



# WWW.cleanspacetechnology.com INSTRUCTIONS



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CS3000

CleanSpace HALO

# 1. Contents

1.	Contents	2
2.	Foreword	3
3.	System Description	3
	$\wedge$	
4.	List of Warnings within these User Instructions	3
5.	Special or Critical User Instructions	4
6.	Limitations of Use	5
7.	System Components	6
8.	HALO BIO System	7
9.	Controls and Indicators	8
10.	Mask Fitting	9
11.	Using CleanSpace HALO With Half Mask	. 10
12.	Using CleanSpace HALO BIO with the BioHood	. 16
13.	Using CleanSpace HALO With Full Face Mask	. 17
14.	Entering and Exiting the Contaminated Area	. 21
15.	Working in Noisy Environments	. 22
16.	Fitting & Changing the Filter	. 23
17.	Battery Information	. 26
18.	Cleaning	. 28
19.	Periodic Maintenance & Checking	. 31
20.	Changing Half Mask Exhalation Valve Covers	. 31
21.	Appendix - Performing a Quantitative Fit Test	. 32
22.	Approvals	. 33
23.	Specifications	. 34
24.	Product and Accessory Information	. 35
25.	Product Warranty	. 36

Important: Before use, the wearer must read and understand these user instructions. Keep these user instructions for reference.

Read these instructions in conjunction with the appropriate CleanSpace™ filters and accessories instructions.

#### WARNING



This product is part of a system that helps protect against certain airborne contaminants. Misuse may result in sickness or death. For proper use, see your Occupational Health Specialist, these user instructions or contact CleanSpace Technology Customer Support on sales@cleanspacetechnology.com or the website: cleanspacetechology.com/welcome/

# 2. Foreword

Read all instructions and warnings before using this device. Keep these user instructions for reference. If you have questions regarding this system contact CleanSpace Customer Service on +612 8436 4000 or e-mail support@cleanspacetechnology.com.

# 3. System Description

CleanSpace HALO is an EN12942 and AS/NZS 1716 compliant respiratory system. The respirator helps to provide protection against particulates and to prevent the transmission of disease between people.

The components of the CleanSpace HALO system are shown in Section 7. The respirator draws ambient air through the high efficiency filter and supplies filtered air to the wearer via the mask. CleanSpace HALO is a breath responsive respirator which means that it blows harder during inhalation and more softly during exhalation. The device continuously adjusts fan speed to maintain positive pressure in the mask. Should the filter become blocked, an audible alarm will sound and the "Filter" light on the keypad will be illuminated. If the battery voltage falls below the minimum required to sustain the designed flow rate, an audible alarm will sound.

#### WARNING



Properly selected, used and maintained respirators help to protect against certain airborne contaminants. It is essential to follow all instructions and government regulations on the use of this product, including wearing the complete respirator system during all times of exposure, in order for the product to help protect the wearer. Misuse of respirators may result in overexposure to contaminants and lead to sickness or death. For proper use, see your Occupational Health Specialist, these user instructions or contact CleanSpace Technology Customer Support on sales@cleanspacetechnology.com or the website: cleanspacetechology.com/welcome/

# 4. List of Warnings within these User Instructions $\angle$

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CleanSpace respirators are unsuitable for use in oxygen deficient atmospheres.

If a satisfactory quantitative fit factor or passing qualitative test cannot be achieved with any of the masks, CleanSpace HALO must not be used. A satisfactory quantitative fit factor is

Test Type	Half Mask	Full Face Mask
Power On	1000	1000
Power Off	100	500

If a satisfactory Seal Check cannot be achieved, do not enter the contaminated zone.

Be sure to remove the Seal Check Cap before entering the contaminated area. The Cap blocks the exhalation valve, making it more difficult for your exhaled air to be expelled from the mask. Failure to remove the cap will lead to increased levels of rebreathed Carbon Dioxide, and may result in headache or dizziness. Never leave the cap in place for more than 2 minutes!

If you cannot adjust the mask to avoid your hairline, the mask is not suitable for you and should not be worn.

Do not remove the respirator until you have vacated the contaminated area. If you have an acute and spontaneous health episode (i.e. experiencing dizziness) and believe removing the respirator while you leave the contaminated area may help, remove the respirator with caution.

Do not use compressed air or a brush to clean the filter! HEPA filters are very easily damaged by the use of compressed air or by brushing. Misuse of CleanSpace HALO by cleaning the filter may result in overexposure to contaminants and lead to sickness or death.

If the blocked filter alarm is triggered (2 beeps, repeated every second, red LED flashes), leave the contaminated area immediately and replace the filter. Operating the respirator after the blocked filter alarm has sounded can cause the flow to fall below the manufacturer's minimum designed flow, which may result in overexposure to contaminants and lead to sickness or death.

When fitting a new filter the blocked filter alarm shall be tested before the respirator is put back into service. See the heading "Testing the Blocked Filter Alarm" below.

Use only CleanSpace<sup>™</sup> filters with the CleanSpace HALO<sup>™</sup> respirator. Use of other filters may result in overexposure to contaminants and lead to sickness or death.

CleanSpace HALO is not intrinsically safe. Do not use in flammable or explosive atmospheres. Doing so may result in injury or death.

Always correctly use and maintain the internal lithium-ion battery packs. Failure to do so may result in fire or explosion or could adversely affect respirator performance and result in injury, sickness or death. Do not charge the on-board battery with unapproved chargers, in enclosed cabinets without ventilation, near flammable liquids or gasses, or near sources of high heat. Do not immerse the device in water. Do not use, charge or store the device in water with elevice in the device outside the recommended temperature limits.

The Power Off State is considered to be an abnormal situation. Although respiratory protection will still be provided the level of protection will be reduced in comparison to the Power On State.

If the battery alarm sounds (3 beeps, repeated every second), leave the contaminated area immediately and re-charge the battery. Operating the respirator after the low battery alarm has sounded can cause the flow to fall below the manufacturer's minimum designed flow, which may result in oversposure to contaminants and lead to sickness or death.

In the extremely rare circumstance that the battery is damaged and electrolyte comes in contact with eyes, flush with water immediately and seek urgent medical attention.

The Steri-Plus and HALO BIO Exhalation Filters (CS3039 and CS3027) are electrostatic filters and their performance will be degraded by exposure to certain organic solvents including isopropanol (IPA), xylene and toluene. Always remove the Exhalation Filter before cleaning the mask. If there is a possibility that the Exhalation Filter has become contaminated with any solvent, replace it.

Never dry the mask or exhalation valve with a cloth that may leave behind lint. Lint contamination of the exhalation valve may cause it to leak, resulting in overexposure to contaminants and lead to sickness or death.

Using a full-face mask with the rain cover raised can cause the exhalation valve to vibrate, which you may notice as a buzzing noise. Lower the rain cover for correct operation.

The power unit contains a battery, sensitive electronics and a motor. Always use the CS3011 Cleaning Plug when using anything wetter than a damp cloth to clean it.

You must recalibrate the internal pressure sensor any time that your CleanSpace HALO is exposed to changes in temperature of more than 20°C. It is best practice to also re-calibrate if the unit has been in storage, particularly if the storage temperature is not known.

To check that the test port plug is fitted correctly (after using the on-board fit test ports), a negative pressure Seal Check shall be performed – see page 19.

European users should be aware that all markings on the HALO filters refer to the standard EN 12942 (1998) + A2 (2008), Class III, TM3 and should not be confused with any other standard.

# 5. Special or Critical User Instructions

This respirator contains a system for synchronising with your breathing and regulating mask pressure. This system requires re-calibration whenever it experiences a change in temperature of more than 20°C. It is best practice to also re-calibrate if the unit has been in storage, particularly if the storage temperature is not known.

For the most accurate battery charge indication, <u>the respirator must be plugged into its charger</u>. To be sure it is fully charged, plug in the charger and wait for **all 3 LEDs to light solidly without flashing**. If the 3<sup>rd</sup> LED is flashing rapidly, the battery is 95% charged.

The CS3038 Steri-Plus Exhalation Filter Case and the CS3039 Steri-Plus Exhalation Filter shall only be used in combination with a HALO Half Mask (CS3003, CS3004 or CS3005) fitted with the PAF-1111 Standard Exhalation Valve Cover. The Steri-Plus does NOT contribute to the system's respiratory protection.

# 6. Limitations of Use

Use this respirator strictly in accordance with all instructions in these user instructions. Never modify or alter this product.

- Do not remove the respirator until you have left the contaminated area, unless you have immediate and sudden health reasons to do so (for example you are experiencing dizziness and believe removing the respirator while you leave the contaminated area may help).
- CleanSpace Respirators are tight-fitting and national standards recommend the user be clean shaven. If a
  satisfactory fit factor cannot be achieved with any of the masks, CleanSpace respirators must not be used.
- This respirator with the half mask does not protect your eyes. In conditions that may damage or irritate eyes, use protective eyewear.
- Only use your respirator with the approved parts and accessories listed in these user instructions.
- Do not use the respirator unless it is powered and running normally.
- Do not use the respirator while it is being charged via the battery charger.
- Do not use in airborne contaminant concentrations above those specified in your national regulations.
- Do not use for respiratory protection against unknown atmospheric contaminants or when concentrations
  of contaminants are unknown or immediately dangerous to life or health (IDLH).
- Do not use in oxygen deficient or oxygen enriched atmospheres. Do not use in flammable or explosive environments.
- Only for use by trained personnel.
- Filters need to be changed regularly. The frequency of change depends on use and the concentration of contaminants in the atmosphere.
- Do not use for escape purposes. National regulations may impose specific limitations on the use of filters depending on the filter class and the facemask used.
- If the respirator has been used in an area that has caused it to become contaminated with a substance
  requiring special decontamination procedures it should be placed in a suitable container and sealed until
  it can be decontaminated.
- Do not disassemble the respirator case. There are no user serviceable parts inside.
- Failure to follow all instructions on the use of this product, and/or failure to use the respirator during times
  of exposure, may lead to adverse effects on the wearer's health and may render the warranty void.

### Immediate Evacuation

### Leave the contaminated area immediately if any of the following occurs.

- The respirator warning lights and/or sounds activate for the Low Battery or the Filter Blocked alarms.
- Any part of the respirator is damaged.
- Air flow into the mask decreases or stops.
- Breathing becomes difficult or increased resistance occurs.
- You feel dizzy or your airway is irritated.
- You can taste or smell contaminants.

### **Operating Conditions**

Your respirator is suitable for use in the following atmospheric conditions.

- Temperature: -10°C to 45°C.
- Relative humidity: 0 to 90% non-condensing.

The respirator will stop functioning if its internal temperature rises above 60°C or falls below -10°C.

#### WARNING



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WARNING CleanSpace respirators are unsuitable for use in oxygen deficient atmospheres.



Figure 1 - System Components

# PARTS OF THE RESPIRATOR

Throughout this manual reference is made to various commonly used components and features of the respirator. Familiarise yourself with these parts before reading the rest of the manual. See Figure 2.



Figure 2 - Parts of the Respirator

# 8. HALO BIO System

The HALO BIO System is a user-configurable respiratory protection system designed to provide for multiple configurations to best suit the user's environment of use and application.

A fully configured HALO BIO system incorporates:

- BioHood (CS3024).
- Half Mask HALO (CS3003 small, CS3004 medium or CS3005 large).
- HALO BIO TM3/P3 Filter (CS3025).
- BIO Exhalation Valve Cover (CS3026).
- (optionally) BIO Exhalation Filter (CS3027).

### Important Notes:

- The HALO BIO is a tight-fitting half mask PAPR. Neither the BioHood nor the BIO Exhalation Filter contribute to the system's respiratory protection.
- The BioHood (CS3024) shall only be used in combination with a HALO Half Mask configured with both the BIO Exhalation Valve Cover (CS3026) and the HALO BIO Filter (CS3025). <u>No other combination of</u> <u>mask and filter is approved for use with the BioHood</u>.
- The HALO half masks may be used without the BioHood with either the HALO BIO Filter (CS3025) or the HALO Standard Filter (CS3002). When configured with either of these filters and no BioHood, the HALO half masks may be used with either Valve Cover (PAF-1111 or CS3026).

- The BIO Exhalation Filter (CS3027) shall only be used in combination with a HALO Half Mask fitted with the BIO Exhalation Valve Cover (CS3026). It can be used with or without the BioHood.
- The BIO Exhalation Valve Cover can be cleaned or disposed of depending on the user's environment and/or application. For instructions on removing it see Section 20.



# 9. Controls and Indicators





### POWER BUTTON

This button is used to switch between the three (3) operating Modes: "On", "Standby" and "Off" Mode.

i) **Standby Mode** is when the green battery indicator lights are on, the motor is not running and there is no airflow to the mask. The respirator will automatically switch to Standby Mode within ten

(10) seconds of the user taking it off. If the respirator is in Off Mode it will switch to Standby Mode when the Power button is pressed.

ii) **On Mode** is when the respirator is being worn, the motor is running and there is air flow to the mask. The motor will start (called On Mode) when the respirator detects a change in pressure in the mask triggered by your breathing. In On Mode you should hear the motor running and feel the airflow on your face. You can also switch to On Mode (start the motor) from Standby Mode by pressing the Power button once.

iii) **Off Mode** is when the green battery indicator lights are off and the motor is not running and there is no air flow to the mask. The respirator automatically switches into Off Mode three (3) minutes after it has been removed from the user's face and the sensors detect that there is no breathing.

To conserve battery life, the respirator is designed to automatically switch from On Mode to Standby then to Off Mode when not being worn.

Important: In Standby Mode, the CleanSpace respirator switches to On Mode as the wearer starts to breathe. The respirator can only switch into On Mode from Standby Mode. If the respirator is in OFF mode, the motor will not run.



### FLOW TEST BUTTON

This button is used to check that the respirator is able to deliver its minimum designed flow. Pressing it once, when the respirator is in Standby Mode (not ON Mode), starts the flow test which lasts about 5 seconds. See Section 11 for instructions on running the flow test.



### BATTERY INDICATOR LIGHTS

Your respirator is equipped with an indicator of battery charge. There are three (3) battery indicator lights. With the charger plugged in and three green lights lit, the battery is fully charged and has up to eight (8) hours of operating time. The respirator should be fully charged before use.

If you need to be sure the battery is 100% charged <u>plug in the charger</u>. Even if the battery is fully charged, the 3<sup>rd</sup> LED will flash for at least three minutes while the respirator checks its condition. Once **all 3 LEDs light solidly without flashing the battery is at 100%.** 

For how to assess the level of charge, see Section 17.

When the battery approaches a level at which it would not be able to supply the Manufacturer's Minimum Design Flow, an alarm sounds (3 beeps, repeated once per second). All green battery lights are extinguished. If the low battery alarm sounds you must leave the contaminated area <u>immediately</u> and recharge the battery.

Operating time is affected by mask seal, work rate and other factors. The operating times quoted above are average durations at moderate work rates at sea level. Actual operating times may vary widely from average durations.



#### FILTER WARNING ALARM

CleanSpace respirators have a Filter Warning Alarm, which is triggered when the filter is blocked. If the Filter Warning Alarm sounds (two beeps, repeated once per second) or the Filter Warning

Alarm light comes on, you must leave the contaminated area, and change the filter.

# 10. Mask Fitting

Before using your respirator you must determine the right mask for your face and know how to adjust the system to achieve a good fit.

It is vital that your mask is the right size for your face and fits properly. **Mask fitting must be carried out by a specialist / designated mask fitter**. The fit must be confirmed by a properly performed fit test. A fit test must be performed during initial selection of a respirator, or whenever the user's face changes shape (for instance due to weight gain or loss) and at least annually.

**Qualitative Fit Testing -** To perform a **qualitative** fit test, follow the relevant standard and/or the instructions provided with the test substance. A qualitative test provides only a PASS/FAIL result, not a fit factor.

Quantitative Fit Testing - See Section 21.

### MASK SELECTION GUIDELINES

No set of guidelines can ensure that you have the right size mask for your face. You must confirm the fit with a fit test. But the tables below will help your mask fitting specialist to select the mask most likely to fit you and may therefore save time.



Once you have achieved an acceptable mask fit and confirmed it with a fit test, record the mask size, neck support size (if any) and, if a quantitative test has been performed, the fit factor achieved.

WARNING If a satisfactory quantitative fit factor or passing qualitative test cannot be achieved with any of the masks, CleanSpace HALO must not be used. A satisfactory quantitative fit factor is

Test Type	Half Mask	Full Face Mask
Power On	1000	1000
Power Off	100	500

# 11. Using CleanSpace HALO With Half Mask

Complete the following five steps each time you use your respirator.

### **STEP 1 - INSPECT**

### Before each entry into a contaminated area, the following inspections must be performed:

- Visually check all parts including the power unit, mask, harness and filter. If parts are missing or damaged replace them only with approved parts before proceeding.
- Check the POWER UNIT for cracks, holes or other damage or missing parts. Do not use the device if
  there is any damage or misuse. Check both bellows for splits or holes. Check that the bellows have not
  become distorted as this may obstruct the air supply to the mask. Check the neck support (if required).
  Check that the battery has enough charge to complete the work period by pressing the Power Button.
  The Battery Indicator Light(s) will illuminate to indicate the approximate charge. Refer to Section 9. A full
  charge is recommended.
- Check the FILTER carefully. The foam seal must be clean and free from damage of any kind. Examine the visible internal surfaces for any sign that dust has penetrated the media. If dust is found, do not use the filter. The body of the filter must be free of cracks or signs of damage. If any sign of impact or scratching is found, discard the filter. Fit the filter to the respirator (see Section 16).
- Check the MASK to ensure that there are no cracks, tears or dirt; check the mask is not distorted. Check the mask exhalation valve for damage or dirt build up. If it is dirty, remove the exhalation valve cover. Remove any dirt, hairs or anything that could affect the seal of the valve against its seat. Check that the valve seat is clean. Reinstall the valve cover. If the valve is damaged, replace the mask.
- Check the HARNESS is intact and has good elasticity and can be fitted to the attachments on the mask. It must be adjusted to support the mask to seal comfortably to the face. DO NOT overtighten.

### **STEP 2 – CALIBRATE**

This respirator contains a system for synchronising with your breathing and regulating mask pressure. This system should be re-calibrated if it experiences it experiences a change in temperature of more than 20°C. It is best practice to also re-calibrate if the unit has been in storage and the storage temperature is unknown.

Steps to re-calibrate:

- 1. Remove the filter (and mask if fitted) from the respirator and place the respirator on a stable surface such as a table.
- 2. With the CleanSpace respirator in Standby Mode (i.e. one or more battery indicators lit), press the "Power" and "Flow Test" buttons on the keypad at the same time.
- 3. When both the blue and red LEDs light, release both buttons. Do not touch or move the respirator.
- 4. After 5 10 seconds the motor will start and will run for 5 10 seconds.
- 5. When the motor stops, calibration is complete and the battery lights return to indicating battery charge status.
- 6. Re-fit the filter.

Important Note: Failure to remove the filter prior to calibration may result in reduced run times. In order to restore the performance of the respirator, calibration must be performed again with the filter removed.

### **STEP 3 – TEST FLOW RATE**

This test checks that the respirator is able to deliver the Manufacturer's Minimum Design Flow of 120 litres/minute.

- 1. Remove the mask if fitted. Leave the filter in place.
- 2. Place the respirator flat on a table or other support.
- 3. Press and release the button marked "Flow Test".
- The respirator will automatically run the Flow Test. Note: During the test, the motor will run fast and air will blow from the left-hand bellows.
- After 2 seconds the respirator reports the test result using the LEDs on the keypad. Use the table below to interpret the LEDs.

LIGHTS	Meaning
3 LEDs:	PASS (Excellent: flow >180 l/min)
2 LEDs:	PASS (Good)
1 LED:	PASS (Acceptable)
ALL LEDs	FAIL (Flow <120 l/min)
FLASH	Do not use the respirator until a new filter has been fitted and / or battery fully charged and the test has been repeated with a PASS result. Reset the respirator by pressing the Power button. Fully charge the battery and / or replace the filter. Repeat the flow test. If the respirator fails the test but the filter is new and the battery is fully charged, contact CleanSpace Technology and do not use until it has been evaluated.

### Important: The Flow Test is not a battery charge test. Three LEDs means that, as of the moment it is tested, the unit can deliver high flow. It does not mean the battery is full. You must check the battery charge separately. See Section 17.

### **STEP 4 - DON THE RESPIRATOR**

Important: Please read Step 4 all the way through before beginning to don the respirator.

Locate your power unit, mask, neck support and harness. Make sure the mask is the size that you used for your last successful fit test. Ensure a clean filter is fitted to the power unit.

### Fit a CleanSpace mask to the power unit

With the peak of the mask upright locate the right-hand mask AirClip (Figure 3). Locate the right-hand power unit AirClip (Figure 4). It is on the same side of the power unit as the keypad.



Figure 3 – Right hand mask AirClip

Figure 4 - Right hand power unit AirClip

Join the AirClips, so that the mask is attached to the power unit (Figure 5). Check that the mask is the right way up! The pointed nose section of the mask must face up, in the same direction as the keypad (Figure 6). Leave the other mask arm and bellow open until you are fitting the respirator. Familiarise yourself with the Adjust Buttons and the Mask Release Buttons (Figure 7).



Figure 5 – Mask on power unit

Figure 6 – Mask and Keypad Orientation

Figure 7 – Mask Release and Adjust Buttons

### Fit the harness

Holding the harness find the two keyhole clips at the end of each elastic strap and fit these to the buttons on the inside of each AirClip (Figure 8). Ensure that the harness strap with the FRONT marker is pointing towards the mask and that there are no twists in the straps (Figure 9). Adjust the harness as follows:

- To move the mask up, tighten the elastic straps by sliding the cleat down the strap as shown in Figure 9.
- To adjust for a smaller head size, shorten the rear strap by using a hole further along the strap, as shown below in Figure 10.



### • Fit a neck support

Align the neck support with the power unit, the two arms with the rounded heads should be at the top. Locate the bottom arms of the neck support in the grooves at the bottom of the unit and slide neck support upwards until you hear a 'click'.



#### Loosen both bellows to their widest opening

Press the adjust button on the power unit and loosen the bellows on both sides so they are fully extended. See Figure 12.



Loosen/Adjust Figure 12 - Adjust Button

### Place the power unit in Standby Mode

Press the Power button once. The green battery indicators will light up on the keypad. The motor will not come on and the air will not flow in Standby Mode.



#### Don the power unit and switch to On Mode.

Place the power unit behind your neck with the bellows and mask resting down one side. The harness should be hanging in front of the mask (See Figure 13 - 15). Fasten the AirClips on your left-hand side so that both sides of the mask are connected to the power unit. Pull the mask up to sit comfortably on your face (Figure 16). **Start to breathe to trigger the system into On Mode (air will flow).** Pull the harness back and onto your head (Figure 17). Adjust harness and settle the mask and power unit so that both are comfortable. Adjust the bellows and harness to achieve a comfortable fit and seal on the face. Do not overtighten the system (Figure 18).



Figure 13 – Power unit behind neck



Figure 14 – Fasten AirClip



Figure 15 – Device fastened around neck



Figure 16 – Pull mask up and onto face



Figure 17 – Pull harness back and onto head



Figure 18 – Settle harness and adjust

If the motor does not start and air does not flow, check the system was in Standby Mode (with the green battery indicators on). If the system is Off (i.e. not in Standby Mode and no green indicators), remove the respirator, press the Power button to activate Standby Mode and don again as described in Figure 13-18 above.

#### Check the harness

The harness should take a little of the weight of the mask and support the power unit so that the respirator system sits level on your head. If necessary adjust the harness. This is done by shortening or lengthening the front straps by moving the cleats up or down the straps. Remember to shorten or lengthen each side by the same amount. If necessary the rear strap can also be adjusted.



Figure 19 - Correct Position for CleanSpace HALO

### Adjusting the mask on your face

Adjust the mask for comfort and until you do not feel any leaks between the mask cushion and your face.

<u>To tighten the system</u>, place one hand against the back of the power unit and the other over the front of the mask. Push the power unit forwards and the mask back (Figure 20). You will hear a series of clicks as the mask is tightened.

<u>To loosen the system</u>, press the adjust buttons on either side of the bellows and pull the mask and power unit away from each other.



Figure 20 – Adjusting the Mask

### **STEP 5 – MASK SEAL CHECK**

A seal check is used to ensure that an adequate seal is achieved each time the respirator is donned and should be completed before entering the contaminated area. To complete a seal check, first place the Seal Check Cap over the exhalation valve of the half mask, ensuring that no air is flowing from the valve. With the respirator in On Mode and while breathing normally, use your fingers to feel around the perimeter of the mask for leaks. For extra sensitivity, breathe out firmly to increase the mask pressure and wet your fingers to make it easier to feel tiny leaks. If there are any leaks, readjust the respirator (harness, adjust button) and try again. Tilt your head down, up, left, and right and check that there are still no leaks. Once you can feel no leaks from the mask, the seal check is complete. Before entering the contaminated area, remove the Seal Check Cap by gently twisting the handle so that one side of the cap comes loose from the exhalation valve. Be careful not the dislodge the exhalation valve cover. See Figure 22.



Figure 21 - Fitting Seal Check Cap







Failure to remove the cap will lead to increased levels of rebreathed Carbon Dioxide, and may result in headache or dizziness. Never leave the Cap in place for more than 2 minutes!

### STEP 6 - INSTALL STERI-PLUS EXHALATION FILTER (OPTIONAL)

To fit the assembled Steri-Plus, align it with the half mask exhalation valve and push it until it clicks into place, ensuring that the vents on the blue outer case of the Steri-Plus are facing in the same direction as the bottom of the mask as shown in Figure 23. If required use your thumbs to help provide a support to push against when clipping the Steri-Plus into place. See Section 16 for information on assembling and changing the Steri-Plus.



Figure 23 - Installing Steri-Plus Exhalation Filter

# 12. Using CleanSpace HALO BIO with the BioHood

If you are using the HALO BIO system, carry out the following additional steps.

# STEP 1 - CHECK MASK SEAL

Check that your mask is configured and fitted with the blue CS3026 BIO Exhalation Valve Cover on the front. See Section 20. Check that your respirator is configured and fitted with the CS3025 HALO BIO Filter, with the blue inlet tube. Don the BioHood. Reach behind your head and pull the rear grommet (rubber patch) over the filter inlet tube until you hear a "snap" and the grommet is sealed around the inlet tube. Press the front grommet (rubber patch) over the mask BIO Exhalation Valve Cover until you hear a "snap" and the grommet seals around the BIO Exhalation Valve Cover. If necessary, support the BIO Exhalation Valve Cover with your other hand, reaching up inside the BioHood.



Have your buddy check that the air vent in the BIO Exhalation Valve Cover is fully through the front grommet and the rear grommet is sealing neatly around the filter inlet tube.

Locate the BIO Seal Check Cap (CS3029), which is a red rubber cap. Fit the cap over the mask BIO Exhalation Valve Cover and push until it snaps into place. Ensure that no air is flowing from the valve. With the respirator in On Mode and while breathing normally, reach up inside the BioHood and use your fingers to feel around the perimeter of the mask for leaks. For extra sensitivity, breathe out firmly to increase the mask pressure and wet your fingers to make it easier to feel tiny leaks. If there are any leaks, readjust the respirator (harness, adjust button etc) and try again. Tilt your head down, up, left, and right and check that there are still no leaks. Once you can feel no leaks from the mask, the seal check is complete. Remove the Seal Check Cap by pulling on the flange around its base. Failure to remove the cap will lead to build-up of Carbon Dioxide in the mask and may result in headache or dizziness.



WARNING If a satisfactory Seal Check cannot be achieved, do not enter the contaminated zone.

#### WARNING



Be sure to remove the Seal Check Cap before entering the contaminated area. The Cap blocks the exhalation valve, making it more difficult for your exhaled air to be expelled from the mask. Failure to remove the cap will lead to increased levels of rebreathed Carbon Dioxide, and may result in headache or dizziness. Never leave the Cap in place for more than 2 minutes!

# **STEP 2 – FIT THE EXHALATION FILTER**

If you are using the BIO Exhalation Filter, fit it now by pressing it onto the BIO Exhalation Valve Cover until you hear a "click". If necessary, support the BIO Exhalation Valve Cover by reaching up inside the BioHood.



# 13. Using CleanSpace HALO With Full Face Mask

Complete the following five (5) steps each time you use your respirator with the Full-Face Mask.

### **STEP 1 - INSPECT**

### Before each entry into a contaminated area, the following inspections must be performed.

- Visually check all parts including the power unit, mask, harness and filter. If parts are missing or damaged replace them only with approved parts before proceeding.
- Check the POWER UNIT for cracks, holes or other damage or missing parts. Do not use the device if
  there is any damage or misuse. Check both bellows for splits or holes. Check that the bellows have not
  become distorted as this may obstruct the air supply to the mask. Check the neck support (if required).
  Check that the battery has enough charge to complete the work period by pressing the Power Button.
  The Battery Indicator Light(s) will illuminate to indicate the approximate charge. Refer to Section 9. A full
  charge is recommended.
- Check the FILTER carefully. The foam seal must be clean and free from damage of any kind. Examine the visible internal surfaces for any sign that dust has penetrated the media. If dust is found, do not use the filter. The body of the filter must be free of cracks or signs of damage. If any sign of impact or scratching is found, discard the filter. Fit the filter to the power unit (see Section 16).
- Check the FULL-FACE MASK to ensure that there are no cracks, tears or dirt; Check the mask is not distorted. Check the mask exhalation valve for damage or dirt build up. If it is dirty, flip up the rain cover. Remove any dirt, hairs or anything that could affect the seal of the valve against its seat. Check that the valve seat is clean. Lower the rain cover. If the valve is damaged, replace it with a new one.
- Check the HARNESS is intact and has good elasticity and the fastening clips can be tightened and loosened. The harness must be adjusted to support the mask to seal comfortably to the face. DO NOT overtighten. Finally check the AirClips can be clicked/unclicked into the power unit.

# STEP 2 – CALIBRATE

This respirator contains a system for synchronising with your breathing and regulating mask pressure. This system should be re-calibrated if it experiences it experiences a change in temperature of more than 20°C. It is best practice to also re-calibrate if the unit has been in storage and the storage temperature is unknown.

Steps to re-calibrate:

- 1. Remove the filter (and mask if fitted) from the respirator and place the respirator on a stable surface such as a table.
- 2. With the CleanSpace respirator in Standby Mode (i.e. one or more battery indicators lit), press the "Power" and "Flow Test" buttons on the keypad at the same time.
- 3. When both the blue and red LEDs light, release both buttons. Do not touch or move the respirator.
- 4. After 5 10 seconds the motor will start and will run for 5 10 seconds.
- 5. When the motor stops, calibration is complete and the battery lights return to indicating battery charge status.
- 6. Re-fit the filter.

**Important Note:** Failure to remove the filter prior to calibration may result in reduced run times. In order to restore the performance of the respirator, calibration must be performed again with the filter removed.

# **STEP 3 – TEST FLOW RATE**

This test checks that the respirator is able to deliver the Manufacturer's Minimum Design Flow of 120 litres/minute.

- 1. Remove the mask if fitted. Leave the filter in place.
- 2. Place the respirator flat on a table or other support.
- 3. Press and release the button marked "Flow Test".
- The respirator will automatically run the Flow Test. Note: During the test, the motor will run fast and air will blow from the left hand bellows.
- After 2 seconds the respirator reports the test result using the LEDs on the keypad. Use the table below to interpret the LEDs.

LIGHTS	Meaning
3 LEDs:	PASS (Excellent: flow >180 l/min)
2 LEDs:	PASS (Good)
1 LED:	PASS (Acceptable)
ALL LEDs	FAIL (Flow <120 l/min)
FLASH	Do not use the respirator until a new filter has been fitted and / or battery fully charged and the test has been repeated with a PASS result. Reset the respirator by pressing the Power button. Fully charge the battery and / or replace the filter. Repeat the flow test. If the respirator fails the test but the filter is new and the battery is fully charged, contact CleanSpace Technology and do not use until it has been evaluated.

Important: The Flow Test is not a battery charge test. Three LEDs means that, as of the moment it is tested, the unit can deliver high flow. It does not mean the battery is full. You must check the battery charge separately. See Section 17.

### STEP 4 - DON THE FULL FACE MASK

### Donning is best done with a buddy to help you check adjustments and fit!

If you have long hair, it is recommended you tie the hair back so that it does not interfere with the harness and the mask seal on the face. To don the Full-Face Mask, follow the steps below.

**Step 1:** Fully loosen all five straps on the mask harness. Hold the mask in one hand while you use the other hand to pull the harness back and away from the mask.





### CHECK THAT THE MASK SEAL DOES NOT CROSS YOUR HAIRLINE

Check all the way around the mask seal, paying particular attention to your forehead and temples. The mask seal must not cross your hairline.



WARNING If you cannot adjust the mask to avoid your hairline, the mask is not suitable for you and should not be worn.

# STEP 5 – MASK SEAL CHECK

It is recommended to do a negative pressure seal check on the mask.

Using your thumbs, block the AirClip air inlets on both sides of the mask. Breathe in sharply. If there is a good mask seal, you should have difficulty drawing air as you inhale. Listen for squeaking or whistling noises which indicate air is leaking past the seal. Hold your breath for 10 seconds. If the mask seal slowly recovers (mask moves away from your face) there is a leak. Readjust the mask fit and repeat the negative pressure seal check. Unblock the AirClip air inlets and resume normal breathing.



#### WARNING



### If a satisfactory Seal Check cannot be achieved, do not enter the contaminated zone.

### **STEP 6 – DON THE POWER UNIT**

### Important: Please read Step 6 all the way through before beginning to don the respirator.

### Fitting the neck support:

With the Full-Face Mask donned, locate your power unit and neck support. There are two sizes of neck support (Small and Medium). Make sure the neck support is the same size that you used for your last successful fit test. Fit the neck support to the power unit. The neck support has keyhole openings that snap over buttons on the power unit case. Place the neck support in position against the buttons and then press firmly towards the power unit to engage the buttons to snap into the keyholes.



#### Familiarise yourself with the power unit

1. Find the Adjust Buttons and the Mask Release Buttons





2. Loosen both bellows to their widest opening



Loosen/Adjust





# 14. Entering and Exiting the Contaminated Area

Prior to entering the contaminated area, complete the inspections and checks listed in these user instructions.

- 1. Ensure Seal Check has been done and motor is responding to your breathing.
- Check no alarms (battery or filter) are sounding or flashing. If your work environment is noisy you may be unable to hear the alarms. In this case you must follow the special precautions set out in Section 15.
- 3. Don the respirator. Check other PPE is being worn if required. Enter the contaminated area.
- 4. Do not remove the respirator until you have left the contaminated area. If you have an acute and spontaneous health episode (i.e. experiencing dizziness) and believe removing the respirator while you leave the contaminated area may help, remove the respirator with caution.
- 5. Leave the contaminated area immediately if any of the following conditions occur:
  - a. Battery or filter alarms trigger.
  - b. Any part of the system is damaged.
  - c. Airflow into the mask decreases or stops.
  - d. Breathing becomes difficult.
  - e. You feel dizzy or your vision is impaired.

- f. You smell or taste contaminants.
- g. Your face, eyes, nose or mouth experience irritation.
- h. You suspect the concentration of environmental contaminants has reached levels at which this respirator may no longer provide protection or the oxygen/carbon dioxide levels change so that PAPRs should not be worn.
- Follow the exiting and decontamination procedures as documented in the workplace Respiratory Protection Program. Follow those procedures with the instructions below when removing the respirator.

### DOFFING THE RESPIRATOR:

Remove the respirator by locating one of the Mask Release Clips (see Section 7) on either side of the respirator. Squeeze the clip and gently pull the power unit from the mask. When the respirator is removed, the motor/airflow will continue to blow for 10 seconds and then automatically switch to Standby Mode when no breathing is detected. There is no need to turn the respirator off. See Figure 24.



Figure 24 - Mask Release Clips

NOTE: Once in Standby Mode (green battery indicators on), if the respirator is not donned (i.e. no breath is detected) within three (3) minutes the power unit will switch into Off Mode (battery indicators off) and the motor will not be triggered by the wearer's breathing.



WARNING

Do not remove the respirator until you have vacated the contaminated area. If you have an acute and spontaneous health episode (i.e. experiencing dizziness) and believe removing the respirator while you leave the contaminated area may help, remove the respirator with caution.

# 15. Working in Noisy Environments

CleanSpace respirators have two audible and visual (2) alarms for battery and filters. If the environment is noisy and the user will not hear the alarms, the following precautions must be taken:

- Do not enter the contaminated zone unless all three green battery indicator lights are illuminated.
- Do not work in a high noise area for more than four (4) hours. At the end of four (4) hours, leave the contaminated zone and check;
  - the filter blocked light is not illuminated; AND
  - o all three green battery indicator lights are still illuminated.
- If two or fewer green battery indicator lights are illuminated, recharge the CleanSpace respirator until 3 lights are showing again (and the 3<sup>rd</sup> one has stopped flashing).
- If the filter blocked light is illuminated, change the filter.
- Be alert for breathing difficulty, increased resistance or air flow stopping. If these things happen, exit the contaminated zone immediately.

# 16. Fitting & Changing the Filter

- Always change the filter outside of the contaminated area and with the respirator doffed.
- CleanSpace filters must NOT be cleaned. Cleaning the filter may cause damage.
- Used filters should be disposed of responsibly and treated as non-recyclable hazardous\* waste (dependent on the contaminant being filtered).
- Change the filter if it is damaged or there is suspected damage.
- Filters should be changed regularly. The frequency of filter replacement depends on several factors: period of
  use, concentration of airborne contaminants, exertion levels and workplace protocols where hazards present a
  risk for cross contamination (i.e. biohazards or asbestos).



WARNING Do not use compressed air or a brush to clean the filter! HEPA filters are very easily damaged by the use of compressed air or by brushing. Misuse of CleanSpace HALO by cleaning the filter may result in overexposure to contaminants and lead to sickness or death.

# **BLOCKED FILTER ALARM**

CleanSpace respirators have a Filter Blocked Alarm that triggers when the filter needs to be replaced. The Filter Blocked Alarm is signalled by a red flashing LED on the keypad and an audible two (2) beeps, repeated every second. When exiting the contaminated area, the audible Filter Alarm can be muted by pressing the Power Button once. The audible Filter Alarm will resume if

- i) After 15 minutes the filter has not been changed, OR
- ii) The device is switched on and redonned without the filter being changed.

#### WARNING



If the blocked filter alarm is triggered (2 beeps, repeated every second, red LED flashes), leave the contaminated area immediately and replace the filter. Operating the respirator after the blocked filter alarm has sounded can cause the flow to fall below the manufacturer's minimum designed flow, which may result in overexposure to contaminants and lead to sickness or death.

# WHEN TO CHANGE THE FILTER

Change the filter when

- The Blocked Filter Alarm triggers audible (2 beeps per second) and visual (red flashing LED).
- The Flow Test indicates that the respirator is not able to produce the Minimum Design Flow.
- The filter is heavily soiled or wet.
- There is any sign of damage or suspected damage to the filter.
- The filter reaches its expiry date. The expiry date is marked on the filter label.
- There are signs of dust or contaminants on the inside surface of the filter.

A respirator with a clean filter will run for much longer than one with a filter that contains dust contaminants. To maximise your work time between battery charges, change the filter often in high dust environments.

### WHEN TO CHANGE THE EXHALATION FILTERS

### CS3027 Exhalation Filter should be changed every time the BioHood is changed and also

- If there is a possibility that it has been splashed with contaminant.
- If there is a possibility that it has been exposed to organic solvents (for instance isopropanol, xylene or toluene) as organic solvents will degrade its performance.
- Do not fit a filter if its expiry date (which is marked on the filter) has passed.

CS3039 Steri-Plus Exhalation Filter is single use only and cannot be cleaned. Dispose of responsibly after use. Do not fit a filter if its expiry date (which is marked on the filter packaging) has passed.

# STEPS TO CHANGE THE FILTERS ON THE CLEANSPACE HALO (CS3002 & CS3025)

- To change the filter on the CleanSpace Halo, unlock the filter cover by pulling the silver pin up. The pin is located on the left side of the power unit (see Figure 25).
- The filter will become loose and fall out. Do not touch the contaminated filter. If necessary, tilt the power unit down so the filter falls out.
- Visually check the area where the filter sits. Ensure there is no dust or liquids on the inside before
  replacing the filter. If necessary wipe the area with a clean cloth or a non-alcoholic cleaning wipe.
- To fit a new filter, locate the short edge on the right-hand side of the filter. Ensure the "CleanSpace HALO" label is the right way up. Fit the short edge to the inside (see Figure 25) on the right of the respirator. Swing the filter shut into the closed position. Hold the filter firmly against the body of the respirator with one hand and press the pin down and back in place. The filter should sit securely in place.







### TESTING THE BLOCKED FILTER ALARM

### After changing the HEPA filter, check that the Blocked Filter Alarm is audible and the Filter LED is working.

- 1. Remove the mask from the power unit. Using your hand, completely cover the air outlet (see Figure 26).
- With the power unit in Standby mode (one or more green battery indicators lit), press and release the Power button. The blue LED will light and the power unit will start blowing. If no LEDs are lit, press the Power button once to enter Standby mode.
- 3. After 5 10 seconds, the red Filter LED will light and the blocked filter alarm will sound (2 beeps, repeated every second).
- 4. Reset the power unit by pressing the Power button. If the red Filter LED does not light or the alarm does not sound, check that the outlet is completely blocked. The outlet is on the left side as you wear the device (see illustration below). If the Filter LED and/or audible alarm are still not working, do not enter the contaminated zone. Contact CleanSpace for assistance.



Figure 26 - Blocking the air outlet for a blocked filter alarm test

# CHANGING THE BIO EXHALATION FILTER

To remove the filter, simply pull it off the BIO Exhalation Valve Cover using a twisting motion. To fit a new Exhalation Filter, press it onto the BIO Exhalation Valve Cover until you hear a "click" and it snaps into place.



# ASSEMBLE THE STERI-PLUS EXHALATION FILTER

To assemble the Steri-Plus, first insert a new exhalation filter (CS3039) to the outer case, ensuring that the filter tabs are positioned in the case slots so that they hold the filter in place. The filter should be oriented in the middle of the case with the 'CleanSpace' text on the side of the filter facing away from the mask. Place the inner case over the filter, align the left-hand side and then close and clip the case shut.



To replace the Steri-Plus Exhalation Filter (CS3039), first remove the Steri-Plus assembly from the mask by pulling it off using a twisting motion. Then, unclip the case, remove the filter and replace it by following the instructions detailed above.



# 17. Battery Information



WARNING CleanSpace HALO is not intrinsically safe. Do not use in flammable or explosive atmospheres. Doing so may result in injury or death.

#### WARNING



Always correctly use and maintain the internal lithium ion battery packs. Failure to do so may result in fire or explosion or could adversely affect respirator performance and result in injury, sickness or death. Do not charge the on-board battery with unapproved chargers, in enclosed cabinets without ventilation, near flammable liquids or gases, or near sources of high heat. Do not immerse the device in water. Do not use, charge or store the device outside the recommended temperature limits.

#### WARNING



The Power Off State is considered to be an abnormal situation. Although respiratory protection will still be provided the level of protection will be reduced in comparison to the Power On State.

### ASSESSING STATE OF BATTERY CHARGE

The level of battery charge is indicated by the three (3) green battery LEDs on the keypad. **The power unit should not be worn when on charge.** The battery LEDs allow the wearer to estimate the charging level of the battery (see table below).

To ensure the battery is 100% charged plug in the charger and wait until all three (3) green Battery LEDs light solidly without flashing.

With the unit NOT on charge		
Green LEDs	Charge	Approximate Run Time*
•••	85 - 100%	4 – 8 hours
••	15 – 85%	1 – 4 hours
•	5 – 15%	Recharge! (20min to 1 hour)

\* Operating time is strongly affected by mask seal, work rate, and other factors. The operating times quoted above are average durations at moderate work rates at sea level. Actual operating times may vary widely from the quoted average durations.

### CHARGING THE BATTERY

The battery must only be charged with a CleanSpace Battery Charger. To charge the battery.

- Turn the power unit upside down.
- Locate the charging port. See Figure 27.
- Insert the charger connector into the charging port.
- Ensure the charger is plugged into a power source.
- The green battery LEDs on the keypad should light up and be flashing as the power unit charges.
- The power unit can be charged at temperatures between 0°C to 35°C. The battery will not charge outside of this temperature range.



Figure 27 - Charging Port

Check that at least one of the green battery LEDs on the keypad is on and flashing. If none of the LEDs are flashing, the unit is not charging. Check the charger is connected securely to the power unit and the power source. If the power unit is still not charging, contact CleanSpace Customer Service sales@cleanspacetechnology.com or visit our website: www.cleanspacehealth.com.

- Charging is complete when the power unit shows three (3) green solid lights. If the third green LED is flashing rapidly, charging is 95% complete.
- When the power unit is fully charged, disconnect the charger cable from the charging port.
- IMPORTANT: The power unit should NOT be worn when on charge.

Do not charge the battery in electro-magnetic environments (such as near welding machines) as it may damage the electronics.

### LOW BATTERY ALARM

CleanSpace respirators have a Low Battery Alarm that is both audible (3 beeps, repeated every second) and visual (green LEDs) that triggers when the battery has low charge. At moderate work rates, this may be 5-15 minutes run time (depending on filter loading). Unlike the filter alarm, the Low Battery Alarm cannot be muted. The Low Battery Alarm will turn off when the power unit is charging or when it is in Off Mode (see Section 9). When the battery charge is extremely low, the motor and airflow will stop.



WARNING If the battery alarm sounds (3 beeps, repeated every second), leave the contaminated area immediately and re-charge the battery. Operating the respirator after the low battery alarm has sounded can cause the flow to fall below the manufacturer's minimum designed flow, which may result in overexposure to contaminants and lead to sickness or death.

### **GENERAL BATTERY INFORMATION**

CleanSpace respirators have an internal lithium ion (Li-ion) polymer battery. Lithium ion (Li-ion) batteries have the highest energy density of all battery types and are widely used in portable electronic devices. The commonly available Li-ion polymer batteries are packaged in a soft polymer film. The soft packaging allows the cells to expand under extreme heat, making the battery safer in fault conditions. CleanSpace respirators use quality Li-ion polymer batteries and are designed to be viable over a minimum of 500 complete charge and discharge cycles while still maintaining at least 70% of their specified full capacity.

# POWER UNIT STORAGE

To maintain the integrity of the internal battery, the power unit must be stored under the following conditions when not being used:

Long term storage (> 30 days) Short term storage (< 30 days) 18°C to 28°C, 30% - 50% RH -10°C to 35°C, 30% - 50% RH

### The following precautions must be followed during use:

- Avoid mechanical shocks or impacts from any sharp or hard objects.
- Do not charge or use the respirator if there are any signs of severe mechanical damage.
- The respirator will stop functioning if its internal temperature rises above 60°C or falls below -10°C.
- Do not dispose of the respirator in a fire.
- Do not use the respirator in heavy rain, or allow it to get wet or immersed in liquid.
- Do not disassemble the power unit case. Disassembly will void the Manufacturer's Warranty. There are
  no user serviceable parts inside.



#### WARNING

In the extremely rare circumstance that the battery is damaged and electrolyte comes in contact with eyes, flush with water immediately and seek urgent medical attention.

# 18. Cleaning

We recommend that you clean your respirator after every use. The power unit, mask, neck support and harness should be cleaned separately. To start, remove the mask, neck support and harness from the power unit before cleaning. Note: The methods to clean the equipment (outlined below) are not a disinfection or sterilisation protocol. If disinfection or sterilisation is required, contact CleanSpace Customer Service sales@cleanspacetechnology.com or visit our website:www.cleanspacehealth.com and download the recommended protocols for disinfection and sterilisation.

# CLEANING THE HALF MASK, HARNESS AND NECK SUPPORT

Before washing the mask, remove the valve cover. To do this, locate the snap feature on the cover that secures it to the valve seat. This feature is located on the bottom edge of the valve seat. Using your thumb nail or a small blunt object such as a pen, press on the snap until the cover springs free of the valve seat. This is shown in Figure 28. For information on removing the BIO Exhalation Valve Cover (CS3026) see Section 20. Removing the valve cover allows you to see the valve and check that there is no dust or contaminants present.



Figure 28 – Removing Standard Exhalation Valve Cover

Once this is complete, the half mask can be cleaned using one of two methods.

### 1. Non-Alcohol Disinfectant or Cleaning Wipes

- Non-alcoholic cleaning wipes are impregnated with benzalkonium chloride, a bactericidal solution ideally suited for face pieces that are going to be worn in the near term/same day. Wipes containing alcohol or more stringent cleaning agents should be avoided if the mask is not going to be washed before being worn.
- Wipe the mask inside and out. Gently lift and wipe the mask exhalation valve leaf edge. Replace the mask exhalation valve cover before use by snapping it back in place.

### 2. Warm soapy water or an industrial washer

- The mask can be washed with a mild detergent in warm water or an industrial washer.
- Use water and drying temperatures less than 50°C.
- For hand washing use a soft brush or sponge to remove stubborn dirt or grit.
- For the mask exhalation valve, with the valve cover removed, gently wash the warm water solution through the
  valve and use a sponge to gently clean the valve surface.
- Rinse the mask thoroughly in fresh water to remove cleaning residue. IMPORTANT: Not rinsing the mask
  thoroughly, may result in residue from cleaning solution causing irritation to the wearer's skin or may
  cause the exhalation valve to stick.
- Replace the mask exhalation valve cover before use by snapping it back into place. .

### Drying the mask

After cleaning allow the mask to air dry in a clean environment, valve up to prevent water pooling. Do not dry the mask by exposing directly to heat i.e. hair dryers or heaters. The mask can also be hand-dried with a clean, lint-free cloth. IMPORTANT: Cleaning can cause the exhalation valve leaf to stick. Before use, check that the exhalation valve leaf operates freely by gently lifting the valve. Replace the mask exhalation valve cover before use.

#### WARNING

The Steri-Plus and HALO BIO Exhalation Filters (CS3039 and CS3027) are electrostatic filters and their performance will be degraded by exposure to certain organic solvents including isopropanol (IPA), xylene and toluene. Always remove the Exhalation Filter before cleaning the mask. If there is a possibility that the Exhalation Filter has become contaminated with any solvent, replace it.

### WARNING

Never dry the mask or exhalation valve with a cloth that may leave behind lint. Lint contamination of the exhalation valve may cause it to leak, resulting in overexposure to contaminants and lead to sickness or death.

# CLEANING THE FULL-FACE MASK

The full-face mask harness can be left attached to the mask. Carrying out the following steps prior to cleaning the mask improves access.

- 1. Remove the orinasal piece Pinch the two orinasal piece snaps together and pull the top of the orinasal back. Withdraw the orinasal piece from the main mask. See Figure 29.
- 2. Raise the rain cover. See Figure 30.



Figure 29 – Remove inner mask



Figure 30 - Raise rain cover

Once this is complete, the full-face mask can be cleaned using two methods.

### 1. Non-Alcohol Disinfectant or Cleaning Wipes

- Non-alcoholic cleaning wipes are impregnated with benzalkonium chloride, a bactericidal solution ideally suited for face pieces that are going to be worn in the near term/same day. Wipes containing alcohol or more stringent cleaning agents should be avoided if the mask is not going to be washed before being worn.
- Clean all surfaces of the mask with a wipe, including the valve leaf.

### 2. Hand wash in warm soapy water

- Wash the mask thoroughly with a mild detergent in warm water (less than 50°C).
- A soft brush or sponge can be used to remove any stubborn dirt or grit.
- To clean the exhalation valve, gently wash the warm water solution through the valve from the inside and use a sponge to gently clean the valve surfaces. Remember to lower the rain cover again when done.
- Rinse the mask and valve well in warm running water. IMPORTANT: If the mask is not rinsed thoroughly, residue from cleaning solution may irritate the wearer's skin or cause the valve to stick.

### Drying the mask

After cleaning, allow the mask to air dry in a clean environment, valve up to prevent water pooling. The mask can also be hand-dried with a clean, lint- free cloth. IMPORTANT: Cleaning can cause the exhalation valve leaf to stick. Before use, check that the exhalation valve leaf operates freely by gently lifting the valve. Do not dry the mask by exposing directly to heat i.e. hair dryers or heaters.



WARNING Never dry the mask or exhalation valve with a cloth that may leave behind lint. Lint contamination of the exhalation valve may cause it to leak, resulting in overexposure to contaminants and lead to sickness or death.

### Reassembling the Mask

- Refit the orinasal piece The frame of the orinasal piece has two ribs on the bottom. Fit these into the 1 slots in the bottom of the main valve block. Push the top of the orinasal piece firmly forwards until both snaps engage, holding it in place against the main valve block. See Figure 31.
- 2. Lower the rain cover. See Figure 32.



Figure 31 - Refit the inner mask



Figure 32 - Lower the rain cover



WARNING

Using a full-face mask with the rain cover raised can cause the exhalation valve to vibrate, which you may notice as a buzzing noise. Lower the rain cover for correct operation.

# **CLEANING THE POWER UNIT**

- Remove the used filter. Used filters should be disposed of responsibly and treated as non-recyclable hazardous\* waste (dependent on the contaminant being filtered).
- IMPORTANT: Insert the CleanSpace Halo Cleaning & Storage Plug (CS3011) into the filter inlet and two bellow air outlets. Using the Cleaning & Storage Plug (CS3011) prevents dust or liquids from entering the air path of the power unit.
- Cleaning wipes or a cloth soaked with cleaning agent can be used to wipe down the outside of the power unit. After cleaning, use a clean cloth to remove the cleaning agent.
- Allow the power unit to air dry in a clean environment. The power unit can also be dried with a clean lint-free cloth. Note: Do not dry the power unit by exposing to heat (i.e. hair dryers or heaters) or compressed air.
- When dry, store the power unit with the Cleaning Storage Plug (CS3011) in place to prevent dust and liquids entering the air path.
- If the power unit is to be used immediately after cleaning, insert a clean filter and lock in place ready for use.



### WARNING

The power unit contains a battery, sensitive electronics and a motor. Always use the CS3011 cleaning plug when using anything wetter than a damp cloth to clean it.

### CLEANING THE HARNESS AND NECK SUPPORTS

The harness and neck supports can be washed using the same methods as the half mask. After cleaning, allow the harness and neck supports to air dry in a clean environment.

Note: Do not dry the harness or neck supports by exposing directly to heat e.g. hair dryers or heaters.

### CLEANING THE VALVE COVERS (PAF-1111, CS3026) & STERI-PLUS FILTER CASE (CS3038)

The exhalation valve covers (PAF-1111 & CS3026) and the CS3038 Steri-Plus Exhalation Filter Cover can all be cleaned using the methods described for the half mask; or disposed of and replaced with new ones, depending on the disinfection policies of the user.

### DISPOSING OF BIOHOOD. BIO EXHALATION FILTER AND STERI-PLUS EXHALATION FILTER

Neither the BioHood (CS3024) or the Exhalation Filters (CS3039, CS3027) can be cleaned. Dispose of after use.

# Recalibration

See Section 11 for information on how to calibrate your respirator.



WARNING

You must recalibrate the internal pressure sensor any time that your CleanSpace HALO is exposed to changes in temperature of more than 20°C. It is best practice to also re-calibrate if the unit has been in storage, particularly if the storage temperature is not known.

# 20. Changing Half Mask Exhalation Valve Covers

The mask can be configured to use either the Standard Valve Cover or the BIO Valve Cover. To change between the two, follow the instructions below.

- To remove the Standard Valve Cover, locate the snap feature on the cover that secures it to the valve seat. This feature is located on the bottom edge of the valve seat. Using your thumb nail or a small blunt object such as a pen, press on the snap until the cover springs free of the valve seat. See Figure 33.
- To fit the Standard Valve Cover, locate the small prong on the Valve Cover into the matching hole in the valve seat. Rotate the Valve Cover towards the mask until the snap on the Valve Cover engages the matching opening in the valve seat.
- To remove the BIO Exhalation Valve Cover, grasp the bottom of the mask (where the size marking is located) in one hand and the BIO Exhalation Valve Cover in the other, and separate them by pulling apart along the bottom edge of the Valve Cover. See Figure 34.
- To fit the BIO Exhalation Valve Cover, grasp the bottom of the mask (where the size marking is located) in
  one hand and the BIO Exhalation Valve cover in the other. Orient the Valve Cover air outlet so that it points
  towards the size marking on the mask (i.e. down when in use). Position the top edge of the Valve Cover
  against the silicone mask just above the body of the exhalation valve. Push the BIO Exhalation Valve Cover
  firmly towards the mask until it snaps into place and is securely fastened to the valve seat. See Figure 35.

Important: After installing either Valve Cover, ensure the valve flap is flat and sealed against the valve body by inspecting the interior of the valve body.



Figure 33 – Removing Standard Exhalation Valve Cover



Figure 34 – Removing the BIO Exhalation Valve Cover



Figure 35 – Fitting the BIO Exhalation Valve Cover

# 21. Appendix - Performing a Quantitative Fit Test

A fit test must be performed during initial selection of a respirator, or whenever the user's face changes shape (for instance due to weight gain or loss) and at least annually. The test is performed using a machine that compares the concentration of particles in the mask with that in the surrounding atmosphere. One example is the PortaCount Respiratory Fit Tester, made by TSI Incorporated. Mask fitting must be carried out by a specialist / designated mask fitter.

# PERFORMING A QUANTITATIVE FIT TEST WITH A HALF MASK

To carry out a quantitative fit test with a Half Mask your specialist mask fitter will require **PAF-0025 PortaCount Adaptor** and the **accompanying S005-7174 Quantitative Fit Test Instructions**. The PortaCount Adaptor is an accessory that fits between the mask and the exhalation valve and allows the air in the mask to be sampled. It comes with detailed instructions on how to carry out a quantitative fit test.

# PERFORMING A QUANTITATIVE FIT TEST WITH A FULL FACE MASK

CleanSpace Full Face Masks come with a built-in sampling port and a sampling ball accessory which make it quick and easy to carry out a fit test. To set up for the test, do the following. **Firstly, we recommend you remove the orinasal piece as this makes access easier.** 



After completing these steps, refit the orinasal piece, don the respirator and complete the fit test following the protocol provided with the fit testing machine. A CleanSpace respirator with the Power On should achieve a fit factor above 1000. If your result is below 1000 adjust the mask and try again.

WARNING



If a satisfactory quantitative fit factor or passing qualitative test cannot be achieved with any of the masks, CleanSpace HALO must not be used. A satisfactory quantitative fit factor is

Test Type	Half Mask	Full Face Mask
Power On	1000	1000
Power Off	100	500

At the end of the fit test, do the following to prepare your mask for use.

- Remove the Sensing Ball from the socket. Refit the orange plug to the Sensing Ball socket. Push it all the way in.
- Remove the sensing tube from the fit test port. Refit the plug to the fit test port.
- Lower the rain cover. If the rain cover is raised during use the exhalation valve can vibrate.



WARNING

To check that the test port plug is fitted correctly (after using the on-board fit test ports), a negative pressure Seal Check shall be performed – see page 19.



WARNING Using a full-face mask with the rain cover raised can cause the exhalation valve to vibrate, which you may notice as a buzzing noise. Lower the rain cover for correct operation.

# 22. Approvals

Area	Description	
Europe (CE)	Notified Body: BSI (2797)	
	Notified Body Address: Say Building, John M. Keynesplein 9, 1066 EP Amsterdam,	
	Netherlands	
	Standard: EN12942:1998/A2:2008	
Australia	Standard: AS/NZS 1716:2012	

Tests were undertaken by BSI to validate that the CleanSpace HALO is a Category III PPE with class design TM3, according to REGULATION (EU) 2016/425 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL and EN12942:1998/A2:2008. HALO is intended to protect against substances and mixtures which are hazardous to health and harmful biological agents, as listed in Annex I of EU 2016/425. The conformity assessment undertaken to verify the risk classification was a Module B EU-type examination and a Module D quality assurance of production processes. These Modules are listed in Annex V and VIII of Regulation (EU) 2016/425. CleanSpace HALO Filters are Class TM3P R SL Particulate Filters as listed in I.S. EN 12942:1998/A2:2008. Requirements 6.1 to 6.17 of EN12942 were satisfied by the CleanSpace HALO respiratory system when tested by BSI as a part of a Module B EU-type examination.



WARNING European users should be aware that all markings on the HALO filters refer to the standard EN 12942 (1998) + A2 (2008), Class III, TM3 and should not be confused with any other standard.

The Declaration of Conformity for CE can be accessed at: <u>cleanspacetechnology.com/eu2016-425/</u>

# SIGNIFICANCE OF MARKINGS

Marking	Meaning
Í	See information supplied by the manufacturer.
1	Manufacturers recommended storage conditions - temperature.
Ť	Manufacturers recommended storage conditions – humidity.

# 23. Specifications

Air Flow	Greater than 120 litre/minute.
	Breath-responsive, with maximum inflow to mask of 120 – 220 litres per minute, dependant on filter loading, altitude and battery condition.
Operating Temperature	-10°C to 45°C.
Range	The motor will shut down while the temperature of the battery pack is above $60^{\circ}$ C or below -10°C.
Operating Humidity Range	Zero to 90%, non-condensing.
Operating Altitude Range	Approximately sea level to 3000m.
Charging Temperature	0°C to 35°C.
Range	The battery will not accept charge outside of this range.
Storage Conditions	Short term storage under 30 days: -10°C to 35°C & 30% - 50% RH.
	Long term storage (> 30 days): 18°C to 28°C & 30% - 50% RH.
	Out of direct sunlight, in a clean, dry environment.
Battery	Lithium Ion Polymer - 1800 mAh
Run Time	On EN12942 Duration Test: 4.5 hours.
	Run time is impacted by work rate, mask leak, filter dust loading, altitude and other
	factors. Run times may vary widely. Actual use time is likely to range from around 4 hours (heavy work, clogged filter, higher altitude) to around 8 hours (light work, clean filter, sea level).
	IMPORTANT: Short run times (under 4 hours) may be a sign of poor mask fit – seek
	advice from a trained safety specialist or CleanSpace Support at
	www.cleanspacehealth.com
Recharge Time	2 hours (to 95%).
Low Battery Voltage Alarm	Triggers when the remaining run time is around 5 to 15 minutes.
	Audible alarm, 3 beeps, repeated every second, 75dB(A) at ear.
Filter Blocked Alarm	Triggers when the filter loading is high and the filter requires replacement.
	Audible alarm: 2 beeps repeated every second, 75dB(A) at ear.
	Visual alarm: Red filter LED flashes.

Charger	Input: 100 – 240VAC, 50 – 60 Hz.	
Weights	Complete system: 540g (respirator, filter, half mask, neck support, harness).	
	Full Face Masks: 745g.	
	Half Masks: 120g to 150g.	
Intrinsic Safety	CleanSpace HALO is not an intrinsically safe system.	
Suitable Packaging	The respirator is shipped in a suitable carton box made from cardboard. The filters	
	are shipped in a plastic vac-formed container.	

# 24. Product and Accessory Information

Product	Product	Description
CS3001	Respirator	HALO Power Unit (includes case, internal battery, motor and electronics)
CS3002	Filter	HALO Standard TM3/P3 Filter
CS3025	Filter	HALO BIO TM3/P3 Filter
CS3003	Mask	Half Mask – HALO Small
CS3004	Mask	Half Mask – HALO Medium
CS3005	Mask	Half Mask – HALO Large
CS3006	Mask	Full Face Mask with Harness – HALO Small
CS3007	Mask	Full Face Mask with Harness – HALO Medium / Large
PAF-1111	Mask Component	Standard Exhalation Valve Cover
CS3026	Mask Component	BIO Exhalation Valve Cover
CS3008	Harness	Harness - HALO
CS3009	Neck Support	Neck Support – HALO Small
CS3010	Neck Support	Neck Support – HALO Medium
PAF-1101	Accessory	Charger Universal - Multi
PAF-1009	Accessory	Seal Check Cap
CS3029	Accessory	BIO Seal Check Cap
CS3024	Accessory	BioHood
CS3027	Accessory	BIO Exhalation Filter
CS3038	Accessory	Steri-Plus Exhalation Filter Case
CS3039	Accessory	Steri-Plus Exhalation Filter
CS3011	Accessory	Cleaning and Decontamination Plug
CS3013	Accessory	CleanSpace Respirator ID Panels (different colours)
CS3015	Accessory	CleanSpace Mask ID badges (different colours)
CS3014	Accessory	Charging & Storage Station (charges and holds 8 units)

# 25. Product Warranty

This product has been manufactured using quality parts and processes. CleanSpace Technology Pty Ltd warrants that the product is free from defective workmanship and parts for a period of three (3) years from the date of original purchase provided the product has been used, cleaned and maintained in accordance with these instructions and CleanSpace's recommendations. This warranty does not include consumable parts, such as filters and face masks, which must be replaced regularly by the user. Consumable parts are warranted up to the point of use, provided they have been stored correctly and are within their expiry date.

This warranty does not cover:

- Where the product has been used for industrial purposes outside the recommendations of CleanSpace Technology Pty Ltd;
- Where damage has been caused by misuse, neglect, accident, or excessive wear and tear.

Any claim under this warranty must be made within three (3) years of the date of purchase of the product. All warranty claims must be made by returning the defective product to your supplier together with the proof of purchase. The purchaser is responsible for all freight. In the event that any part of the product is found by CleanSpace to be defective, CleanSpace will either repair or at its discretion replace the faulty part.

This warranty is given by:

CleanSpace Technology Pty Ltd, (ABN 24 146 453 554) Unit 5, 39 Herbert Street, St. Leonards, NSW 2065 Australia; T. +61 2 8436 4000 | E. sales@cleanspacetechnology.com

This warranty is provided in addition to other rights and remedies you have under law. You are entitled to replacement or refund for a major failure. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

### **Disclaimer:**

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