DESCRIPTION

Sequence of Operation

- ❑ Communicate Raw Data to the BMS or LACS, Demand-Controlled Ventilation (DCV) signal by others
- ❑ Send DCV signal to the BMS or LACS

Sequence Overview for DCV Selection

The AQMS will send a signal to be used to execute DCV to the BMS or LACS.

The BMS or LACS will control the airflow control valves in response to the greatest of three demands:
1. Temperature control
2. Fume hood demand
3. DCV command from the AQMS

The temperature controls and fume hood controls will operate independent of the AQMS and shall override the DCV signal when required to maintain comfort, space pressurization, and well-being. The AQMS shall provide a signal to be used for DCV that corresponds to the greatest contaminant concentration sensed through the duct probes and/or faceplates.

The sensed contaminants, as selected above, shall be measured against a clean supply air reference point that shares the same sensor pack and is representative of the air being supplied to the lab space. This methodology cancels sensor drift and provides a differential measurement that is ultimately converted into a DCV signal.

The signal to be used for DCV shall correspond to an Air Change per Hour (ACH) ventilation rate that is defined by the Laboratory Ventilation Management Plan (LVMP). The concentration trigger limit of each contaminant shall be determined by the LVMP. Although establishing the LVMP is not part of Antrum's scope, Antrum, or the Antrum supplier, will participate in meetings or calls with the necessary parties as needed.

- When GEX contaminant concentrations sensed by the AQMS are all below their low thresholds as defined in the LVMP, the DCV signal shall be 0.
- When GEX contaminant concentrations sensed by the AQMS are all at or above their high thresholds as defined in the LVMP, the DCV signal shall be 100.
- When GEX contaminant concentrations sensed by the AQMS are all between their low and high thresholds as defined in the LVMP, the signal shall be between 0 and 100, and shall represent the percentage of contamination, as defined by the thresholds, of the contaminant with the greatest percentage of contamination.

For example, using Table 1 below if the CO reading was 75ppm above the clean air reference then the percent contamination according to CO see equation 1:

(75 – 25) / (200 – 25) = 0.285 = 29% Contaminated **(Equation 1)**

Additionally, if the TVOC (PID) reading was 0.4ppm above the clean air reference then the percent contamination according to TVOC (PID) (see equation 2):

(0.4 – 0.1) / (1 – 0.1) = 0.333 = 33% Contaminated **(Equation 2)**

Then the DCV signal would be 33 because the percentage of TVOC (PID) contamination was the greatest.

The actual lab ACH shall be dynamic and equal to the higher of the temperature control demand, the fume hood exhaust demand and the DCV signal from the AQMS.

Table 2 is to be completed by the customer.

Table 1: Suggested Contaminant Thresholds

	0	**100**	**%**
CO	3	10	ppm
CO_2	400	3,000	ppm
CH_2O	0.5	2.0	ppm
NH_3	25	50	ppm
$PC_{2.5}$	500,000	5,000,000	pcf
TVOC[1]	0.3	3	ppm
TVOC (PID)[1]	0.1	1	ppm

[1]calibrated to isobutylene

Table 2: Contaminant Thresholds

	0	**100**	**%**
CO			ppm
CO_2			ppm
CH_2O			ppm
NH_3			ppm
$PC_{2.5}$			pcf
TVOC			ppm
TVOC (PID)			ppm

Test Mode

The AQMS shall come equipped with a test mode that can be entered by writing to the AntrumX Gateway from the BMS (see BACnet point summary). The purpose of entering test mode is primarily for commissioning to allow users to test the functionality of their DCV sequence by passing a preset data package from the AntrumX Gateway to the BMS to ultimately observe the resultant change in ACH. To facilitate this, when test mode is initiated, all contaminant levels will be set to the 100% contaminant level as specified in Table 2. Test mode can be initiated or terminated at any point by resetting the BACnet point.