

RTX Respirator

Getting Started

- Ensure that the mains cable is connected to the side of the Power Unit.
- Raise the lid to expose the screen and the keypad.

Push the main power switch on the power unit to its 'ON' position. When switching on the machine, ensure that no tubing is connected to the power unit until the self-test has been completed which takes approx. 30 seconds (during the initial start up, the self-test may need to be started by pressing the 'accept' button).

NOTE: When starting up the RTX, if the alarm settings are shown as anything other than zero, the alarm will sound. Press MUTE to silence the alarm while entering settings and connecting the cuirass.

The Cuirass

- There are 8 sizes of cuirass, which fits over the front of the patient's chest, ranging from infant to adult. The sides of the cuirass are bordered with a soft foam rubber to provide a comfortable and airtight seal (seal is disposable, one patient use only).
- Cuirass sizes 0 to 2 are neonatal, sizes 3 to 6 are paediatric, and size 7 is adult and must be fitted so that the number (size) and the letters RTX on the cuirass are the correct way up on the patient (decreased lung volume may result from the cuirass placed upside down).
- The cuirass should fit from the axillae to at least below the umbilicus, therefore the correct cuirass size should be used (using a cuirass which is too small may be restrictive and may decrease lung volume).

NOTE: The cuirass should not be applied directly to exposed skin, but fitted over a loose fitting garment.

Fitting the Cuirass to the Patient and Unit

- Lift the patient and slide the two appropriate sized Velcro straps beneath the patient (small straps for cuirass size 0 to 3 and large straps for size 4 to 7).
- Pull out on the cuirass sides (by holding the rubber seal and the plastic cuirass). Place the cuirass on the patient, enclosing the chest and upper abdomen. Gently release the sides of the cuirass so that they are depressed into the patient's sides (towards their back).
- Bring the Velcro straps around the cuirass and attach to the Velcro on the front of the cuirass (the straps can be adjusted as required).
- Ensure that there is an airtight seal between the cuirass and patient by running a finger around the cuirass rubber seal at the abdomen, armpit, and chest and ensure that the seal is firm but not tight.
- If there is not an airtight seal, ensure that the correct size of cuirass is being used, if so, use additional padding to create an airtight seal.
- Once the Power Unit is on and has run through its self-test, connect the cuirass to the power unit by attaching the end of the appropriate sized wide bore tubing into the port on the cuirass (the wide bore tubing fits tightly **inside** the cuirass port hole). The small bore tubing fits cuirass sizes 0 to 3 and connects to the front of the power unit using a white tubing adaptor. For cuirass sizes 4 to 7 connect the large bore tubing, from the cuirass, directly onto the front of the power unit.
- Attach the cuirass pressure sensor tube (blue) into the small hole on the front of the cuirass (the tubing fits tightly **inside** the cuirass hole) and the other end to the front panel of the power unit (labelled cuirass) to measure chamber pressure.

NOTE: When using both respiratory triggered and respiratory synchronized modes, the trigger source can be either through the cuirass or through the airway, therefore an optional airway sensor tube can be connected if required (Cuirass Triggered Mode will pick up more vigorous spontaneous breathing, whereas Airway Triggered Mode can be triggered by smaller, shallower respiratory effort). The airway sensor tube can also be used as a monitoring aid if fitted.

- If airway pressure is to be monitored/used, connect the airway pressure sensor tube (clear) by attaching the green connector to the end of the patients ET tube and the other end to the front panel of the power unit labelled airway.

Available Modes

Monitor mode

Monitor Mode is used to monitor the cuirass and airway data (ECG (Lead II) can also be monitored but is not used).

Continuous Negative Mode

Negative pressure is set. This gives a continuous negative chamber pressure, which increases lung volume, where the patient can take spontaneous breaths.

The respiratory rate can be monitored through both the cuirass sensing line and the airway sensing line if fitted.

Control Mode

Inspiratory and expiratory chamber pressures, frequency (cycles/breaths per minute) and I:E ratio is set. This provides full control over the patient's respiratory cycle regardless of patient's effort (frequency should not be set above 60cpm (cycles per minute)).

Respiratory Triggered Mode

Minimum Back-up frequency, inspiratory and expiratory chamber pressures, I:E ratio, trigger source (triggered through the cuirass or airway) and sensitivity is set. This mode provides triggered ventilation, where the inspiratory phase of the respiratory cycle and frequency is triggered by the patient. This allows better adjustment to the patient's actual requirements. The set minimum back-up will be delivered if the patient's own breath rate falls below the set minimum back-up rate until triggered by the patient (the cycle will restart again).

Respiratory Synchronized Mode

Minimum Back-up frequency, inspiratory and expiratory chamber pressures, trigger source (triggered through the cuirass or airway) and sensitivity are set. This mode fully synchronizes to the patient's own respiration, automatically adjusting to the rate and shape of breathing with the natural breathing adjustments being made by the patient themselves (the initial inspiratory and expiratory effort is triggered by the patient).

I:E ratio will be calculated and displayed. The set minimum back-up will be delivered if the patient's own breath rate falls below the set minimum back-up rate and will give a set I:E ratio of 1:1 until triggered by the patient (the cycle will restart again).

ECG Triggered Mode (Not used)

Secretion Clearance Mode

This is used as a chest physiotherapy tool and to enhance the clearance of secretion from the lungs.

The mode has two cycles:

- Vibration Mode, which enhances the loosening of the secretion and
- Cough Mode, which creates a cough-like effect to assist in eliminating the secretion.

Frequency, inspiratory pressure and time are set for the vibration mode (expiratory pressure is not set as the vibration has a preset amplitude).

Frequency, inspiratory and expiratory pressures, I:E ratio and time is set for the cough mode.

The cuirass will vibrate for the set period of time and will incorporate the required coughs within the time set. This whole vibration/cough cycle can be repeated up to 20 times if required.

Display and Machine Operation

The monitor display is divided into four sections. The top three graphs display and monitor the cuirass, airway and ECG data with the readings displayed on the left hand side of each graph. The top bar shows the current mode and whether the machine is on or in standby mode. The main parameter settings are displayed at the bottom of the screen and the alarm settings on the right of the screen.

While the unit is operating, there are three options available and these are:

- Mode Selection
- Parameter Settings
- Alarm Settings

These options can be accessed by using the 'menu' button on the keypad.

Use the ↑ and ↓ buttons to highlight option and press the 'accept' button to select.

To change any numerical values, use the ↑ and ↓ buttons to highlight option and the number pad to key in new values.

Press the 'accept' button to accept new settings or press the 'cancel' button to cancel setting or exit the menu.

Mode Selection

This allows you to choose the appropriate mode. There are seven modes that can be selected using the RTX Respirator (see Available Modes for details).

NOTE: The alarm settings appear automatically once the mode and parameters have been accepted.

NOTE: You cannot change between modes while the RTX is running; therefore the machine must be in Stand-by to do this (using the 'Start/Stop' button).

Parameter Settings

This shows the parameters for the mode you are in/have selected which can be adjusted.

Available parameters:

Negative Pressure – Adjustable between –1 to -50 cmH₂O (Continuous Negative mode only)

Frequency (cycles per minute) – Adjustable between 6 to 1200 cpm

Insp Pressure - Adjustable between –3 to –50 cmH₂O

Exp Pressure - Adjustable between 0 to 50 cmH₂O

I/E Ratio - Adjustable between 1:6 to 6:1

Min Backup (cpm) - Adjustable between 6 to 50 cpm (Triggered and Synchronized modes only).

Minimum back-up delivered to the patient if their own breath rate falls below this set rate.

Trigger Source – 1.Airway, 2.Cuirass (Triggered and Synchronized modes only).

Sensitivity – Maximum of 1 to Minimum of 9 (Triggered and Synchronized modes only)

Secretion Clearance mode only:

Frequency (Vibration) – Adjustable between 240 to 1200 cpm

Insp Pressure (Vibration) - Adjustable between –3 to –50 cmH₂O

Time (Vibration) – Adjustable between 1 to 99 mins (should be set as the same as cough time).

Frequency (Cough) – Adjustable between 10 to 60 cpm

Insp Pressure (Cough) - Adjustable between –3 to –50 cmH₂O

Exp Pressure (Cough) - Adjustable between 0 to 50 cmH₂O

I/E Ratio (Cough) - Adjustable between 1:6 to 6:1

Time (Cough) – Adjustable between 1 to 99 mins (should be set as the same as vibration time).

Repeat Count (for whole cycle) – Adjustable between 1 to 20 times. Number of times the Vibration/Cough cycle is repeated.

Alarms

The RTX has both visual and audible alarms. The visual alarms consists of a red LED flashing light on the front panel of the power unit and are shown on the right hand side of the screen.

The alarms visible on the screen are shown in one of three ways;

- If alarm limits have been set, the background will be highlighted in green.
- If alarm limits have not been set, the background will be highlighted in blue.
- If alarm limits have been set but are out of range, the background will be highlighted in red.

There are 5 alarm settings that can be adjusted:

Inspiratory Pressure – Acts as a high and low inspiratory pressure limit. Ranges from ± 1 to 9 cmH₂O from set value.

Expiratory Pressure – Acts as a high and low expiratory pressure limit. Ranges from ± 1 to 9 cmH₂O from set value.

Apnoea (Duration) – Acceptable apnoea time limit before alarm is activated. Ranges from 10 to 30 seconds (this alarm can be switched off by setting the time to zero).

Respiratory Rate (High) – Maximum respiratory rate limit before alarm is activated. Ranges from 10 to 120 bpm (this alarm can be switched off by setting the bpm to zero).

ECG Pulse (High and Low) – Should always be set at 0 beats per min (off) as this feature is not used. If an alarm is activated, both visual and audible alarms will be activated and the legend at the bottom of the screen will indicate the problem.

NOTE: Pressing mute will silence the audible alarm for up to one minute. If the alarm condition is not corrected, this alarm will continue. The visual alarm will remain until the alarm condition has been corrected.