ChatGPT

Ventilation System 360.005 (Røa, Oslo) – English Overview and Continuous Control Proposal

1. System overview

The *Ventilasjon COVENT 360.005* installation serves a parking garage (levels U1 and U2), the storage units in U2 and the supply air for the main pool's technical room in the Røa swimming facility. It consists of one air handling unit (AHU) with a cross-flow heat exchanger and a water heating coil, plus two separate exhaust fans for the pool technical rooms. The AHU has a design capacity of around **15 000 m³/h** and is designed for continuous 24/7 operation. There is no mechanical cooling; heat is supplied via a heat pump in the U2 boiler room.

2. Dampers and components

In the control tags used in Bravida Cloud/Schneider Building Operation, the dampers and their roles are as follows:

Tag	Component	Description
`KA40`	**Fresh air intake damper**	Regulates the amount of outside air entering the AHU.
`KA50`	**Exhaust damper**	Regulates how much air is expelled to the outside.
`KA41AB`	**Heat-exchanger bypass damper**	Bypasses the cross-flow heat exchanger when open. Normally closed to recover heat, but opened during very cold outdoor conditions to prevent freezing/icing.
`KA42`	**Recirculation damper (omluft)**	Controls how much return air is mixed back into the supply. It is opened during energy-saving or frost-prevention modes and closed during high contamination/avfukting modes.
`JV50`	**Supply-air damper**	Works with the supply fan to control the fresh-air flow to the building.
`JV40`	**Return-/exhaust-air damper**	Works with the return/exhaust fan to control how much air is returned or exhausted.
`LV40` / `SB40`	**Heating coil valve**	Not a damper; controls hot water flow to raise supply-air temperature.
Sensors	`CO250` / `CO5`, `QD40` / `QD50`, `RF50`, `RT40`, `RT50`, `RT90`	Monitor CO and CO_2 concentrations, airflow, relative humidity and temperatures; these readings determine which operating mode should be active.

3. Operating logic

The AHU switches between modes based on CO/CO_2 levels, relative humidity (RH), and outdoor temperature. The dampers above are modulated accordingly:

3.1 High recirculation (maintenance mode)

- **Trigger:** low CO/CO_2 concentration and low relative humidity.
- **Behaviour:** The recirculation damper `KA42` opens and the fresh-air intake `KA40` and supply-air damper `JV50` close partially. The exhaust damper `KA50` and return damper `JV40` are adjusted to maintain airflow balance. Heat-exchanger bypass `KA41AB` may open partly. This reduces energy use by using mostly recirculated air.

3.2 Full fresh air / dehumidification / high CO/CO_2/RH

- **Trigger:** high CO/CO_2 concentration or high relative humidity (detected by `C0250`, `C05`, `RF50`).
- **Behaviour:** The recirculation damper `KA42` closes and the fresh-air intake `KA40` and supply-air damper `JV50` open fully. `KA50` opens fully to expel contaminated air. This maximises fresh-air exchange to remove pollutants and moisture. The heating coil and heat exchanger maintain supply-air temperature.

3.3 Frost-prevention / low outdoor temperature

- **Trigger:** low outdoor temperature measured by `RT90`/`RT40` (typical winter conditions in Oslo). Ice or condensation risk in the heat exchanger.
- **Behaviour:** Partial recirculation is used to keep the supply air warm. `KA42` opens partly; `KA40` closes partially. The heat-exchanger bypass `KA41AB` may open to prevent ice buildup. The heating coil (`LV40`/`SB40`) increases its output. Supply- and exhaust-air dampers `JV50` and `JV40` maintain minimum fresh-air flow to avoid indoor pollution.

3.4 Heating mode

- **Trigger:** supply air temperature below setpoint.
- **Behaviour:** The cross-flow heat exchanger is modulated from 0–100 % and the heating coil increases water flow via `SB40`. Damper positions follow the recirculation or full-fresh-air logic described above.

4. Proposal for continuous automated control via MCP server / AI

To free facility managers from manual oversight, an **MCP (Mission Control Platform) server** or an AI agent can monitor the sensors and automatically adjust the damper positions and heating coil. Here is a conceptual design:

1. **Data acquisition:** Use the Bravida Cloud connector (or native API if available) to periodically read the current values of CO/CO_2 (`C0250`, `C05`), relative humidity (`RF50`), temperatures (`RT40`, `RT50`, `RT90`), and damper positions (`KA40`, `KA50`, `KA41AB`, `KA42`, `JV40`, `JV50`). This can be done via Playwright automation (as in the existing RPA script) or via an API, if Schneider/Bravida provides one.

2. **Decision logic:** Implement a finite-state controller or rule engine on the MCP server:

3. **If CO/CO_2 or RH exceeds predefined thresholds**, switch to **full fresh-air mode**. Close `KA42`; open `KA40`, `JV50`, and `KA50` fully.
4. **If levels fall below thresholds**, transition to **maintenance mode**, gradually opening `KA42` and closing `KA40`/`JV50`.
5. **If outdoor temperature is below a frost threshold**, blend in recirculated air by opening `KA42` partially and closing `KA40`; open `KA41AB` to bypass the heat exchanger if necessary. Increase the heating coil valve `SB40` as required.
6. **Always enforce minimum fresh-air flow** to prevent stale air.
7. **Actuation:** Use the same Playwright automation or available API to set the positions of the dampers (`JV40_Pos`, `JV50_Pos`, etc.) and heating coil valve. Ensure the script respects safety limits (e.g., do not fully close fresh-air intake, avoid rapid cycling) and logs each change for traceability.
8. **Alerts and overrides:** The MCP server should send alerts (email/SMS) if sensor values exceed safe thresholds or if the system cannot maintain the desired state (e.g., CO_2 remains high despite full fresh-air). Facility managers can manually override the AI when necessary via a simple interface.
9. **Optional AI optimisation:** With enough historical data, a machine-learning model could learn to anticipate occupancy patterns and outdoor conditions, optimising when to switch modes to minimise energy use while maintaining air quality. However, a rule-based controller as described above is sufficient for initial deployment.

By deploying such an MCP or AI-based controller, the ventilation system can run unattended yet safely, automatically switching between high recirculation, full fresh-air, frost-prevention and heating modes. This reduces the need for manual intervention and helps facility managers take vacations while ensuring compliance with indoor-air-quality requirements.
