

## Chapter 1 – Product Information

### 1.1. About Biological Safety Cabinets (BSCs)

S1

Biological safety cabinet plays a significant role in any laboratories that handle biological materials. It is a primary containment device that is designed to protect the operator and environment from biological hazards that would otherwise pose a threat to human life and the environment. Class II Biological Safety Cabinet is additionally designed to provide product protection to eliminate or at least minimize the product contamination from outside contaminants or from cross-contamination of products worked on inside the work zone.

We encourage you to learn more about the functions and operating principles of your biological safety cabinet. We also further encourage you to conduct a risk assessment on your work with your safety professional to determine the biological safety cabinet you require. The information below is provided to help you with your risk assessment.

### 1.2. Quick View AC2 G3

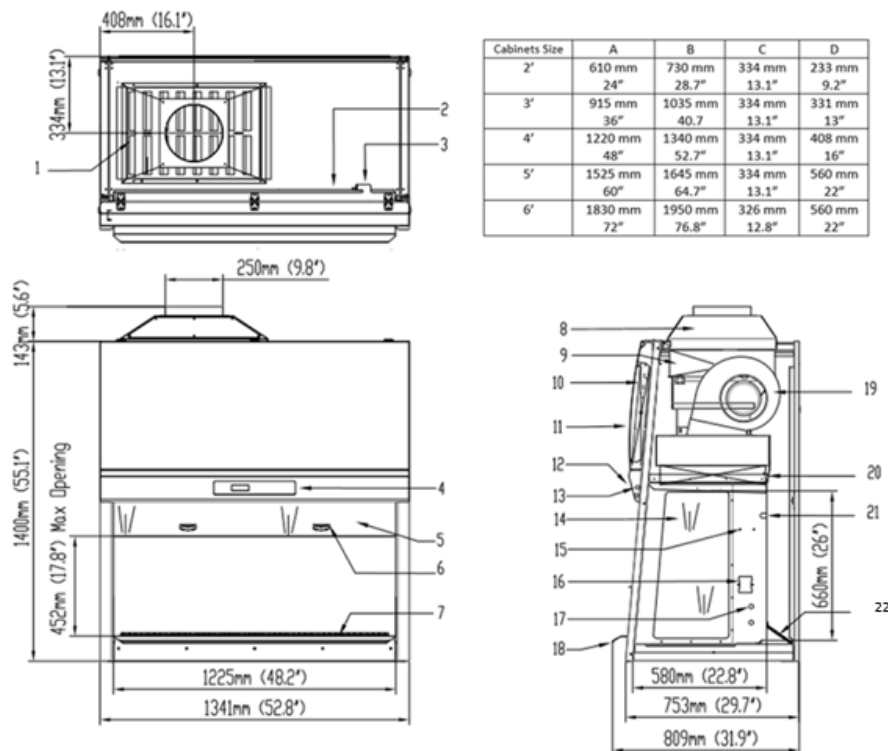


Figure 1.1. AC2 Gen 3 General Parts

- |                                 |                              |                                       |
|---------------------------------|------------------------------|---------------------------------------|
| 1. Airflow Sensor               | 8. Exhaust Collar (Optional) | 15. IV Bar Retrofit Kit Provision     |
| 2. RS232 Port                   | 9. Exhaust ULPA Filter       | 16. Electrical Outlet Kit Provision   |
| 3. Power Inlet                  | 10. Electrical Panel         | 17. Service Fixture Kit Provision     |
| 4. Sentinel Gold Control System | 11. Curved Front Panel       | 18. Stainless Steel Armrest           |
| 5. Sash Window                  | 12. Display Panel            | 19. ECM Blower                        |
| 6. Sash Handle                  | 13. Fluorescent Lamps        | 20. Downflow ULPA Filter              |
| 7. Work tray                    | 14. Side Window              | 21. UV Lamp                           |
|                                 |                              | 22. Paper Catch (optional pre-filter) |

### 3.2.4.2 New FAN PIN (Default 0000 - DISABLED)

FAN PIN restricts access to fan control and some parts of the menu, settings and set mode. User must enter the four-digit PIN before switching the fan on or off. This feature prevents unauthorized personnel from accessing critical control sections. It will also prevent unauthorized shutdown of the BSC when continuous operation is required. FAN PIN is also needed to disable the alarm when the sash is fully raised, and cleaning needs to be performed.

It is recommended that the FAN PIN be issued only to personnel authorized to use the BSC. With FAN PIN, the user can access admin and set mode parts of the menu.

Setting the PIN to 0000 will disable this feature. The FAN PIN is disabled by default. When the FAN PIN is disabled, the BSC can be turned on and off without requiring PIN. However, to access the menu, the user is still required to enter the FAN PIN (0000).



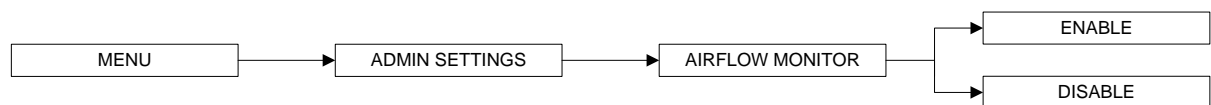
### 3.2.4.3 Airflow Monitor

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Whenever the air velocity falls below the fail point, the air fail alarm will be triggered. This option is used to enable/disable alarm. The alarm is enabled by default.

When the Airflow Monitor is disabled, the warm-up period is removed but the airflow will not be displayed for the first three minutes.

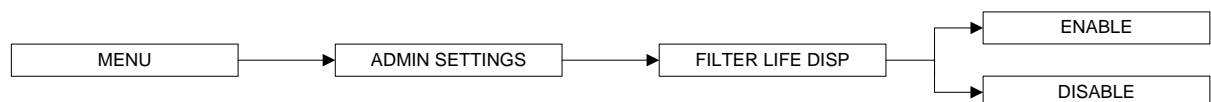
If the ambient temperature is outside of 18-30°C (which is the cabinet working temperature), the Airflow Monitor is automatically disabled.



### 3.2.4.4 Filter Life Display

Using this option, the user can select whether the filter life is displayed or not.

Filter life is calculated based on the filter hour meter (F/H/M). The filter life display will count down according to the number of hours left in the filter hour meter with respect to filter life expectancy of 10,000 hours. When the filter is changed, the F/H/M must be reset (please see section 3.2.4.8 to reset the F/H/M). Please note that the life of the filter is dependent on multiple factors which include environmental air cleanliness. A dirty / dusty environment will load the filter fast.

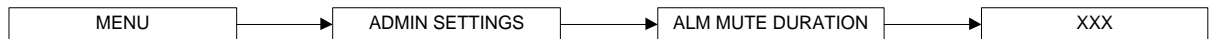


### 3.2.4.5 Set Language

Using this option, the user can select the language of messages displayed on the LCD.

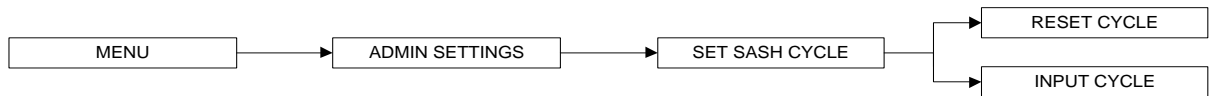
### 3.2.4.11 Alarm Mute Duration

**S22** To mute unsafe sash height and air fail alarm for a certain period. The mute period can be set from 0 up to 299 seconds; the default value is 30 seconds. Alarm will be activated when sash is not in the working height and when the inflow velocity is below the value prescribed by the standard the cabinet is designed or certified to.



### 3.2.4.12 Set Sash Cycle (Not applicable to non-motorized sash BSC)

To reset the sash cycles, count to zero or to input the sash cycle count manually. The maximum value of sash cycles is 16,000 and after which the motor needs to be replaced (e.g. as part of the preventive maintenance program). The cycles will raise every sash move to up and down.

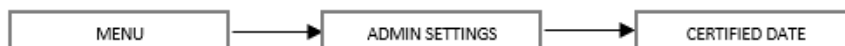


Warning message will be shown after the cycle value reaches 15,000.

- 1st warning: “Replace Sash Motor” – after sash reached 15,000 cycles.
- 2nd warning: “Stop Using Sash” - after sash reached 15,500 cycles.
- 3rd warning: “Sash Motor Locked” (sash motor cannot operate) - after sash reached 16,000 cycles.

### 3.2.4.13 Date Certified

This option is used to input the date the cabinet was certified. The year can be adjusted from 2000 to 2099.



## 3.3. Stopwatch and Experiment Timer (Only for non-motorized sash BSC)

- The stopwatch function can be started by pressing the UP button while the sash is in the safe/ready position. Pressing UP button again while the stopwatch function is activated will stop and resume the timer. Use the DOWN button to exit the stopwatch function and reset the timer. The timer in the stopwatch function is counting up and is shown using the HH:MM:SS format.
- The experiment timer can be started by pressing the DOWN button while the sash is in the safe/ready position. Pressing DOWN button while the experiment timer function is activated will stop and resume the timer. Use the UP button to exit the experiment timer function and reset the timer. The timer in the experiment timer function is counting down and is shown using the HH:MM:SS format. Operator can use the SETTINGS | EXPERIMENT TIMER menu (refer to section 3.2.1.3) to set the experiment timer.

### 3.4. Alarms and Warnings

A BSC uses alarms to indicate that the condition inside the BSC is not safe for the operator, so check the LCD display to understand the cause of these alarms. The most common alarm is the SASH ALARM, which indicates that the sash is neither at the normal operating height nor at fully closed position (UV mode) – this condition can easily be corrected by putting the sash at the appropriate operation position.

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Other alarms that indicate a failure or an error in the BSC system:

- **AIRFLOW: NO!** will be displayed if there is an airflow failure.
- **SASH: ERROR POSITION** indicates a failure in the sash detection system.
- **SENSOR UNCALIBRATED** will be displayed if the airflow velocity sensor is not yet calibrated.

*Note: If the message "Call Service for re-certification" is displayed, it means the BSC certification has expired. Call service or Esco's local distributor for re-certification.*

### 3.5. Diagnostic Mode

Diagnostic mode can be accessed by pressing the SET button. The diagnostic mode allows the user to know the condition of the BSC or help the service engineer during maintenance and troubleshooting.

On Screen	Explanation
MODE	Shows which mode is active: NORMAL MODE, QUICKSTART MODE or MAINTENANCE MODE
VERSION	Shows the version of the software; e.g.: CP104D V 1.0
TEMPERATURE	Shows the temperature inside the cabinet.
B/H/M	Blower Hour Meter – increase by the hour.
SASH CYCLE	Shows the cycle of sash moving. Maximum cycle is 16000.
FILTER LIFE	Shows percentage of filter life (based on Filter Hour Meter) and expected filter life of 10000 hours.
AF OUT TEMP	Velocity display status when temperature out of range
UV LIFE	Shows percentage of UV lamp life (based on UV Lamp Hour Meter).
UV TIMER	Shows the UV timer value – default is 60 minutes. Maximum value is 00 minutes (infinite on).
MUTE TIMER	Shows the mute timer value – default is 30 seconds. Maximum value is 299 seconds.
ADC IFF	ADC for Fail Point Inflow – calculated using offset based on Inflow Nominal Point.
ADC IFN	ADC for Nominal Point Inflow – based on field calibration.
ADC IFA	ADC for Actual Inflow – showing real time sensor reading.
ADC IF0	ADC for factory calibrated Zero Point Inflow (no inflow).
ADC IF1	ADC for factory calibrated Fail Point Inflow.
ADC IF2	ADC for factory calibrated Nominal Point Inflow.
DFN	Nominal of Downflow – keyed in during factory or field calibration.
CONSTANT	Airflow sensor constant. This value is needed when ordering a new sensor.
CALIB TEMP	Temperature when the factory calibration was performed.
ADC TEMP	ADC value for TEMPERATURE.
M_SWITCH1	Shows the condition of magnetic switch 1 – fully open position.
M_SWITCH2	Shows the condition of magnetic switch 2 – safe position.

## Chapter 5 – Maintenance

### 5.1. Scheduled Maintenance

Proper and timely maintenance is crucial for trouble-free functioning of any device and your Esco BSC is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested hereunder in order to obtain optimal performance from your Esco BSC.

No.	Description of Task to Perform	Maintenance to be carried out every					
		Day	Week	Month	Quarter	1 Year	2 Years
1	Surface decontaminate the work zone	√					
2	BSC power-up alarm verification	√					
3	Perform thorough surface decontamination on the drain pan		√				
4	Check the paper catch for retained materials		√				
5	Clean UV lamp (where present) of any dust and dirt		√				
6	Clean the exterior surfaces of the BSC			√			
7	Clean the sash window			√			
8	Check all service fixtures (where present) for proper operation			√			
9	Inspect the BSC for any physical abnormalities or malfunction				√		
10	Clean stubborn stains on stainless steel surfaces with MEK				√		
11	Recertification					√	
12	Check the cabinet's functionality					√	
13	Change UV Lamp (where present)					√	
14	Change the fluorescent lamps						√

#### Cleaning the BSC

- Clean the work surface and walls with appropriate disinfectant and soap water afterward.
- Clean the sash window with appropriate disinfectant and glass cleaner afterward.
- Use a damp cloth to clean the exterior surface of the BSC, particularly on the front and top in order to remove dust that has accumulated there.
- Use sterile water to finish the cleaning and wash away any residue of disinfectant, soap, water and glass cleaner.
- For removing stubborn stains or spots on the stainless-steel surface, make use of MEK (Methyl-Ethyl-Ketone). In such cases, make sure that you wash the steel surface immediately afterwards with sterile water and some liquid detergent. Use a polyurethane cloth or sponge for washing. Regular cleaning of the stainless-steel surface helps retain the attractive factory finish.
- Ensure that the chemicals used are compatible with one another.
- Use appropriate personal protective equipment (PPE) when carrying out the activity.

#### Test the audible and visual alarm

**S22** The simplest method by far would be to move the sash until the glass window is no longer in the sash ready or UV mode position.

#### Check the cabinet's functionality

- Check the BSC's mechanical functionality (e.g. sash window).
- Check the BSC's electrical functionality (e.g. fluorescent lamp – replace if necessary).
- Check the BSC for any defect and if any, repair immediately.