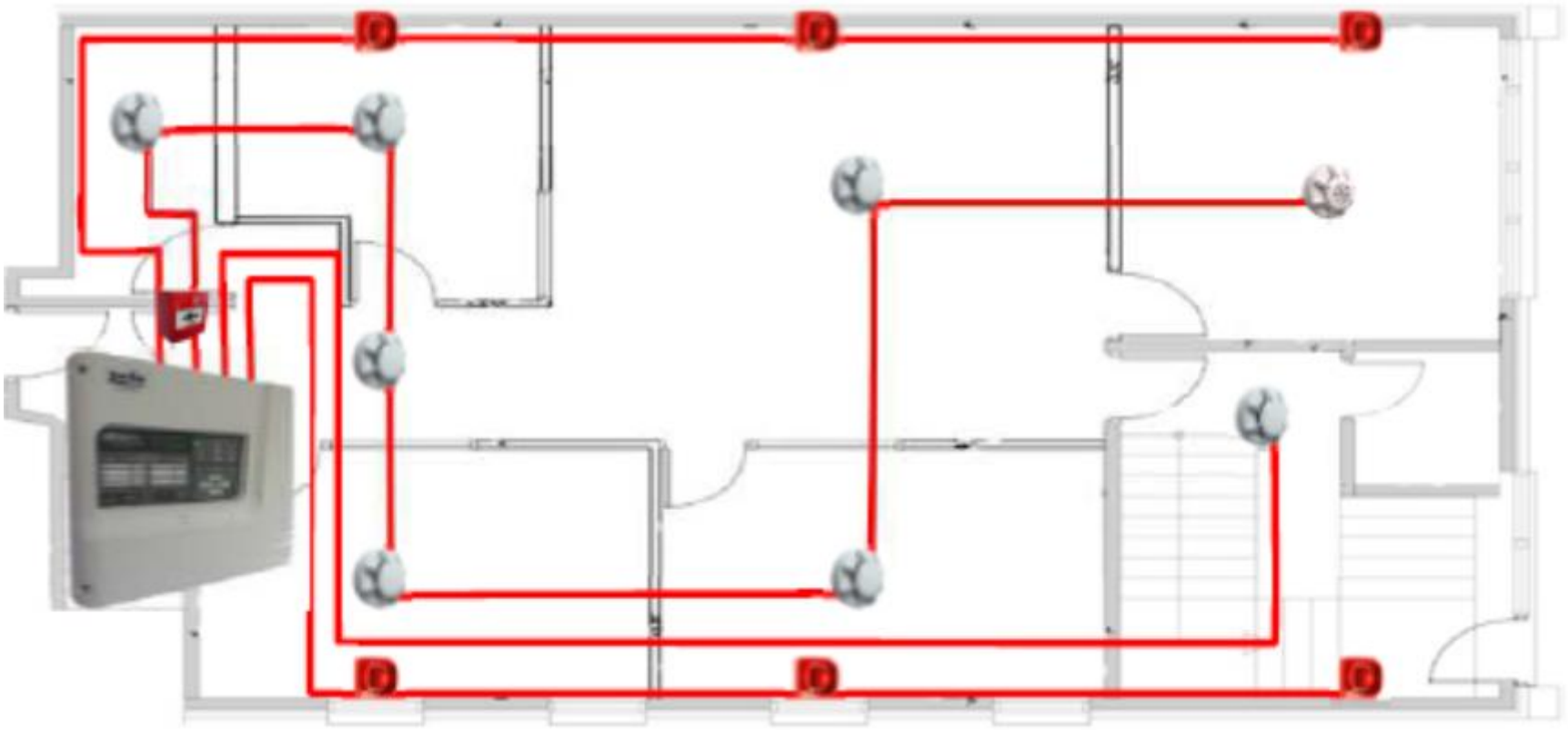
Auxiliary Functions and Fire Alarm Matrix

- Identify the different functions a FACU can perform in addition to interpreting detection signals and initiating notification signals.
- Determine the response from a FACU for a given input from a fire alarm matrix.
- Explain system integration.

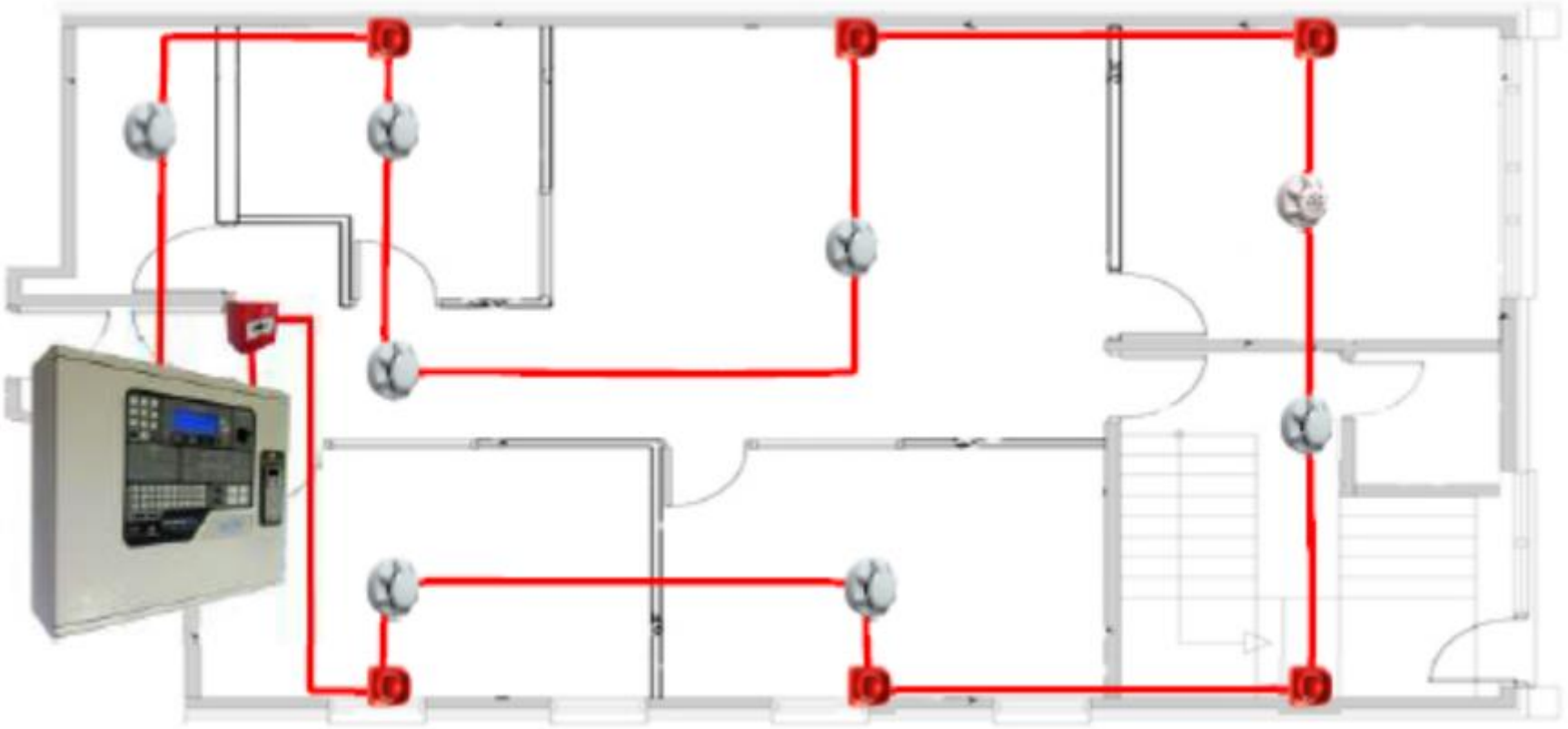
Conventional Alarm System

- Used in small locations
- Activate individually upon detection
- Help in quick and safe escape
- Use radial circuits
- Can set up in zones
- Devices are simple two-state (on/off) devices that use different levels of resistance (load) to signal to the control panel
- Less expensive due to less installation labor



Addressable Alarm System

- Use in large buildings or complexes
- Customizable
  - Different devices with different alarm thresholds
  - Data communications technology
  - Contains FACU that show exact location of alarming device
    - Each device is given a unique identification number (address)
- More programming may mean more expense

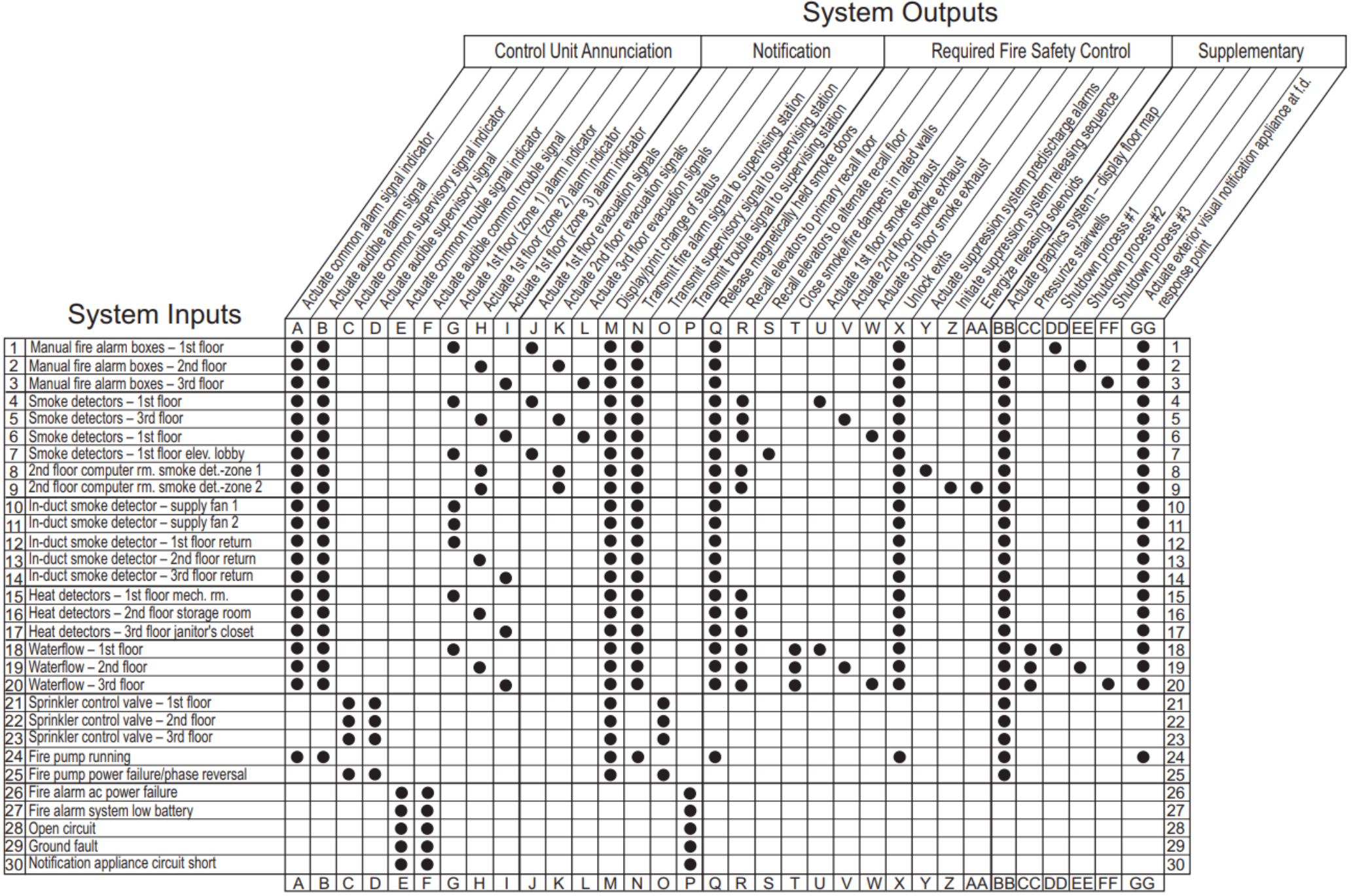


Addressable System Advantages

- In the late 1990s it was generally not considered cost-effective to switch to an addressable system until more than 8 zones were required, but with today's products it can sometimes be worthwhile for a system as small as 2 or 4 zones
- Advantages
  - Reduced cable requirements
  - Simple loop based wiring. Able to add devices and expand easily
  - Notification devices may be more easily integrated with detection
  - Displayed location identification in the event of alarm rather than just a zone number
  - Event log for locating faults

Signal Transmission

- Link between devices and the control panel
  - Three basic circuits
    - Initiating device
    - Notification appliance
    - Signaling lines
      - Two-way data communication
        - Addressable device to panel
        - Communication of alarm off-site
          - Remote
          - Central station



Δ FIGURE A.14.6.2.4 Typical Input/Output Matrix.

Detector Installation

- Special applications
  - Duct smoke detectors
  - Initiate closure of smoke doors
  - Fire suppression control
    - Clean agent
    - Pre-action systems
    - Deluge systems

Auxiliary Services

- Shut down HVAC system
- Close smoke and/or fire doors and dampers
- Stairwell pressurization
- Override control of elevators
- Automatically return the elevator to designated evacuation floor
- Operate heat and smoke vents
- Activate special fire extinguishing systems
  - Pre-alarm and release
- Monitor aspect of fire pump
- Process shutdown

Other Automatic Fire Suppression Systems

- There are NFPA standards describing the respective fire suppression systems and the standards provide information as to interfacing requirements with the fire alarm system

Fire Safety Function Interfaces

- Elevator control
  - Recall
  - Shut down
- Door control
  - Circuit should be arranged to provide fail safe operation
  - Release a door normally held open
  - NFPA 72 does not require a door hold-open device to be connected to standby power
    - Units are required to operate in a failsafe mode
  - Unlock a door that is normally locked
    - Conflict arises when security systems attempt to control occupied movement in buildings in contradiction to freedom of movement for self-preservation
    - Security systems cannot override code requirements established for life safety

System Integration

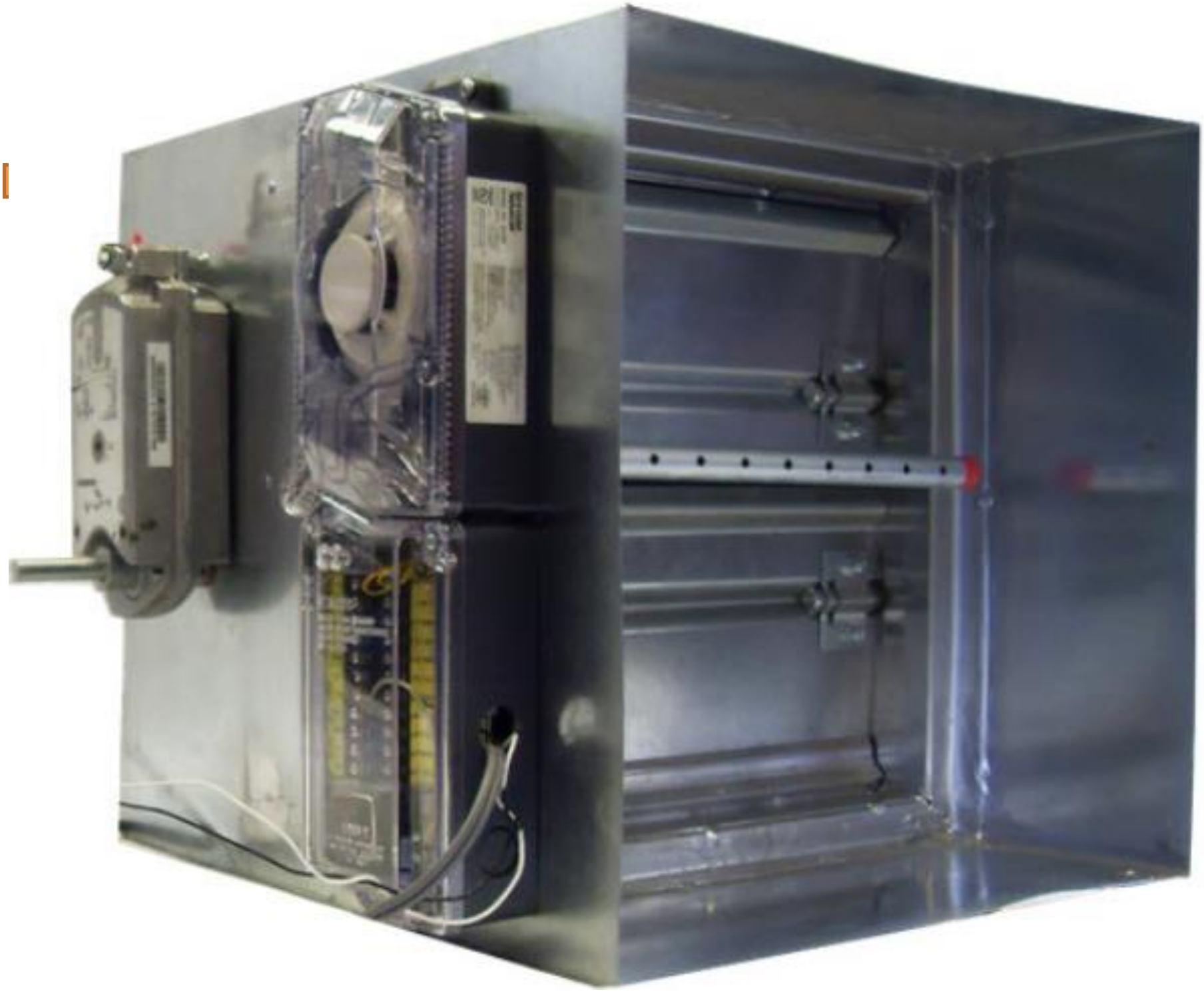
- All systems through one panel
  - Fire
  - Nonfire
  - Reduced costs
  - Ease of use

Interfaced Equipment

- Relay to initiate control must be within 3 ft of device
  - Why?
- Must be listed method
- Must be compatible with FACU
- Wiring must monitored for integrity
  - Or fail in correct operation
- Interface must not interfere with other functions

Building Automation Systems

- Non-computer control systems
  - Power is generally switched on or off
  - Wiring for these controls must be monitored for integrity
- Computer controlled building systems
  - Examples are fans and dampers
  - Network interconnections must be monitored for integrity
- Interconnected fire alarm control units
  - May occur during in addition to a building
  - Involves two different manufacturers' control units to be interconnected
  - Possibility of error in the system. Example:
    - First alarm system controls exhaust fan in a smoke vent shaft
    - Second alarm system controls the dampers in the vent shaft
    - If connected to different alarm systems and the interface is compromised, the fan can be told to start and the damper not be told to open resulting in collapse of the vent shaft



Non-Fire Alarm Interfaced Equipment

- AHJ should be consulted
  - If the interfaced system is monitoring conditions affecting life safety of the occupants, it may be required to have that system initiate an alarm condition on the fire alarm system

Key Point

- Address interface requirements early in the design stage to ensure the operational reliability of the fire alarm systems being interfaced with other building systems