

# Ventilation for Acceptable Indoor Air Quality

## Part 6 – Integrating Outdoor Air with Building Pressure Control

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# Airflow Control Points

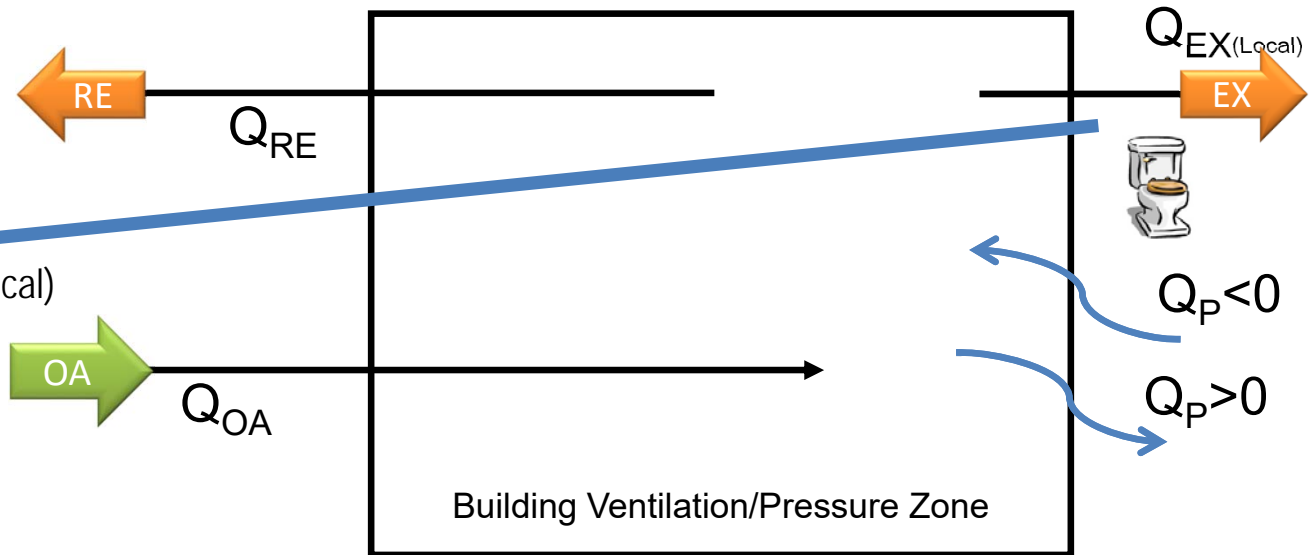
Dilution Ventilation/Economizer:

- $Q_{OA}$

Pressurization:

- $Q_P = (Q_{OA} - Q_{RE}) - Q_{EX(Local)}$

a.k.a.  $\Delta CFM$



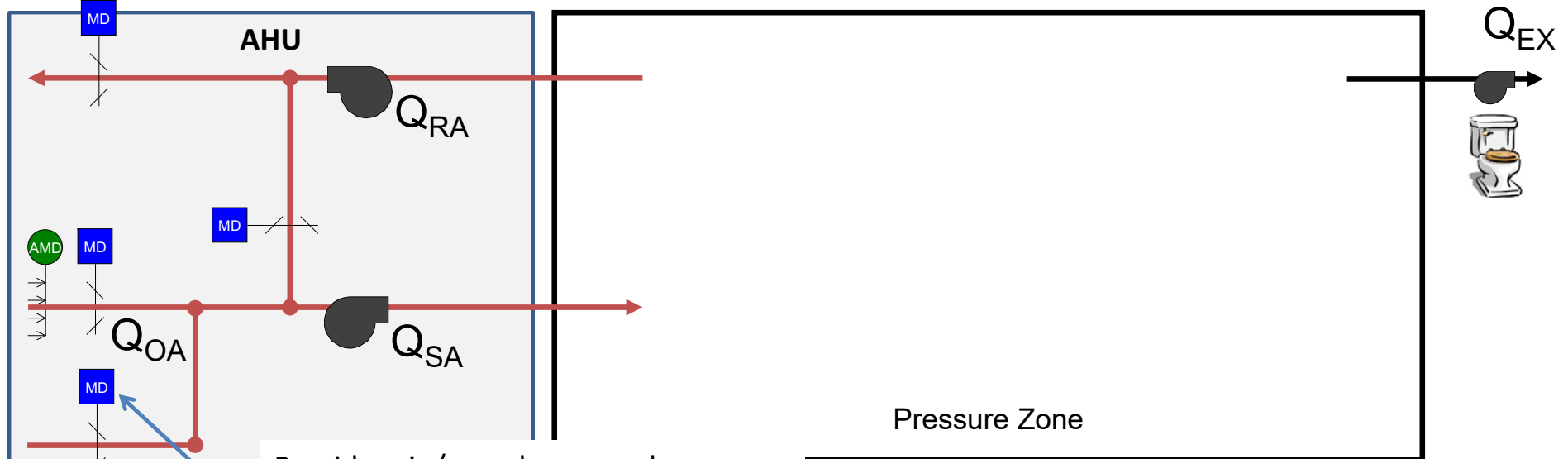
# Measurement Requirements and Airflow Control Strategies

Supply/Return Fan Systems



# SA/RA Fan Systems

Measurement requirements for dilution ventilation,  $Q_{OA}$ , with or without active relief at the AHU

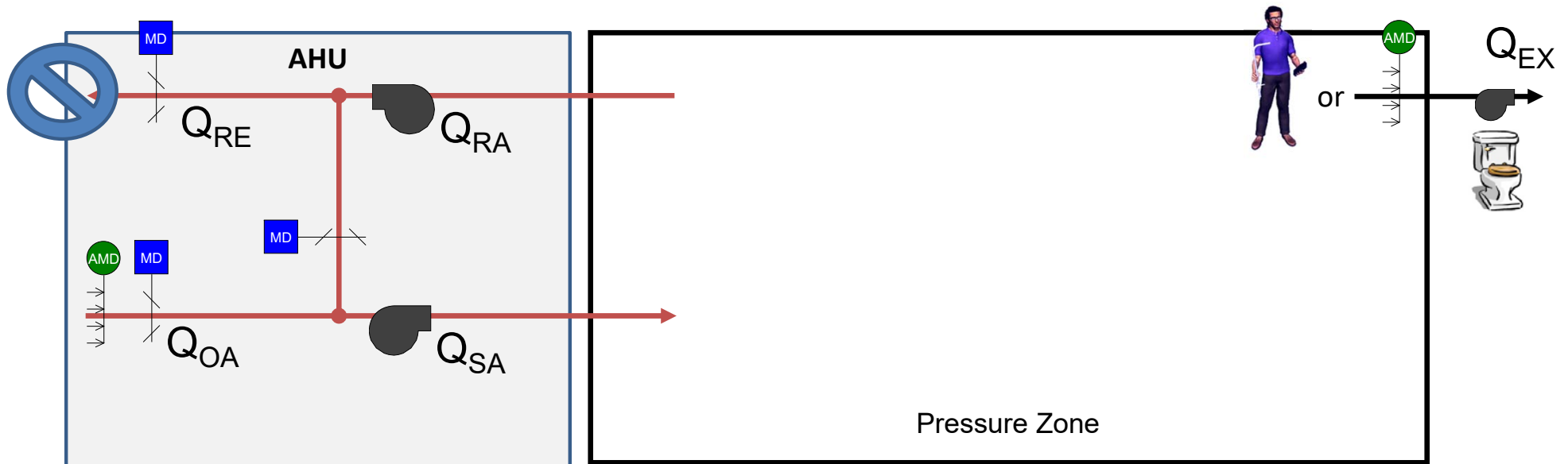


Provide min/max damper, when possible, if minimum OA velocity falls below 150 FPM (avoid false readings from transient wind gusts)



# SA/RA Fan Systems

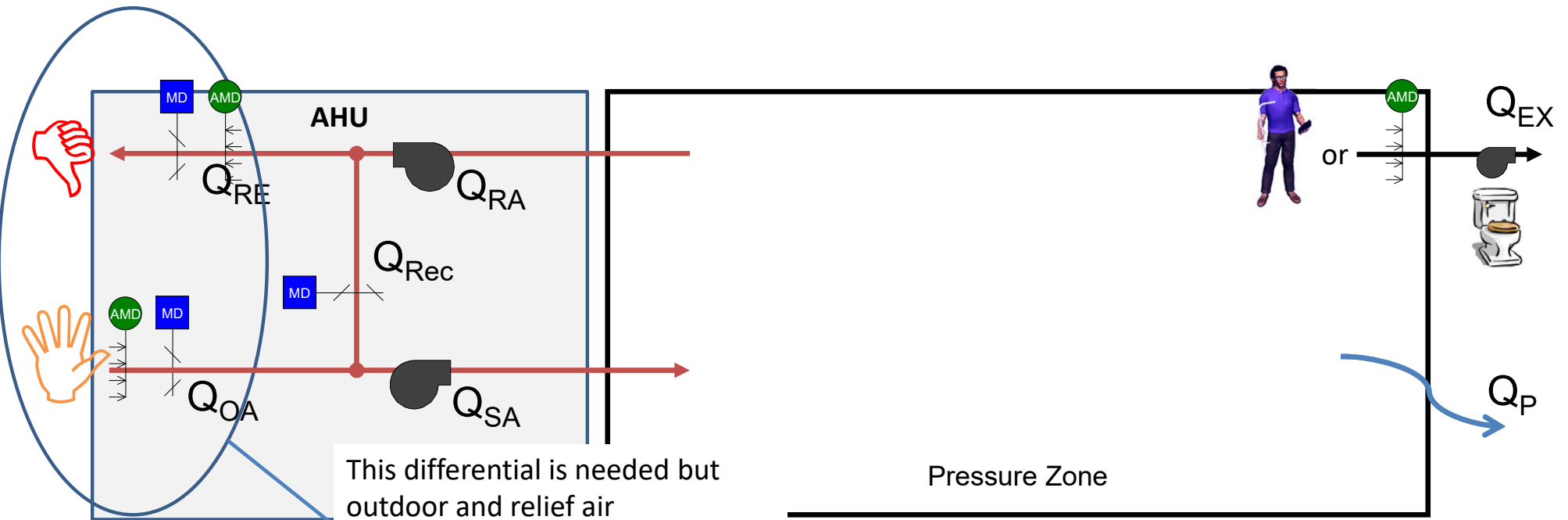
Measurement requirements for  $Q_P$  control when  $Q_P = Q_{OA} - Q_{EX}$   
(i.e. no relief is required at the AHU to maintain pressurization)



# SA/RA Fan Systems

Measurement requirements for  $Q_P$  control (with active relief)

$$Q_P = [Q_{OA} - Q_{RE}] - Q_{EX}$$



This differential is needed but outdoor and relief air measurements are generally not accurate enough for tracking.



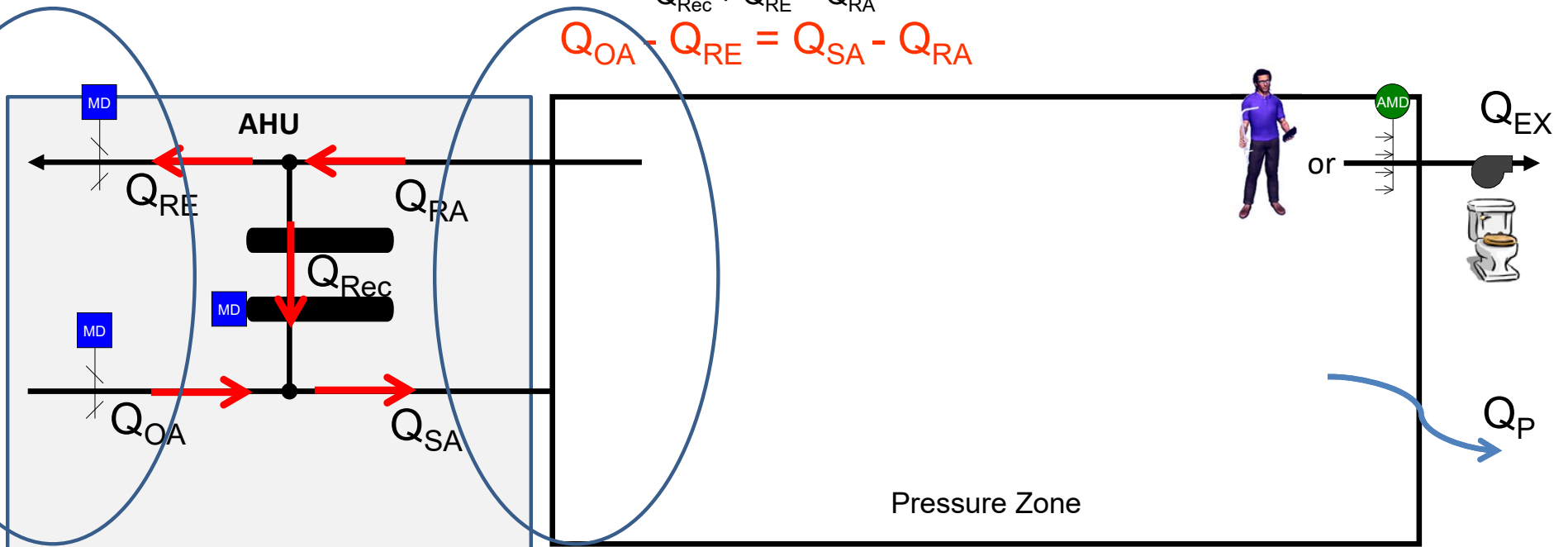
# SA/RA Fan Systems

Is there a better way to determine  $Q_{OA} - Q_{RE}$ ?

$$Q_{Rec} + Q_{OA} = Q_{SA}$$

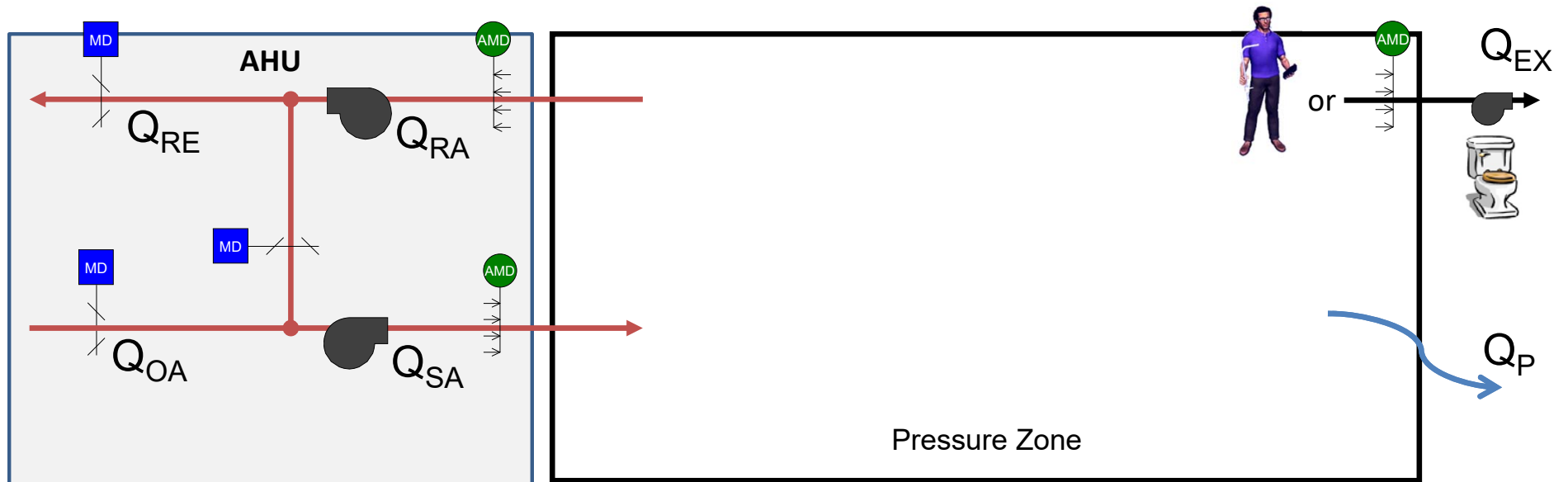
$$Q_{Rec} + Q_{RE} = Q_{RA}$$

$$Q_{OA} - Q_{RE} = Q_{SA} - Q_{RA}$$



# SA/RA Fan Systems

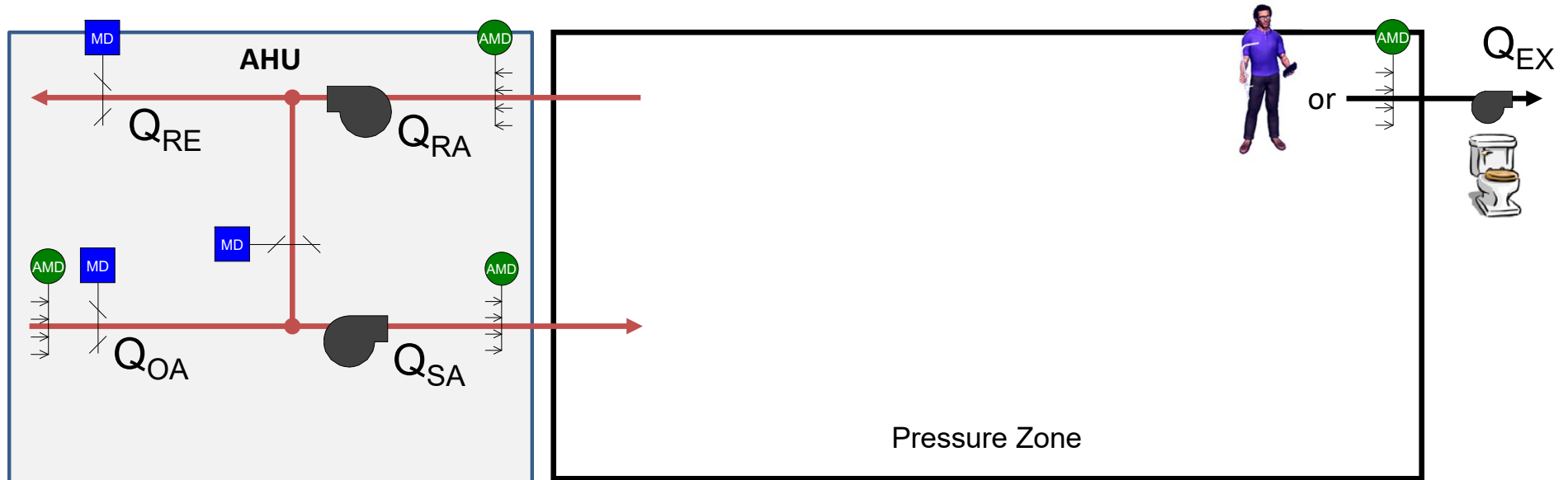
Measurement requirements for  $Q_p$  control  
(with active relief at the AHU)





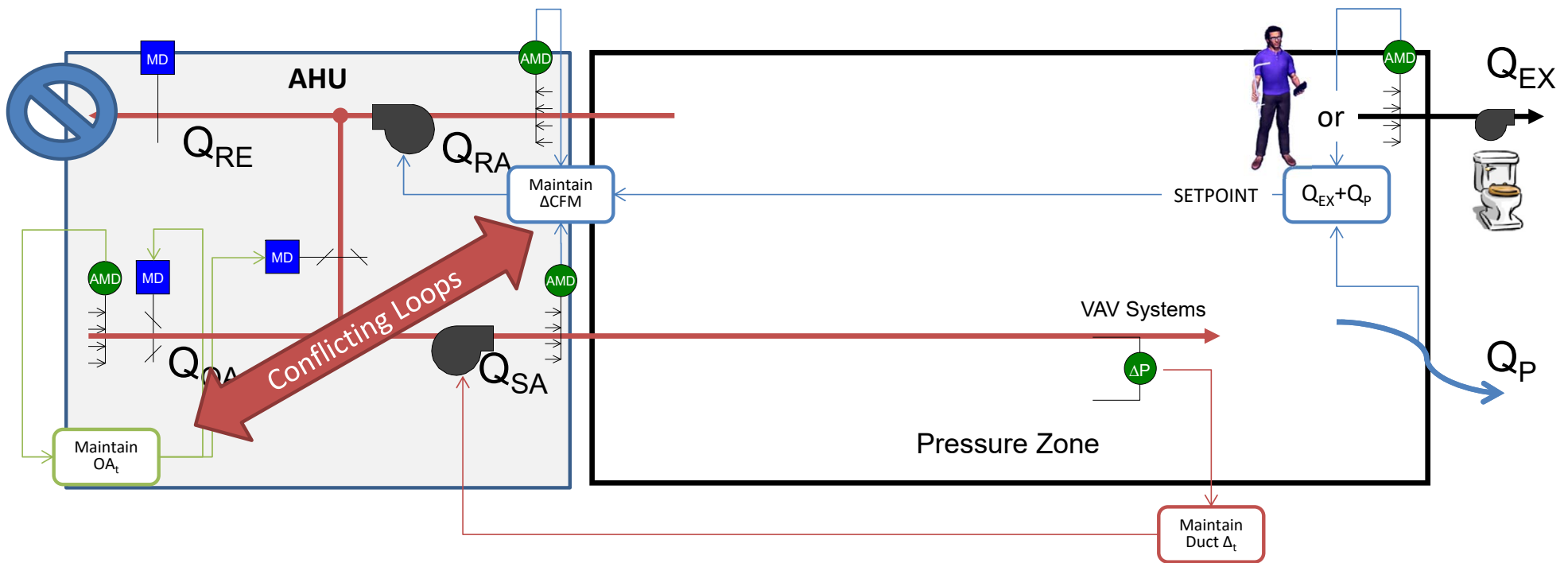
# SA/RA Fan Systems

Required measurement paths for  $Q_{OA}$  and  $Q_P$  control



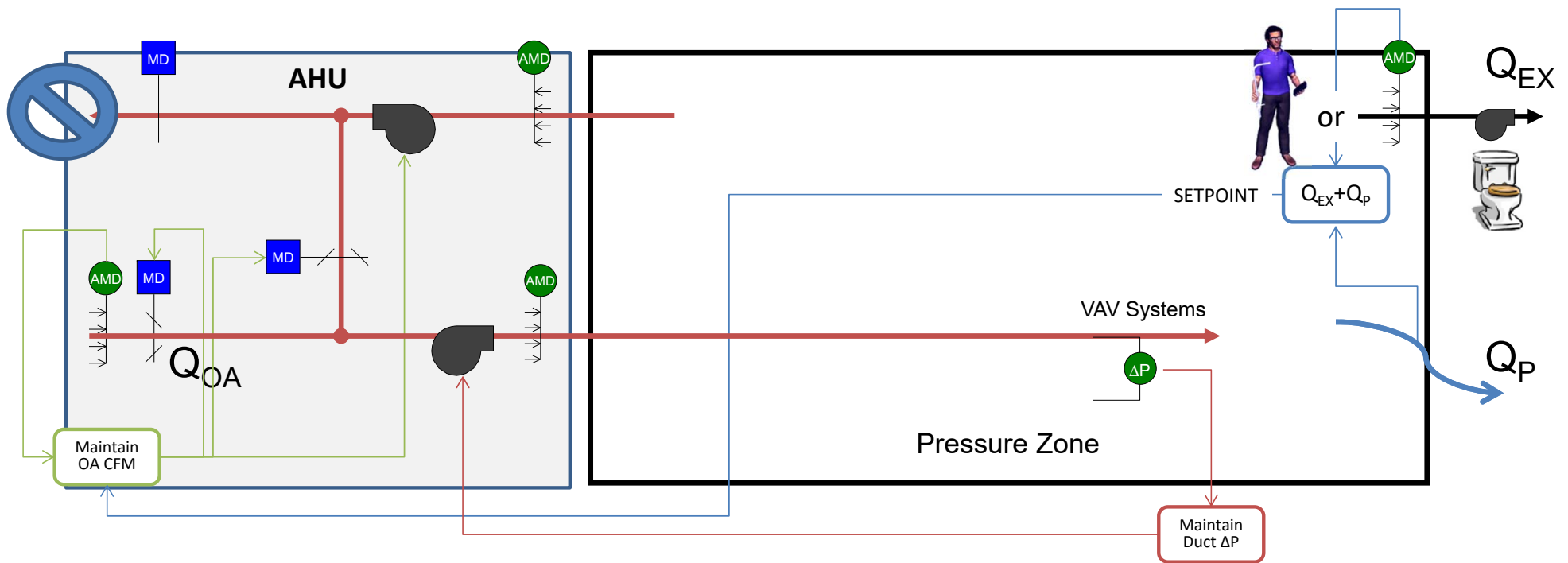
# SA/RA Fan Systems

Control strategy when no active relief is required at the AHU  
(Don't do this)



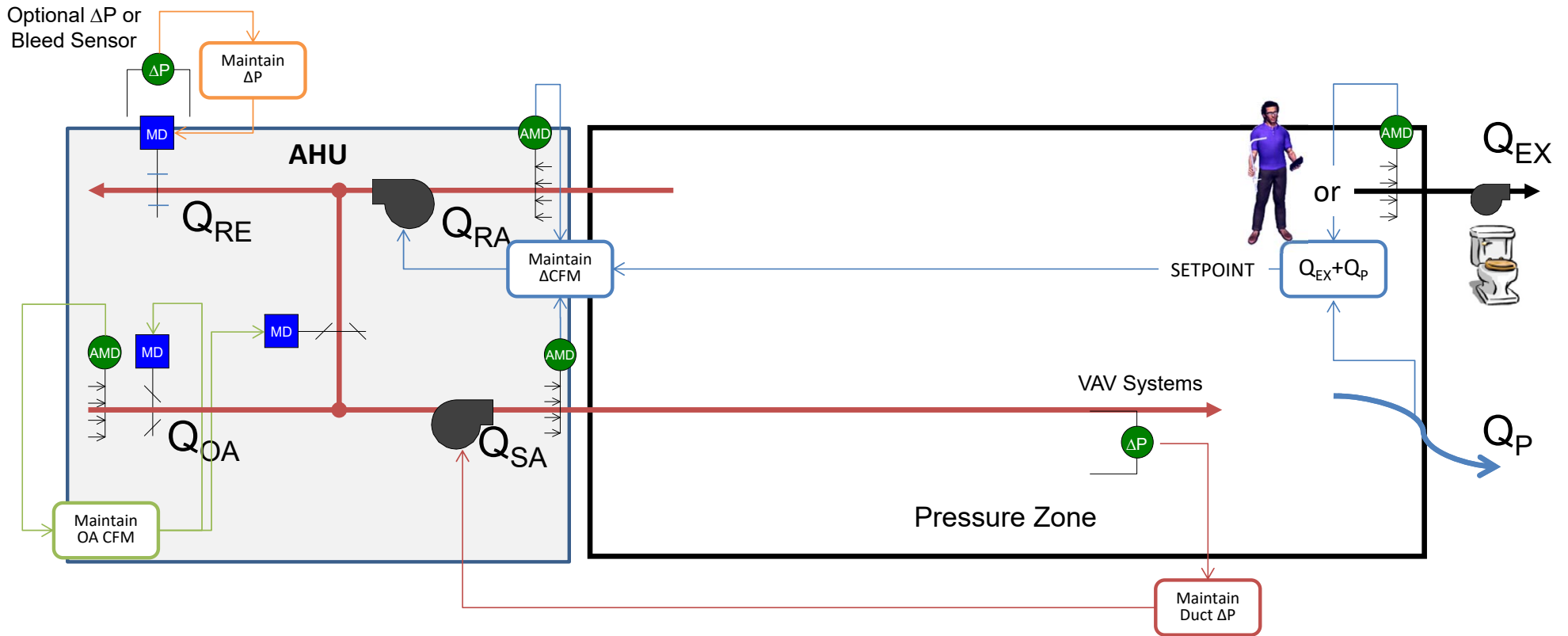
# SA/RA Fan Systems

Control strategy when no active relief is required at the AHU  
(Do this)



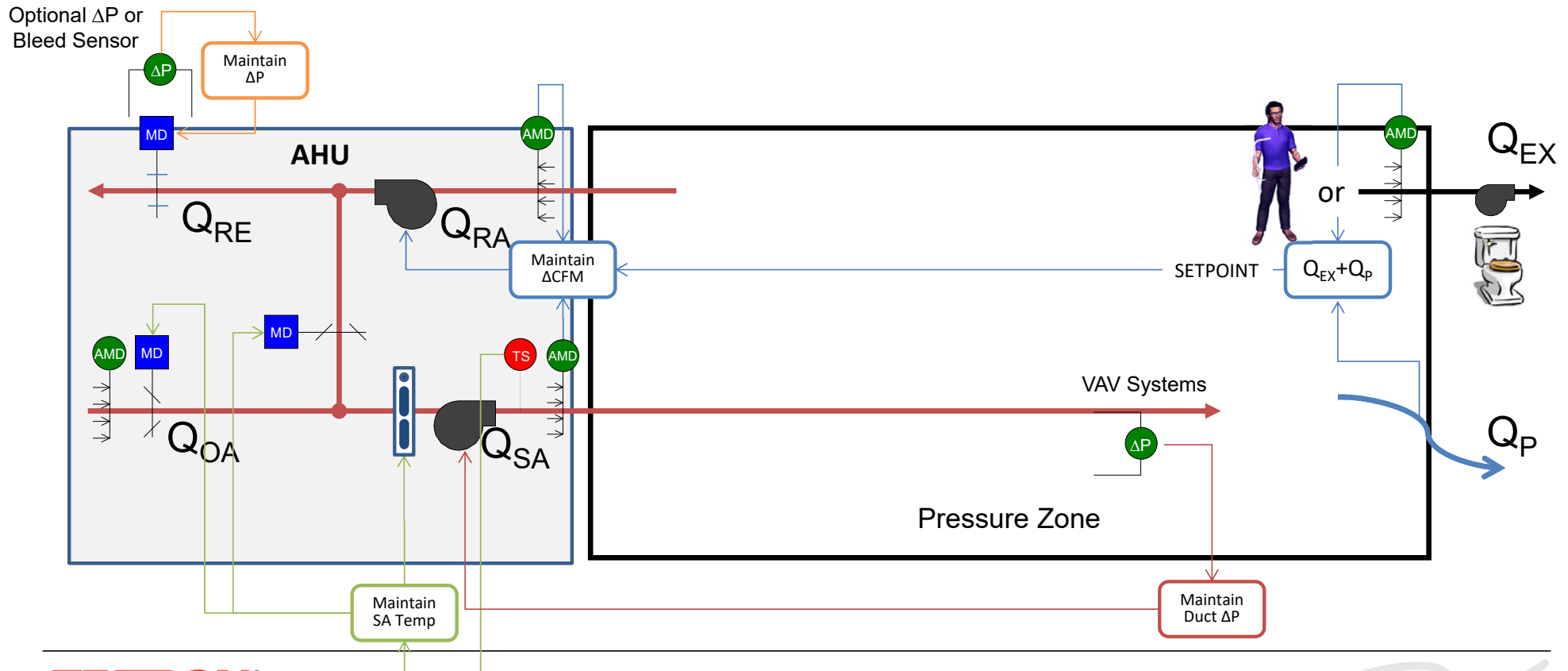
# SA/RA Fan Systems

Control strategy when active relief is required at the AHU

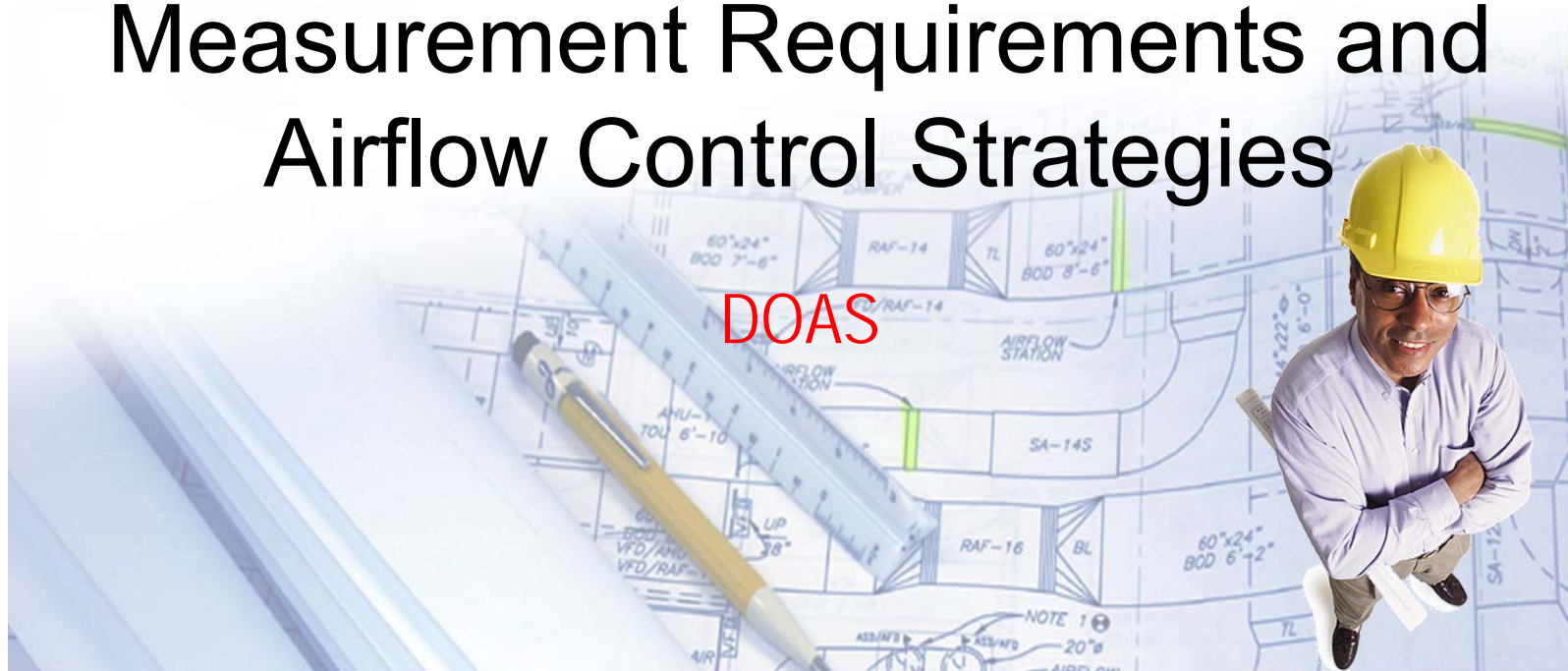


# SA/RA Fan Systems

Control strategy when economizer mode is active

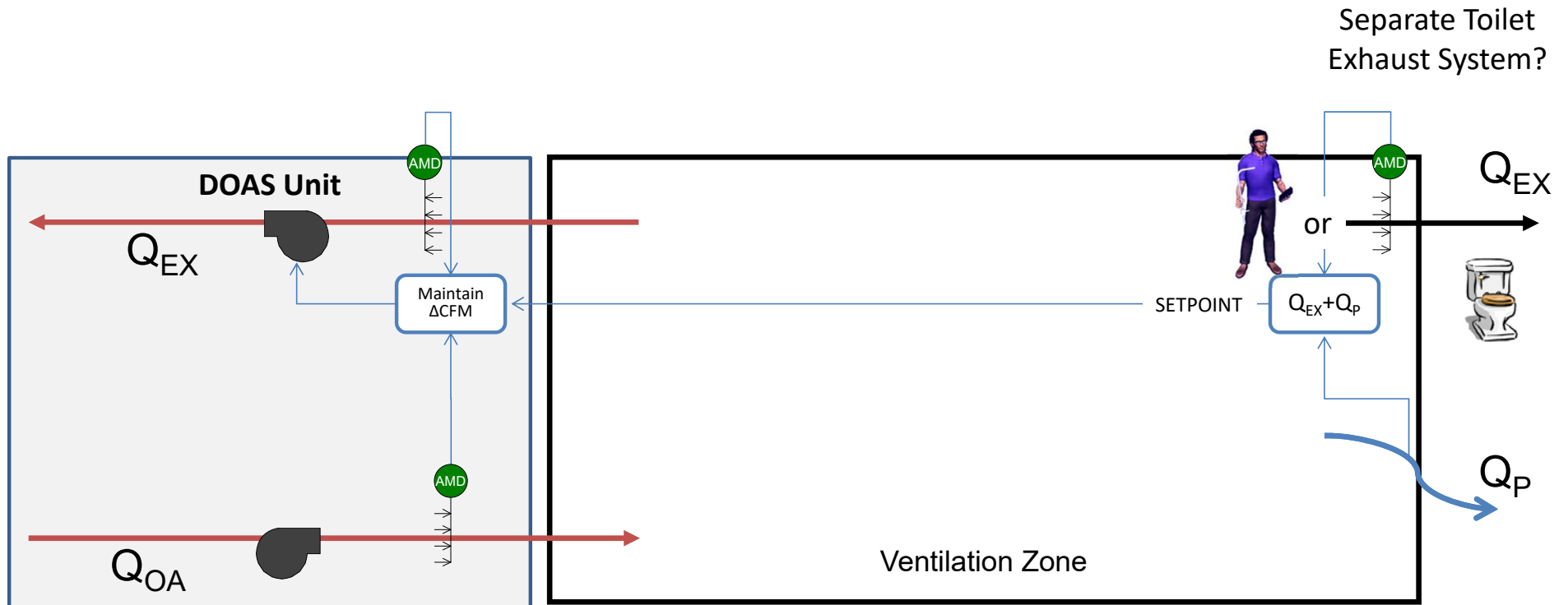


# Measurement Requirements and Airflow Control Strategies



# DOAS System Considerations

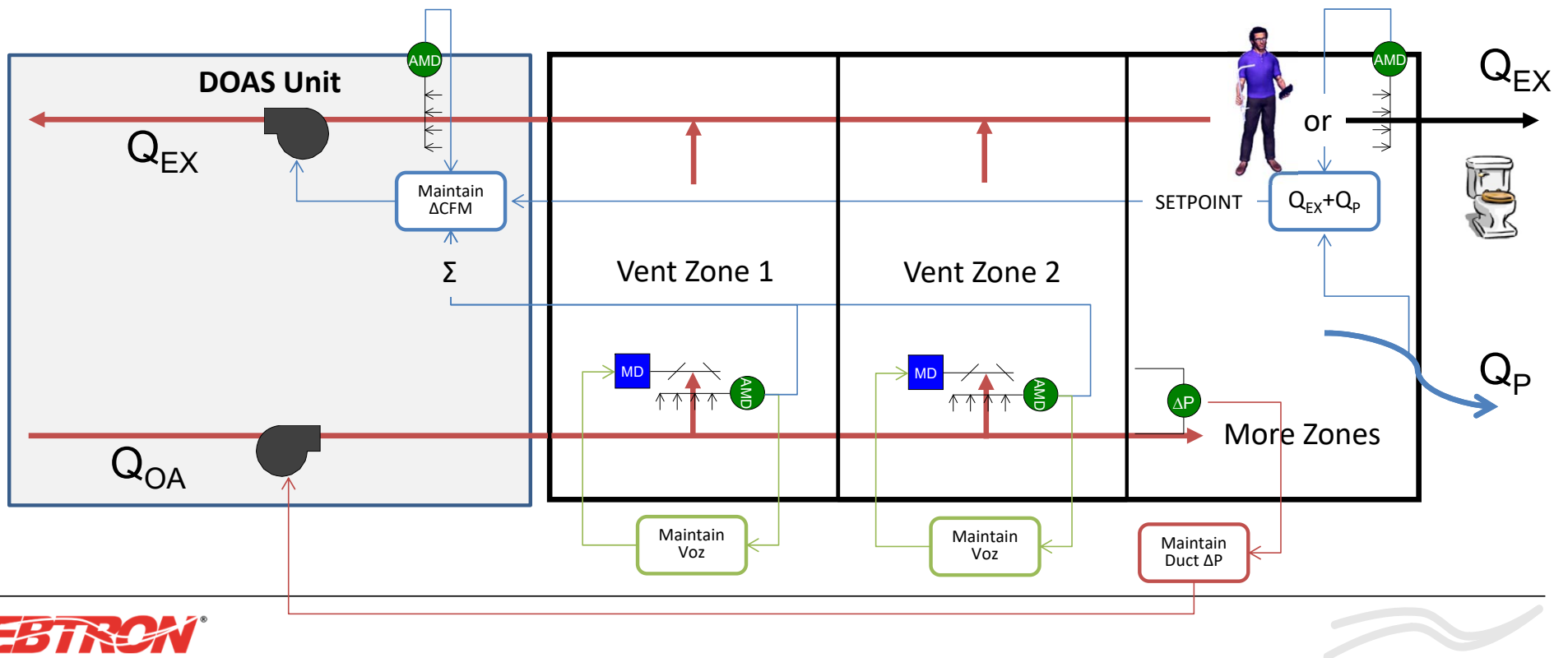
Simple, constant single or multi-zone OA during occupied periods



# DOAS System Considerations

Serving multi-speed fan coils or VAV terminals

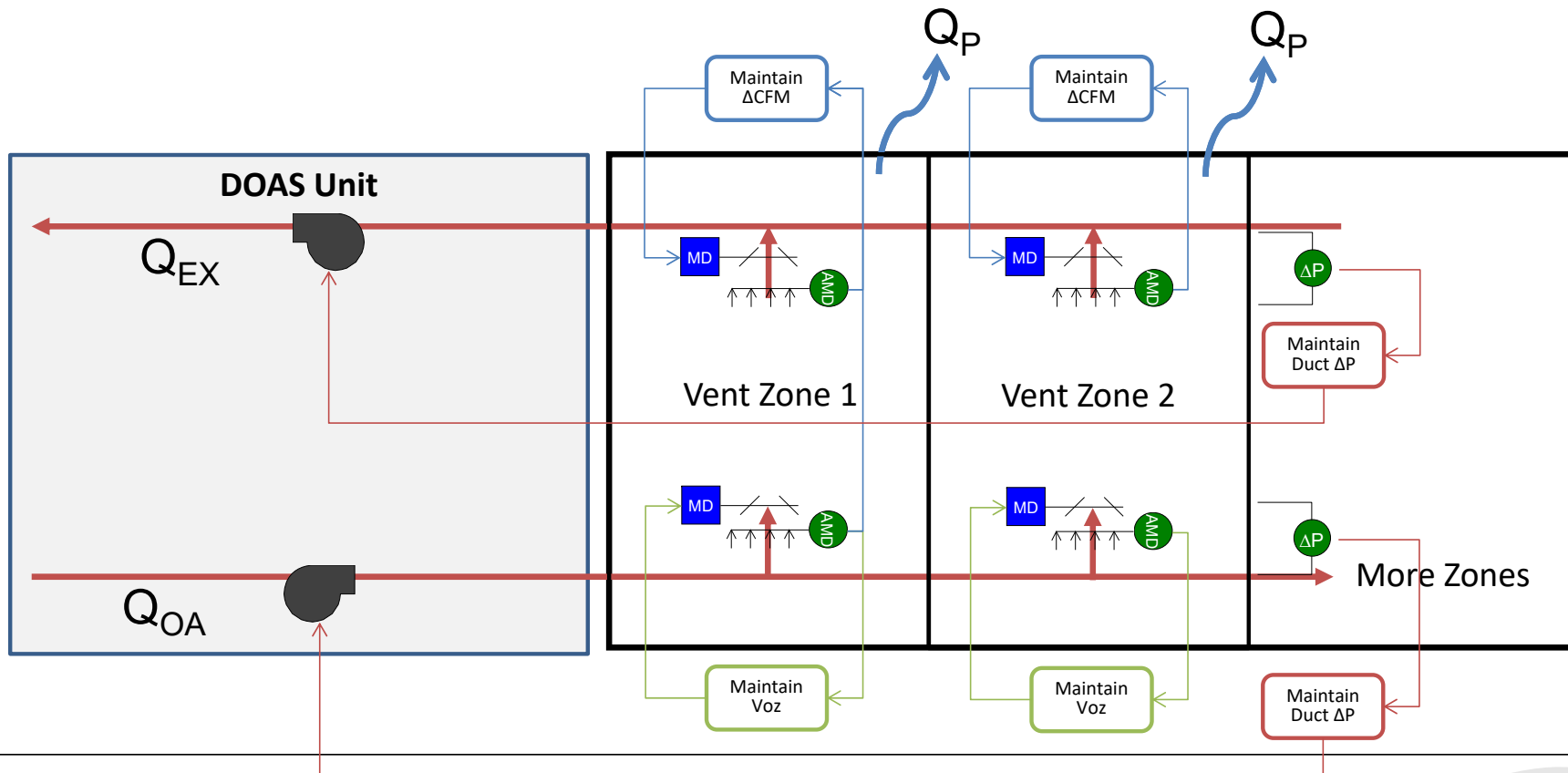
Separate Toilet Exhaust System?





# DOAS System Considerations

Alternate for zone level pressure control



# Thank You!

Questions? More information?

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