

Healthier Buildings: IAQ and Enhanced OA Ventilation



75F

Audio Settings:




Make sure your output selection is your computer speakers.




GoToWebinar Control Panel

▼ Audio



☒ Computer audio 

☐ Phone call

☐ No audio

 **MUTED**

MacBook Pro Microphone


 

MacBook Pro Speakers


Talking: 75 F


▼ Questions

Type question here.

 Send

Healthier Buildings Webcast Rehearsals
Webinar ID# 871-613-179

 This session is being recorded.

 GoToWebinar

To Ask a Question



File View Help

Audio

Sound Check

☒ Computer audio
☐ Phone call

MUTED

Transmit (2- Plantronics Savi 7xx)

Speakers (2- Plantronics Savi 7xx)

Questions

[Enter a question for staff]

Send

Webinar Now
Webinar ID: 200-167-467

GoToWebinar

TEMPERATURE CHECK

IAQ and Enhanced OA Ventilation

1. Recap: Guidelines
and Science

3. Building Wellness Diagnostics

2. Armstrong Fluid Technologies

4. Q & A

IAQ and Enhanced OA Ventilation

1. Recap: Guidelines and Science

3. Building Wellness Diagnostics

2. Armstrong Fluid Technologies

4. Q & A

1

CDC

COVID-19 Employer Information for Office Buildings

ASHRAE EPIDEMIC TASK FORCE

Commercial COVID-19 Guidance



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

[A-Z Index](#)



[Advanced Search](#)

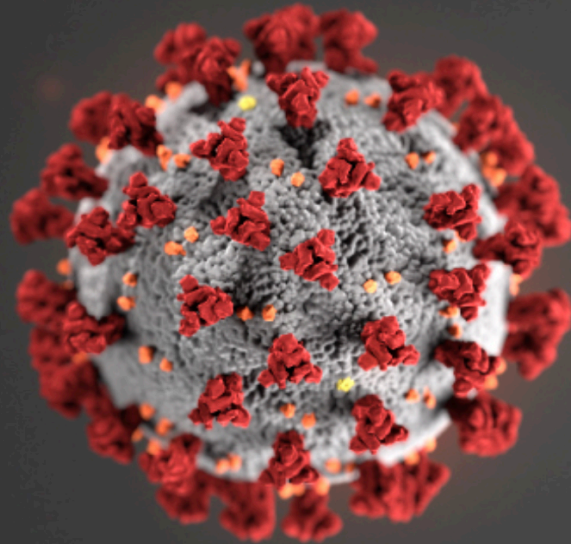
[Diseases & Conditions](#) ▼

[Healthy Living](#) ▼

[Travelers' Health](#) ▼

[Emergency Preparedness](#) ▼

[More](#) ▼



Coronavirus Disease 2019

CDC is responding to the novel coronavirus outbreak.

[Learn More About COVID-19](#)

CDC: How COVID-19 Spreads

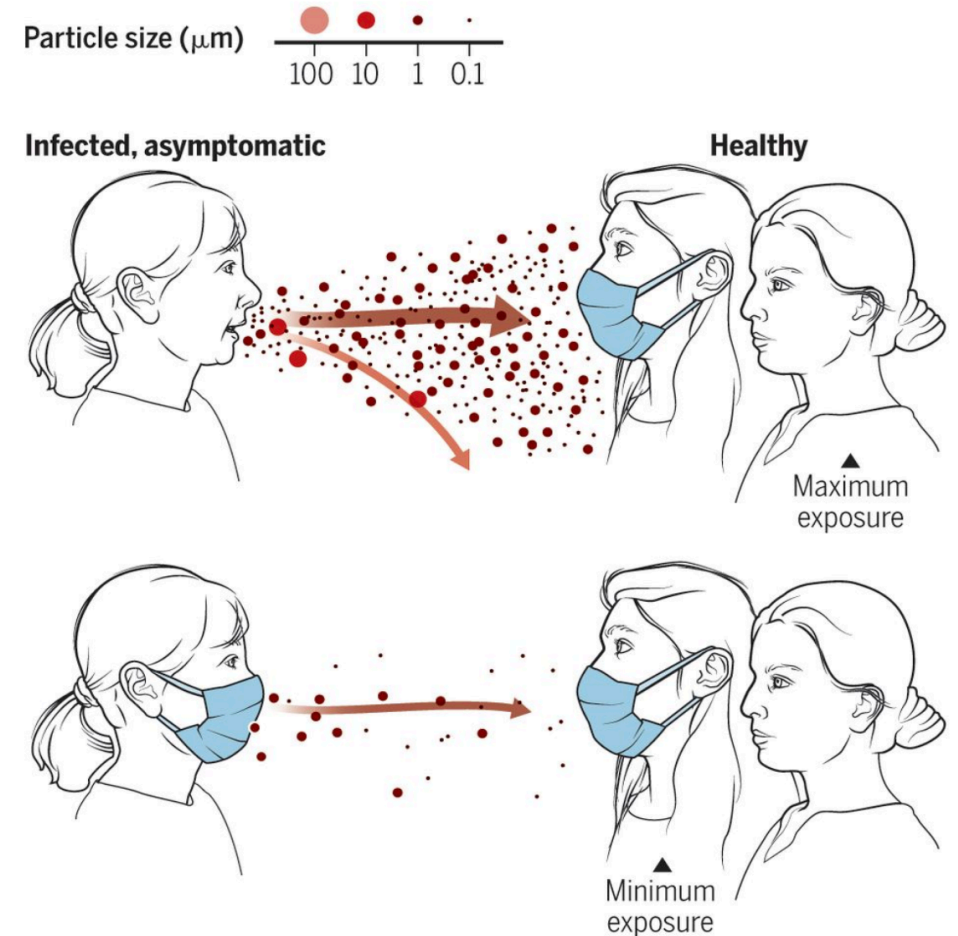
The virus is thought to spread mainly from person to person.

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs, sneezes, or talks.
- These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

The virus may be spread in other ways.

- Touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes. This is not thought to be the main way the virus spreads.

Source: [CDC](https://www.cdc.gov)



GRAPHIC: V. ALTOUNIAN/SCIENCE

239 Experts With One Big Claim: The Coronavirus Is Airborne

The W.H.O. has resisted mounting evidence that viral particles floating indoors are infectious, some scientists say. The agency maintains the research is still inconclusive.





AMERICAN
SOCIETY FOR
MICROBIOLOGY

ASM NEWS

COVID-19 Research Registry

This registry includes top-ranked, COVID-19 research articles curated by experts and serves as a resource for scientists working to accelerate scientific research on SARS-CoV-2.

[VISIT THE REGISTRY →](#)

EXPLORE

SHOW ME ALL YOUR
SCIENCE

FIND ME
FUNDING

MORE

Log In



SARS-CoV-2

CAREERS

**Help Me
Get Ahead →**



CELEBRATING 125 YEARS

What Are You Looking For?



[JOIN](#) [VOLUNTEER](#) [MAKE A GIFT](#)

[BOOKSTORE](#)

[LOG IN](#)

[ABOUT](#) ▾

[TECHNICAL RESOURCES](#) ▾

[PROFESSIONAL DEVELOPMENT](#) ▾

[CONFERENCES](#) ▾

[COMMUNITIES](#) ▾

[MEMBERSHIP](#) ▾

[Home](#) > [Technical Resources](#) >



COVID-19 (CORONAVIRUS) PREPAREDNESS RESOURCES

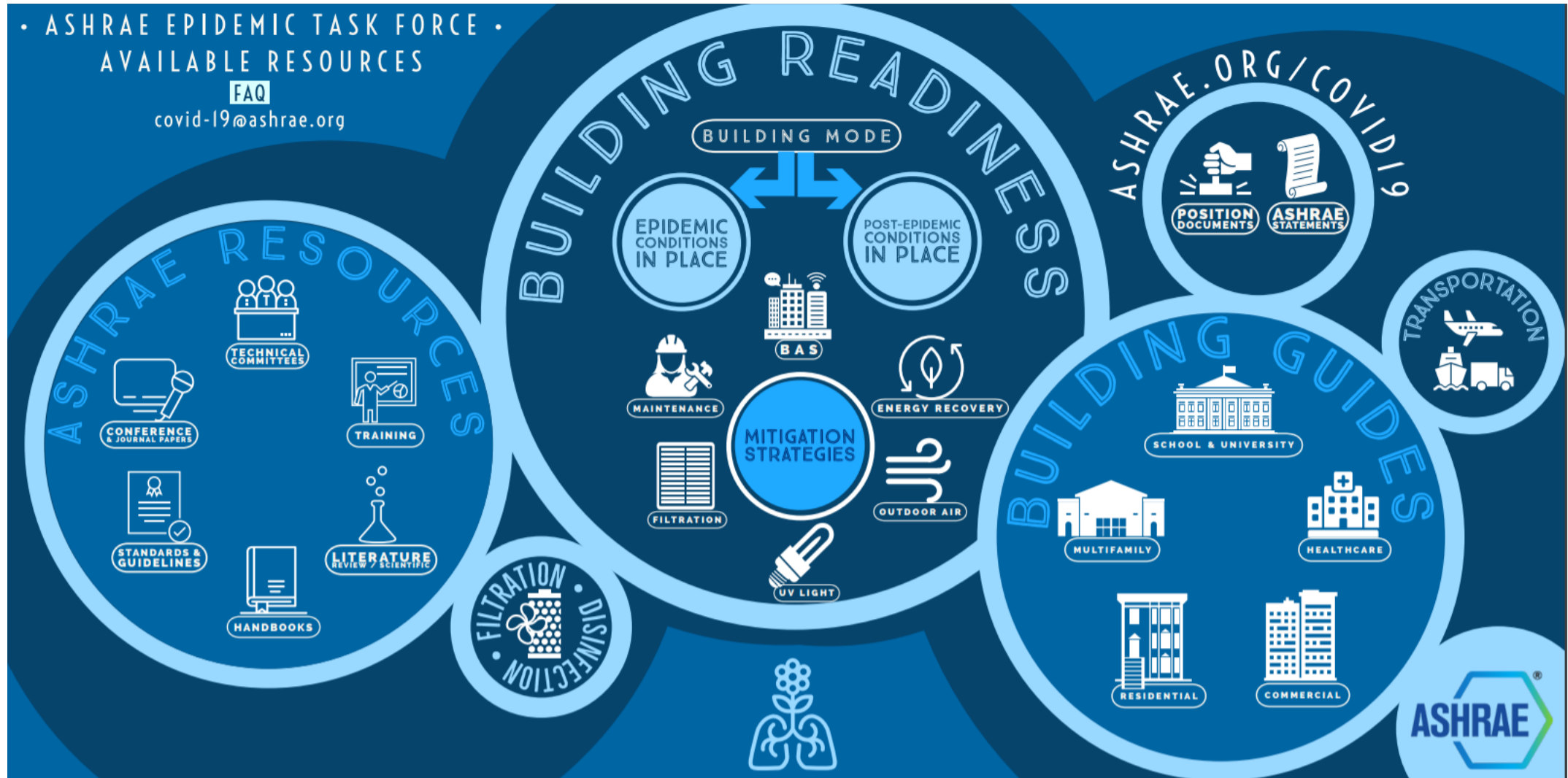
SHARE THIS



“Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.”

“Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air...”

ASHRAE: Reopening Guidance and Building Readiness



ASHRAE: Building Readiness: www.ashrae.org/technical-resources/resources

- Open Outside Air (OA) to the maximum possible while maintaining acceptable indoor conditions.
 - If the space temperatures are satisfied and the relative humidity is less than 55%, OPEN the OAD [CLOSE the RAD] 3% every 15 minutes.
 - If the space temperatures are exceeded by 1 degree F OR the relative humidity is greater than 60%, CLOSE the OAD [OPEN the RAD] 6% every 5 minutes.
- Building and Space Pressure
- Pre and Post-Purges: Flush the building for a duration sufficient to reduce concentration of airborne infectious particles by 95% . For a well-mixed space, this would require 3 air changes.
- Disable Demand Control Ventilation.

ASHRAE Mitigation Strategies – Filtration and Disinfection

ASHRAE has updated information about mitigation strategies other than outside air (which remains the prominent guidance).

- Bipolar Ionization/Corona Discharge / Needlepoint Ionization and Other Ion or Reactive Oxygen Air Cleaners.
 - Systems are reported to range from ineffective to very effective in reducing airborne particulates and acute health symptoms.
 - Convincing scientifically-rigorous, peer-reviewed studies do not currently exist on this emerging technology; manufacturer data should be carefully considered.
 - CDC response to ASHRAE posted on the site.
- Ultraviolet Light
 - See ASHRAE chapter 62
 - Design guidance “lacking”
- Upgrading and Improving Filtration – at least MERV 13 and MERV 14 if possible (equipment limited)
 - Practical approach to increase MERV in AHUs

TEMPERATURE CHECK

Q&A

IAQ and Enhanced OA Ventilation

1. Recap: Guidelines
and Science

3. Building Wellness Diagnostics

2. Armstrong Fluid Technology
– Steve Lane, Communications Manager

4. Q & A

2

Indoor Air Quality



Agenda

- IAQ – definition
- Why it's more important now
- Effects of poor IAQ
- Sources
- Solutions
- Performance Issues
- Diagnostic Capabilities
- Operating Savings
- Armstrong Solutions

Indoor Air Quality

www.epa.gov

- *“Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants.”*

Why it's more important now

- Many people self-isolating at home
- Spending more hours indoors
- IAQ matters to their health
- HVAC can have a role in combating the spread of COVID-19



Health Effects

Irritation of eyes and respiratory tract

General: headache, dizziness, loss of coordination, nausea, visual disorders

Allergic reactions, including asthma and rhinitis

Chronic:

Damage to liver, kidney, blood system and central nervous system (CNS)

Some may cause cancer in humans (formaldehyde)

World health Organization - https://www.who.int/ceh/capacity/Indoor_Air_Pollution.pdf



Effect on Cognitive Abilities

- Study results published in Harvard Business Review
- A double-blind study to limit the potential for bias
- Setting a reliable base-line by fixing the level of volatile organic compounds (VOCs) in the space by controlling the number of common materials that emit these chemicals — e.g., surface cleaners, dry erase markers, dry cleaned clothing, and building materials.

Analyte			
	Background	Green+	Med. CO ₂
VOCs			
1,2,4-Trimethylbenzene	0.3	0.2	ND ^a
2-Butanone	2.5	0.7	0.7
2-Propanol	1.0	1.2	1.1
Acetone	12.0	14.7	9.6
Benzene	0.5	0.8	0.5
Carbon disulfide	0.6	0.2	ND
Carbon tetrachloride	ND	0.2	0.4
Chloroform	ND	0.1	ND
Chloromethane	1.3	1.7	1.5
Cyclohexane	0.2	0.3	0.4
Dichlorodifluoromethane	2.5	2.6	2.9
Ethyl acetate	ND	ND	ND

- *Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environments* - Joseph G. Allen, Piers MacNaughton, Usha Satish, Suresh Santanam, Jose Vallarino, and John D. Spengler Published: 1 June 2016

Cognitive Effects - Test protocols

- Standardized, widely accepted tests assessing 9 separate aspects of cognition
- Volatile Organic Compounds (VOC) - Exposed the workers to 2 levels of VOC concentrations:
 - Low level
 - Typical level for office spaces
- CO₂ - Exposed the workers to 3 levels
 - low levels (600 parts per million) that result from high ventilation rates
 - typical levels seen in many offices (950 ppm)
 - higher levels that are commonly encountered in U.S. schools (1400 ppm)



Cognitive Effects - Results

- *“Breathing better air led to significantly better decision-making performance among our participants.”*
- *“We saw higher test scores across nine cognitive function domains when workers were exposed to increased ventilation rates, lower levels of chemicals, and lower carbon dioxide. “*



Solutions

Make Cleaning Safer - choose cleaning agents carefully

- Avoid spray / aerosol products
 - Use soap and water for household cleaning
 - If a stronger cleaning agent is needed, use vinegar
 - If an abrasive is needed, use baking soda
-
- Never mix or blend cleaning agents

Food Preparation

- Cooking creates particulate matter (PM) - small particles of cooked food, fat or oil that may become airborne when you **fry, deep-fry, roast, broil, sauté, toast, bake, or burn food.**
- PM levels can be 65 times higher than background levels following cooking
- Steaming, boiling or using a microwave produces fewer particles.

Sun, Wallace, Dobbin, You, Kulka, Shin, St-Jean, Aubin and Singer.

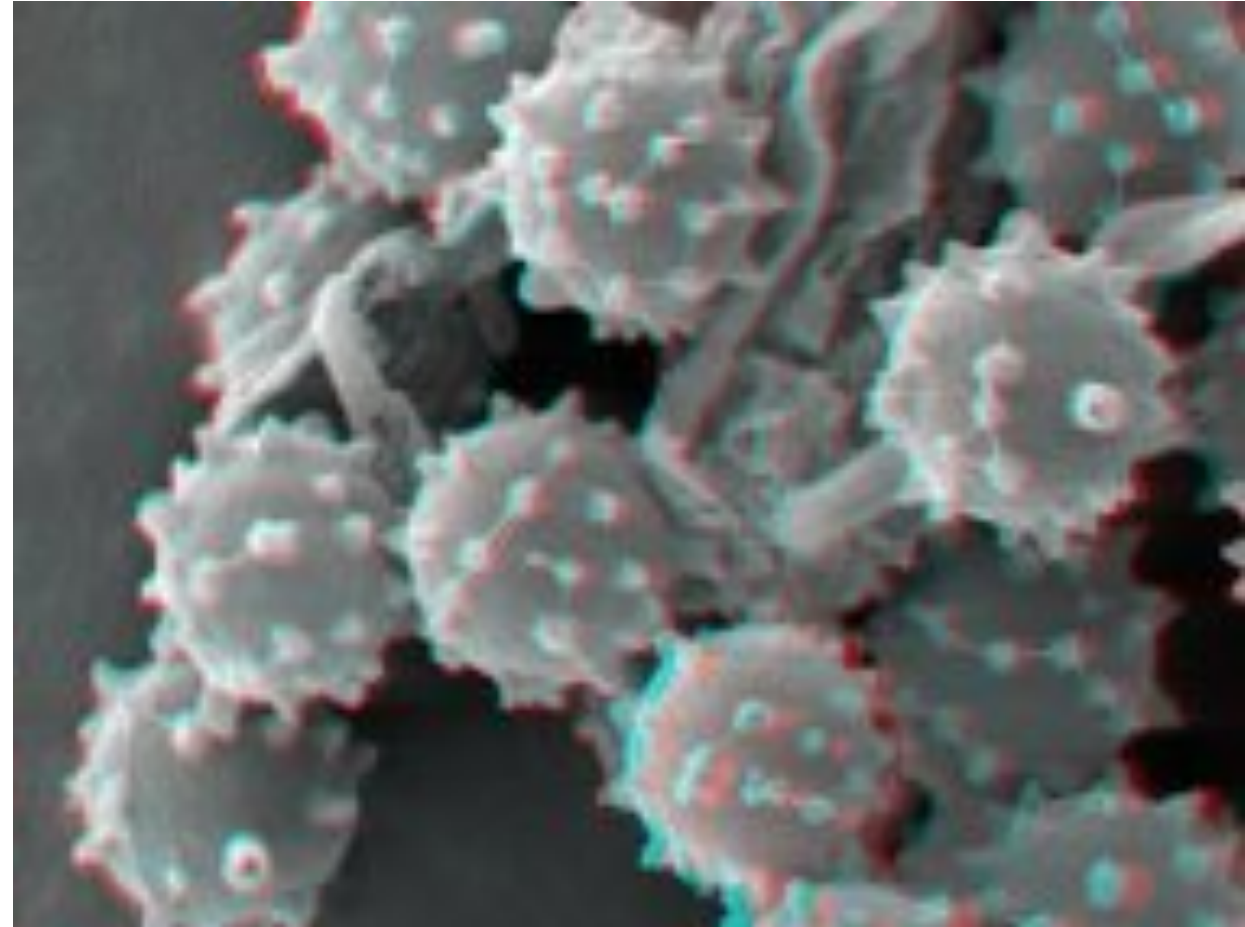
2018 Effect of venting range hood flow rate on size-resolved ultrafine particle concentrations from gas stove cooking.

Food Preparation

- Remind occupants to use exhaust fans in the kitchen
- Suggest that they boil, steam or poach food
- Minimize frying
- Suggest that occupants stay in the kitchen - “Watch your food cook”
- Use the exhaust fan - cook on the back burner so the fan can extract more humidity and pollutants
- Keep the exhaust fan on for 30 minutes

Mold

- Mold is a contributor to poor IAQ
- MOLD-RELATED DISEASES
 - Airway and conjunctival irritation
 - Headaches
 - Difficulty concentrating
 - Hypersensitivity reactions: asthma, rhinitis
- World health Organization - https://www.who.int/ceh/capacity/Indoor_Air_Pollution.pdf



Mold – Steps to Prevent or Minimize

- Use a bathroom or kitchen exhaust fan when showering or cooking.
- Keep the fan on for at least 30 minutes afterward.
- Use a dehumidifier to remove water from the air
- Remove water from dehumidifiers when not in use

- Keep curtains and blinds open to prevent condensation from forming on windows
- Dry window frames and sills daily if condensation is visible
- Dispose of moldy items quickly - food, plants, clothing, furniture
- Clean mold as soon as possible and thoroughly

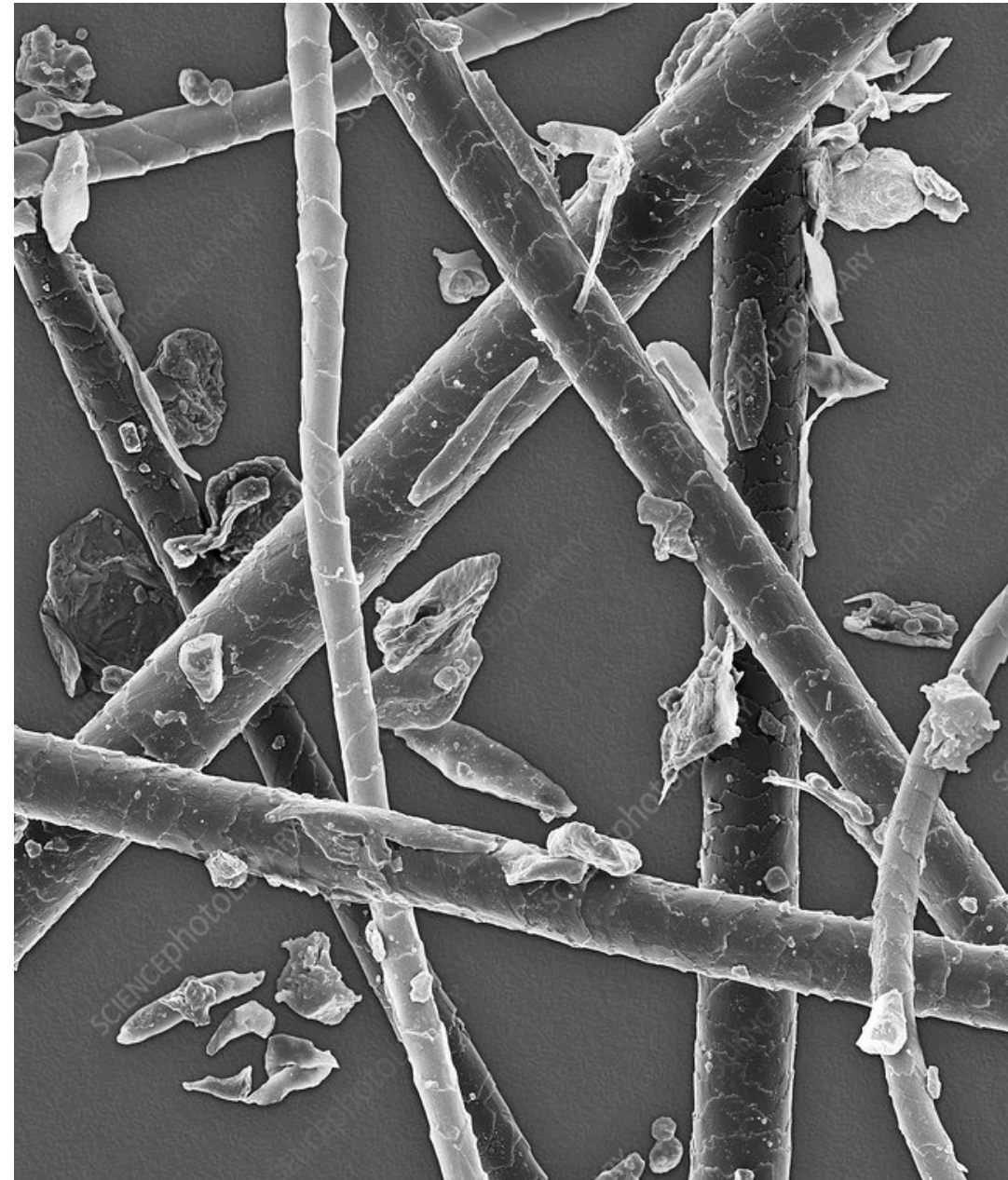
Humidity

- Managing humidity can help keep indoor allergens under control
- Maintain humidity in a range of 30 to 60 percent.
- Use a dehumidifier if needed, especially during the summer months to cut down humidity levels
- Correct humidity levels are also key for occupant comfort



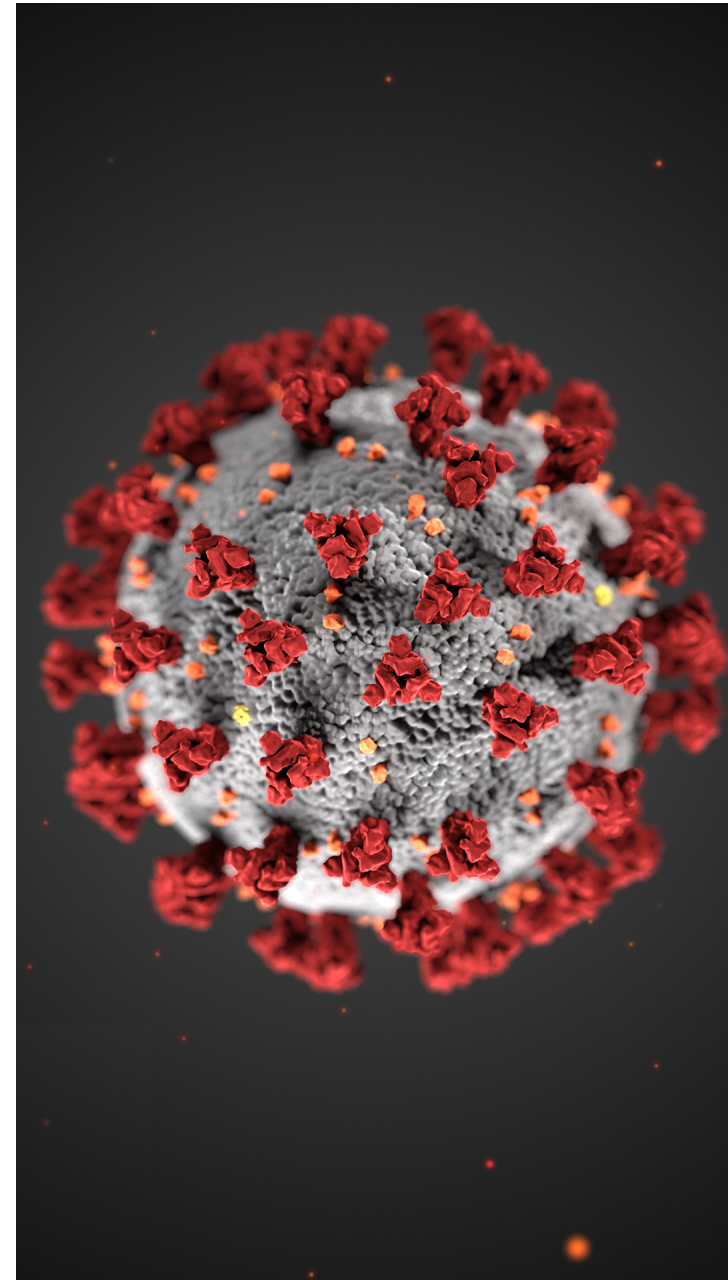
Pet care

- Pet dander is a common indoor air pollutant
- Pets should be groomed regularly
- Ask occupants to groom their pets outdoors and/or vacuum all the carpeting, floors and furnishings using a vacuum cleaner with HEPA filter



COVID-19 and IAQ

- Are there IAQ practices that can specifically help slow the spread of COVID-19?
- Coronaviruses (novel) should be understood from the standpoint of IAQ.
- Growing indications that Coronavirus can be spread through airborne transmission
- Latest info suggests that transmission does not need to be a cough or sneeze.



Possible Transmission Route

"World Health Organization (WHO) also recognizes a faecal-oral transmission route for SARS-CoV-2."

WHO recommends

- Avoiding drying-out of drains in floors and other sanitary devices by adding water to keep the U-bend full



Filtration

- High-efficiency particulate arrestance (HEPA) filters are currently popular, and among the best available for air duct filtration systems
- Effective at trapping particles down to 0.3 microns in size
- Very effective in trapping pollens



UV Options

- Filters are designed to capture larger particulates in the air
- Surface ultraviolet disinfection and airstream UV disinfection are effective at inactivating pathogens
- UV germicidal systems have also been shown to reduce microbial load and pathogens that are found within the HVAC system and drain pan
- Upper-air UV-C fixtures can destroy microbes when they are exposed to the UV-C energy

Service and Maintenance

Regular maintenance plays a big role in IAQ

- Armstrong has an extensive network of Service Partners ready to assist

Balancing plays a key role in HVAC

- If a system is not balanced, a zone that has a clogged filter could be starved for flow and will not be properly heated or cooled

Armstrong Circuit Balancing Valves

Extreme Accuracy in valve settings help with balancing

Precision flow measurement

Pump throttling and temperature measurement capabilities

½" to 2" models feature multi-turn adjustment for precise control

Hidden memory stops to set balance point



Design Envelope Pumps – Flow Measurement Accuracy, Intelligent Variable Speed and Connectivity

- The balancing process is made easier by Design Envelope pumps - flow reading at the pump or through Pump Manager
- Flow control and measurement accuracy of +/- 5%
- Insights into flow Help maintenance personnel troubleshoot buildings and identify air-side or water-side issues
- clogged strainers or clogged filters – manifested through low delta T



Summary – Managing IAQ

1. Avoid introduction of pollutants wherever possible
2. Ventilation removes pollutants
3. Filtration can help remove air-borne particles

Questions

- Please email your questions to info@armstrongfluidtechnology.com

Q&A

IAQ and Enhanced OA Ventilation

1. Recap: Guidelines
and Science

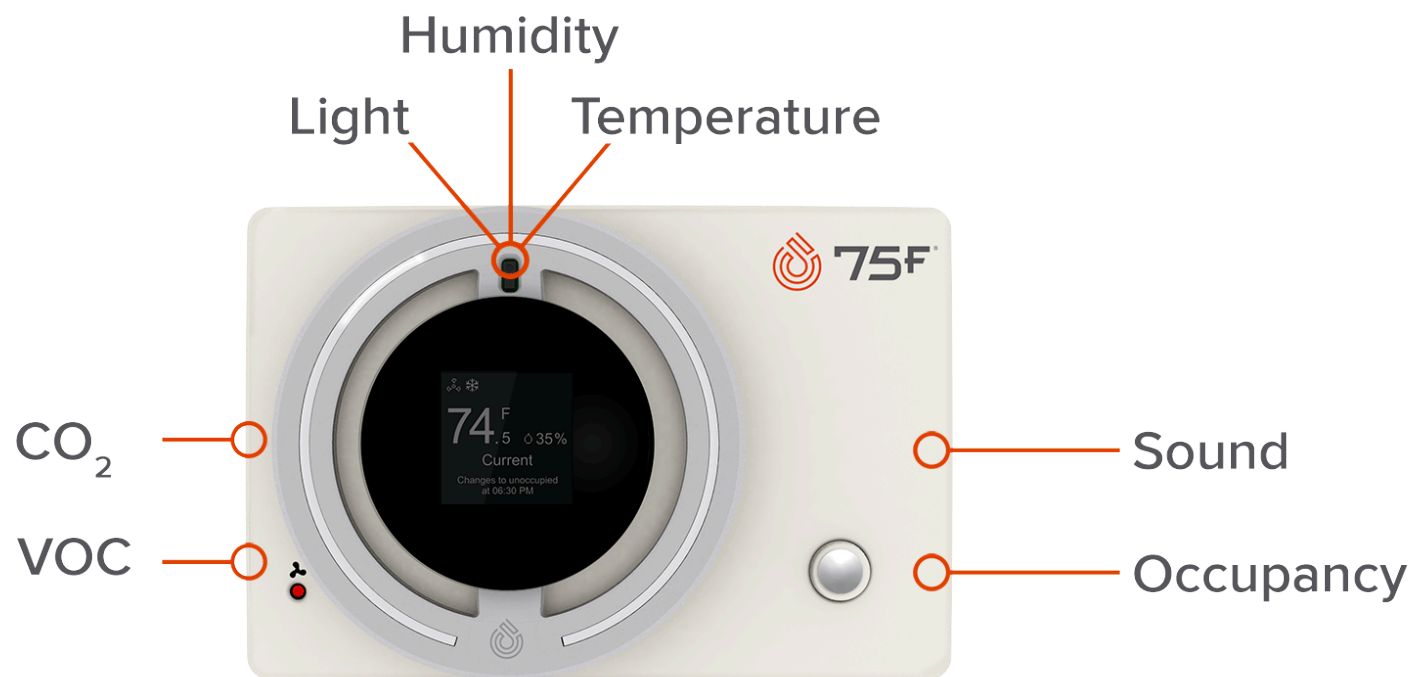
2. Armstrong Fluid Technologies

3. Building Wellness Diagnostics

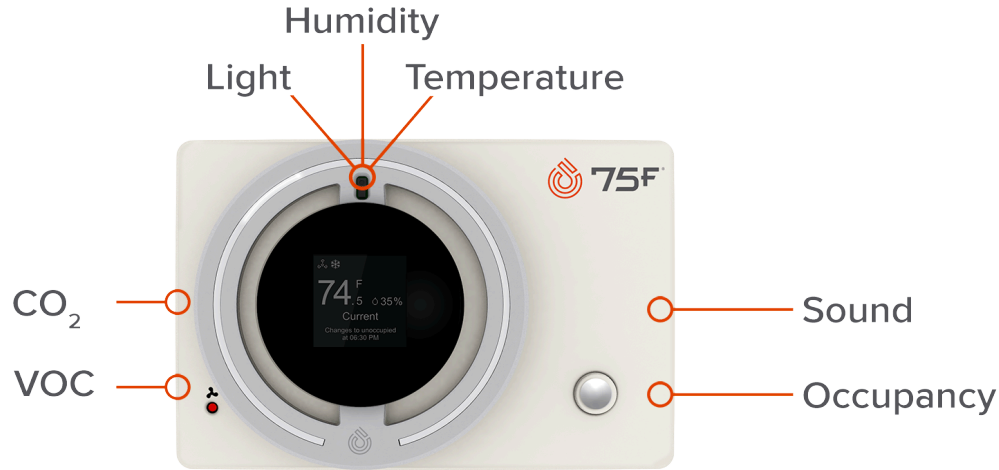
4. Q & A

3

75F Sensing



75F IAQ and Wellness Rapid-Results Test Kit



Streaming IAQ data in 15 minutes

Selection Pane

Select Site

- ☐ Select all
- ☐ Diamond Hill
- ☐ Flipkart ETV
- ☒ Mikros Engineering

zone

- ☐ Select all
- ☒ Main_Floor_Smart_Stat
- ☐ Main_Zone_2

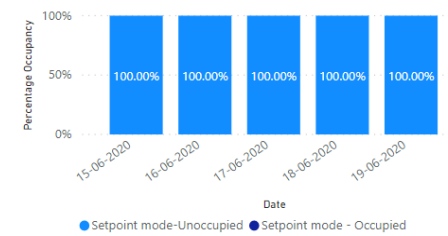
Select Date:

6/8/2020 6/29/2020

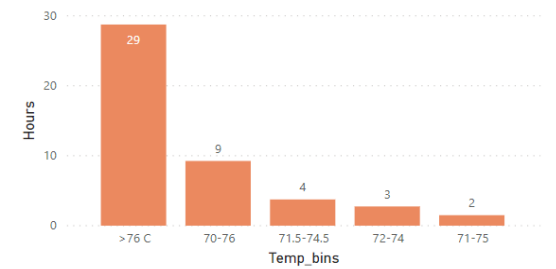


Indoor Air Quality Monitoring

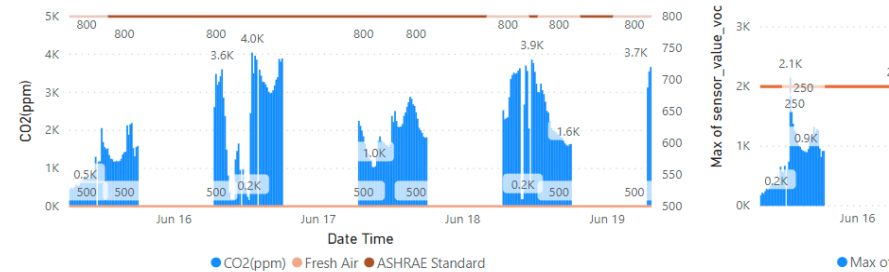
Zone occupied duration in Setpoint mode (Minutes)



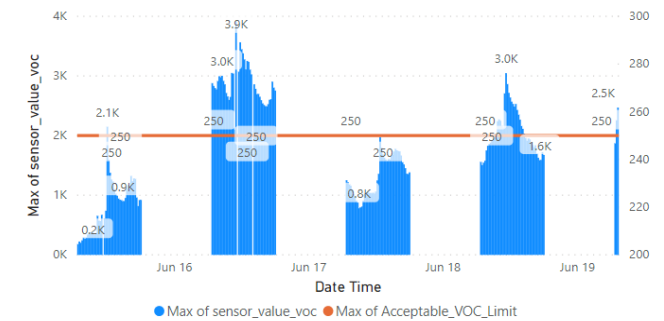
Comfort -Temperature based



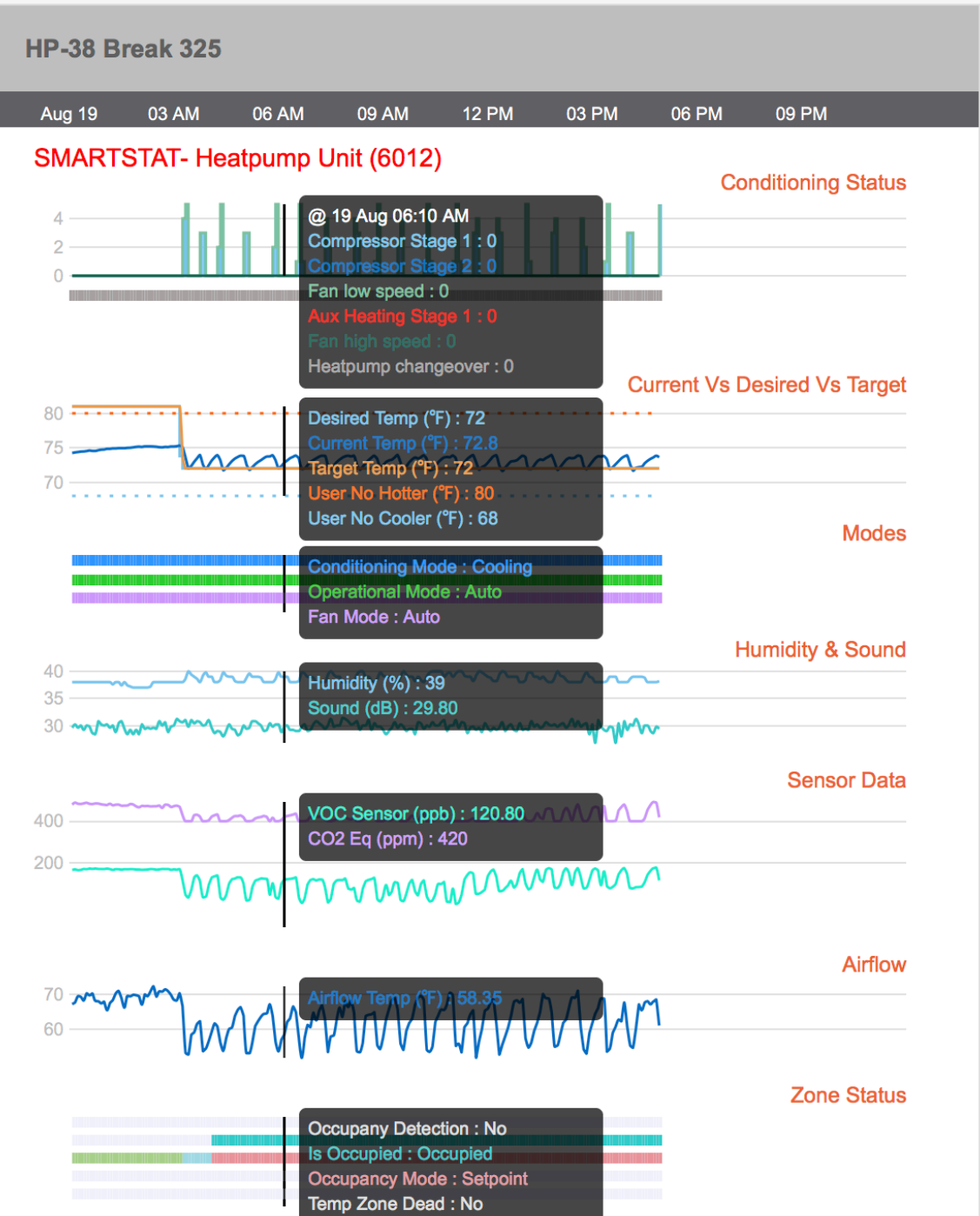
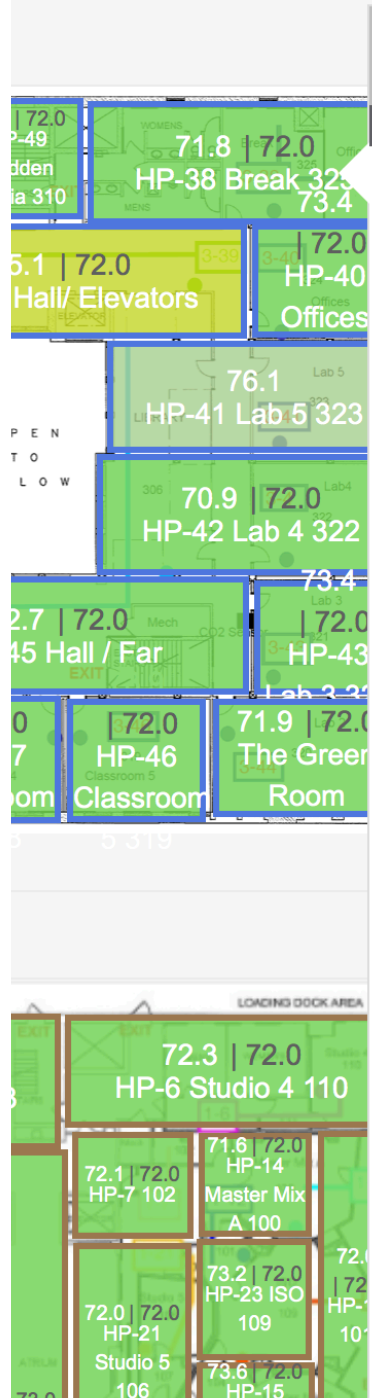
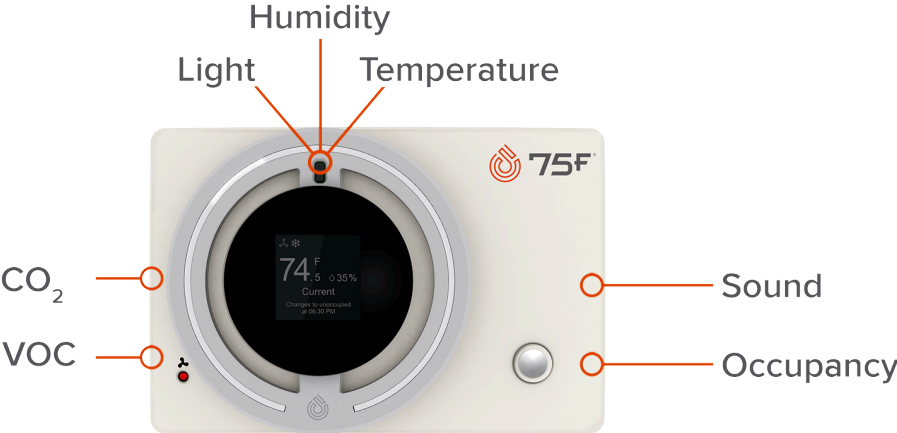
CO2 Monitoring



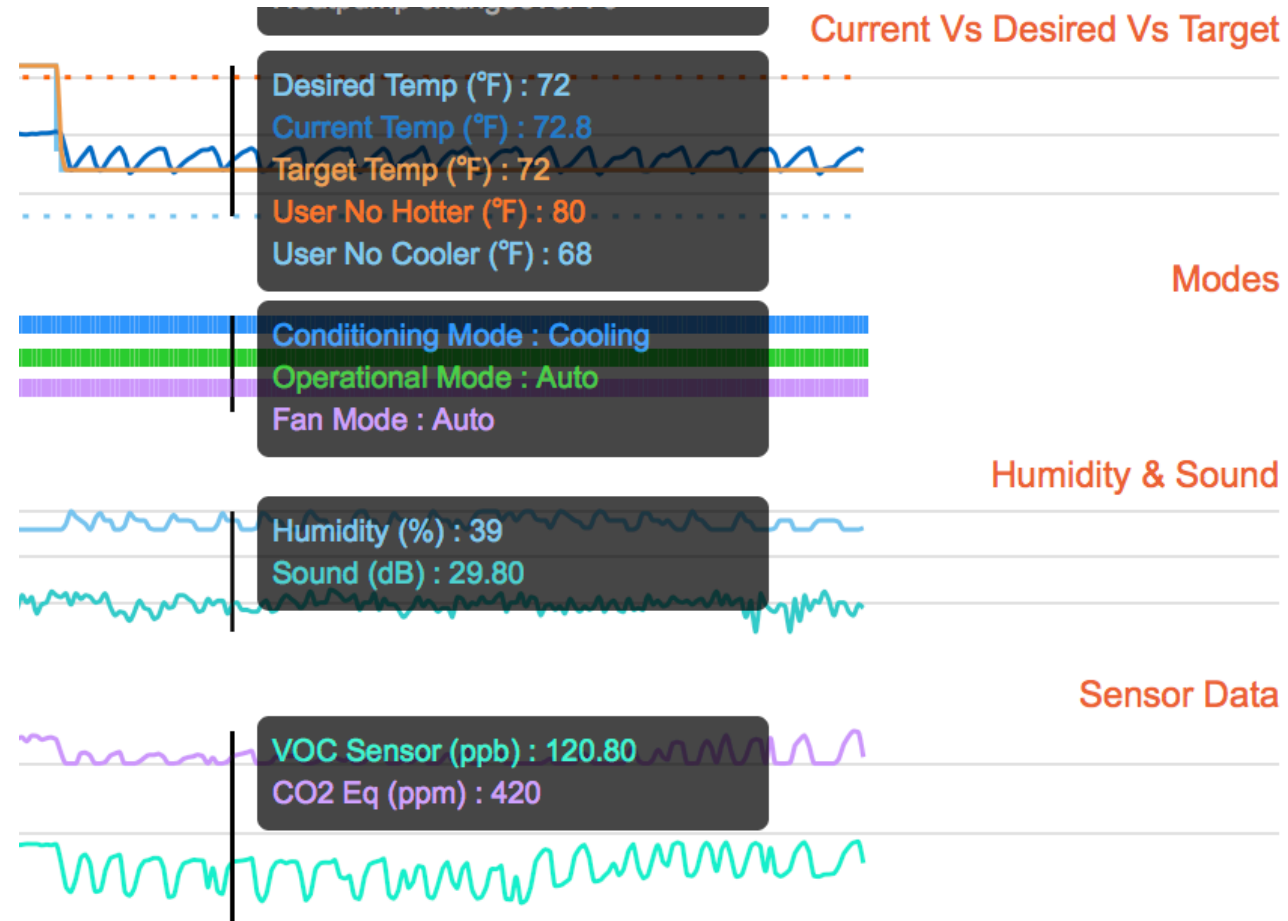
VOC Monitoring



75F Sensing



75F Sensing



75F Epidemic Mode™

- **Smart Purge™** automatically flushes the air in the building prior to occupancy.
- Maximize outside air intake based on equipment and weather.
- Open up zone dampers or VAV boxes.
- Sequences are automatically updated as CDC and ASRAE guidelines change, or to meet state or federal regulations.





75°F

DASHBOARD

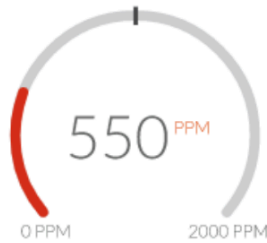
ZONES

SYSTEMS

BUILDING



RTU_1 VAV Staged RTU



0 PPM

2000 PPM

OAQ

AUTO

HEAT ONLY

COOL ONLY

Occupancy Status :

In Setpoint | Changes to Energy Saving at 18:00

Equipment Status :

Fan Stage 1 thru 4 **ON** | Cooling Stage 1,3 **ON**

ECONOMY



Min Inside Humidity 40 % ▼

Max Inside Humidity 40 % ▼

Compensate for Humidity



Demand Response Mode



Epidemic Mode Settings

Smart Pre Purge



Smart Post Purge



Enhanced Ventilation





OAO

AUTO

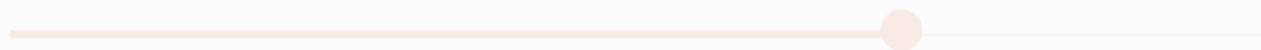
HEAT ONLY

COOL ONLY

Equipment Status :

Fan Stage 1 thru 4 **ON** | Cooling Stage 1,3 **ON**

ECONOMY



Min Inside Humidity 40 % ▼

Max Inside Humidity 40 % ▼

Compensate for Humidity



Demand Response Mode



Epidemic Mode Settings

Smart Pre Purge



Smart Post Purge

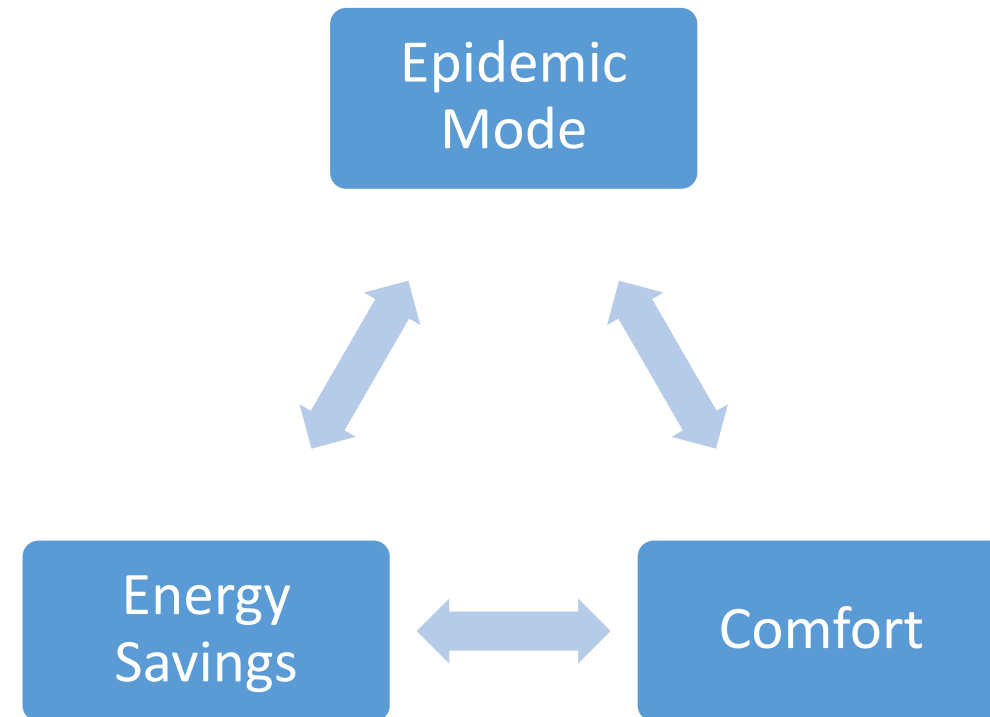


Enhanced Ventilation



Protect your employees and customers today while saving energy

Save the planet with 30-50% energy savings



Q&A



Bob French

bob@75F.io

651-261-3942