

# OPERATING INSTRUCTIONS

BioCloud® Safe Space Technology for SARS-CoV-2 Detection

## Operating Features



### AIR SAMPLING PUMP

- Draws in ambient air from the flow through vents at rate of 4 to 12 Litres per minute, through the virus collection system where the air sample is condensed, optimized, and collected for analysis in the Viral Targeting System
- Volume of air that is sampled varies automatically depending on size of room and parameters monitored



### AIR CIRCULATION FANS

- Air circulation fans can assist in moving higher volumes of air through the BioCloud® analyzer and promote air circulation within a space ensuring optimum sampling of the air in the room.
- For those areas and spaces where air circulation may be limited BioCloud can be modified to increase the volume of intake air for sampling up to 150 cubic feet per minute (cfm).



### SARS-COV-2 DETECTION CHAMBER / CAPTURE SYSTEM

A key component of the BioCloud system is the proprietary SARS-CoV-2 Detection Chamber which uses both a viral collider and a chemical process to trap and identify the SARS-CoV-2 virus particles via optical sensors spectroscopy.



### COMMUNICATION & REMOTE ALERT SYSTEM

BioCloud® can be integrated with standard industry network protocols such as BACnet (Building Automation Controls Network) for advanced applications, or Modbus for industrial applications. Integrated Wi-Fi (802.11 A/B/G/N/AC) and Bluetooth connectivity gives BioCloud the ability for remote communication and alerts that can be sent to key personnel via email notification. The silent alert and notification system are created in the Cloud or over local intranet.



### CLOUD DATA STORAGE

BioCloud has the option to store data in a secure Cloud application or operate on a local intranet. This feature is user definable from the configuration screen of the BioCloud unit.

BioCloud data is stored in an internal memory location which can be accessed via hardwire RJ45 port locally, Wi-Fi, or other supported network infrastructure. Once the BioCloud unit has been connected to the network it will appear as a device on that network and the stored data can be accessed directly. Operators will be able to use data synchronization and backup protocols native to their network system to store BioCloud data in real time.

## BIOCLOUD RANGE OF DETECTION

One BioCloud® unit can cover up to 280 m<sup>3</sup> (10,000 cubic ft). In practical terms this means one BioCloud can cover approximately 93 m<sup>2</sup> (1,200 square ft.) of space with a 3m (10 ft.) ceiling or 116 m<sup>2</sup> (1,500 square ft.) with a 2.4m (8 ft.) ceiling. **In a typical indoor setting with 116-140 m<sup>2</sup> (1250 – 1500 sq. ft) of space, one BioCloud unit is capable of sampling the entire volume of air in the room within 1 hour of operating time.**

### OPERATING EXAMPLE BASED ON LOWER DETECTION LIMIT

Many factors can affect virus dispersion and air flow in a space as it relates to air sampling including room size, heating and cooling (HVAC) system, number of people in the room, and air circulation. The table below gives an approximation of detection time in various sized rooms, with a single contagious individual breathing at a regular pace\*.

Room Size	Ceiling Height	Approximate Detection Time
1,000 sq ft	10 ft	6 min
1,500 sq ft	10 ft	8 min
2,000 sq ft	10 ft	11 min
2,500 sq ft	10 ft	15 min

\*The Approximate Detection Time calculations are based on a number of assumptions and referenced scientific research. There are numerous factors which can have an impact on detection times.

#### The calculations assume the following:

- A typical office HVAC system that produces 3 air exchanges per hour<sup>[5]</sup>
- Current research regarding virus emission from a single person classified as a high emitter of COVID-19, breathing regularly and coughing once per air exchange located across a room from the BioCloud analyzer<sup>[5]</sup>
- That humans shed virus in differing amounts<sup>[5]</sup>
- Independent lab testing received by Kontrol setting the lower detection limit as well as a set detection sequence time
- The calculations also generally assume, that virus can be airborne<sup>[1][2]</sup>, that viruses can travel through distance in a room in the air<sup>[3]</sup>, and that HVAC and air filters can have an impact on calculations<sup>[4]</sup>
- These calculations are limited by HVAC performance, persons location, room layout, vent and return placement, objects and furniture arrangement and their combined affect on air flow and circulation in a room or space
- This data cannot be extrapolated as more factors need to be considered for air flow and viral spread in larger spaces

# Maintenance

## DETECTION CHAMBER CLEANING

When the Detection Chamber comes in contact with the SARS-CoV-2 virus, it will need to be disposed of and replaced. The Detection Chamber of the BioCloud® was designed to be easily accessible and can be quickly changed once the front panel of the device is opened.

The internal components are cleaned by initiating a cleaning cycle from the display screen and simultaneously spraying a 2 to 3 second stream of aerosol disinfectant approved to kill SARS-CoV-2 (e.g. Lysol, Microban) toward the lower air intake of the BioCloud from a distance of 30 cm (12 inches).

The self-cleaning sequence will operate for a period of 3 hours to ensure that any remaining virus particles have been neutralized and that the disinfectant solution has been purged. During this cycle the reagent is allowed to flow through the internal tubing to neutralize any remaining virus particles.

Any virus contained within the Detection Chamber is neutralized by the chemical reaction processes, however it is recommended that the Detection Chamber when removed be sprayed with a 5% sodium hypochlorite solution (i.e. household bleach) as recommended by Health Canada or aerosol disinfectant that is approved to kill SARS-CoV-2 (e.g. Lysol, Microban) and be disposed in a standard Ziploc style bag. External cleaning and disinfecting of the BioCloud unit are also recommended and requires only 5 minutes to complete by local staff using commercially available disinfectant wipes or sprays.

Operators are advised to use disposable latex or Neoprene gloves when performing a cleaning of the BioCloud unit.

Following the self-cleaning cycle, the operator can proceed to replace the Detection Chamber with a new one and replace the reagent cartridges as necessary. Replacement of the detection chamber does not require any special tools or PPE following the cleaning process.

## REAGENT CARTRIDGE REPLACEMENT

The reagents are part of the Viral Targeting System which are specifically made to interact with the SARS-CoV-2 virus. Because of the Reagent's chemical composition, the cartridge requires replacing typically **every 120 days**.

*\*Detection cartridges and reagents do not pose a health risk and do not contain viruses. Replacement of the reagents is easily facilitated with the front panel open and requires no special tools or PPE.*

## FIRMWARE UPDATES & CALIBRATION

Firmware updates are typically conducted **every 30 days** and are facilitated through the cloud. Calibration of the unit is achieved through the Cloud or local activation and is conducted when the Reagent Cartridge replacement is preformed (i.e. typically every 120 days).

## RESETTING ALERT & NOTIFICATION SYSTEM

Following a detection event and replacement of the Detection Chamber it is necessary to reset the Alert and Notification system. This is accomplished through the user menus accessible on the front panel display. Resetting of the Alert and Notification System will deactivate the current Alert.

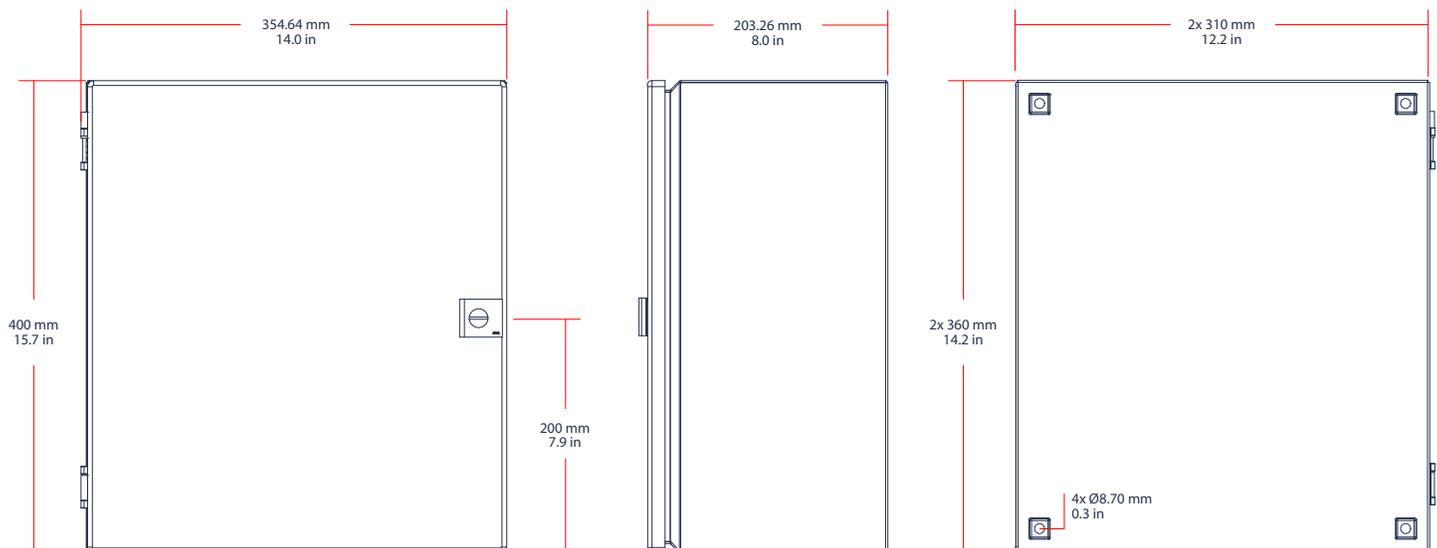
All data pertaining to the Alert is archived in the internal memory for retrieval via the operator's network infrastructure. Alert and Notification parameters such as the email or Instant Message address of the recipient can also be updated via the user menus.

## INSTALLATION REQUIREMENTS

In a room equipped with an HVAC system BioCloud® should be installed near a return register but away from doorways, passageways or continually open windows. An idealized location would be on an opposing wall from a doorway near a return register.

In a room without an HVAC connection or with radiant heating BioCloud should be installed away from doorways, passageways or continually open windows. An idealized location would be on an opposing wall from a doorway.

BioCloud is to be installed by four (4) 8 mm (5/16 inch) bolts. The bolts are mounted through the backwall of the case into wall anchors (not provided). The bottom of the BioCloud unit should be between 1.2m – 1.8m (4ft - 6ft) from the floor but should allow a minimum of 0.6m (2ft) of clearance from the top of the unit to a ceiling or overhead surface.



The BioCloud unit has a weight of 15kg (33lbs) and can be installed on most wall surfaces using the appropriate wall anchors for the chosen 8mm or 5/16 inch mounting hardware and conforming to the clearance guidelines stated above.

## RECOMMENDED STEPS WHEN RECEIVING ALERT

Individual operators are encouraged to develop protocols to be taken following an Alert event which are aligned with the space and environment of the operator. The steps detailed below are intended as a general guide to the minimum steps to be taken.

**NOTE:** Each operator is responsible for developing their own site-specific procedure based on location, conditions, and standard operator policies.

1. Take necessary steps to isolate the area and prevent personnel from entering localized area until further investigated.
2. Invoke operators' protocols for the notification of potentially affected personnel.
3. With proper PPE\*, take the necessary steps to clean and disinfect the area as prescribed in your Building's maintenance protocol or local Health Authority guidelines.
4. Initiating a cleaning cycle from the display screen and simultaneously spraying a 2-3 second stream of aerosol disinfectant approved to kill SARS-CoV-2 (e.g. Lysol, Microban) toward the lower air intake from a distance of 30cm (12 inches). The self-cleaning sequence will operate for a period of 3 hours to ensure that any remaining virus particles have been neutralized and that the disinfectant solution has been purged. During this cycle the reagent is allowed to flow through the internal tubing to neutralize any remaining virus particles.
5. After BioCloud cleaning cycle is completed, disconnect power to the BioCloud<sup>®</sup> Unit.
6. Proceed with cleaning the exterior of the BioCloud unit with 5% sodium hypochlorite solution (household bleach), as recommended by Health Canada, or disinfectant wipes approved to kill SARS-CoV-2 (e.g. Lysol, Caviwipes). (1 – 2 min. to complete)
7. Proceed with opening front panel of the BioCloud and identify the location of the Detection Chamber.
8. Remove Detection Chamber and spray down with 5% sodium hypochlorite solution (household bleach) as recommended by Health Canada, or a commercially available aerosol disinfectant spray approved to kill SARS-CoV-2 (e.g. Lysol, Microban) (1-2 min. to complete) and dispose in a sealed Ziploc style bag.
9. Re-apply power to the BioCloud unit.
10. Remove and replace the detection chamber.
11. Replace the reagent cartridges.
12. Reset the Alert and Notification System via the on-screen user menus.
13. Initiate data retrieval and backup through the operator's network infrastructure. (Recommended)

On completion of the steps, the BioCloud unit is once again ready to resume its function as a Safe Space monitor.

\* Recommended minimum PPE are disposable latex or neoprene gloves and disposable surgical mask.

Please refer to local Health Authorities for additional guidelines.

# Specifications



## Communication & Connectivity

Wireless Sync	Yes (Integrated 802.11 A/B/G/N/AC)
Bluetooth Connectivity	Yes
Smart Notifications	Yes
Notifications	Email, Text message
Protocols	Modbus, CANBUS, BACnet, serial, Profibus

## Display & Design

Air Quality Measurement & Indicator	Yes
Viral Analysis Display	Yes
Status Indicator	Yes
24hr. Scheduling System	Yes

## Power

Power Input (Volt. Range)	Universal input 90 – 240V AC 50/60 Hz 230VA
Electrical connection	Standard wall plug, or optional hardwire terminal

## Approvals

Electrical	ESAFE to CSA standards, UL and CE standards
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## Air Intake

Effective CFM circulation (adjustable range)	50 – 120 cfm
Sample air intake (adjustable range)	4 – 12 l/min (liters per minute)

## Physical Features

Exterior Colour	White / Silver
Dimensions	354.64mm (W) X 400.00mm (L) X 203.26 (D)
Weight	15Kg

## Warranty

**PRODUCT WARRANTY:** 12 months

**ACCREDITATIONS\*:** ESAFE to CSA standards, UL and CE standards

*\*Registered markings identify that product has been independently tested and certified to meet recognized standards for safety and performance. BioCloud® is not a medical device and makes no individual health claims, it does not require Health Canada or FDA certification*

## References

1. Scientific Brief: SARS-CoV-2 and Potential Airborne Transmission, Updated October 5, 2020. [Read](#)
2. Coronavirus disease (COVID-19): For health professionals. [Read](#)
3. Size and Capturability of Human-generated SARS-CoV-2 Aerosol, University of Nebraska Medical Center.
4. Aerosol transmission of SARS-CoV-2 Evidence, prevention and control, Environ Int. 2020 Nov; 144: 106039. [Read](#)
5. Estimation of Viral Aerosol Emissions From Simulated Individuals With Asymptomatic to Moderate Coronavirus Disease 2019, JAMA Network Open. 2020;3(7):e2013807. doi:10.1001/jamanetworkopen.2020.13807

### DISCLAIMER:

BioCloud is a real-time analyzer designed to detect airborne viruses. It has been designed to operate as a safe space technology by sampling the air quality continuously. With a proprietary detection chamber that can be replaced as needed, viruses are detected, and an alert system is created in the Cloud or over local intranet. BioCloud's applications include classrooms, retirement homes, hospitals, mass transportation and others.

BioCloud is not a medical device and Kontrol BioCloud Inc. is not making any express or implied claims that its product has the ability to eliminate, cure or contain the COVID-19 (or SARS-2 Coronavirus).

