



Ventilation Basics – Zoning and Indoor Air Quality Systems

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Subjects We Will Cover In This Session

- Zoning Overview
 - Technical Concepts
 - Applications
 - Product Line & Features
- Indoor Air Quality Overview
 - Technical Problems
 - Acronyms & Opportunities
 - Product Line & Features
- When You Have Questions
- Q&A

Overview – What is Zoning?

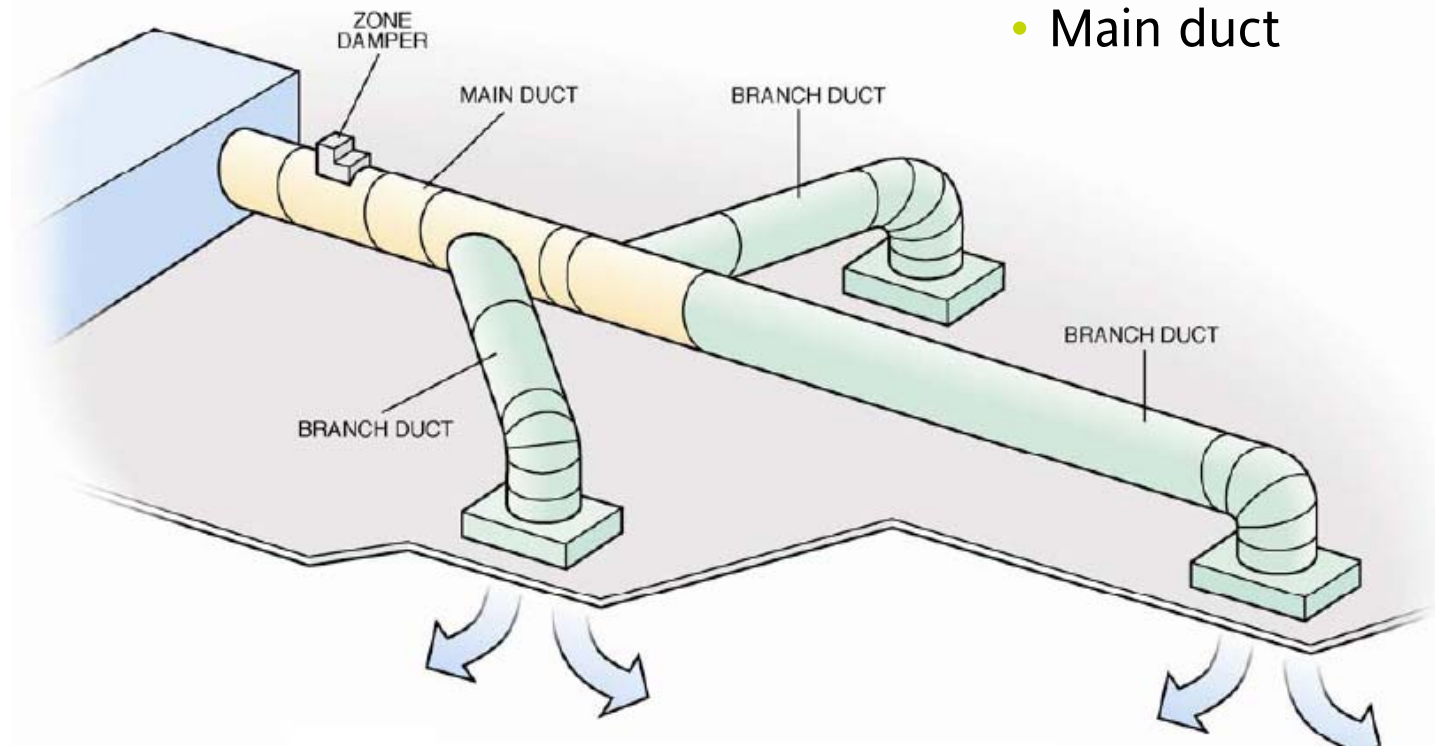
- **Zoning is** where dampers (or valves) are used to direct heating and cooling from a single HVAC system to more than one area, as needed.
- **Benefits of Zoning:** Increases efficiency & improves comfort.
- **Zoning is not** multiple HVAC units, each serving a different area or floor.
- **A Two-Zone System** will most likely have two dampers, each one controlling the airflow to a zone.
- **A Zone Controller** connects multiple thermostats to a single HVAC system.

When Is Zoning Used?

- Vaulted ceilings
- Large homes with varying user schedules
- Multiple level homes
- Rooms over the garage
- Finished basements
- Rooms with large glass facing sunlight

Zoning Concepts and Terminologies

- Zone dampers
- Branch duct
- Main duct



Zoning Concepts and Terminologies

What is a Bypass Damper?

- Bypass duct allows excess pressure from the supply to escape into the return air plenum
- Excess pressure is restricted from freely flowing back to the return air plenum by adjusting the bypass damper(s)
- A bypass damper must be adjusted so that when all zones are open, the bypass damper closes

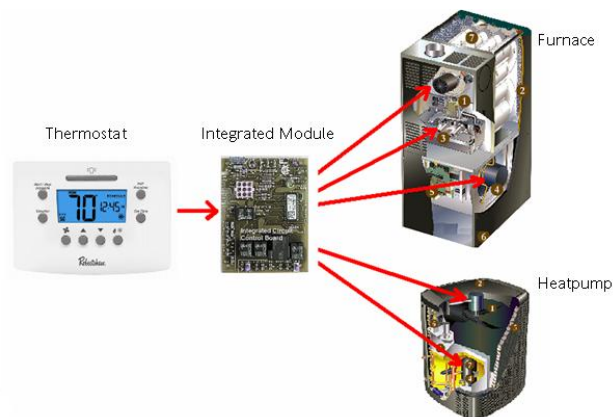
Thermostat Design Features

- Thermostats control the temperature in the zone being served
- Zone thermostat location is key priority
- Zone thermostats should be located within the zone and at a maximum distance from:
 - Registers
 - Return air grills
 - External influences that would cause a false temperature indication
- Zone components may be located up to 300 feet from the zone control logic panel when 18 AWG copper wire is used



Equipment Design Features

- Air conditioning sizing is dependent on coil frosting
- Most systems must deliver 320 to 360 CFM per ton to the space to prevent frosting
- Low limit protection is recommended in conjunction with a bypass system
- High limit protection should be used when temperature across the heat exchanger exceeds the manufacturer's high limit lockouts
- Do not rely on free air infiltration for optimum results
- Sufficient return air is very important!



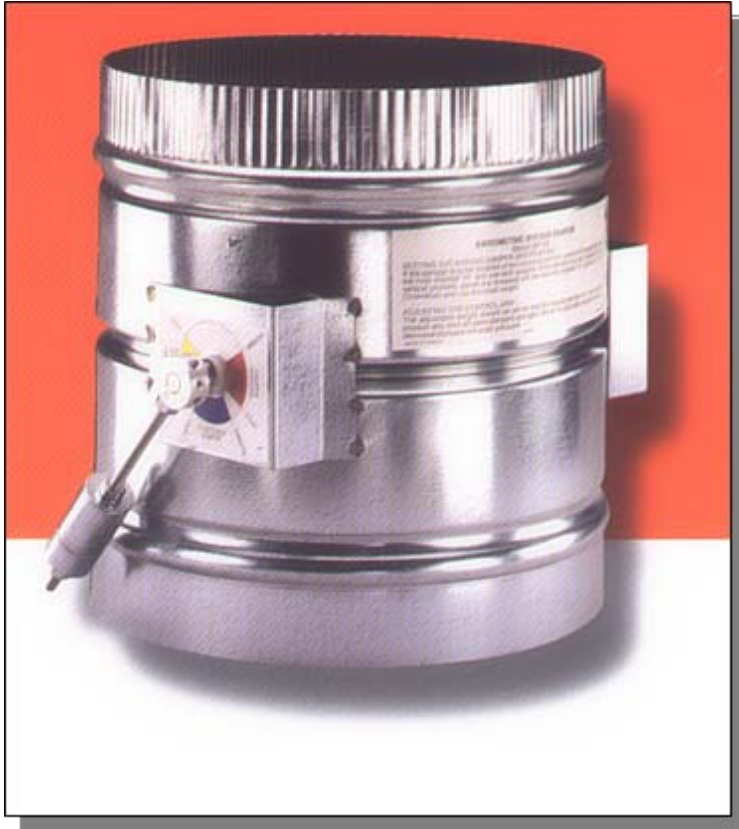
Round Motorized Zone Dampers

Robertshaw



- Lightweight for easy installation
- Stiffening ribs maintain rigidity
- Motor mount welded to shell for added sturdiness
- External damper blade position indication
- External minimum position adjustment
- Nylon bushings provide smooth operations and eliminate blade slippage

Bypass Dampers



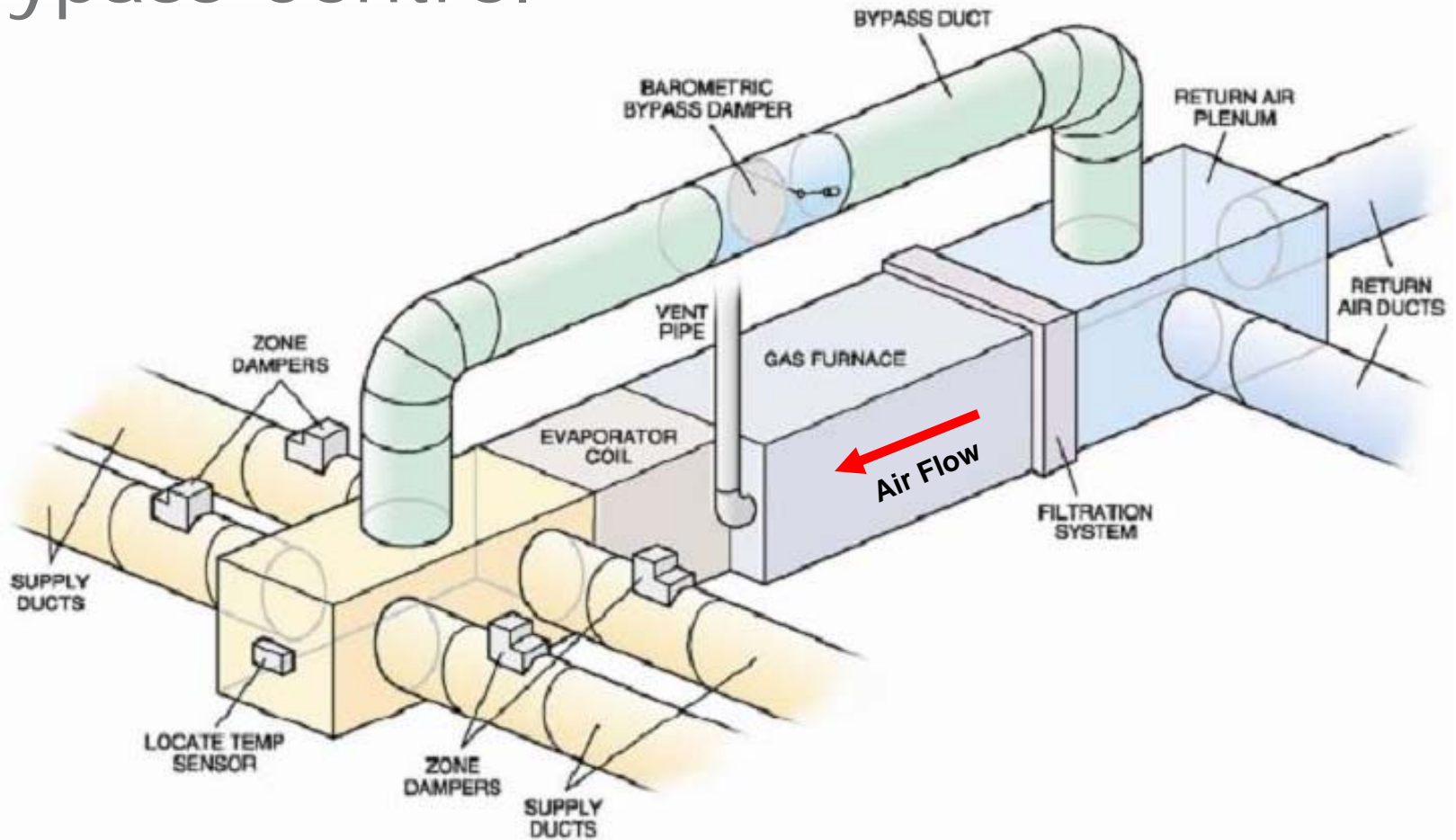
- Barometric design eliminates motors and static pressure controls
- Vertically or horizontally mounting
- Reversible design allows for right or left hand air flow
- Easy to install and calibrate
- 10" and 12" standard size
- 14" and 16" custom available
- Quiet Operation

Rectangular Supply Air Zone Dampers



- Power Open Closed (RPOC) Design
- Adjustable Min or Max
- Sizes include
 - 6", 7", 8", 9", 10", 12", 14" & 16"
- Low Pressure Two Position Dampers

Bypass Control



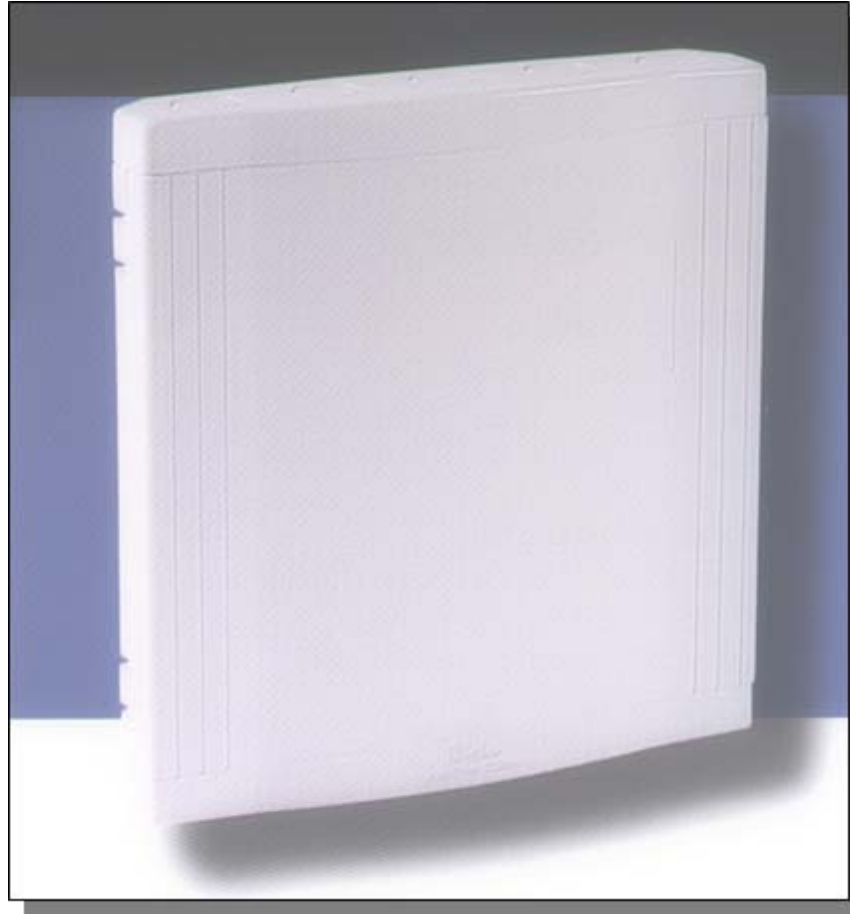
Existing Robertshaw® Zoning Products

Classic (II and III)

Deluxe

Premier

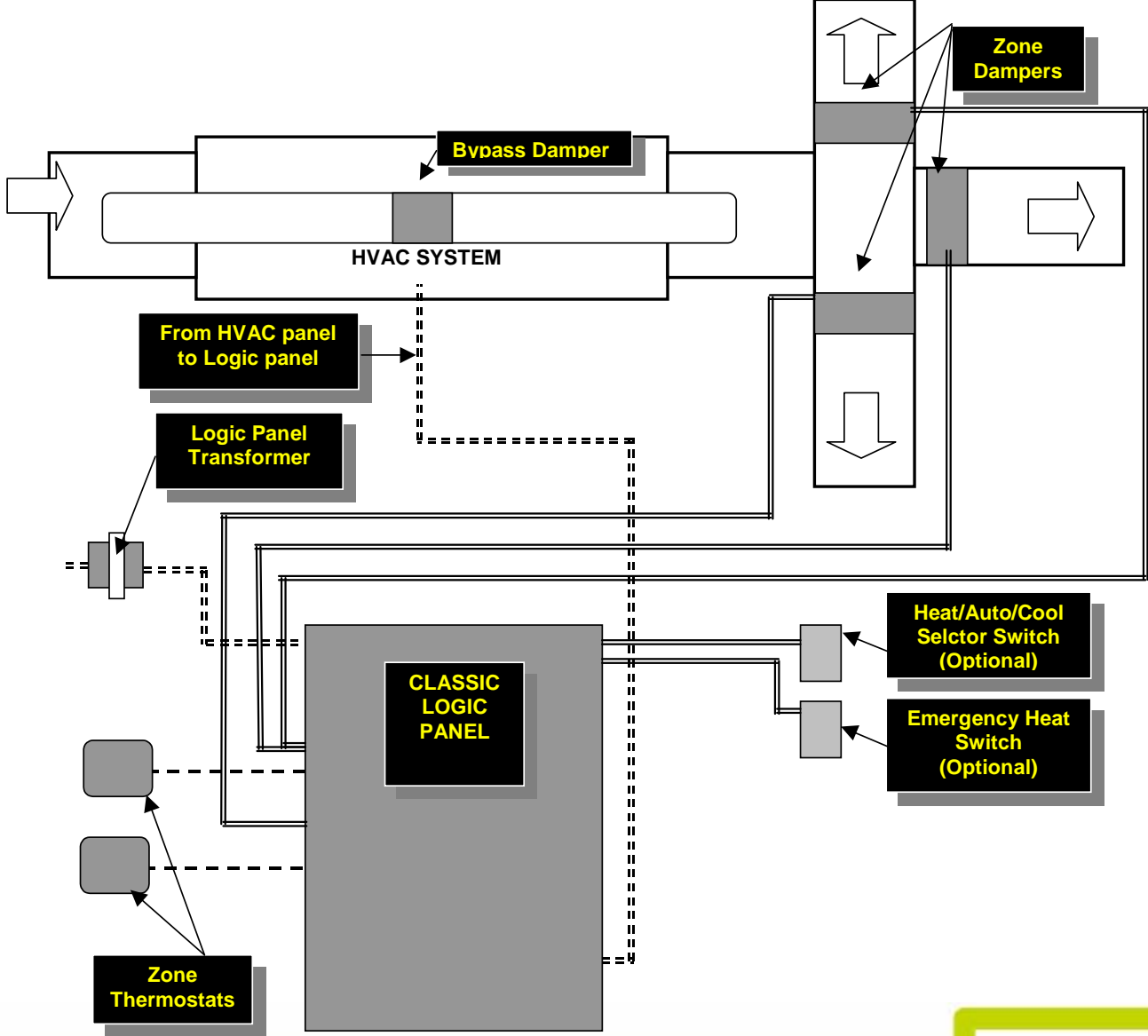
Robertshaw® SlimZone Classic



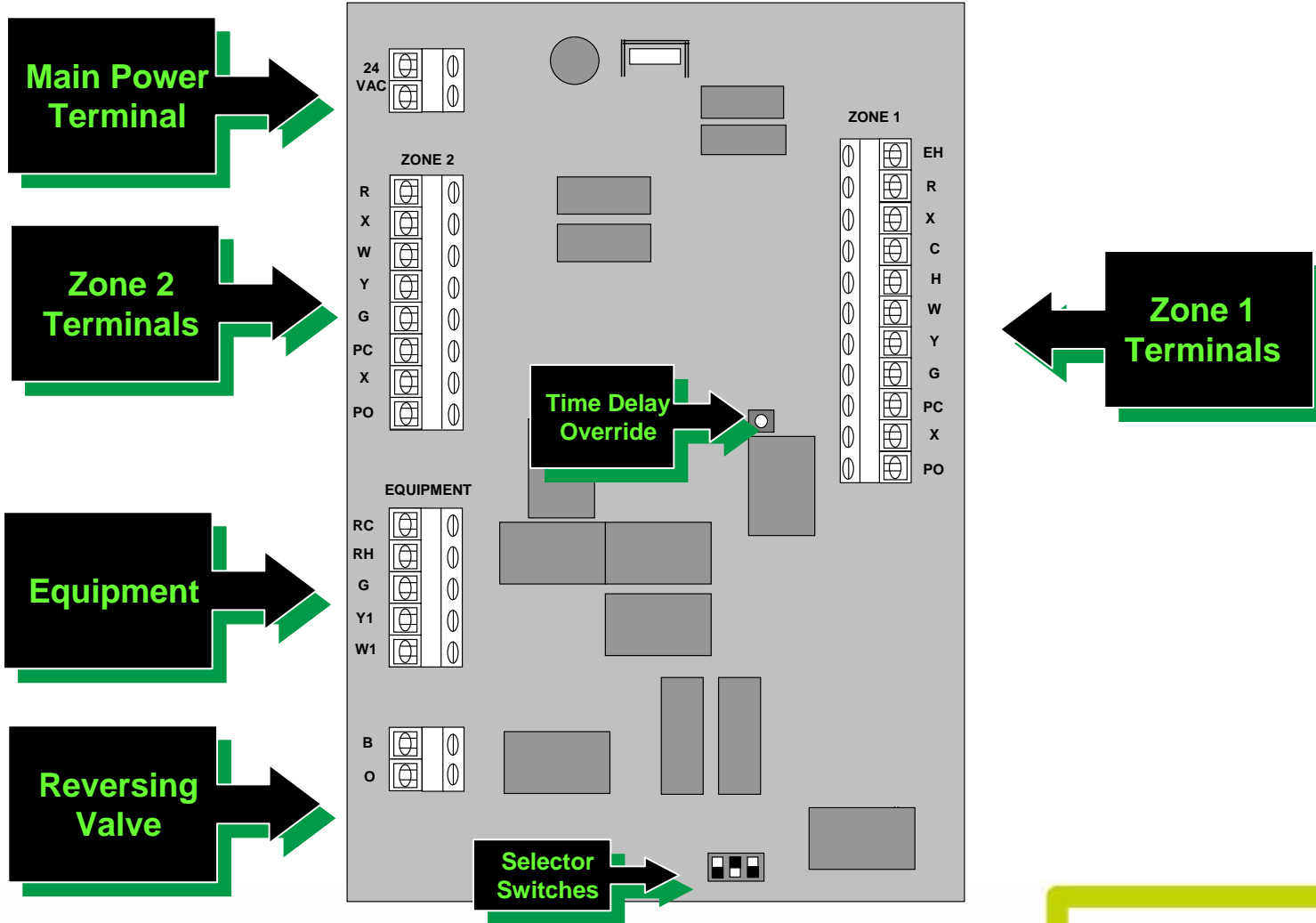
Operational Features of Classic

- Controls single-stage heat/cool equipment, single compressor heat pumps with auxiliary heat, oil, electric or dual fuel (add-on heat pumps)
- Controls two or three zones
- Uses any single stage thermostat (Heat pump thermostats are not required)
- 15 minute upstage to auxiliary heat for heat pumps (non-adjustable)
- First Call Priority control algorithm
- All low voltage wiring (24 V UL Class II)
- Minimum ON/OFF times of 4 minutes with built-in short cycle protection

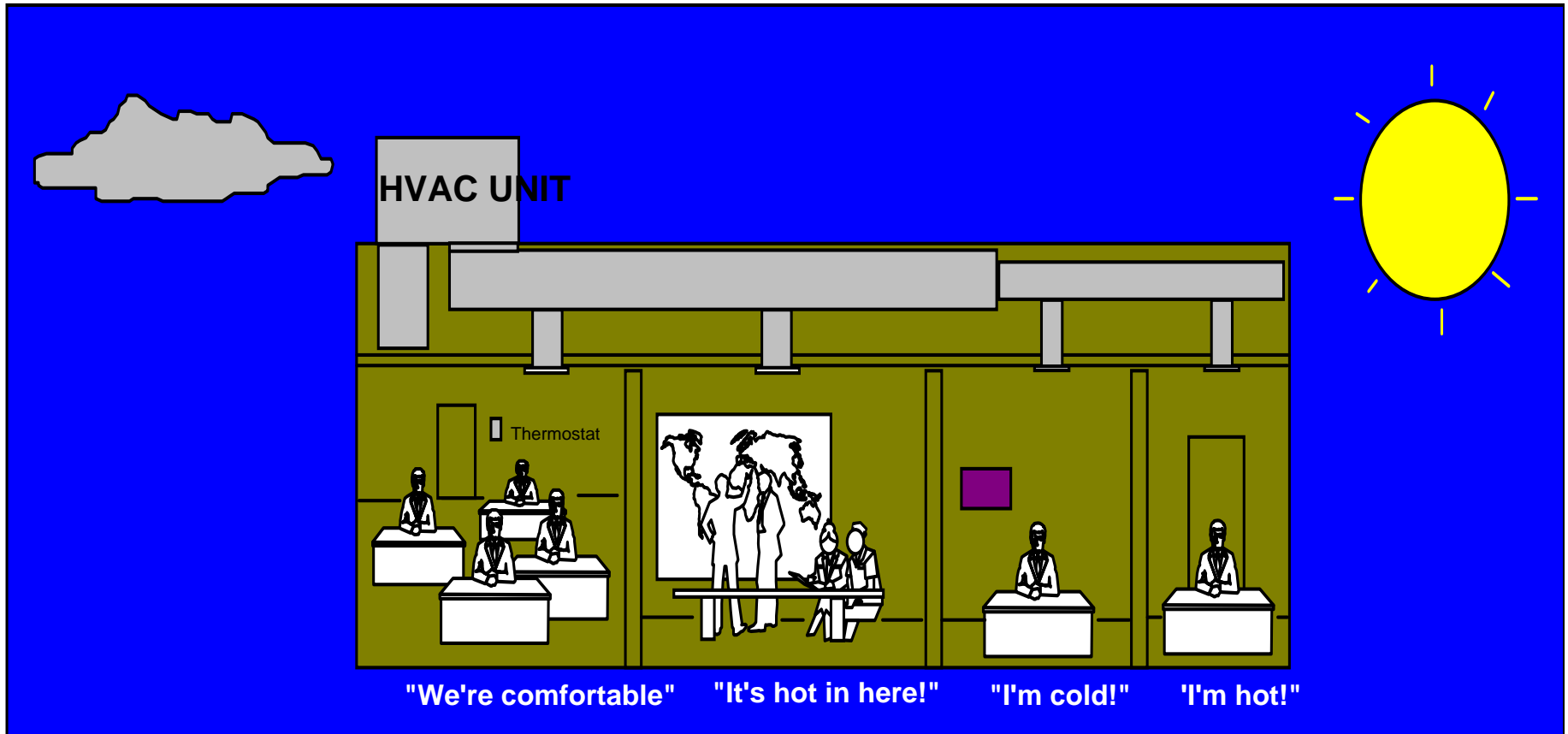
SlimZone Classic System Diagram



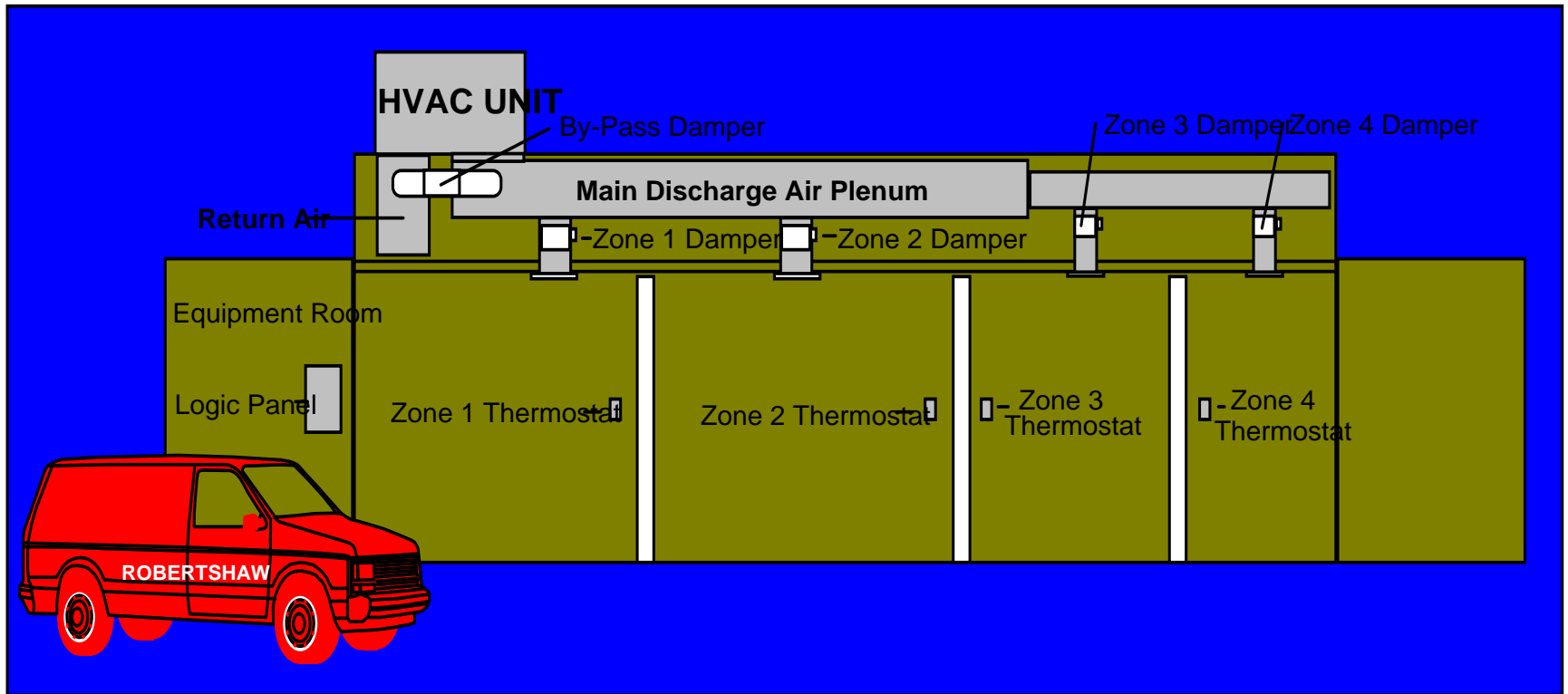
SlimZone Classic Panel Terminal Layout



Commercial Zoning Application



Typical Four Zone Commercial System



Premier Series Features

Robertshaw



SZP-5 Premier Panel

- Ultra Slim Styled Cabinet
- Backlit Digital Display
- User Friendly Interface
- LED Indicators on all system functions
- Expandable from 3 to 19 zones
- 45 second fan purge
- 2 or 3 Wire Damper Capability
- Perimeter Heat Control from Thermostats

Premier Series Features

- Ultra slim styled ABS cabinet
- Two modes of operation: timesharing or differential control
- LED (light emitting diode) status for all system functions
- Solid-state control module with current limited (Poly fuse) protection
- User interface at logic panel allows:
 - System programming (temperature, schedules and events)
 - 12 or 24 hour clock
 - Fahrenheit or Celsius temperature display
 - Complete equipment test
 - Automatic by-pass damper set up when SZEM environmental module is used

Indoor Air Quality (IAQ) Topics

- Ultraviolet Lamps
- Ventilators
- Humidifiers
- Air Filters

IAQ Problem

- According to the EPA, indoor air quality is one of the top five environmental health risks of our time
- Since the energy crisis of the 1970's, homes built tighter and tighter
- New construction materials consist of more synthetic or man-made materials
- These building techniques have developed problems
 - Asthma
 - Allergic Responses
 - Infectious Diseases
 - Respiratory Problems

Acronyms

BRI	=	Building Related Illness
CFM	=	Cubic Feet per Minute of airflow
EPA	=	Environmental Protection Agency
HEP	=	High Efficiency Particulate Air Filters
IAQ	=	Indoor Air Quality
IEQ	=	Indoor Environmental Quality
nm	=	Nanometers (10^{-9})
SBS	=	Sick Building Syndrome
UV	=	Ultra Violet
UVC	=	Ultra Violet in the C band
UVGI	=	Ultra Violet Germicidal Irradiation

Healthy Air

What you should know about the air you breathe

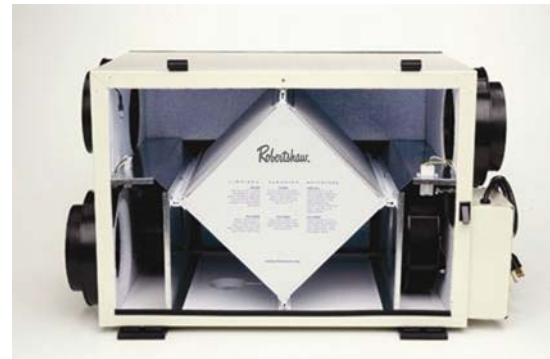


Indoor Air Quality Opportunities *Robertshaw*

UV Lights



Ventilators



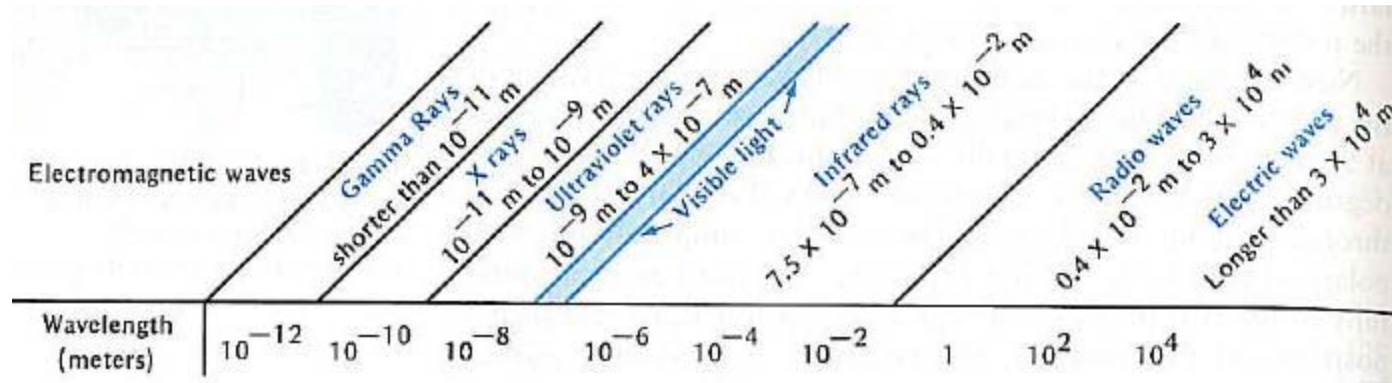
Air Cleaners



Humidifiers



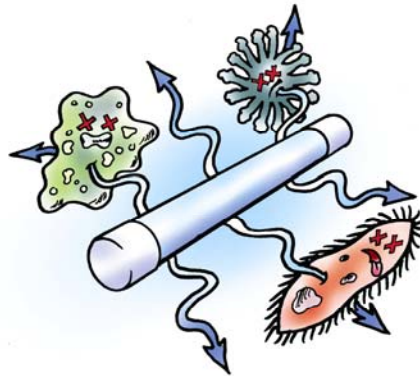
What is Ultraviolet Light?



- The Ultraviolet 10^{-9} Molecules section above is the region of the electromagnetic spectrum that exists between visible light and X-rays.
- The range of UV light is between 90 - 400 nm. UV light is most effective at sterilizing in the C band range of 200 – 280 nm.

How Does UV Light Disinfect?

- By altering the molecular bonds in a microbe's DNA
- The 254nm wavelength of ultraviolet light will penetrate the membrane and nucleus of a micro-organism
- Breaks apart the molecular bonds of the DNA
- This disruption or breakage leaves the cell unable to reproduce, rendering it harmless



Applications

- Homes and offices
- Schools and locker-rooms
- Food and beverage processors
- Laboratories and clean rooms
- Water treatment facilities
- Hospitals and doctors' offices
- Prisons and holding cells
- Airports
- ...almost anyplace with a concern for clean air

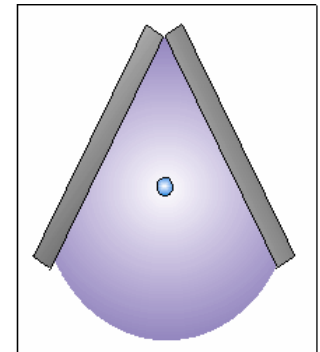
New Product Indoor Air Quality (IAQ)

- Ultra Violet Light System [7602-002](#)
- Compact design fits tight spaces – low profile
- 35 watt 16" twin-tube lamp design
- Will not produce Ozone
- Safety interlocked mounting ring
- Emits UVC radiation at 254 nanometer
- Operates on standard 120V power
- LED light indicates proper unit operation
- Replacement light bulb available [7602-006](#)
- Brand name is MicroPure™ - distributed by Robertshaw®



Installation Tips for UV Lights

- Ultra Violet Lights destroy micro organisms at the DNA level
- Mounts conveniently into plenum and can be mounted inside “A coil”
- Plugs into conventional outlet
- Kill switch for safety
- Reduces odors from air space
- Improves efficiency of central air systems
- Reduces build-up in drain pans
- Never expose yourself to UV light for long periods of time
- **Always wear eye protection when working with UV lights**



UV Lights Operate At What Wavelength?

- 2.4 Giga Hertz
- 254 nano meters
- 254 pico meters
- None of the above

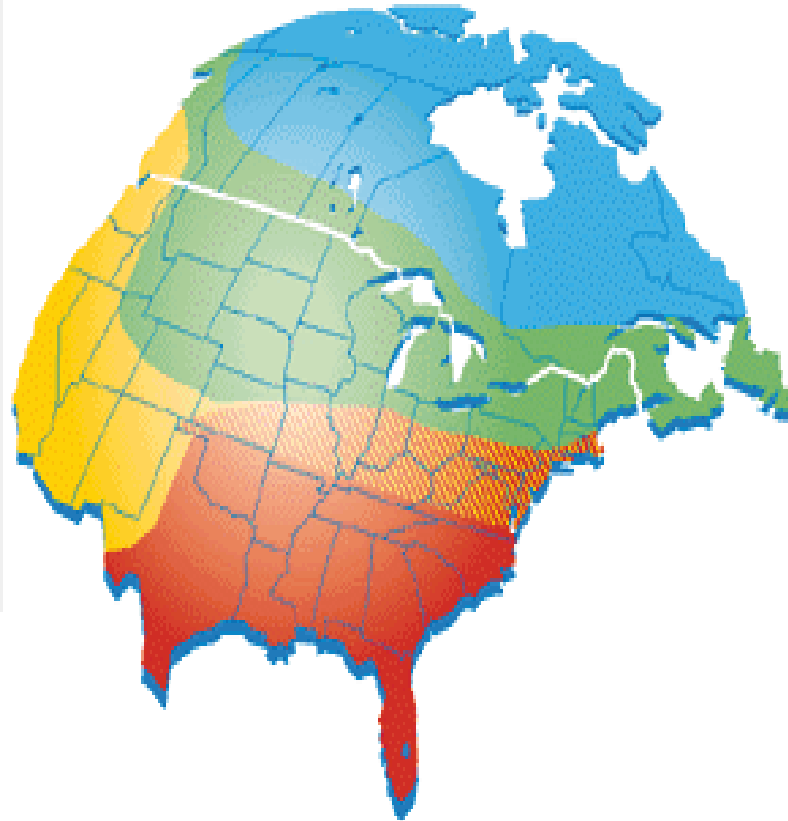
Heat Recovery And Energy Recovery Ventilators



What is Ventilation?

- This is the “V” in HVAC!
- Ventilation is the process of removing stale air and replacing with “clean” air while maintaining temperature
- Ventilation pulls fresh air into space
- Heat exchange core transfers heat to fresh air without mixing streams in the **Heat Recovery Ventilator**
- An **Energy Recovery Ventilator** uses heat exchanger plus humidity regulator to add or remove moisture
- Good ventilation is a major contributor to the health and comfort of building occupants and energy savings

Weather to ERV or HRV?



Top, N (Blue): HRV

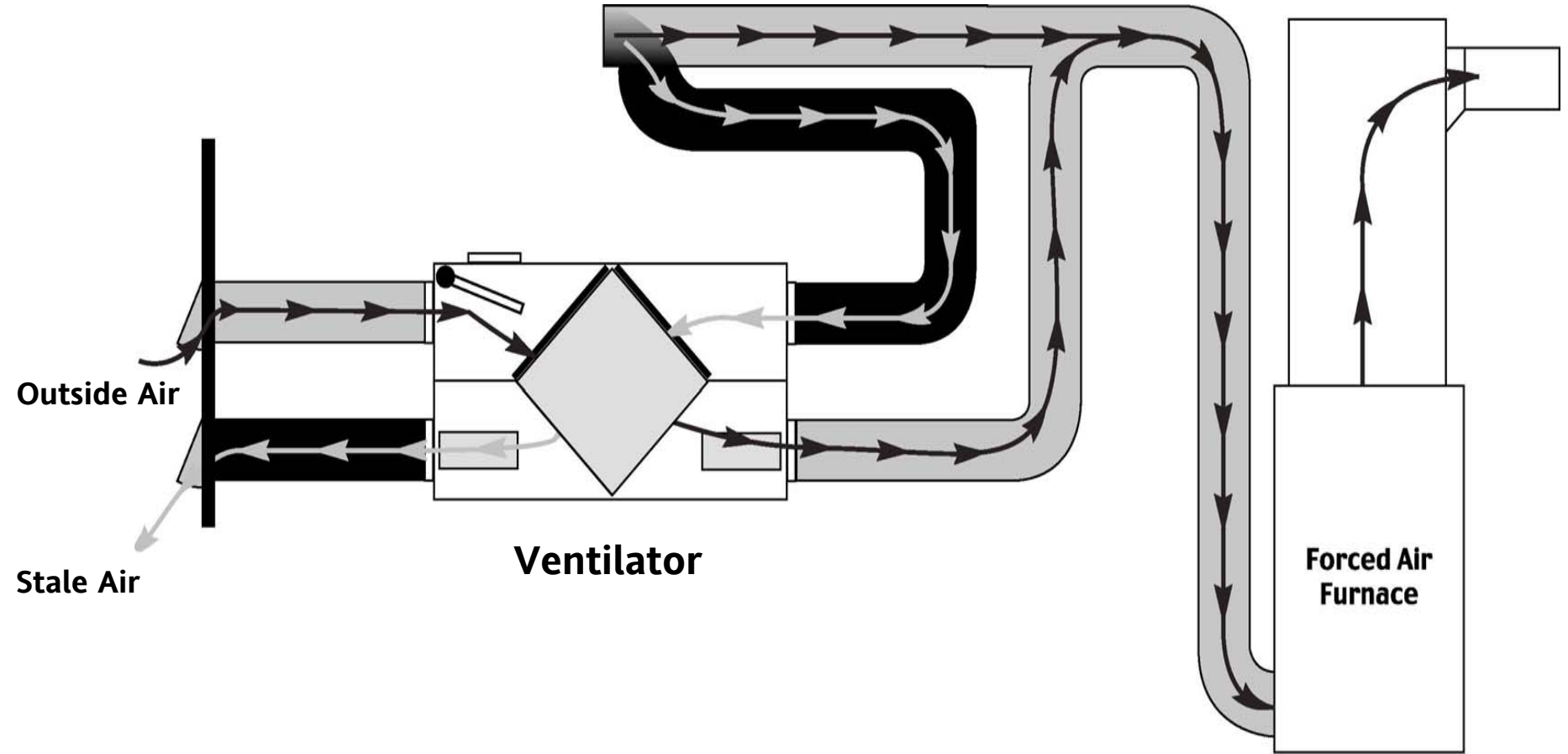
Below (Green): HRV Recommended

Far Left: (Yellow) HRV

Bottom, S.E. (Red): ERV

Above S.E. (Orange with stripe): ERV
with Defrost Option

System Circulation



Driving Factors for Ventilators



- Retrofit market
- Homes built in the last 5 years suffer from IAQ problems including mold
- Energy Efficient Construction
- Some Code requirements
- Innovative and Early Adopters in new areas
- Educated people in developed areas

Humidifiers

Bypass Humidifier

- With or without Humidistat
- Robertshaw® i2 9800 Thermostat



Power Humidifier

- Media replacement sold separately
- May require transformer and relay



Humidifier Types

Bypass Humidifier

- Allows additional moisture to be added and distributed
- Added humidity increases comfort levels of the dwelling
- Heated air from plenum goes through a water pad and deposits moist air into the return air
- Common operation works with furnace heat ON

Power (Fan-style) Humidifier

- Takes air from the plenum through a water pad and deposits humidified air back into the plenum
- Some Power humidifiers have separate transformer and may need an isolation relay

Steam (or Mist) Humidifier

- Takes water or steam and sprays into the plenum
- Setting up application is critical as water may not fully evaporate

Why Humidifiers

- Humidifiers add moisture to the air
- Doctors often recommend for allergy and asthma sufferers
- IAQ recommends Relative Humidity for cleaner air
- Dry air can be damaging to home or office for wood floors, doors, & furnishings causing warping and cracking
- Contractors will find installation to be easy with the Top Mount Valve design to connect to plumbing
- Designed for left or right handed installations
- Can be connected to Robertshaw® Thermostats and outdoor sensors

Dew Point and Humidity

Dew point

- Temperature where air becomes saturated with water
- Temperature where air has to cool to reach 100% RH

Relative Humidity

- Ratio of the vapor pressure of air to the vapor pressure at the dew point temperature

As Relative Humidity percentage increases so does the amount of water in the air

Temperature *below* 52° F, increase in RH% makes it feel **colder**

Temperature *above* 52° F, increase in RH% makes it feel **warmer**

High Efficiency Air Cleaner

- Traps indoor pollutants Dirt, Dust, Pollen, and Particulates
- Woven glass fiber mesh
- Can trap as small as 0.01 microns
- MERV 8 rating
- Compatible with UV Lamps
- Impervious to UV Lamp degradation
- Two sizes available
- Install between return & supply and before blowers and burners
- Vertical or horizontal installation



Contractors Incentive to be the “V” in HVAC

- IAQ fastest growing segment of HVAC market
- Homeowners and Builders requesting them
- Avoid Depressurization issues
- Meet mechanical ventilation requirements
- More profitable than installing Furnaces and AC

When You Have Uni-Line® Questions

Telephone:

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Technical Service Fax 1-630-260-7294

Customer Service 1-800-304-6563

Customer Service Fax 1-800-426-0804

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General Information Websites for:

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