (black foam) is clean.</p>	<div data-bbox="855 1238 1195 1626" data-label="Image"> </div> <div data-bbox="855 1659 1240 1980" data-label="Image"> </div>


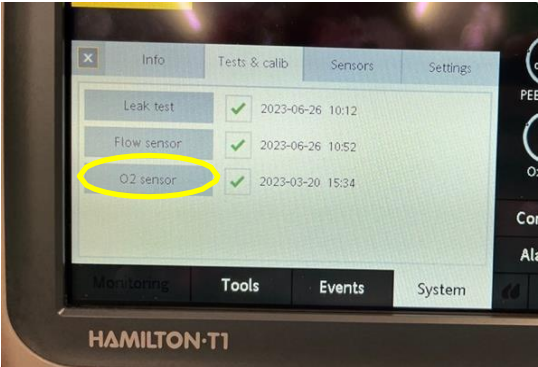
Circuit set-up		
4.	<p>Check the expiratory valve diaphragm is correctly attached to the valve (metal plate visible).</p> <p>This valve is disposable after use.</p>	
5.	<p>Right side of ventilator = outputs.</p> <p>Insert the expiratory valve into the expiratory port .</p> <p>Turn the reel on the valve clockwise to lock it into place.</p>	
6.	<p>Adult/Paed circuit: Push the coaxial circuit in to the inspiratory and expiratory ports. Note. The limbs should be inserted so that the circuit exits towards the front of the ventilator.</p> <p>Neonatal circuit: Insert inspiratory (white) and expiratory (blue) limbs into the corresponding ports. Note. A HMEF can be sited between the expiratory limb and expiratory valve, moving it away from the patient end.</p>	 

7.	Check the Flow Sensor is connected in the circuit.	
8.	<p>Insert the ends of the flow sensor tubing into the ventilator:</p> <ul style="list-style-type: none">- Blue tubing to blue port.- Clear tubing to white port. <p>This may require splitting the tubing to make a 'Y'.</p>	
9.	<p>Switch the T1 ventilator ON.</p> <p>The ventilator will run through a self-test.</p>	
		Preop checks
10.	To prevent unnecessary alarms (i.e. 'Wrong Expiratory Valve'), make sure that the correct circuit is selected.	

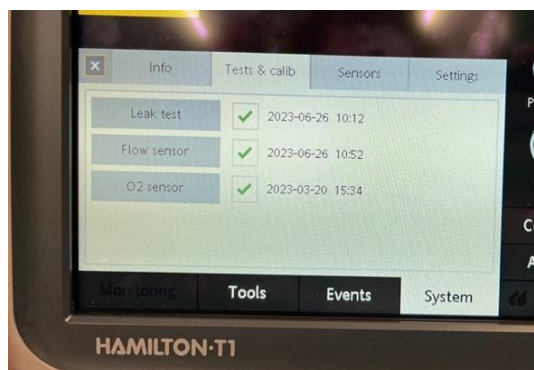
<p>11.</p>	<p>Select Preop check.</p> <p>These checks should be conducted prior to every patient use (new circuit).</p> <p>Note. in extremis, the ventilator will permit use without completing the pre-op checks.</p>	 <p>The image shows the Hamilton T1 DuoPAP screen in Standby mode. The 'Preop check' button is circled in red. Other visible buttons include 'Standby', 'Neonatal', 'Adult/Ped.', 'Last patient', 'BIPAP/DUOPAP', 'PSIMV', 'SIMV', 'Male', 'Female', '130 cm', '30 IBW kg', 'Pat. height', 'Start ventilation', 'Monitoring', 'Tools', 'Events', 'System', 'Controls', and 'Alarms'. On the right, there are gauges for P high (20 cmH2O), PEEP/CPAP (5 cmH2O), and Oxygen (50%).</p>
<p>12.</p>	<p>Checks to be completed are:</p> <p>Leak test</p> <p>Flow sensor</p> <p>O2 sensor</p>	 <p>The image shows the Hamilton T1 screen with the 'Tests & calib' menu open. The 'Leak test', 'Flow sensor', and 'O2 sensor' options are circled in yellow. Each option has a green checkmark and a timestamp: 'Leak test' (2023-06-26 10:12), 'Flow sensor' (2023-06-26 10:52), and 'O2 sensor' (2023-03-20 15:34). The bottom of the screen shows 'HAMILTON-T1' and navigation buttons: 'Monitoring', 'Tools', 'Events', 'System'.</p>
		<p>Leak Test</p>
<p>13.</p>	<p>Select Leak test.</p> <p>A progress bar from 0 to 100% will be displayed.</p> <p>It will state 'Disconnect patient'. Make sure there is nothing occluding the flow sensor.</p>	 <p>The image shows the Hamilton T1 screen with the 'Leak test' progress bar at 0%. The text 'Block breathing circuit' is displayed above a diagram of the breathing circuit. The 'Leak test' button is circled in yellow. The bottom of the screen shows 'HAMILTON-T1' and navigation buttons: 'Monitoring', 'Tools', 'Events', 'System'.</p>
<p>14.</p>	<p>'Block' the circuit on instruction, using the flow sensor cap (keep hold of the cap for future use), or a gloved hand.</p>	 <p>The image shows the Hamilton T1 screen with the 'Block breathing circuit' instruction and a diagram of the breathing circuit. The diagram is circled in yellow. The bottom of the screen shows 'HAMILTON-T1' and navigation buttons: 'Monitoring', 'Tools', 'Events', 'System'.</p>

	<p>Once the circuit is occluded, ‘test in progress’ is displayed. KEEP the circuit occluded.</p> <p>Follow the instructions on the screen to complete the test.</p>	
15.	<p>If the Leak test has passed, you will see a green tick with a date and time of completion.</p> <p>If you see a red cross this test has failed. Please repeat the test - steps 13 - 14.</p>	
		Flow sensor test
16.	<p>Apply the flow restrictor to the flow sensor (found in the circuit packaging).</p> <p>Select Flow sensor.</p> <p>A progress bar from 0 to 100% is displayed.</p> <p>It will state ‘Disconnect patient’. Make sure there is nothing occluding the flow sensor.</p>	<div><div>Adult/Paeds Neonatal</div></div> 

17.	<p>When prompted to do so:</p> <p>‘Flip flow sensor’ and connected flow restrictor (into the position in the picture).</p>																
18.	<p>The bar will state:</p> <p>‘Calibration in progress’ before...</p> <p>it will prompt you again to ‘Flip the flow sensor’ (into the position in the picture).</p>																
19.	<p>You can now remove the flow restrictor from the flow sensor.</p> <p>DO NOT dispose of the flow restrictor.</p> <p>You can clip the flow restrictor to the flow sensor tubing, near to the ventilator flow sensor ports.</p> <p>This flow restrictor can be used to calibrate the flow sensor again, if required.</p>																
20.	<p>If the Flow sensor test has passed, you will see a green tick with a date and time of completion.</p> <p>If you see a red cross this test has failed. Please repeat this test - steps 16 - 19.</p>	 <table border="1"> <thead> <tr> <th>Test</th> <th>Status</th> <th>Date & Time</th> </tr> </thead> <tbody> <tr> <td>Tightness</td> <td>✓</td> <td>2018-11-16 17:04</td> </tr> <tr> <td>Flow sensor</td> <td>✗</td> <td>2018-11-16 17:05</td> </tr> <tr> <td>O2 cell</td> <td>✓</td> <td>2018-11-14 14:54</td> </tr> <tr> <td>CO2 sensor</td> <td>—</td> <td>—</td> </tr> </tbody> </table>	Test	Status	Date & Time	Tightness	✓	2018-11-16 17:04	Flow sensor	✗	2018-11-16 17:05	O2 cell	✓	2018-11-14 14:54	CO2 sensor	—	—
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CO2 sensor	—	—															

		O2 sensor test
21.	<p>The O2 sensor is inside the ventilator. Your technicians are trained to replace the O2 sensor.</p> <p>Your unit needs to calibrate the O2 sensor monthly, or when the ventilator message appears on screen.</p> <p>If you choose to calibrate more often, the life of the O2 sensor will lessen.</p> <p>The galvanic O2 sensor requires approximately 30 minutes warm-up. We recommend performing the calibration after the O2 sensor has warmed up.</p> <p>You DO NOT need to attach a circuit to complete this test.</p>	
22.	<p>Select O2 sensor.</p> <p>Ensure ventilator is connected to 100% (high pressure) O2.</p> <p>The test takes approximately 2 minutes.</p> <p>The device tests the cell and resets the calibration points specific to the cell in use.</p>	
23.	<p>If the O2 sensor test does not pass, repeat step 22.</p> <p>Repeated failure requires engineering input.</p>	

24. If all the **Preop checks** have passed, you are safe to connect the circuit to the patient.



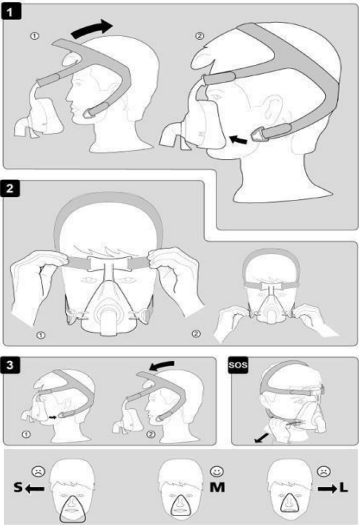



25. **Adult/Paed circuit:** HMEF is connected to the flow sensor, before the patient.

Neonatal circuit: HMEF is placed between the expiratory limb and expiratory valve.






Adult/Paed

	NIV	
1.	<p>Face mask sizes that are available are S, M, L.</p> <p>The mask needs to be NON-VENTED.</p>	
2.	Complete circuit set-up as above.	
3.	Connect the Face Mask to the Flow sensor .	
4.	Attach the mask as instructions show.	
5.	<p>OPTIONAL - For more flexibility in the circuit you can attached a catheter mount between the flow sensor and face mask.</p>	

Batteries

- Located behind the magnetic removable cover below the front screen.
- Two per unit; left-side is removable and hot-swappable. Right-side should only be removed by technicians.
- Top right of the front screen there is a battery/power indicator:

Indicator on ventilator	Battery status
	<i>Solid green:</i> The indicated battery (1 shown) is fully charged and the device is connected to primary power, even when the ventilator is turned off.
	<i>Flashing green:</i> Flashes to show that the device is connected to a primary power source and the indicated battery is charging, even when the ventilator is turned off.
	<i>Not lit:</i> Dark to show the indicated battery is not charging (the device is running on battery power and is not connected to a primary power source or the battery is overheated).

- Approx. 6hrs to fully charge one battery.
- 8-9hrs of use, when both batteries are fully charged.
- Lithium ion.

Time

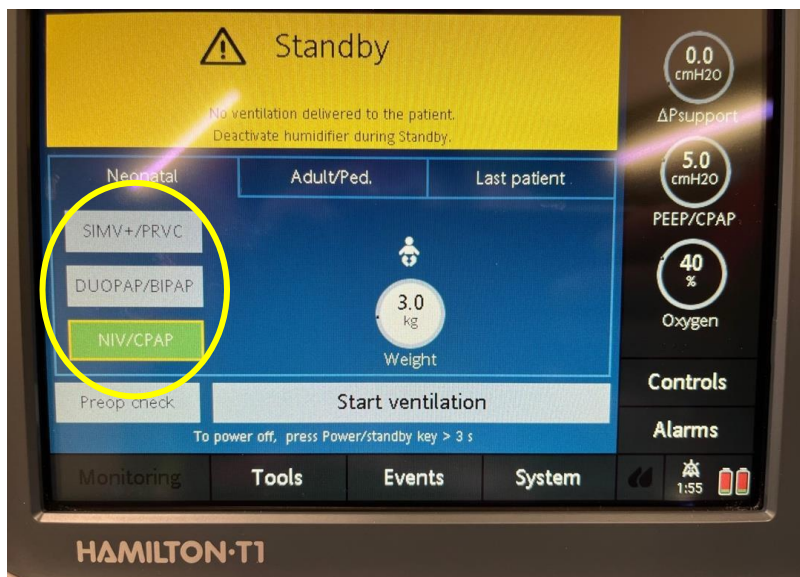
- Note. the time on the ventilator will not adjust with UK daylight-saving changes. Therefore, this will need to be changed manually.
- If the ventilator is left unplugged and the batteries run to empty, when the ventilator is restarted it will have numerous alarms/alerts. To recommence ventilation, try setting the time and date. If this doesn't resolve the alarms and permit the ventilator to function, please contact NEASUS.
- For this reason, it is advised that the ventilator is always plugged in to mains power when not in use.

Initial screen quick start

Adult/Paed modes:



Neonatal modes:



Note. on the initial screen (as above) we have included the Hamilton name for the ventilating modes, as well as the Drager name (for comparison/quick understanding).

Ventilation Modes

Table 7-1. HAMILTON-T1 ventilation modes, description and applicable patient group

Mode name	Patient group	Mode
Volume-targeted modes, adaptive pressure controlled		
APVcmv/ (S)CMV+	All	Breaths are volume targeted and mandatory.
APVsimv / SIM V+	All	Volume-targeted mandatory breaths can be alternated with pressure-supported spontaneous breaths.
Pressure-controlled modes		
PCV+	All	All breaths, whether triggered by the patient or the ventilator, are pressure-controlled and mandatory.
PSIMV+	All	Mandatory breaths are pressure controlled. Mandatory breaths can be alternated with pressure-supported spontaneous breaths.
DuoPAP	All	Mandatory breaths are pressure controlled. Spontaneous breaths can be triggered at both pressure levels.
APRV	All	Spontaneous breaths can be continuously triggered. The pressure release between the levels contributes to ventilation.
SPONT	All	Every breath is spontaneous, with or without pressure-supported spontaneous breaths.
Intelligent ventilation		
ASV	Adult/Ped	Operator sets %MinVol, PEEP, and Oxygen. Frequency, tidal volume, pressure, and I:E ratio are based on physiological input from the patient.

Mode name	Patient group	Mode
Noninvasive modes		
NIV	All	Every breath is spontaneous.
NIV-ST	All	Every breath is spontaneous as long as the patient is breathing above the set rate. A backup rate can be set for mandatory breaths.
nCPAP	Neonatal	Demand flow Nasal Continuous Positive Airway Pressure.
nCPAP-PC	Neonatal	Breaths are pressure controlled and mandatory.

Please dial in patient height on the initial screen to activate suitable ventilator settings.

Default weights:

- Adult/Paed 70kg
- Neonatal 3kg

For all quick-press modes:

- I:E 1:2 (Adult/Paed) or 1:3 (Neonatal)
- FiO₂ 0.5 (Adult/Paed) or 0.4 (Neonatal)
- PEEP 5
- Ramp 200ms
- ET 25%
- Vt 7mls/kg (where applicable)
- P_{insp} 20 +/- P_{sup} 15 (where applicable)
- Apnoea 20sec (where applicable)

Alarm limits will default depending on the settings, so please check they are suitable for your patient prior to connecting to the circuit.

All circuits for the Hamilton's on the NEAS trolleys are dry circuits, therefore, they require HMEFs.

Paw waveform

- Blue line – pressure limit set (in mode set-up).
- Red line – alarm pressure limit, defaults to 10cmH₂O above pressure limit set (blue line).

Cuffless Tracheostomy

- Due to significant leaks around a cuffless tracheostomy, the ventilator cannot compensate using invasive ventilation modes, leading to a leak alarm and poor ventilation.
- With a cuffless tracheostomy it is advised that the NIV modes are used to overcome the issue above.

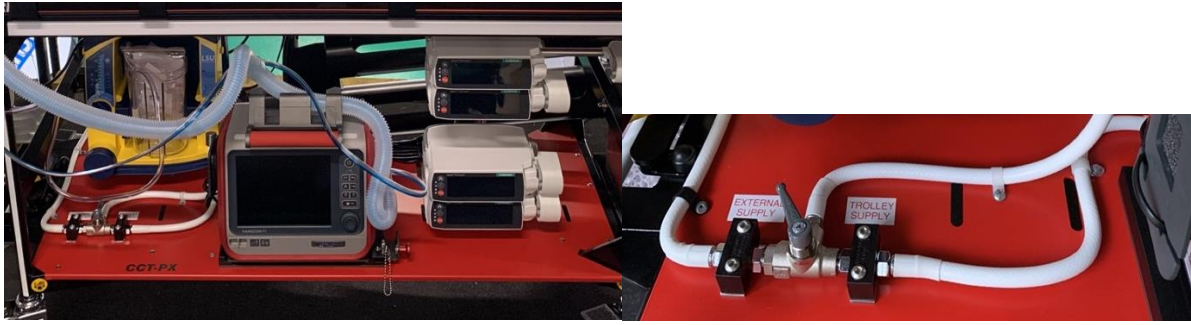
Servicing

- Checks are required, as per the NoECCN document.
- Maintenance services are due every 12 months and will be conducted by NEASUS. They will inform the unit of a trolley service and substitute the trolley for a 'spare'.
- If the ventilator alarms 'service due', please inform NEASUS, but it is safe and possible to use the ventilator as long as there are no other fault alarms.

IPC

For patients who have IPC concerns, the expiratory valve should protect the ventilator from contamination. However, in addition, a filter can be inserted into the circuit between the expiratory valve and tubing.

Trolley



Picture above: the Hamilton T1 is located bottom-centre on the trolley. The trolley permits two ways of delivering oxygen, using the silver lever to the left of the ventilator to select the oxygen source; 'Trolley supply' (cylinders) or 'External supply' (Schrader valve in to the wall).



Pictures above: the Hamilton T1 can be removed from the trolley to assist patient transfer, though this is not advised as the oxygen tubing is short. To remove the ventilator push down on the top of the silver pin, while pulling out the silver pin. This releases the grey bracket which rotates towards you using the red handle. The Hamilton then slides forward on a bracket to be lifted off the trolley.

B BRAUN: Training Resources

E- LEARNING – TEACHING VIDEOS

[Spaceplus Infusion Pump - how it works](#) | [B. Braun Training](#) | [Handling Videos - YouTube](#)

Hold your smartphone camera over the QR code to view the Space^{plus} training videos.



For further Face-face training please contact B Braun directly.

Jamie Atherton - jamie.atherton@bbraun.com



Space^{plus} Perfusor[®]
Syringe Pump and
Infusomat[®] Space^{plus}
Volumetric Pump

SUPER USER TRAINING RECORD

HOSPITAL: _____

WARD: _____

ROLE: _____

NAME: _____

We
PROTECT
and
IMPROVE
the
HEALTH
of people
around the world.

CONTENT

INTENDED USE

SETTING UP AND MAINTAINING AN INFUSION

TRANSPORT / ATTACHMENT OF SPACE^{PLUS} PUMPS

DISINFECTION AND CLEANING

COMPETENCY ASSESSMENT OF THE SUPER USER

WRITTEN ASSESSMENT

SUPER USER TRAINING GUIDE

INTENDED USE

Adults, children and neonatal for the intermittent or continuous administration of parenteral and enteral solutions through standard medical access routes.

The pump is to be used to deliver drugs, fluids, blood and blood components that are infused via intravenous, intra-arterial, subcutaneous, epidural, or enteral access routes.

SETTING UP AND MAINTAINING AN INFUSION

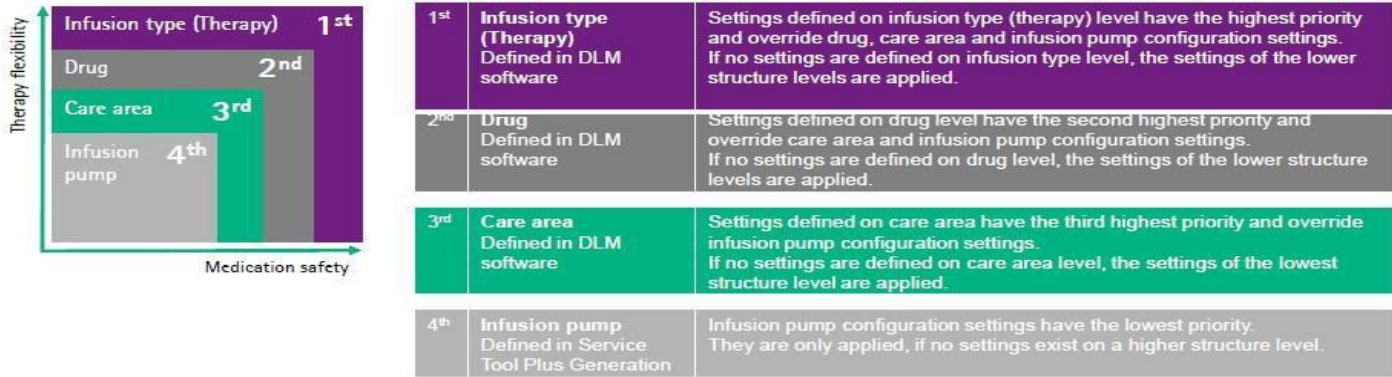
Self-Test

When the pump is switched on it will automatically conduct a self-test. If this self-test is unsuccessful the pump will need to be returned for servicing.

Inserting Disposable

- 👤 If further instruction is needed, press the home button and select help.
- 👤 Automatic priming via pump can be enabled via service tool.

The diagrams below show the priority structure for the pump and drug library configuration:



Drug Library

- 👤 The pump can be configured to mandate the use of a drug library.
- 👤 Drug Library delivers pre-defined drugs with concentrations, colour labels, limits, loading dose, bolus, pressure settings, etc.
- 👤 Drugs can be grouped into categories.
- 👤 There are two ways to select a drug from the library:
 - either via keypad
 - or in the footer all drugs

The Drug Library Is Constructed Using The Following Data:

- 👤 care area
- 👤 drug name
- 👤 patient profile
- 👤 concentration
- 👤 patient data
- 👤 infusion parameter

It is possible to activate a drug library review screen in order to view all programmed data before starting an infusion.

Changing Parameters While An Infusion Is Running

Select the infusion parameter on the right of the run screen to edit or select home - change parameter button.

Selecting A Different Variable Run Screen Parameter

In order to see more or different parameters of the running infusion (e.g. downstream pressure, infused volume, remaining time/syringe time/volume, care area etc.), a selection of those are provided by clicking on the parameter that you wish to alter, underneath the drug name on one of the smaller parameters.

Syringe View

In order to see the status of the syringe on the run screen select - change view. A visual of the live syringe will be displayed, showing fill status, brand and size of syringe.

Entering Values

- 👤 If soft limits are defined in the drug library they are displayed at the top of the screen when entering infusion parameters.
- 👤 If it is not possible to enter values outside the defined ranges, you cannot confirm the value (the confirm button is greyed out).
- 👤 Values within editor should be entered from left to right in order to have no value limitations within the keyboard.

The keyboard automatically greys out values which are outside the defined ranges, either per drug library or via mechanical limitations.

Delivering A Bolus

There are three options for administering a bolus:

- 👤 Programming a bolus
- 👤 Reusing a programmed bolus
- 👤 Manually administering a bolus

Whether all three options are available to you or not depends on the configuration of your pump and the situation.

- 👤 **Programming a bolus:** In the bolus menu, press the 'programme bolus' button. Enter the bolus amount followed by the bolus duration. Start the programmed bolus from the overview menu.
- 👤 **Reusing a programmed bolus:** In the bolus menu, press the 'last bolus' button. The pump displays an overview menu that allows you to view and change the values of the last programmed bolus. Start the programmed bolus from the overview menu.
- 👤 **Press and hold the 'Manual bolus' button** in the bolus menu. The pump infuses the bolus for as long as the button is pressed. The manual bolus is interrupted after 10 seconds and an audible signal sounds.

After delivery of programmed bolus: pump displays hint which summarises given bolus vs programmed bolus.

Totals And Info

- 👤 Infused volumes and the infusion status is available via the home menu and selecting totals and info.
 - infused volumes are configurable within the service tool. (intermittent volume can be deactivated).
 - total volume counts all infused volume administered to the patient (if you clear total volume, also the intermittent volume is cleared)





All volumes (intermittent and total) are cleared as soon a new patient is selected.

- 👤 **InfusionStatus:** Sums up all data about the running infusion





SUPER USER TRAINING GUIDE

SETTING UP AND MAINTAINING AN INFUSION

Battery

-  The battery symbol is shown in the left part of the display on the run screen or on the headline of the display in the programming screens.
-  The battery charges as soon as a pump is inserted into the Station or when it is connected to the mains.
-  Pre-alarm occurs when nearly empty.
-  Operating alarm occurs 3 minutes before battery has completely depleted.

Pressure Settings




-  To change the pressure settings access the home button and select pressure settings or device settings.
-  Pressure settings can be pre-defined per drug within the drug library settings.
-  While selecting a pressure level the respective mm Hg is shown.
-  On the run screen, the manometer pointer shows the current pressure in the infusion system. The lower the selected pressure level, the bigger the grey area on the manometer. As soon as the pointer enters this grey area, a pressure alarm is triggered.

It may be necessary to change the pressure level due to various influencing factors, e.g. fluctuations in syringe friction, line length and inner diameter, fluid viscosity, and the filter used in the system.

As a general rule, the pressure level should always be set higher than the pressure in the infusion system. Start with a low pressure level and adjust it if necessary to ensure short alarm times.




Standby

Only possible when disposable is inserted




-  To activate standby hold on/off button for 1.5 seconds.
-  Standby time can be changed once standby is activated.
-  If standby has elapsed, pump gives notification.

If an infusion has been programmed and the pump is in standby, the programmed infusion will be shown in the headline of the display

Display Lock



-  Display locks automatically activates following a pre-determined time frame. This is to ensure no accidental presses can occur.
-  In order to change a parameter on the run screen, deactivate the display lock by pressing unlock. No code is required.
-  By pressing the home button, the display lock is automatically disabled.


Data Lock

-  Available via home – device settings.
-  The pump can be protected against unauthorised use using the code lock.
-  Various codes can be stored in the pump.

Alarms and Troubleshooting




Information to user via notification and reminder

-  Pre-alarm (yellow alarm): infusion still runs.
-  Operating alarm (red alarm): infusion stops.

-  Device alarm: disconnect the pump from the patient, remove the disposable syringe and switch the device off and on again. If the alarm persists contact the service department.

Alarms and Troubleshooting



Information to user via notification and reminder

-  Pre-alarm (yellow alarm): infusion still runs.
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Barcode

Shows data matrix with article code and serial number (e.g. for inventory reasons).








Help Menu

-  Available in the home menu.
-  The help menu displays disposable change, to access this function select the home button and help.



TRANSPORT / ATTACHMENT OF SPACE^{PLUS} PUMPS

Only carry via integrated handle, with a maximum of 3 pumps to be carried via handle. The pump clamp can be positioned vertical or horizontal.

Handling Together With Space^{plus} Station





-  A maximum of 24 pumps can be stacked in one system using six stations.
-  Close pump handle before inserting pump into the Station.
-  When inserting device into the station ensure the ‘click’ occurs to ensure devices are securely placed.
-  If the pump is correctly locked in, the release button on the left side of the pump is flush with the pump housing.
-  Use tube guides (left side on the Station) in order to organise lines.
-  The Station only provides power when pump is properly inserted.
-  Cover shows pump status (running and alarming).

Cover Can Run On Battery During Transport

-  Alarm volume can be changed on the Cover.
-  Brightness sensor adapts to environment.

DISINFECTION AND CLEANING

Do not spray disinfectant directly onto the mains power connections, interfaces or pump openings. This can lead to short circuits, corrosion or malfunction of sensitive electronic components and/or to electric shocks.

-  Do not immerse the pump in liquid.
-  Observe the exposure times required according to the manufacturer’s instructions before usage. The pump must be completely dry before use.
-  Do not use sharp objects for cleaning.
-  Disinfect the pump/accessories with damp cloths from all angles.

COMPETENCY ASSESSMENT OF THE SUPER USER

DURING THE DEMONSTRATION SESSION PROVIDED BY A B. BRAUN SPECIALIST, THE SUPER USER:	YES	NO
1. Stated the clinical application of the Pump		<input type="radio"/>
2. Explained the safety checks and precautions to be taken prior to use		<input type="radio"/>
Securely fastened the pump by		<input type="radio"/>
3. a. mounting in the Station, or		<input type="radio"/>
b. using the pump clamp and attaching to an IV pole		
4. Stated the functions of the keys and indicators on the front panel		<input type="radio"/>
5. Demonstrated the correct insertion of the disposable		<input type="radio"/>
Initiated and started a prescribed infusion		<input type="radio"/>
6. a. mL/h		<input type="radio"/>
b. drug per drug library with patient data		
7. Explained the information displayed on the screen whilst the pump is running		<input type="radio"/>
8. Demonstrated the ability to change the rate once the infusion has started		<input type="radio"/>
Demonstrated the correct administration of a prescribed bolus (if applicable) by		<input type="radio"/>
9. a. delivering a manual bolus		<input type="radio"/>
b. delivering a programmed bolus		
10. Demonstrated how to check the pumps battery status		<input type="radio"/>
11. Explained why the pressure indicator is important and demonstrated how to check and adjust the pressure level		
12. Demonstrated how to activate standby mode		<input type="radio"/>
13. Demonstrated the ability to activate and de-activate data lock (if applicable)		<input type="radio"/>
14. Demonstrated the correct way to remove the disposable from the pump		<input type="radio"/>
15. Turned the pump off and discussed the correct cleaning and storage procedures		<input type="radio"/>

WRITTEN ASSESSMENT

1. How many pumps can be attached to one pump clamp?

2. What do you do if the pump has a Device Alarm?

3. Can you deliver a bolus whilst the infusion is stopped?

4. Write down the steps involved in giving a bolus, using one of the three possible methods.

WRITTEN ASSESSMENT

5. Where do you locate the pumps' battery capacity?

6. Where would you go if you needed to change the pumps' Occlusion Pressure Alarm Limits?

7. a) Explain the difference between a Yellow 'pre-' and Red 'operational' alarm.

b) Give an example of each.

8. What is the intended use of the Space^{plus} pumps?

9. How to clean the devices?

CERTIFICATION

This is to certify that:

Trainees Name: _____ Date: _____

Signed: _____

has successfully completed the super user training session, and has been assessed by:

Assessors Name: _____ Date: _____

Signed: _____

of B. Braun Medical to be competent on using the Space^{plus} Perfusor® and/or Space^{plus} Infusomat®, with the software

version: in delivering cascade training sessions and assessing user competence.

This space is designed for your Trainer to note any action points, (if required) for further practice following your assessment. Your Trainer may also set a date that you may be required to attend an annual update or complete further training.

[illegible]



Perfusor® Spaceplus Syringe Pump and Infusomat® Spaceplus Volumetric Pump TRAINING RECORD

HOSPITAL: _____

WARD: _____

ROLE: _____

NAME: _____

The submission of personal data or business data (names) is done on an explicitly voluntary basis. This data will not be transmitted to B. Braun Medical Ltd or any third party unless you explicitly indicate that this is your wish. The data collected will be stored in line with your NHS Trust Privacy Policy.

We
PROTECT
and
IMPROVE
the
HEALTH
of people
around the world.

INTRODUCTION

AIMS AND OBJECTIVES

The aim of this worksheet is to aid the participant in demonstrating a practical knowledge and appropriate clinical use of the Perfusor® Spaceplus Syringe Pump and Infusomat® Spaceplus Volumetric Pump.

Trainer: Date of training:

Hospital: Unit/Ward:

This Hands-on worksheet is for use within all clinical areas and has been designed to be used in conjunction with the B. Braun E-Learning material and Quick Reference Guides. These are to be used to help re-enforce the knowledge and skills gained during your training session.

Should you require assistance please contact your B. Braun Clinical Education Specialist or Ward/Unit Super User.

This worksheet contains a learning and development process to aid you gain confidence and proficiency in using B. Braun Spaceplus infusion pumps. The process has been designed to help support the NHSLA Risk Management Standards for Acute Trusts (2006).

STEP ONE: FIRST LINE TRAINING

This training session will be carried out using the B. Braun Spaceplus E-Learning material. The training session will take about 20-30 minutes, and provides you the overall information about the system. This is to help ensure you have acquired the relevant knowledge and skills to commence using the infusion pumps within your clinical setting. On completion of the E-Learning programme you will receive a certificate for your records.

STEP TWO: CLINICAL APPLICATION

You will be supported by members of the B. Braun Clinical Education Service (CES) and your Ward/Unit Super-User whilst you start to use the devices clinically. Using the training received, continue to complete the scenarios in the self-assessment section to re-enforce the knowledge gained during your training session. Use the reference material provided for further support. Once self proficiency has been achieved, complete the relevant sections of your worksheet.

STEP THREE: REVIEW: ASSESSMENT / CONTINUOUS ANNUAL REVIEWS

To ensure proficiency is being maintained your trainer will undertake an assessment. Following this you may be required to attend annual training updates and reviews.

COMPETENCY SELF ASSESSMENT

Self-assessment of proficiency should be measured against the following statements:

These statements are designed to indicate proficiency to use this device. Responsibility for use remains with the user, so if you are in any doubt regarding your proficiency to use the Perfusor® Spaceplus Syringe and Infusomat® Spaceplus Volumetric Pumps, you should seek education to bring about improvement. Various methods include, self-directed learning, coaching and further formal training may be initiated.

Section A - Perfusor® Spaceplus:	SIGN	DATE
<p>Insert the Spaceplus Perfusor® into the Spaceplus Station.</p> <p>Position the pump so that the two guide rails on the underside of the pump are on the pump slot guide rails. Slide pump until you hear a click. If the pump is correctly locked in, the release button on the left side of the pump is flush with the pump housing.</p>		
<p>Switch the Spaceplus Perfusor® on.</p> <p>Press the on/off hard key button.</p>		
<p>Insert a 50 ml syringe and confirm the correct syringe (brand and size).</p> <p>Pull syringe holder, turn completely to right. Place the syringe wing is between the syringe holder and the pump housing.</p>		
<p>Using the Drug Library:</p> <p>Start a new infusion via drug library.</p> <p>Home menu – New infusion. Commence with either new/same patient – Select the drug library care area – Use keyboard to type the name of the drug required (or all drugs) - Select concentration – Enter patient data (if required) - Start infusion.</p>		
<p>Change dose rate in order to exceed the soft limit.</p> <p>Run screen – Click on Dose Rate editor - Change parameter (as soon as value is in soft limit, a yellow indication will be noted) - Confirm value and confirm soft limit warning - Yellow indication shown on run screen.</p>		
<p>Rate Only:</p> <p>Start the infusion with 5 ml/h Home menu.</p> <p>New patient – Rate / Vol / Time.</p>		
<p>Change the delivery input rate to 8.15 ml/h.</p> <p>Run Screen - Click on flow rate – Editor.</p>		
<p>How long will the syringe run?</p> <p>See variable run screen parameter for syringe remaining time.</p>		

Section A - Infusomat® Spaceplus:	SIGN	DATE
<p>Insert the Spaceplus Infusomat® into the Spaceplus Station.</p> <p>Position the pump so that the two guide rails on the underside of the pump are on the pump slot guide rails. Slide pump until you hear a click. If the pump is correctly locked in, the release button on the left side of the pump is flush with the pump housing.</p>		
<p>Switch the Spaceplus Infusomat® on.</p> <p>Press the on/off hard key button.</p>		
<p>Insert and confirm the pre-filled line and use the tube guides on the side of the Spaceplus Station.</p> <p>Press the open hard key, after confirmation, front door opens automatically. Insert the infusion line into the pump from right to left. The infusion line must be in the line guide channel at all points. Including the housing side contour. Close the front flap by pressing the front flap firmly with both hands. Press until you can hear and feel the motorised locking mechanism closing the front door.</p>		
<p>Using the Drug Library:</p> <p>Start a new infusion via drug library.</p> <p>Home menu – New infusion. Commence with either new/same patient – Select drug library care area – Use keyboard type the name of the drug required (or all drugs) - Select concentration – Enter patient data (if required) - Start infusion.</p>		
<p>Change dose rate in order to exceed the soft limit.</p> <p>Run screen – Click on Dose Rate editor - Change parameter (as soon as value is in soft limit, a yellow indication will be noted) - Confirm value and confirm soft limit warning - Yellow indication shown on run screen.</p>		
<p>Rate Only:</p> <p>Start the infusion with 80 ml/h.</p> <p>Home menu - New patient – Input Rate / Vol / Time if Infusomat® Space Line SafeSet is used, no VTBI needed if Infusomat® Space Line is used, VTBI is mandatory to start infusion.</p>		
<p>Change the delivery rate to 125 ml/h.</p> <p>Run Screen - Click on flow rate – Editor.</p>		

Section B - Spaceplus:	SIGN	DATE
Give a manual bolus of 2 ml (if applicable). Run screen – Bolus – Press and hold manual bolus button.		
Give a bolus with a volume pre-selection of 2 ml (if applicable). Run screen – bolus – Bolus on demand – Enter bolus amount.		
Reset the volume to zero. Home menu - Totals and info - Infused volumes it is not needed to stop the pump for this.		
Change the alarm volume to level two. Home menu – Device settings – Change to alarm volume.		
Activate the data lock level. Home menu - Device settings - Data lock (Default is 9119).		
Change flow rate to maximum flow rate (highest value which is possible in the editor). Enter highest value in editor in general, depending on the syringe size different flow rate ranges can be set in the service tool.		
React to pre-alarm and operating alarm. Minimise pre-alarm, mute and minimise the operating alarm.		
End the infusion and perform a syringe change (Perfusor® only). Run screen – End infusion, Pull syringe holder, turn completely to right. The syringe wing is between the syringe holder and the pump housing.		
Change variable run screen parameter to downstream pressure. Run screen – Click on variable parameters (underneath drug name) and pick element of the selection list.		
Change view to syringe view (Perfusor® only). Run Screen - change view button.		
Activate the standby mode for 30 minutes. Stop infusion (either via stop hard key or on/off hard key) and press and hold the on/off hard key or stop infusion (either via stop hard key or on/off hard key) and press on/off hard key, answer question to set in standby.		
Deactivate the stand-by mode, end infusion and switch off the device completely. Exit standby button or any of the hard keys, click end infusion, take out disposable and press and hold on/off hard key.		
Take out the Spaceplus device off the Spaceplus Station.		

I certify that I am aware of my professional responsibility for continuing professional development and realise that I am accountable for my actions. With this in mind I make the following statement:

I am proficient to use the Perfusor® and Infusomat® Spaceplus Pumps, and I am aware of the support material available to me.

Print: Date:

Signed:

PROFICIENCY ASSESSMENT

This form is to be completed by yourself and your Unit/Wards Super User (Cascade Trainer) during your assessment. The assessment is designed to establish that self-competence has been achieved within your clinical practice.

If you have any further questions or queries then please do not hesitate to ask your B. Braun Education Link or your B. Braun Clinical Super User.

Trainee's Name: Date:

Signed:

Assessor's Name: Date:

Signed:

This space is designed for your Trainer to note any action points, (if required) for further practice following your assessment. Your Trainer may also set a date that you may be required to attend an annual update or complete a further self-assessment.

Review Date	Notes/Training Update Required

B BRAUN: Useful Information

Configuration

All NEASUS critical care transfer trolley B Braun pumps have been configured specifically for our requirements.

Drug libraries

After powering on the pump and selecting 'New Patient' there will be two options:

- Adult Transfer
- Paediatric Transfer

Notes.

- Either library can be used on any patient as we have not set strict limits. Therefore, there is a potential safety risk using the pumps. However, we did not want to restrict usability, and the critical care transfer team should be trained and have sufficient experience to offset this risk.
- Main difference between the libraries is the way the pump delivers the infusion:
 - Adult – mls/hr
 - Paeds – weight-based rate e.g. mcg/kg/min
- Both contain the same drug lists.
- Both have a 'Rate only' option – can be used to run any infusion that is not in the drug list.

Boluses:

- Manual bolus is only active for sedative and analgesic drugs.
- For other drugs, the programmable bolus option should be available.
- Programmable bolus:
 - Adult = 3mls
 - Paeds = 2mls
 - Can be repeated numerous times (no limit set).

Power button:

- With a syringe in-situ, this will 'Standby' the pump.
- To power-off the pump, the syringe needs to be removed then the power button pressed until the pump has turned off.

Emergency release

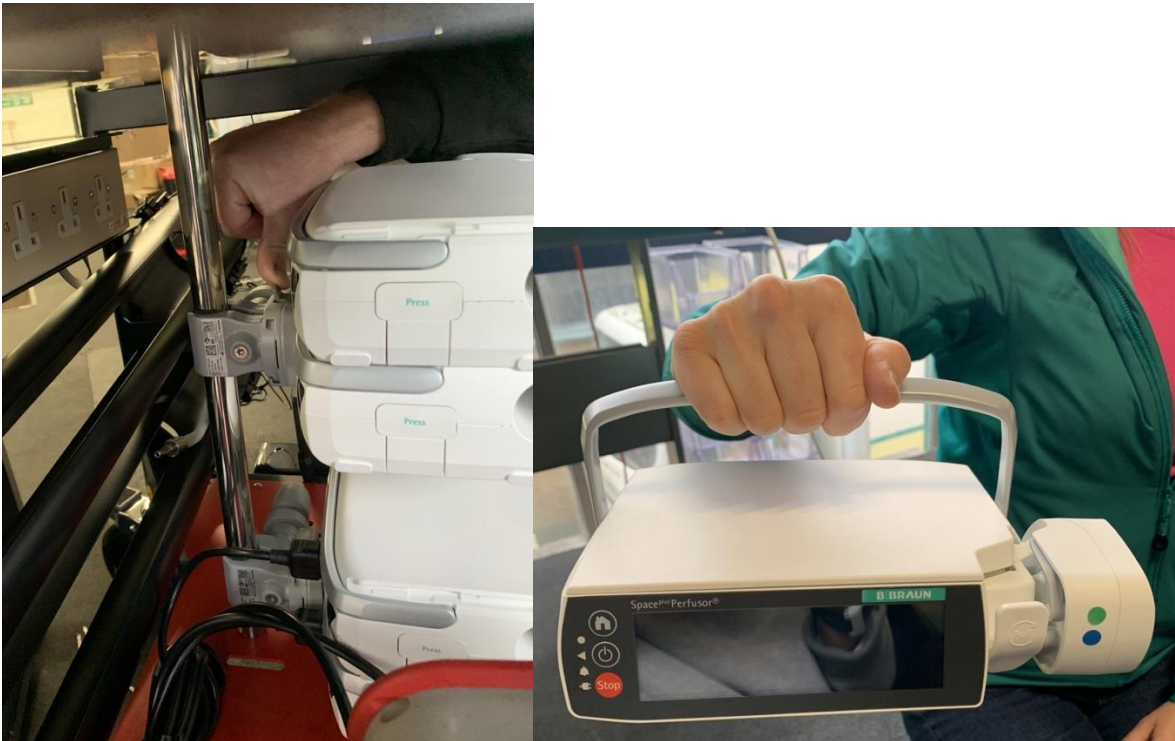
To remove a syringe in an emergency, there is a depressible button on the end of syringe arm.



This should only be used when there is not time to wait for the pump to go through the normal syringe change procedure, or if this has failed. Following use of the emergency release, the pump should be checked by NEASUS technicians.

Trolley

There are four B Braun pumps on each trolley. They are located right-bottom of the trolley, and are attached in pairs to a drip stand. The pumps can be released from the stand by pushing a grey lever at the back of the pumps:



Pictures above: Removal of the pumps from the drip stand. The pumps can then be separated using the 'press' button on the left side, then sliding the top pump towards you. The pump can be easily carried using its handle.

MINDRAY ePM Monitor

<https://www.mindray.com/uk/services/education/education-epm>

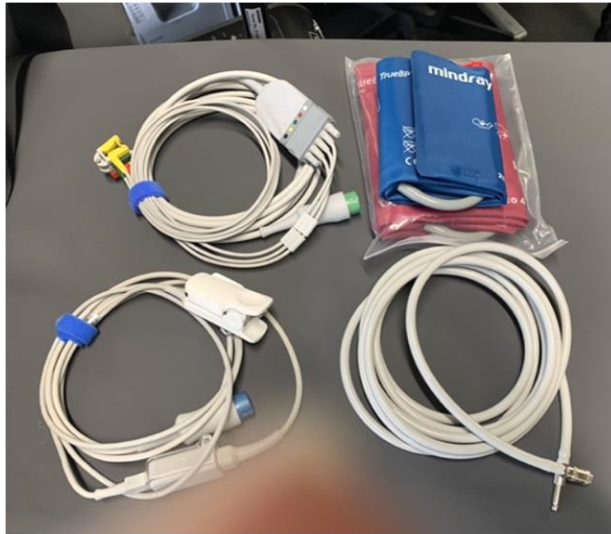
The Mindray ePM is similar to the monitor on the old transfer trolley. It has been configured to permit sufficient monitoring for a level 3 patient; ports include two IBP, NIBP, EtCO₂, Temperature x 2, ECG, Pulse Oximeter.

The display screen initiates with a simple display, then uploads any further monitoring values/waveforms when the correlating cable is connected. Settings can be adjusted temporarily using the appropriate menus.

The screen displays 'factory default' in the top left corner, as this is the standard we have set.



Pictures above: Mindray ePM Monitor with monitoring ports.



Picture above: Cables supplied with the trolley; NIBP with 2 cuffs, Pulse Oximeter, 3-lead ECG. Note. One IBP cable is supplied (not pictured), others can be purchased.

Trolley



Picture above: Mindray sits on its own rotational bracket, below the head-end of the patient rack. There is some movement of the monitor during transfer, but this does not cause artifact or affect the monitoring.

LAERDAL SUCTION UNIT (LSU)

<https://laerdal.com/gb/products/medical-devices/airway-management/laerdal-suction-unit-lsu/support>

Suction down ETT should not exceed 125mmHg.

Power Save Mode is activated when the Operating Knob is set to 200, 350 or 500+ mmHg and the actual vacuum level has been continuously higher than 120 mmHg for more than 2 minutes. The Power On Indicator will flash green slowly. Exit Power Save Mode by turning the Operating Knob to another setting.

With a fully charged battery the LSU should operate for a minimum of 20 minutes.



Picture above: LSU is located bottom-left on the trolley. The suction bag and tubing should be changed between patients. It should be tested pre-transfer following the user guide (link above).



Picture above: the LSU can be removed from the bracket for cleaning or patient use.