

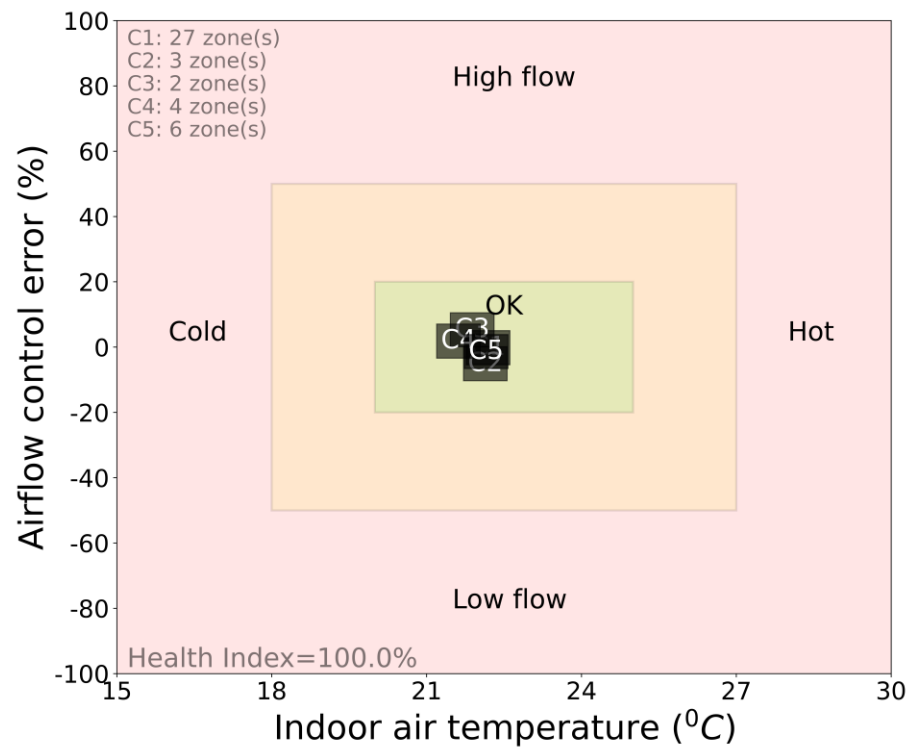
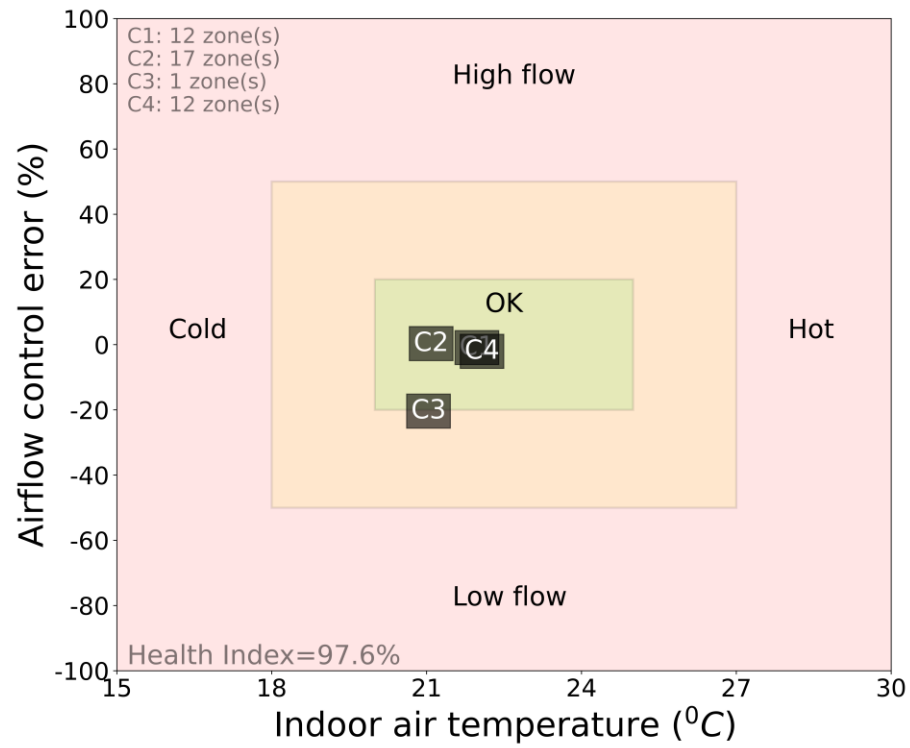
Zone Anomaly - Analysis Report

The zone anomaly function **detects anomalous zones based on indoor air temperature and airflow control errors**. This function can help identify potential faults in variable air volume (VAV) units which may result in anomalous airflow and temperature conditions in thermal zones. Visuals are also generated which plot the average indoor air temperature and airflow control error or groups of zones; this is done separately for the heating and cooling season.

Visuals

The generated visuals plot the average indoor air temperature and average airflow control error or groups of zones. Each group of zones (C1, C2, C3, etc.) represents a number of zones which is presented at the top-left of the visual. The airflow control error is the difference between the actual and setpoint airflow rate with respect to the airflow rate setpoint. A positive (+) percentage indicates a higher actual flowrate than the setpoint and a negative (-) percentage indicates a lower actual flowrate than the setpoint. This visual is generated twice, once for the heating season (December through February) and again for the cooling season (May through August). The following are possible symptoms of anomalous operations:

- High flow: Zones exhibit abnormally high airflow. Ensure the VAV terminal damper and airflow sensors are operating as intended. High airflow to zones may result in excessive use of perimeter heaters.
- Low flow: Zones exhibit abnormally low airflow. Ensure the VAV terminal damper and airflow sensors are operating as intended. Low airflow to zones may result in inadequate indoor air quality for occupants.
- Cold: Zones exhibit abnormally low indoor air temperatures. If zones exhibit acceptable airflow control errors, ensure perimeter heating devices and/or reheat coils are operating as intended. Consider decreasing the minimum airflow setpoint.
- Hot: Zones exhibit abnormally high indoor air temperatures. If zones exhibit acceptable airflow control errors, ensure perimeter heating devices and/or reheat coils are operating as intended. Consider increasing the maximum airflow setpoint.



Key performance Indicators

This section presents the generated KPIs - **the zone health index**. The zone health index is the **ratio of zones with acceptable indoor air temperature and airflow control error over the total number of zones** - this is calculated separately for the heating season (December through February) and the cooling season (May through August). An acceptable indoor air temperature is considered to be between 20 and 25 degrees, and an acceptable airflow control error is +/- 20%. A greater percentage is desirable since this indicates little to no detected anomalous zones.

- Zone health index for heating season: **97.6%**
- Zone health index for cooling season: **100.0%**

The following tables lists the number of zones in each group and the average indoor air temperature and average airflow control error for each group. For the heating season, the average fraction of active (ON-state) perimeter heaters within a zone is also provided for each cluster.

Heating season KPIs

Number of zones	Average indoor air temperature (C)	Average airflow control error	Average fraction of active perimeter heaters
12	22.0	-0.9%	19.5%
17	21.1	0.3%	86.4%
1	21.0	-20.4%	82.4%
12	22.1	-2.1%	53.7%

Cooling season KPIs

Number of zones	Average indoor air temperature (C)	Average airflow control error
27	22.2	-0.2%
3	22.1	-5.1%
2	21.9	5.3%
4	21.6	1.8%
6	22.2	-1.4%