

Application Examples for Multi-Floor Smoke Damper Control

PLC-based control approaches for
smoke management, sandwich
mode, and scalable building
integration

Why Centralized Control

Single PLC, multi-floor coordination

- One LOGO PLC coordinates supply and exhaust damper commands across six floors.
- This replaces large relay banks while keeping clear, floor-by-floor control.

Straightforward expansion path

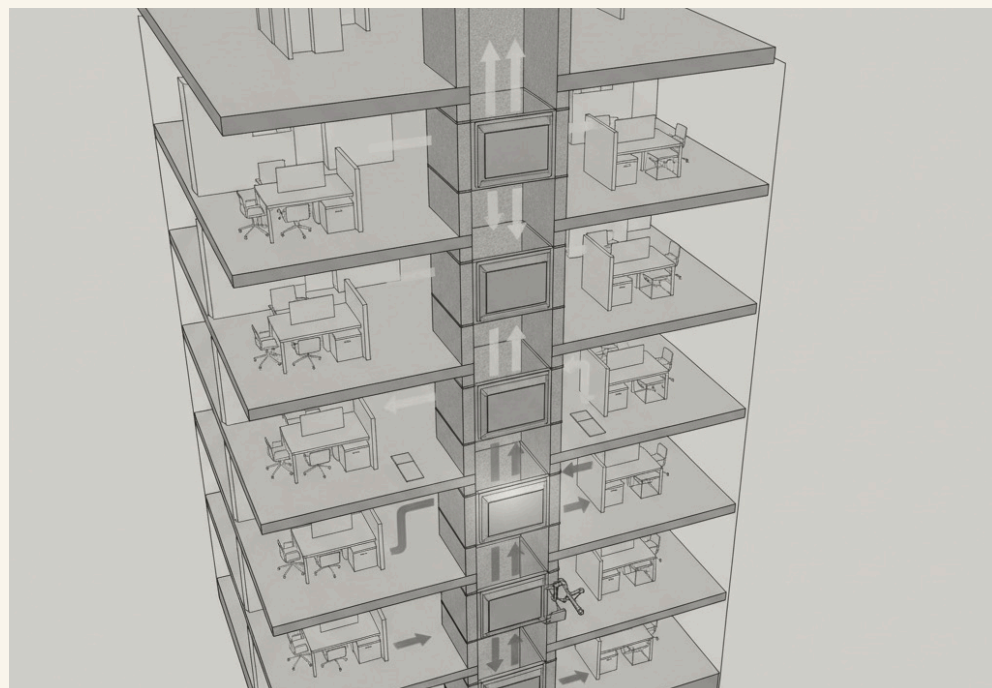
- Add a relay expansion module to scale from 6 to **10 floors**.
- Supports up to **20 actuators** (S/A plus EXH./A per floor).

High-rise scalability via interlocks

- Link multiple PLC groups by sharing fire output signals between floor banks.
- This makes the overall number of controlled floors effectively open-ended.

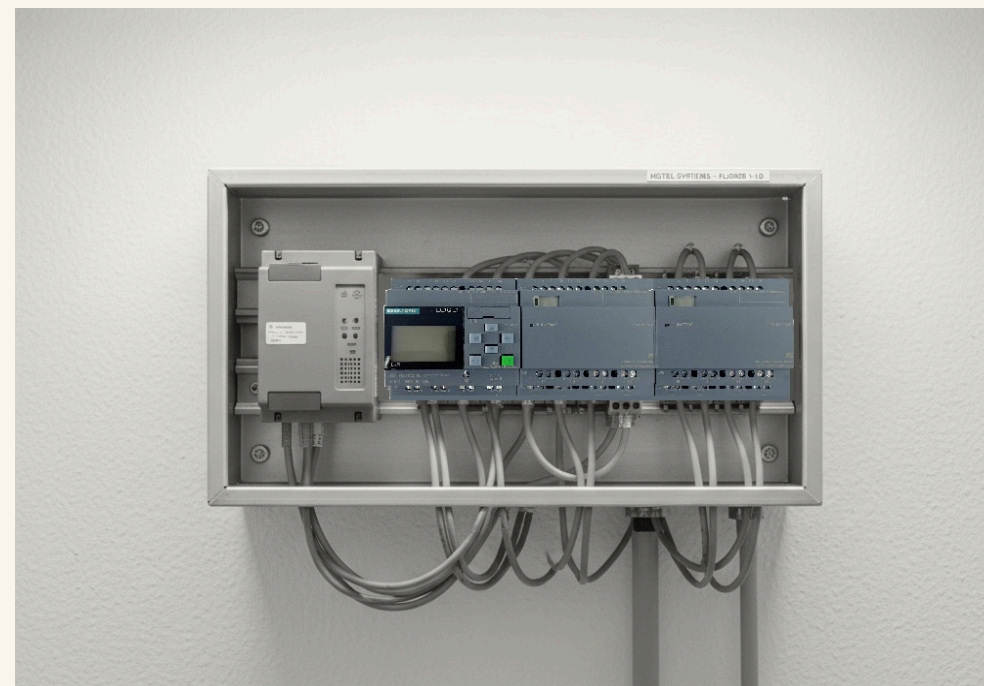


Typical Applications



Office tower smoke extract

- Run standby ventilation, then switch to fire-mode damper positions.
- Use per-floor fire inputs to target the affected floor exhaust path.



Hotels and apartments

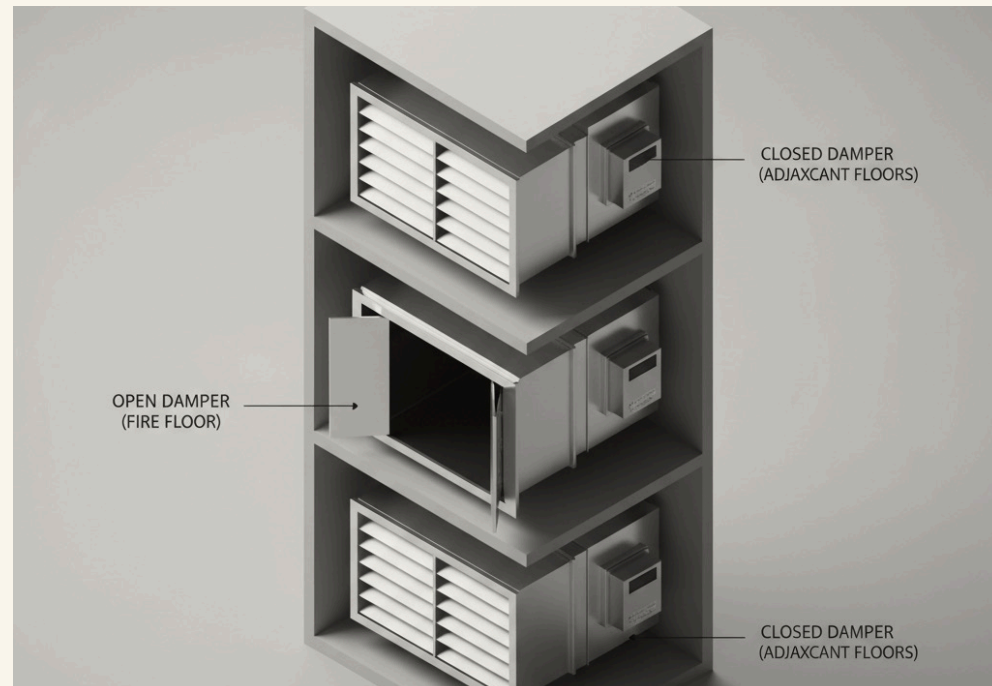
- Group floors under one PLC for consistent corridor and shaft response.
- Expand from 6 to 10 floors using relay output expansion modules.



Mixed-use high-rises

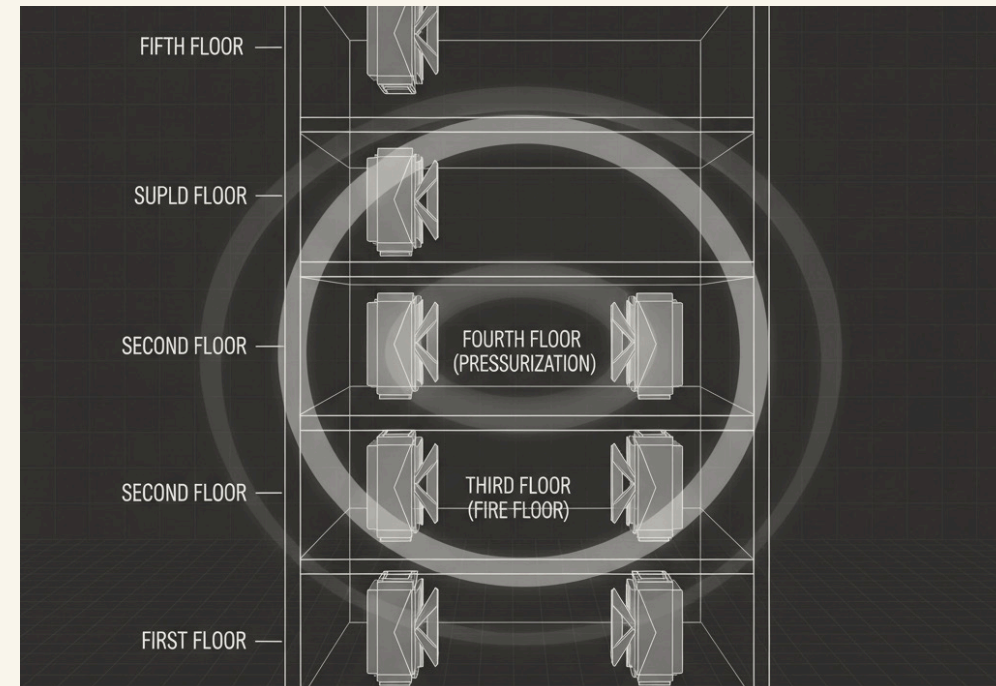
- Interlock multiple PLC groups to extend control beyond 10 floors.
- Add PBEC1v modules when BMS 0-10 V dampers need fire override.

Fire Mode Responses



Fire-affected floor actions

- The fire-floor exhaust damper is released to open for extraction.
- The remaining exhaust dampers stay driven closed for isolation.



Optional sandwich mode

- Supply dampers on floors above and below can be commanded together.
- This supports pressure control around the fire floor, when enabled.



Non-affected floor fail-safe state

- All other dampers are driven or sprung to their **safe position**.
- Fail-safe logic treats open inputs as fire, keeping outputs predictable.

Actuator Integration

Two-position actuator wiring

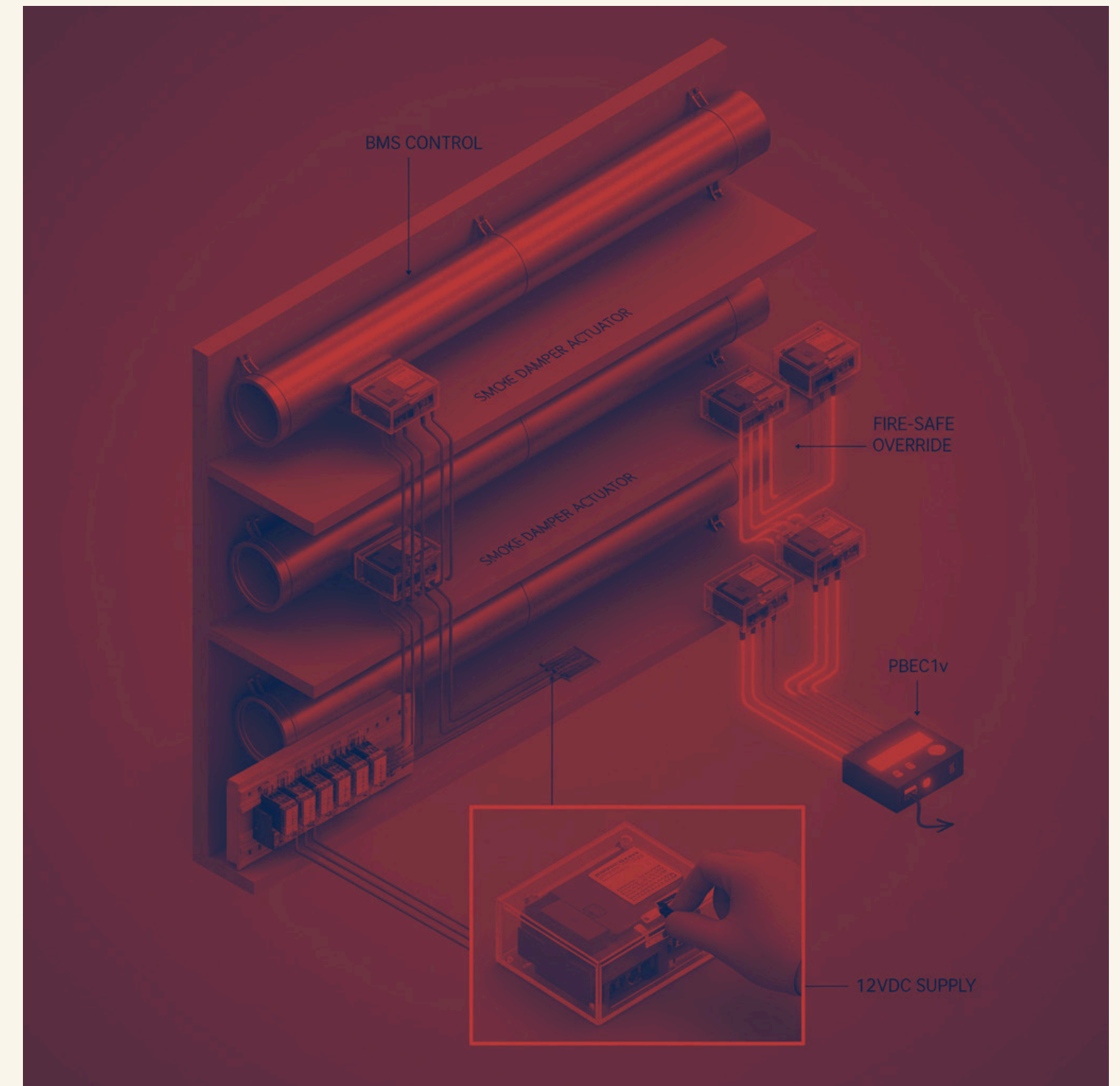
- Wire spring-return open/close actuators via PLC **voltage-free relays**.
- Relay interlocks provide clear open/close commands for each floor damper.

0–10 V actuators with override

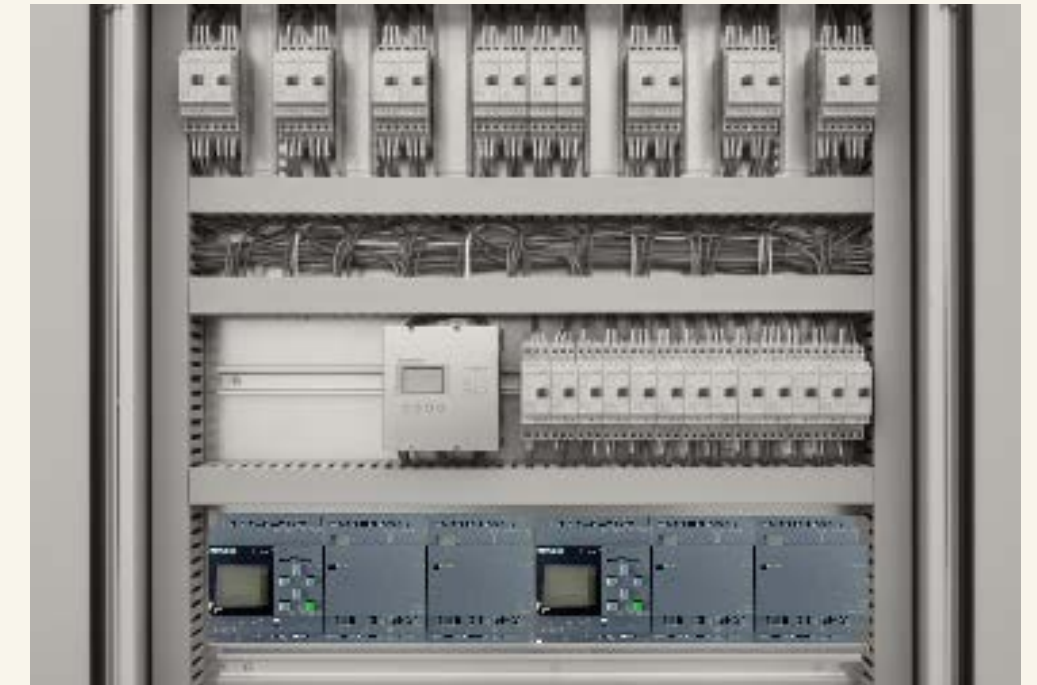
- Add one PBEC1v per actuator to switch between BMS and fire mode.
- Fire mode uses a shared external 12 VDC signal to drive safe positions.

Commissioning and operations

- PBEC1v A/O/M slide switch supports quick functional testing on site.
- Normal ventilation stays under BMS control until alarm override is active.



Engineering Takeaways



Fail-safe by design

- Inputs are normally energised, so an open contact flags fire mode.
- Outputs drive dampers to their spring-return safe position on loss of power.

Commissioning visibility

- The PLC LCD shows live I/O status for rapid fault finding.
- Unused floor inputs can be tied to 24 V active to avoid false alarms.

Scalable, cleaner panels

- One module handles 6 floors, and expands to 10 via relay expansion.
- Interlocking PLC groups reduces relay wiring while enabling high-rise growth.