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PremiSys®

PREMIER VRF  
VENTILATION  
SOLUTIONS

# Presentation Objectives

- Introduce Mitsubishi Electric US, Inc.
- Provide an overview of the PremiSys product line
- Describe the Computer Aided Product Selection Software (PremiSys CAPS) system options
- Discuss energy recovery technology
- Explain system design and control
- Review the DOAS market and competitive landscape
- Identify other ventilation system products

# Mitsubishi Electric US, Inc.



**Mitsubishi Electric Automation, Inc.**



**Mitsubishi Electric US, Inc.**



**Mitsubishi Electric Automotive America, Inc.**



**Mitsubishi Electric Visual and Imaging Systems (ME-VIS), Inc.**



**Mitsubishi Electric Power Products, Inc.**



**Mitsubishi Electric Research Laboratories, Inc.**



**Diamond Vision™ Systems**



**Mitsubishi Electric America Foundation**



# Mitsubishi Electric Cooling & Heating

**32 Years**

Experience in the U.S. Market



# Cooling and Heating Solutions

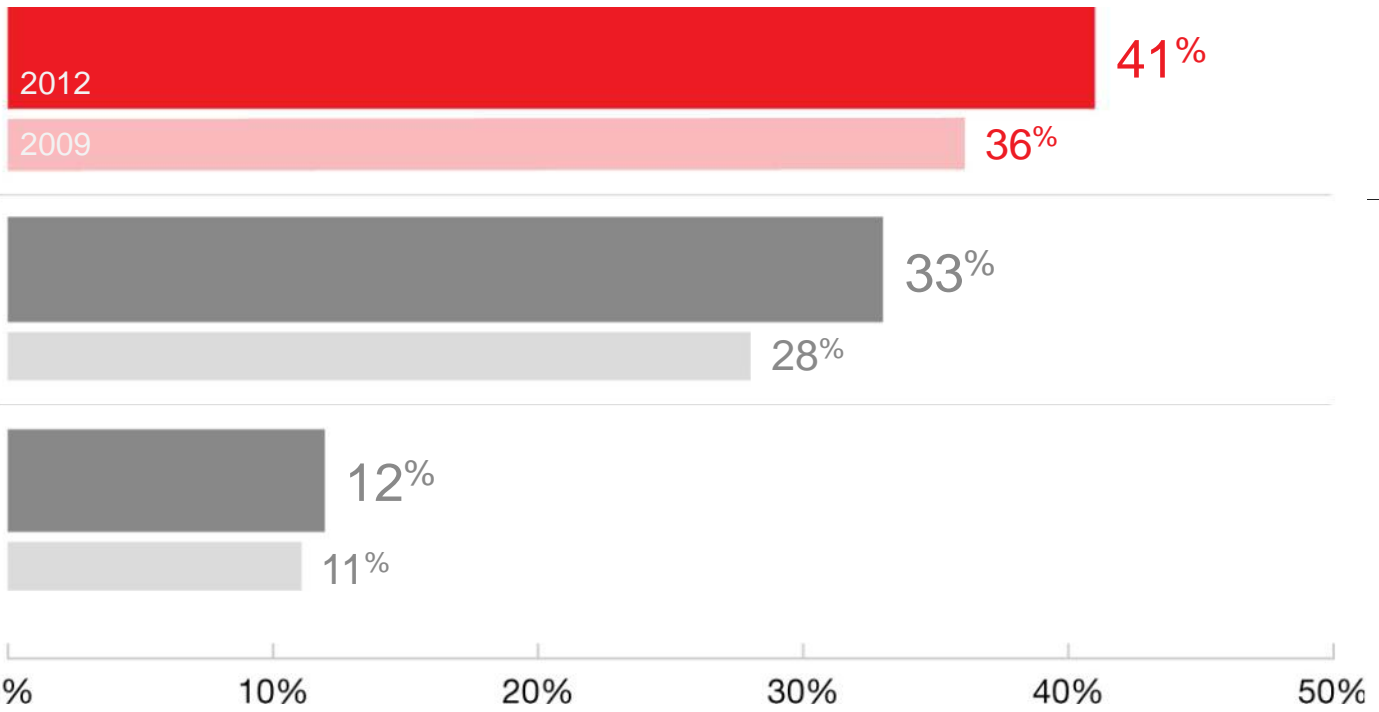


We are the leading marketer of

## **Variable Refrigerant Flow (VRF) Zoning**

and split-zoning air-conditioning systems  
for both commercial and residential installation.

# Industry Leader



# Product Line Accolades



Mitsubishi Electric HVAC offers  
**the highest quality &  
technologically advanced products**

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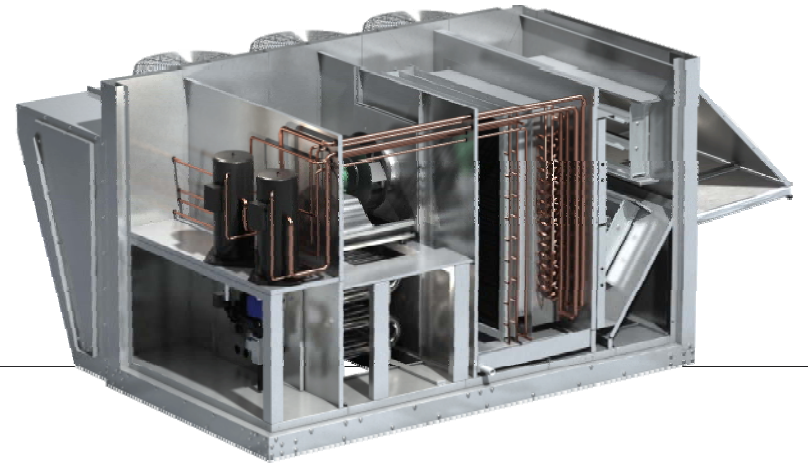
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# PRODUCT OVERVIEW

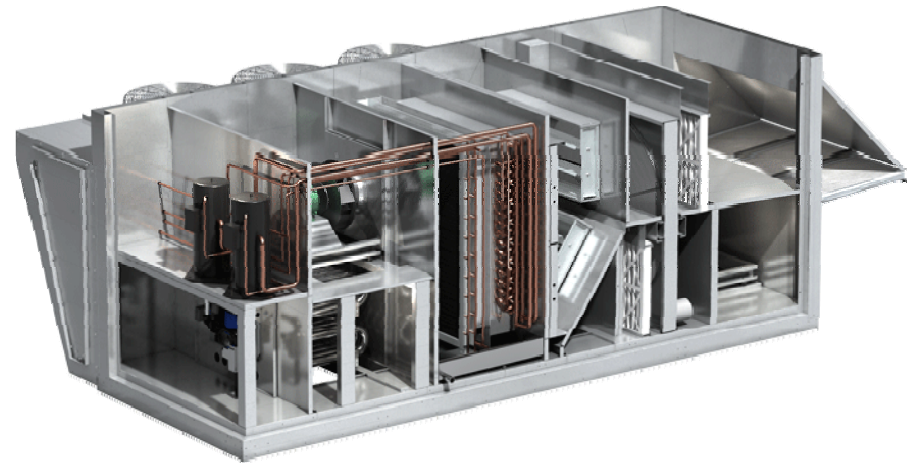


# Two Product Models

**MP – Packaged DX without ERV**



**MPE – Packaged DX with ERV**



# MP Model Nomenclature

Packaged DX without Energy Wheel

Model parent	Cabinet size	Cool/Heat	Nominal capacity	Version M-NET
<b>MP</b>	<b>2</b>	<b>11</b>	<b>240</b>	<b>0M</b>
MP = ME PremiSys	1 = Small 2 = Medium 3 = Large		60 to 360 MBH available	* No digit present if no M-NET

Cool/Heat Designation	
<b>Cooling</b>	<b>Heating</b>
0 = None	0 = None
1 = Packaged DX	1 = Indirect gas
2 = Split system DX	2 = Electric
3 = (future use)	3 = Hot water

# MPE Model Nomenclature

Packaged DX with Energy Wheel

Model parent	Cabinet size	Wheel Designation	Cool/Heat	Nominal Capacity (PDX)	Version M-NET
<b>MPE</b>	<b>- 2</b>	<b>- W1</b>	<b>- 11</b>	<b>- 240</b>	<b>- 0M</b>
MPE = ME PremiSys with ERV	1 = Small 2 = Medium 3 = Large	W1 = 3623 W2 = 3622C W3 = 3628C W4 = 5245 W5 = etc...		60 to 360 MBH available	* No digit present if no M-NET

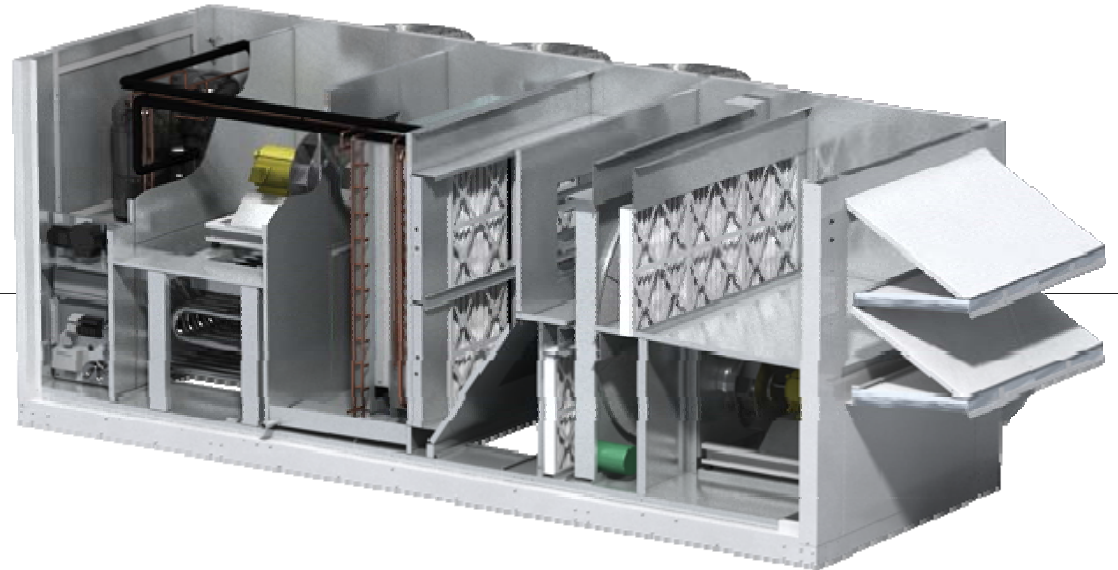
Cool/Heat Designation	
Cooling	Heating
0 = None	0 = None
1 = Packaged DX	1 = Indirect gas
2 = Split system DX	2 = Electric
3 = (future use)	3 = Hot water

# Dimensions, Weights, & Configurations

Unit Size	Nominal Tonnage (tons)	Height	Width	Length	Intake	Condensing Section	Nominal Weight (lbs)	Outdoor Intake	Supply Discharge	Exhaust Discharge
MP-1	5-15	58	81	117	22	30	2,500	End	Bottom or Side	N/A
MP-2	10-25	70	100	130	22	36	3,600			
MP-3	15-30	82	100	143	27	32	4,500			
MPE-1	5-15	58	81	169	22	30	3,600	End	Bottom or Side	Side
MPE-2	10-25	70	100	184	22	36	4,900			
MPE-3	15-30	82	100	205	27	32	6,200			

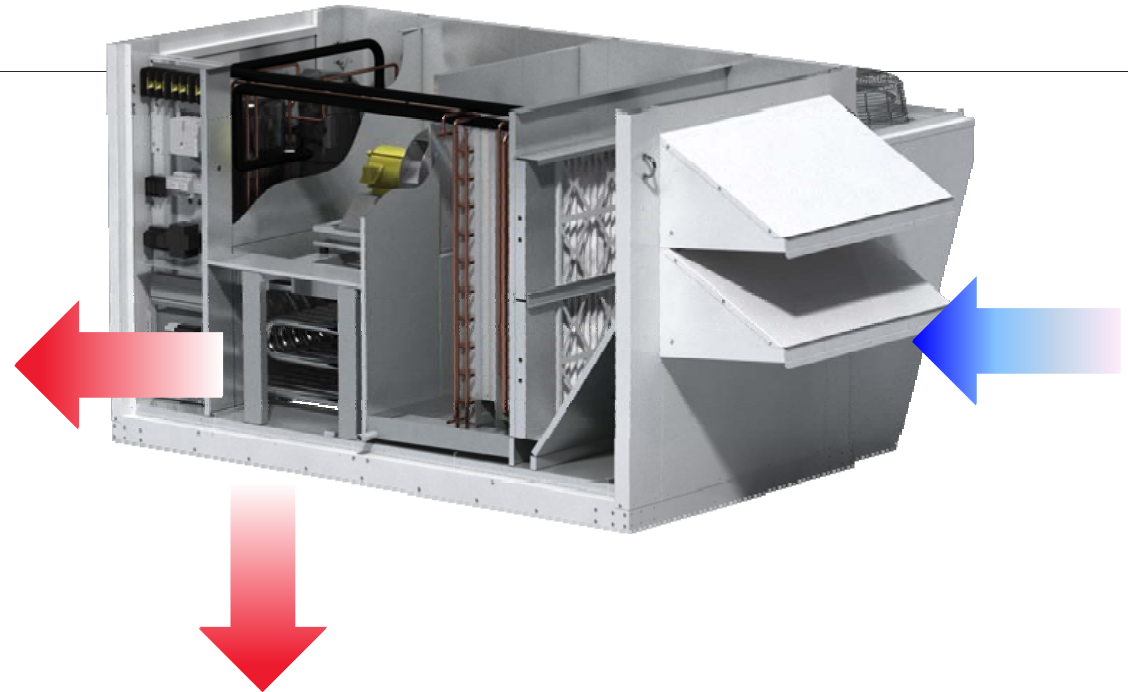
# Product Overview

- Airflow:
  - 1,000 to 8,000 CFM
  - 100% outdoor air
- Heating:
  - Indirect gas
  - Hot water
  - Electric
- Cooling:
  - Packaged air-cooled DX
- Reheat Option:
  - Hot gas reheat (PDX only)



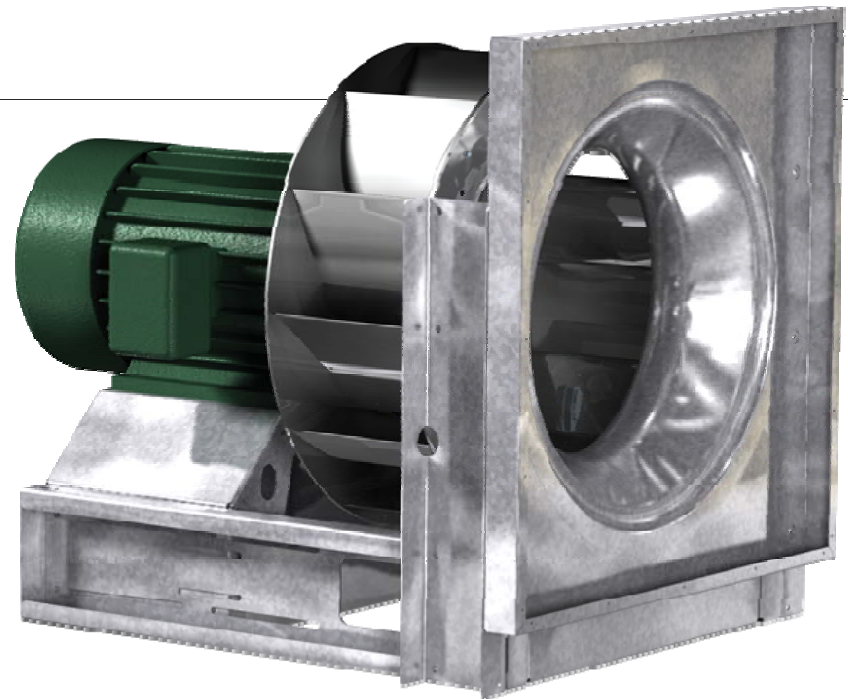
# Intake and Discharge Configurations

- **Outdoor air intake** – End
- **Supply discharge** – Bottom or side
- **Exhaust discharge (MPE)** – Side



# Direct-Drive Plenum Fans

- Welded-aluminum airfoil wheel
- 12 Blade design for quiet operation
- Both supply and exhaust fans are direct drive with factory mounted VFD



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# **PRODUCT SELECTION SOFTWARE**





# CAPS Options

Unit Configuration	
Features	Availability
Heating options	Indirect gas Electric Hot water
Cooling options	Packaged DX
Arrangement	100% Outdoor air

Packaged DX Cooling Options	
Features	Availability
Compressor type	Digital scroll
Reheat	None Modulating HGRH
Voltage	208/3 230/3 460/3 575/3
Mounting location	Outdoor only

# CAPS Options, *continued*

Heating Options			
Features	Indirect Gas	Electric Heat	Hot Water
Heat each/type	Stainless steel	Open element	Fin-tube coil
Capacity	100 – 500MBH	Up to 100kW	1 row & 2 row
Turndown	4:1 Modulating	SCR control	Modulating (valves by others)
Voltage	208/3 230/3 460/3 575/3	208/3 230/3 460/3 575/3	208/3 230/3 460/3 575/3
Mounting location	Outdoor only	Indoor and outdoor	Indoor and outdoor
Special options		Single-point power (heating only and heating + reheat)	N/A
Extended warranty	Standard, 5 yr, or 10 yr	Standard	Standard

# CAPS Options, *continued*

Energy Wheels				Selection Options	
Features	RVE-35	RVE-50	RVE-80	Features	Availability
Wheel diameter	36"	52"	58"	Frost controls	Electric preheat Timed exhaust Modulating wheel
Wheel thickness	1.5" 3.0"	1.5" 3.0"	1.5" 3.0"	Outdoor air intake	2" MERV 8 2" MERV 13 2" MERV 8 and 2" MERV13
				Exhaust air filters	2" MERV 8
				Return air dampers	None Low leakage
				Recirc air damper	None
				Weatherhood	Downturned
				Unoccupied recirc damper	No

# CAPS Options, *continued*

Control Options	
Features	Available Options
Control options	Microprocessor Microprocessor – M-NET
Supply fan controls	Constant volume CO2 by factory Network control
Exhaust fan controls	Constant volume Supply tracking Network control
Economizer controls	Temperature Temp/dew point
Energy wheel controls	None Stop wheel Modulating wheel
BMS protocols	BACnet MSTP BACnet IP LonWorks ModBus RTU ModBus TCP/IP M-NET
Room sensing options	None RH sensor

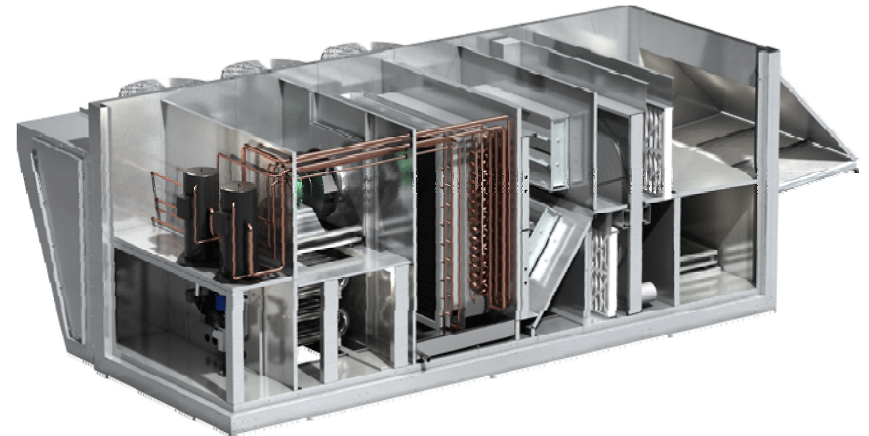
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# ENERGY RECOVERY

# Energy Recovery Benefits

- Reduction of:
  - OA cooling load by 3 - 4 tons per 1,000 CFM
  - Heating and cooling energy consumption
  - Variability in air conditions entering the cooling coil
- Conforms with industry standards:
  - ASHRAE, 90.1-2010
  - IECC 2012



# Energy Recovery Technology



Run around



Heat pipe heat exchanger



Plate exchanger



Energy wheel



# Effectiveness: 20 points

- 20 points of effectiveness means:
    - 1 ton of cooling per 1000 cfm
      - \$750 per ton for air handling units
      - \$2,000 per ton for high percentage outdoor air equipment
- 
- Are code requirements met with unbalanced airflows?
    - Effectiveness directly related to amount of exhaust air.
    - Not enough exhaust air and the device effectiveness is too low to meet code.

# Total Energy Wheels

- Types:
  - Polymer (1.5" – 3" deep)
  - Aluminum or synthetic fiber (4" – 12" deep)
- Remove sensible (air) and latent (moisture) heat
- Have an efficiency range of 70-80%
  - Heat transfer
  - Moisture transfer
  - Total effectiveness



Polymer



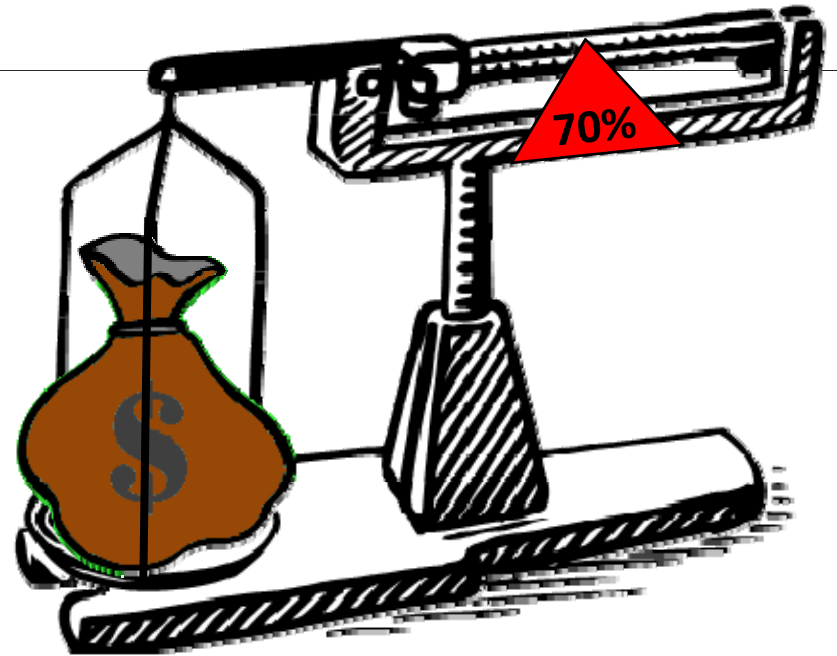
Aluminum or Synthetic Fiber

# Energy Recovery Savings

Target effectiveness is 70%

Rules of Thumb:

- 3-4 tons of A/C per 1,000 CFM OA
- \$400-\$500 annually per 1,000 CFM OA
  - Based on 40 hrs of operation/week

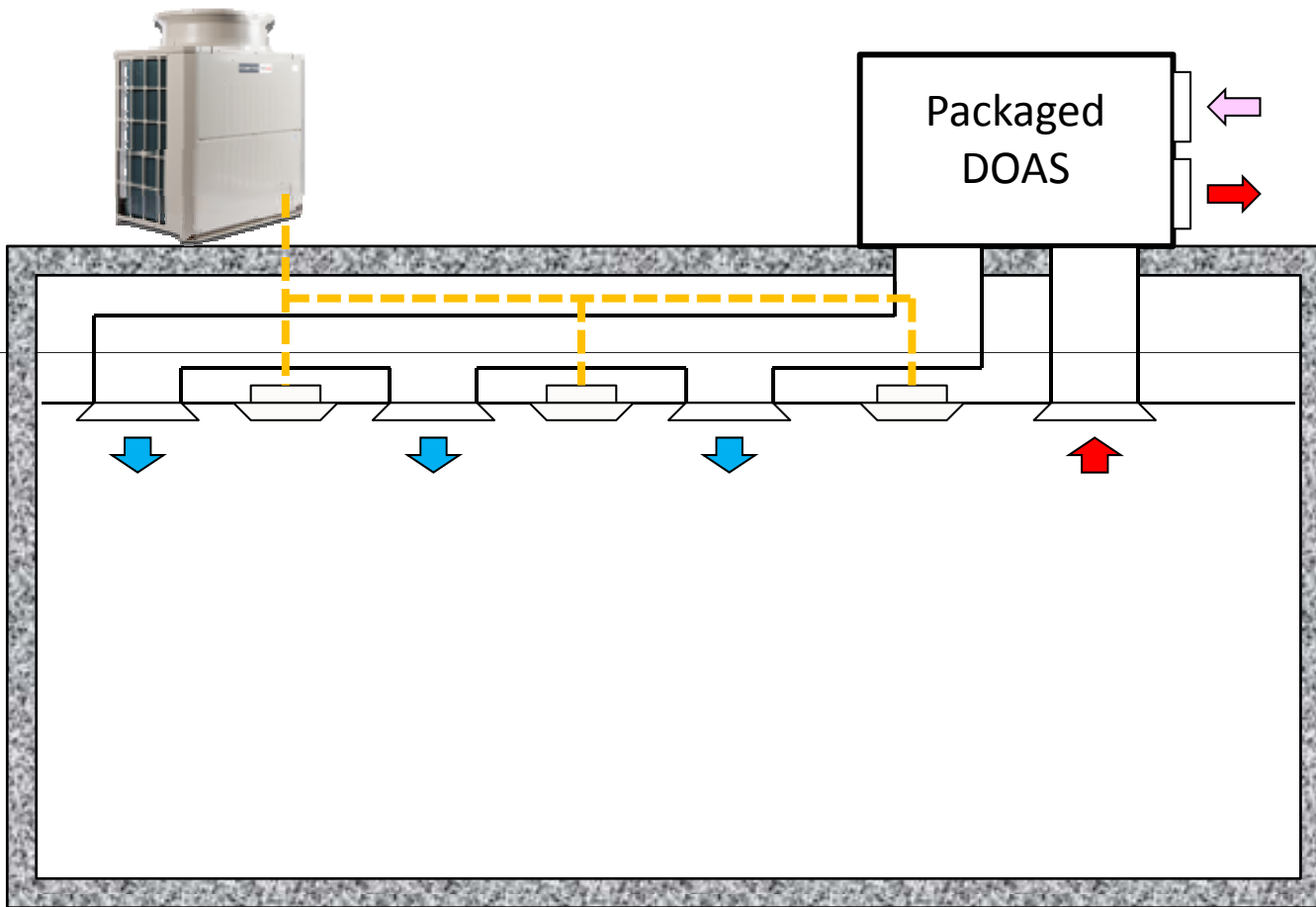


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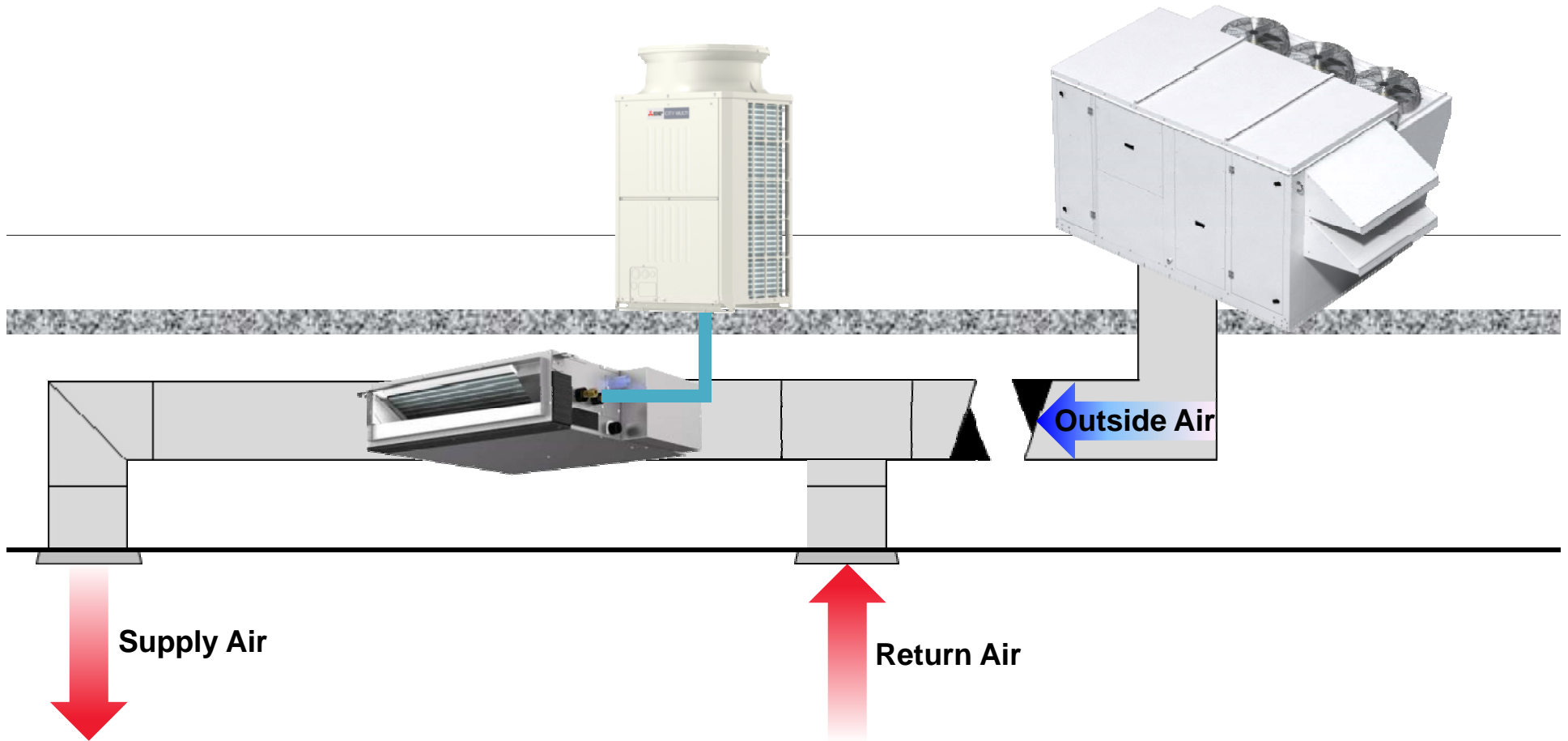
# SCHEMATIC DESIGNS

# Example Schematic



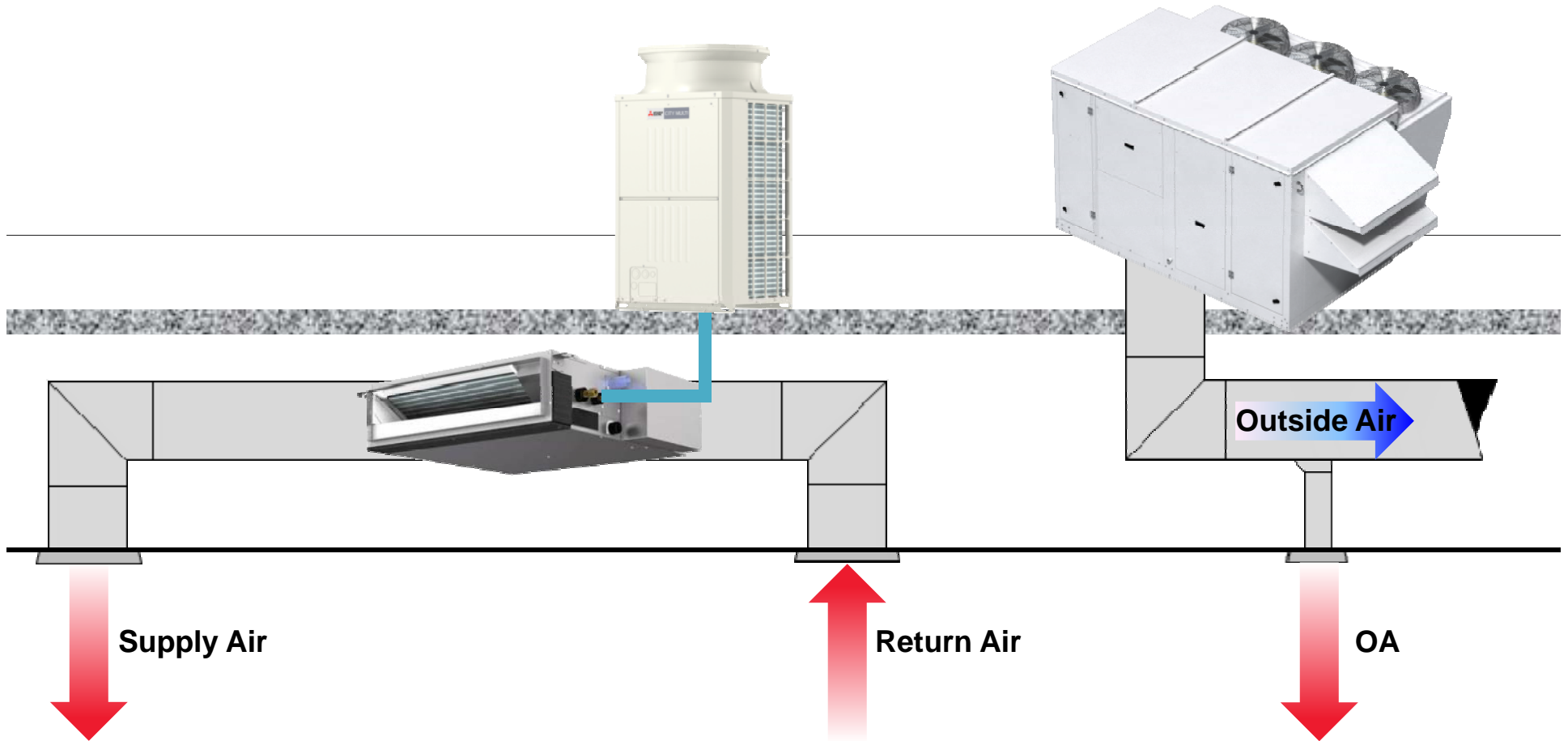
# Example Schematic

Integrated with VRF Indoor Units



# Example Schematic

Complete DOAS



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# CONTROLS



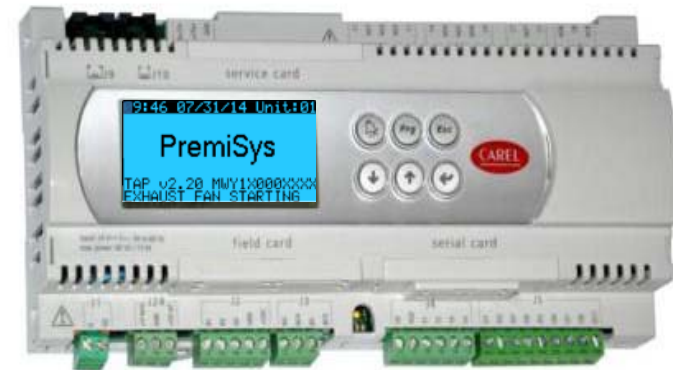
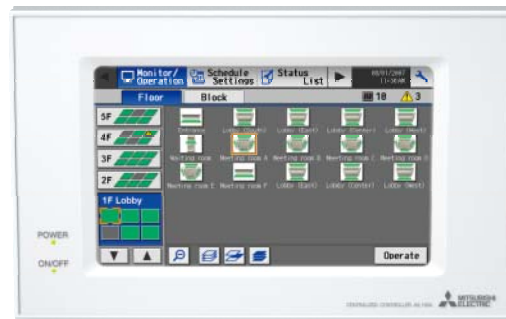
# Controls



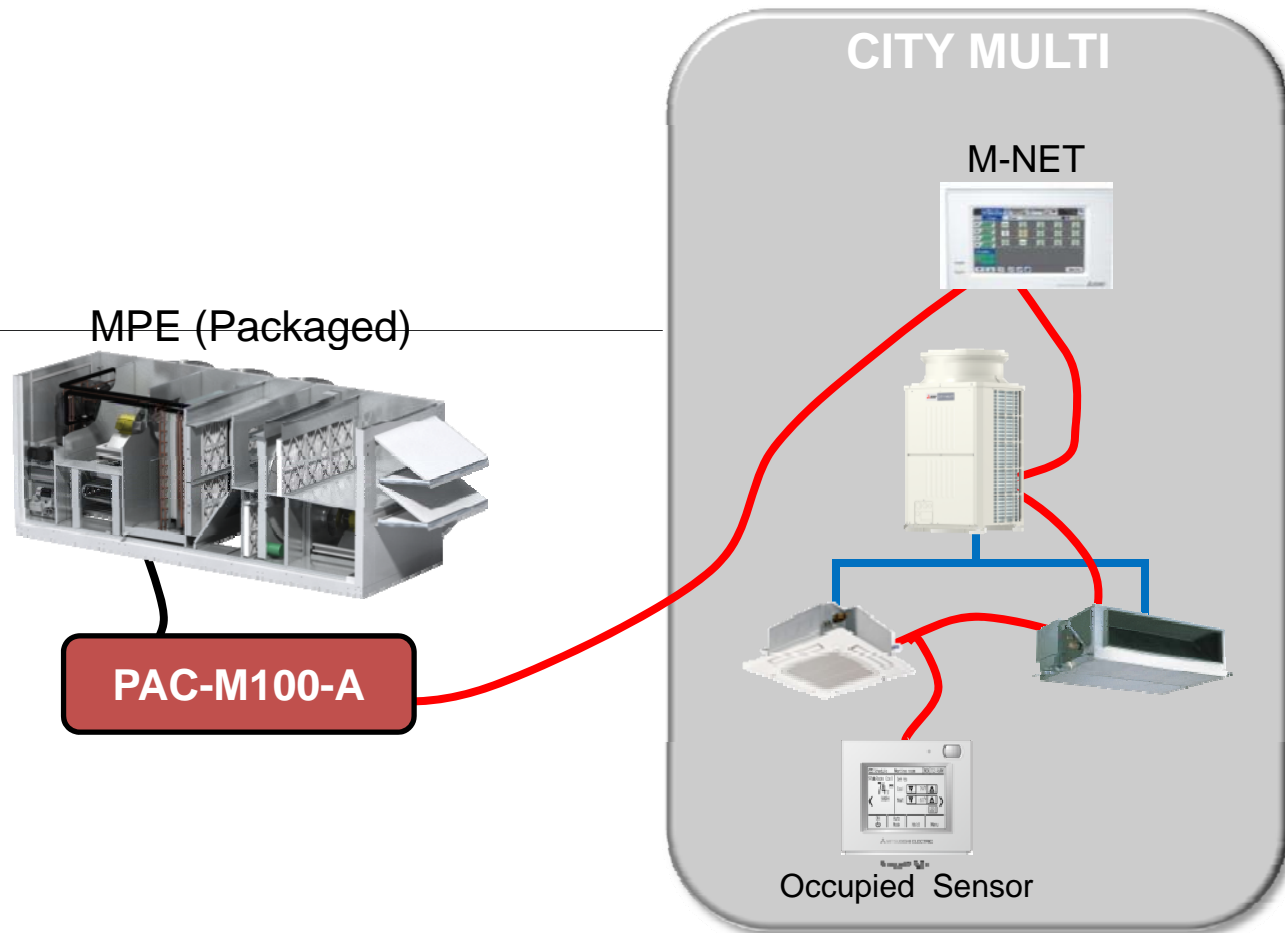
Central Controller



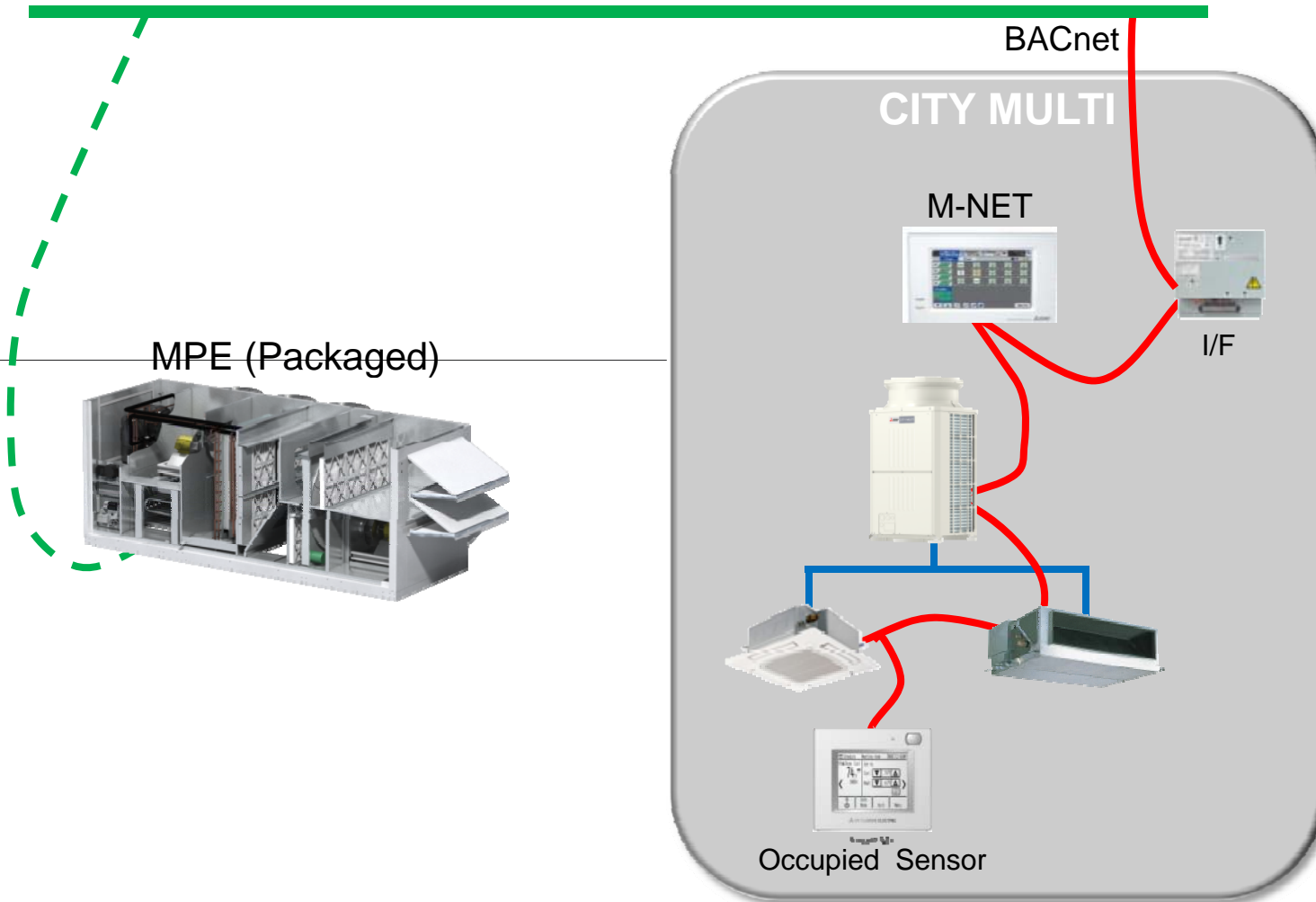
pCO5



# Controls Schematic



# Controls Schematic



# PAC-M100-A Control Options

- ON/OFF
- Discharge temperature
  - Default: DOAS unit discharge (55°-90° F)
  - Option: Reset Schedule

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- Alarm
  - Read only
  - Reset

**Note:** To use these functions through the M-NET, they must be activated in the unit microprocessor by choosing BMS as the source



# PAC-M100-A Control Options

## Auto (Reset Schedule)

**Control Methods**

**Condition List**

PremiSys®

ON OFF

Mode Cool Heat **Auto**

Set Temp. 67°F

Prohibit Remote Controller Operation

CN/OFF Mode Set Temp. Filter Sign

Hold

ON OFF

Cancel OK

**AUTO [Outdoor Reset] Control**

System Supply Air will operate based on the Outdoor Reset Settings  
This is the best control method when the DOAS is providing air into VRF Indoor Units

1. Leave the switches in factory default position on the interface control board
2. Set Microprocessor "Supply Temp Set Point" source to BMS
3. Set Microprocessor "ON/OFF" control source to BMS
4. On central controller, set the system group to ON
5. On central controller, set the system group mode to Auto

The Set Temp. cannot be changed while operating in the auto mode  
The current Set Temp. will be displayed  
See VRF and PremiSys Integrated Control Function below for description of Mode prohibit

**Note:**  
Mode prohibit can be ON or OFF

## Supply Air Temperature

**Condition List**

PremiSys®

ON OFF

Mode Cool Heat Auto

Set Temp. 72°F

Prohibit Remote Controller Operation

CN/OFF Mode Set Temp. Filter Sign

Hold

ON OFF

Cancel OK

**Controlling System Supply Air Temp from the central controller**

System Supply Air Temp will operate based on the setting in the central controller  
This is the best control method when air is directly into the space

1. Leave the Dip switches in factory setting position on the interface control board
2. Set Microprocessor "Supply Temp Set Point" source to BMS
3. Set Microprocessor "ON/OFF" control source to BMS
4. On central controller, turn the system group to ON
5. On central controller, turn the system group mode to Cool or Heat  
The Set Temp. for Cool or Heat mode will be the same  
The unit will determine the Mode automatically
6. Set the Set Temp. to a temperature that represents the average space Set Temp. served by this DOAS unit., for example 72° F

**Note:**  
Mode prohibit can be ON or OFF  
See VRF and PremiSys Integrated Control Function below  
Recommended OFF when providing outside air directly to the space

## VRF & PremiSys: Integrated Control Function

**Condition List**

PremiSys®

ON OFF

Mode Cool Heat Auto

Set Temp. 72°F

Prohibit Remote Controller Operation

CN/OFF Mode Set Temp. Filter Sign

Hold

ON OFF

Cancel OK

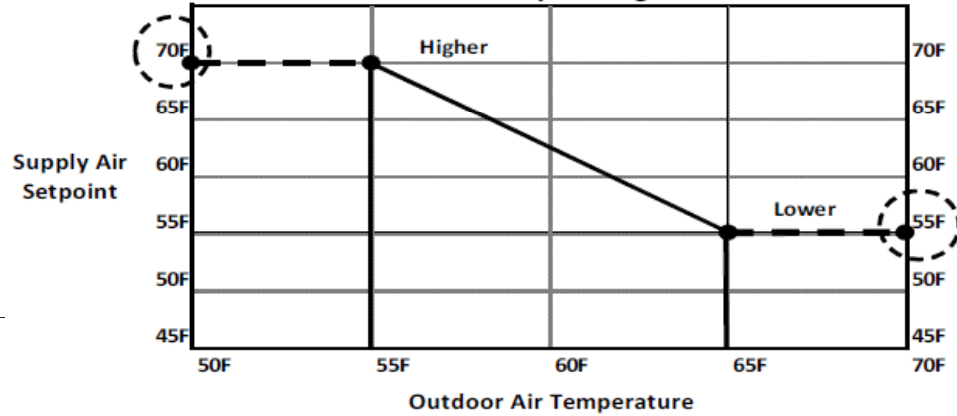
**VRF and PremiSys Integrated Control Function**

This function will override the Supply Air Temperature setpoint in the above control setups  
Best used when the air is supplied to the VRF indoor units  
When all indoor units are in Cool mode and thermal ON, the reheat will be turned off and 53°F air will be supplied  
Under Prohibit Remote Controller Operation, use the MODE prohibit switch to activate and deactivate this function  
Prohibit as shown, turns the function OFF  
Permit position turns the function ON  
Cool mode function only

SW4 Dip Switch Settings  
Supply air Setpoint

SW4 -					SW4 -						
1	2	3	4	5	Higher Setpoint	6	7	8	9	10	Lower Setpoint
					70F Fac. Setting						55F Fac. Setting
					50						50
					51						51
					52						52
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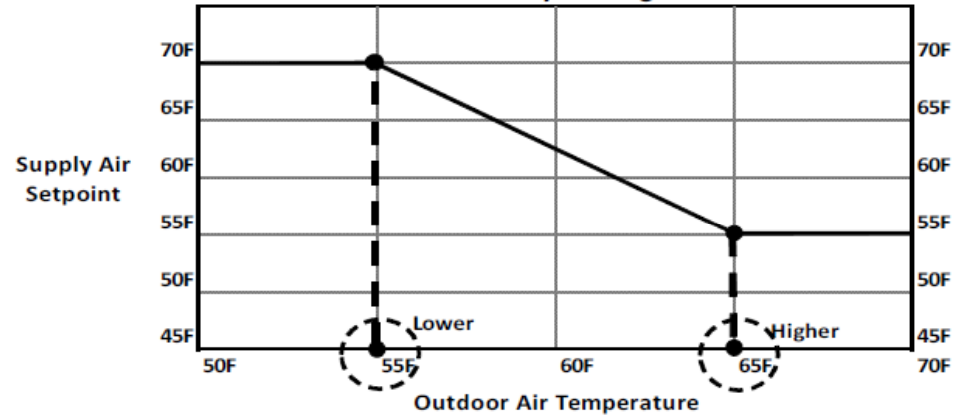
Outdoor Air Reset Function  
Factory Setting



SW3 Dip Switch Settings  
Outdoor Air Temperature

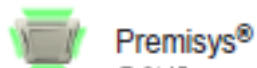
SW3 -					SW3 -						
1	2	3	4	5	Higher Setpoint	6	7	8	9	10	Lower Setpoint
					65F Fac. Setting						55F Fac. Setting
					50						50
					51						51
					52						52
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					74						74
					75						75

Outdoor Air Reset Function  
Factory Setting



# CITY MULTI Systems and PremiSys

## Condition List



ON  OFF

Mode  Cool  Heat  Auto

Set Temp.

72 °F

### Prohibit Remote Controller Operation

ON/OFF  Mode  Set Temp.  Filter Sign

Hold

ON  OFF

Cancel

OK

### VRF and PremiSys Integrated Control Function

This function will override the Supply Air Temperature setpoint in the above control setups

Best used when the air is supplied to the VRF indoor units

When all indoor units are in Cool mode and thermal ON, the reheat will be turned off and 55° F air will be supplied

Under Prohibit Remote Controller Operation, use the MODE prohibit switch to activate and deactivate the this function

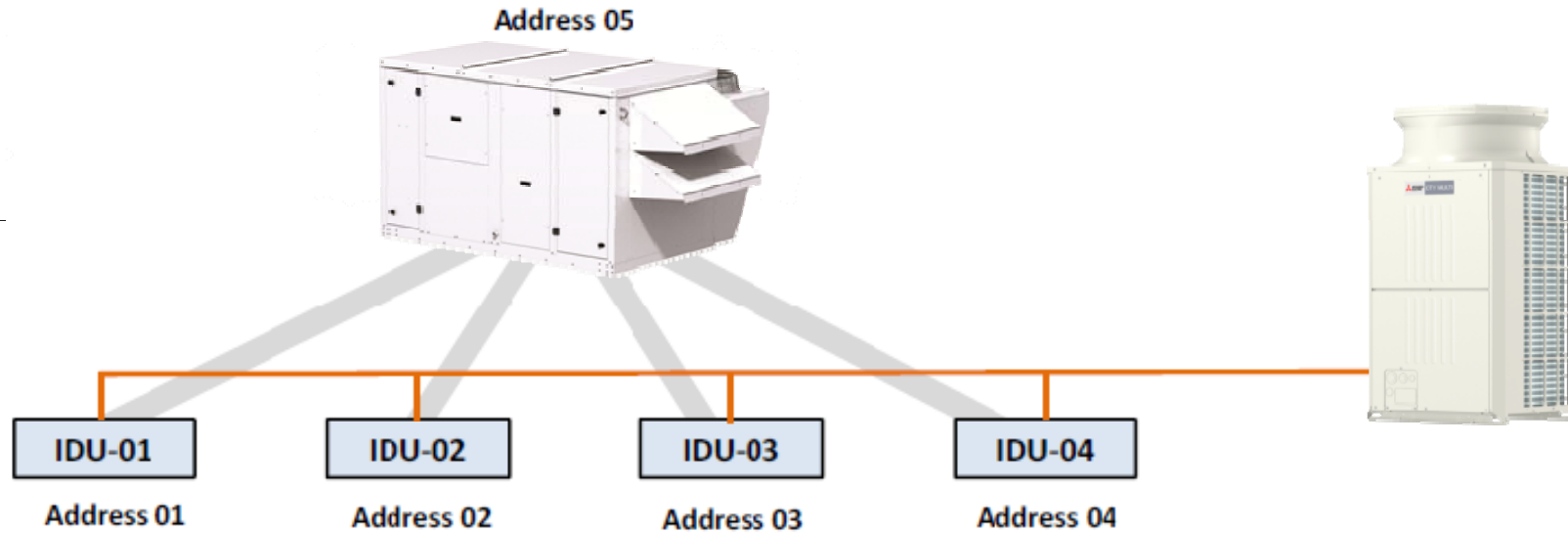
Prohibit as shown, turns the function OFF

Permit position turns the function ON

Cool mode function only

# CITY MULTI Systems and PremiSys

One CITY MULTI System and one PremiSys Unit

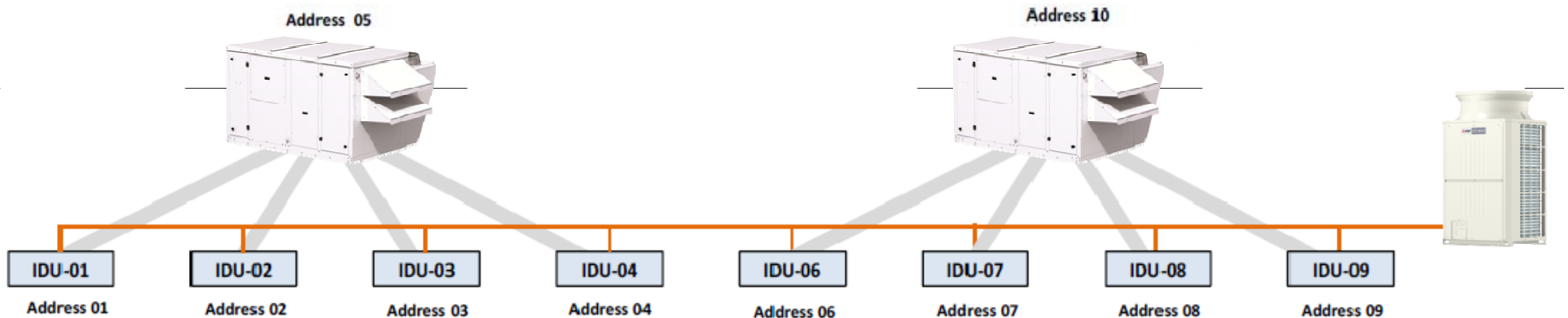


	IDU-1	IDU-2	IDU-3	IDU-4	DOAS
Address	01	02	03	04	05



# CITY MULTI Systems and PremiSys

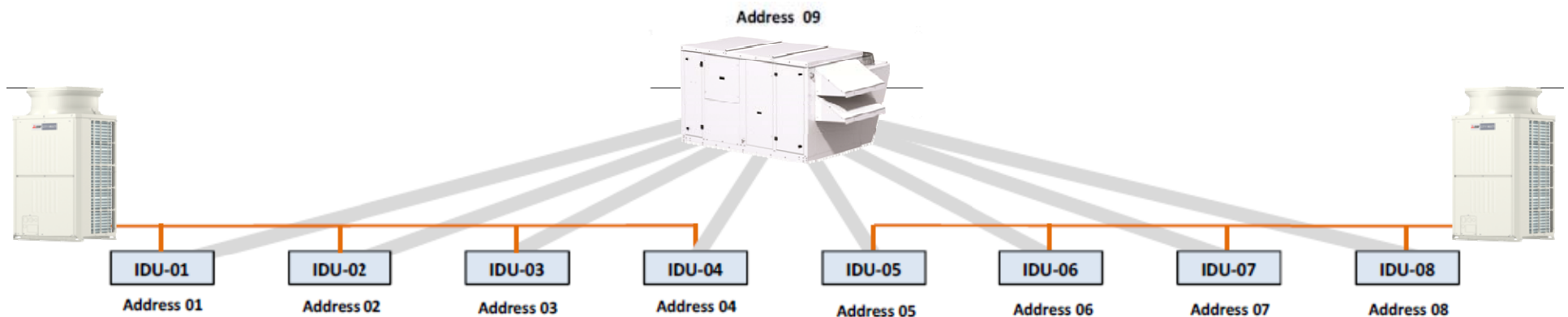
One CITY MULTI System and Two PremiSys Units



	IDU-1	IDU-2	IDU-3	IDU-4	DOAS-1	IDU-6	IDU-7	IDU-8	IDU-9	DOAS-2
Address	01	02	03	04	05	06	07	08	09	10

# CITY MULTI Systems and PremiSys

## Two CITY MULTI System and One PremiSys Unit



	IDU-1	IDU-2	IDU-3	IDU-4	IDU-5	IDU-6	IDU-7	IDU-8	DOAS-1
Address	01	02	03	04	05	06	07	08	09

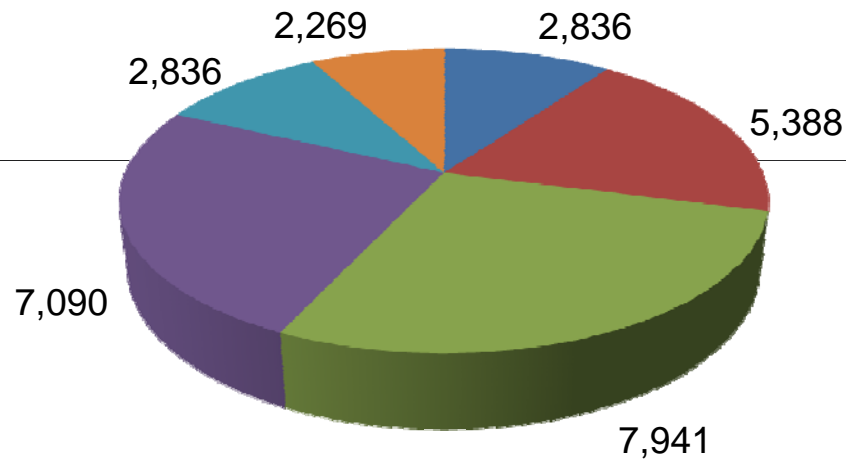
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# DOAS MARKET

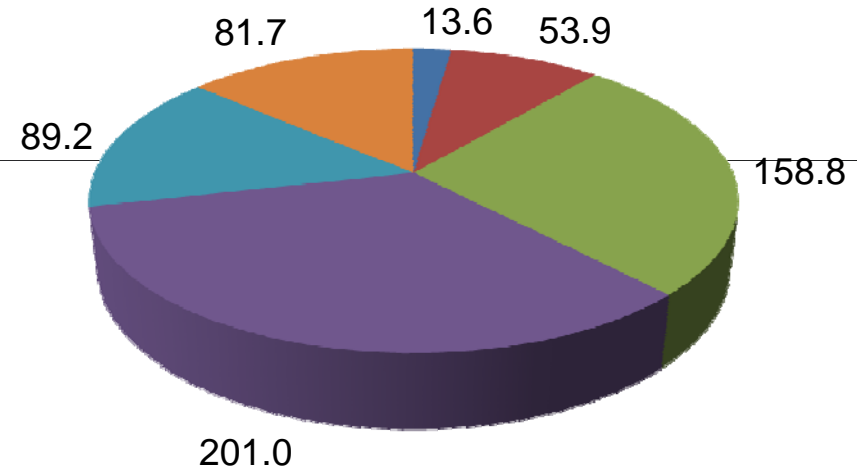
# DOAS Total Market

US market for DOAS in 2012.  
Number of units by CFM rate.



- 400 to 1,000 CFM    ■ 1,000 to 2,500 CFM
- 2,500 to 5,000 CFM    ■ 5,000 to 7,500 CFM
- 7,500 to 10,000 CFM    ■ Over 10,000 CFM

US market for DOAS in 2012.  
Revenues in US\$ million by CFM rate.

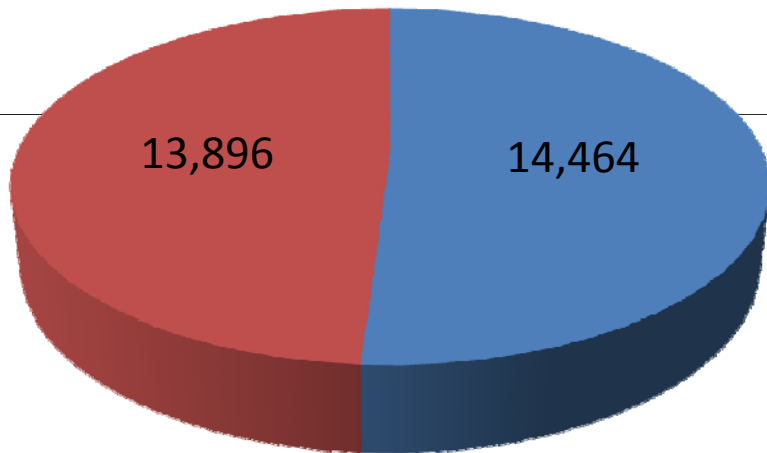


- 400 to 1,000 CFM    ■ 1,000 to 2,500 CFM
- 2,500 to 5,000 CFM    ■ 5,000 to 7,500 CFM
- 7,500 to 10,000 CFM    ■ Over 10,000 CFM

Source: BSRIA

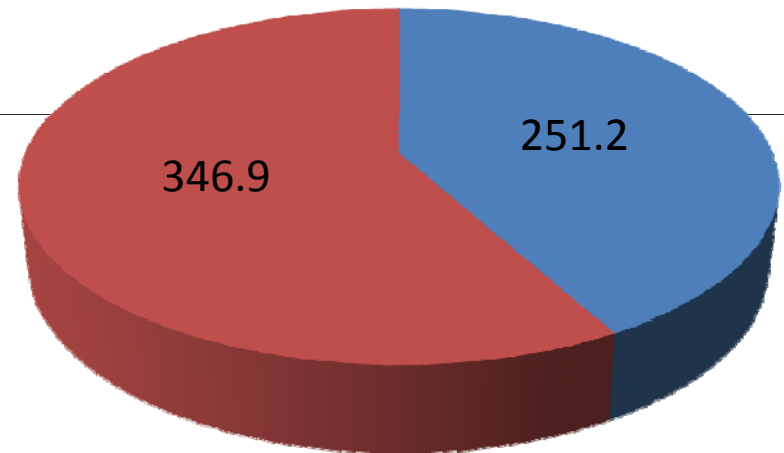
# Energy Recovery Market

US market for DOAS in 2012.  
Number of units by energy  
recovery.



■ Without Energy Recovery ■ With Energy Recovery

US market for DOAS in 2012.  
Revenues in US\$ million by  
energy recovery.

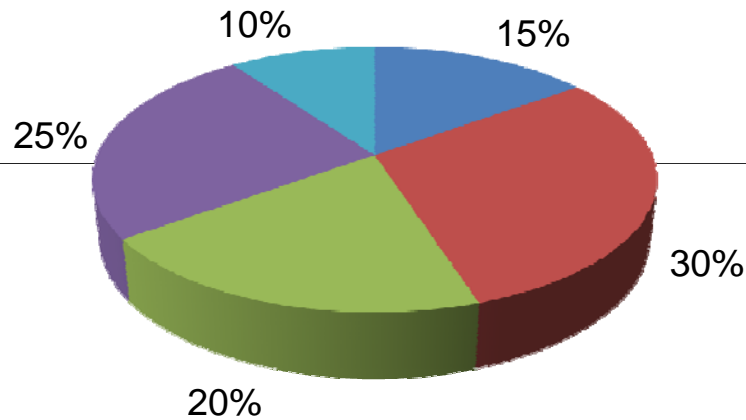


■ Without Energy Recovery ■ With Energy Recovery

Source: BSRIA

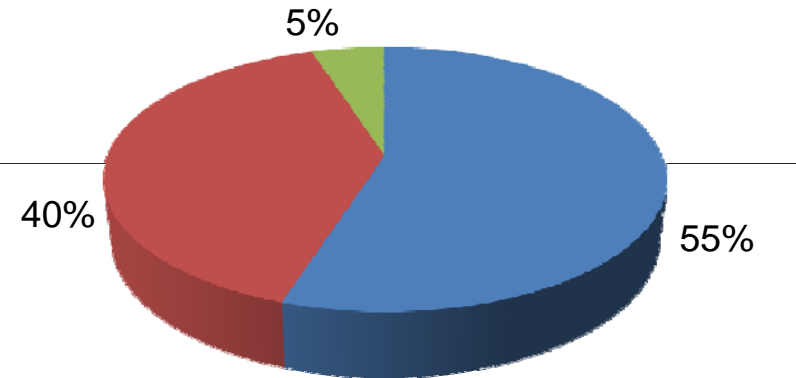
# DOAS Market by Vertical

US market for DOAS in 2012.  
Number of units by CFM rate.



- Education
- Hospitality, leisure, and religious
- Large retail including grocery stores
- Healthcare (hospitals)
- Other

US market for DOAS in 2012.  
Number of units (%) by application.

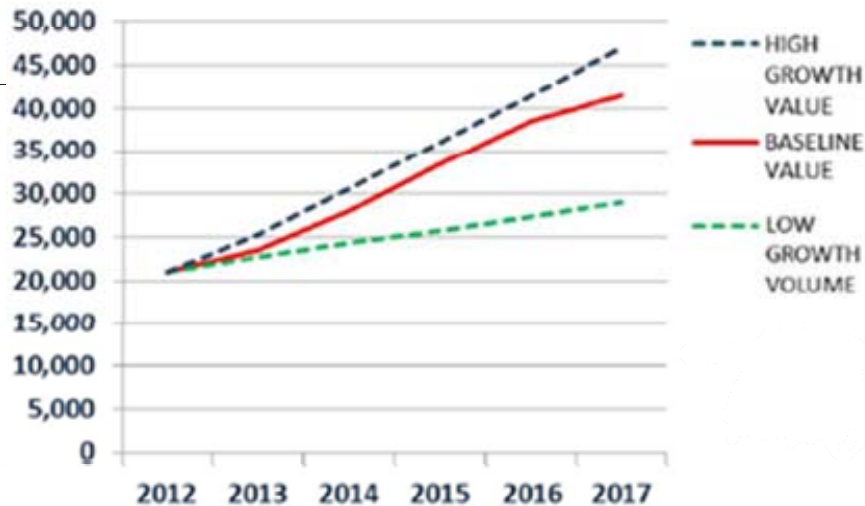


- New built
- Refurbishment
- Replacement/retrofit

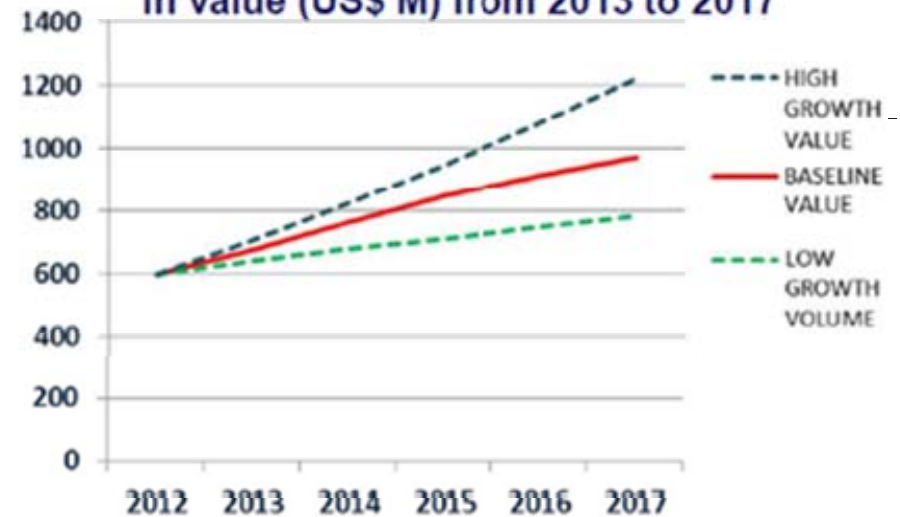
Source: BSRIA

# DOAS Forecast

The US market for DOAS. 3 scenario forecast in number of units from 2013 to 2017



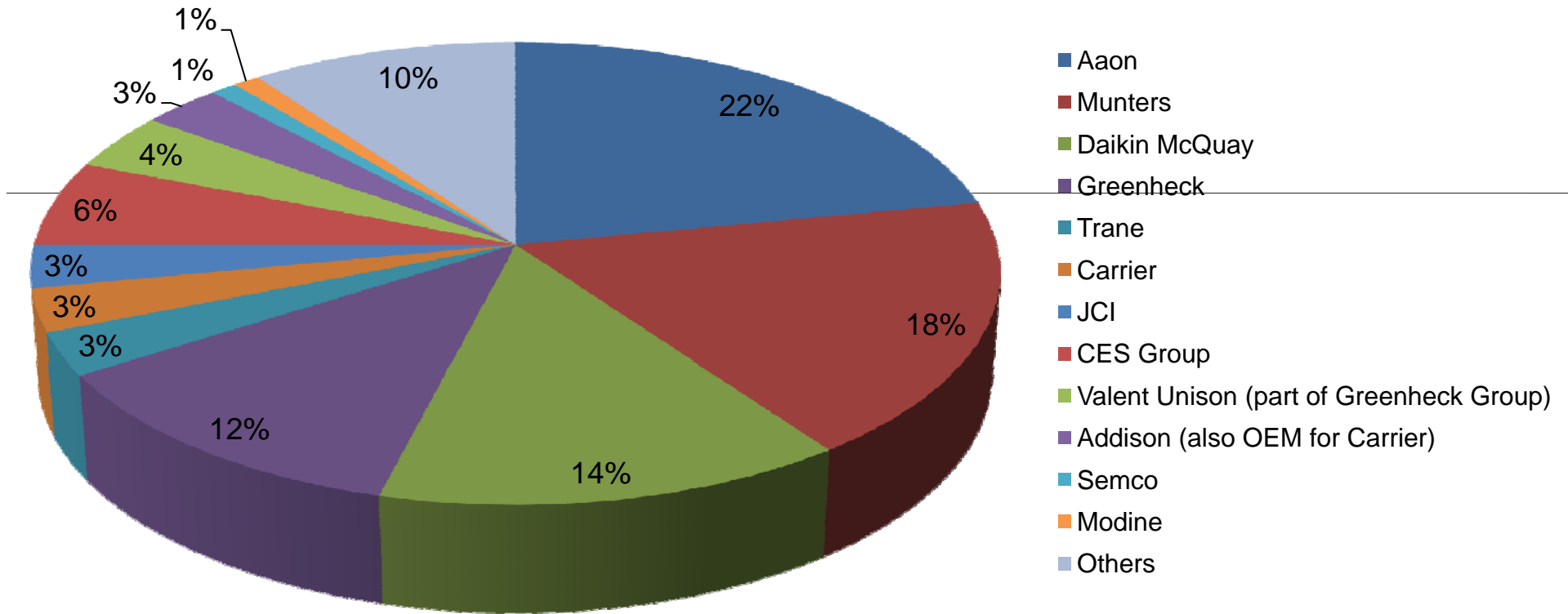
The US market for DOAS. 3 scenario forecast in value (US\$ M) from 2013 to 2017



Source: BSRIA

# Competitive Landscape

2012 Market Shares for DOAS in value



Source: BSRIA



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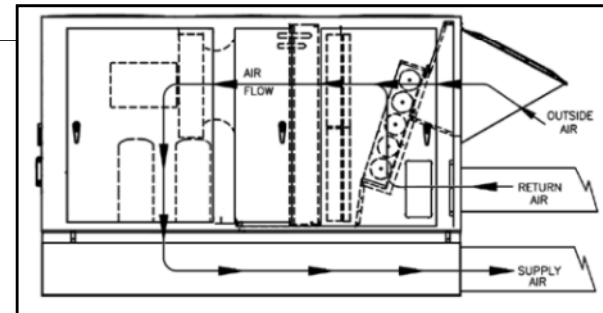
# COMPETITION

# Comparison Summary

Supply Air CFM	Mitsubishi		Aeon		Daikin	Trane	
500							
1,000							
1,500					A Cabinet 3-6 tons		
2,000	MPE-1 5-15 tons		A Cabinet 6-10 tons			OAL 3-9 tons	
2,500				B Cabinet 9-15 tons			OAU1 5-15 tons
3,000		MPE-2 10-25 tons					
3,500							
4,000							
4,500							
5,000							
5,500			MPE-3 15-30 tons				OAU2 15-30 tons
6,000							
6,500							
7,000							
7,500							
8,000					D Cabinet 26-70 tons		
8,500							
9,000							
9,500							
10,000							
11,000							
12,000							OAU3 30-54 tons

# PremiSys Advantages

- Superior fan construction
- Flexible unit configuration (side supply)
- Standard 2" base insulation
- Standard 2" wall insulation
- Easy to use controls






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# VENTILATION LINEUP

# Ventilation Products

CFM	PEFY-AF 	LGH 	PremiSys 
300		F300RX5-E	
470		F470RX5-E	
500			
600		F600RX5-E	
750			
1,000			MP(E)
1,200	CFM / CFMR	F1200RX5-E	MP(E)
2,000			MP(E)
3,000			MP(E)
4,000			MP(E)
5,000+			MP(E)

# PEFY-AF DOAS System Components

## Non-Reheat System



- 100% OSA indoor unit (PEFY-AF1200CFM)
- 10 Ton Y-Series unit
- SmartME controller

## Reheat System



- 100% OSA reheat indoor unit (PEFY-AF1200CMFR)
- 10 Ton R2-Series unit
- BC controller
- SmartME controller

# Lossnay Energy Recovery Ventilator (ERV)

- Four models available:
  - 300 CFM
  - 470 CFM
  - 600 CFM
  - 1,200 CFM
- Fully integrated controls
  - CITYMULTI M-NET compatible

LGH-F300RX5  
LGH-F470RX5  
LGH-F600RX5



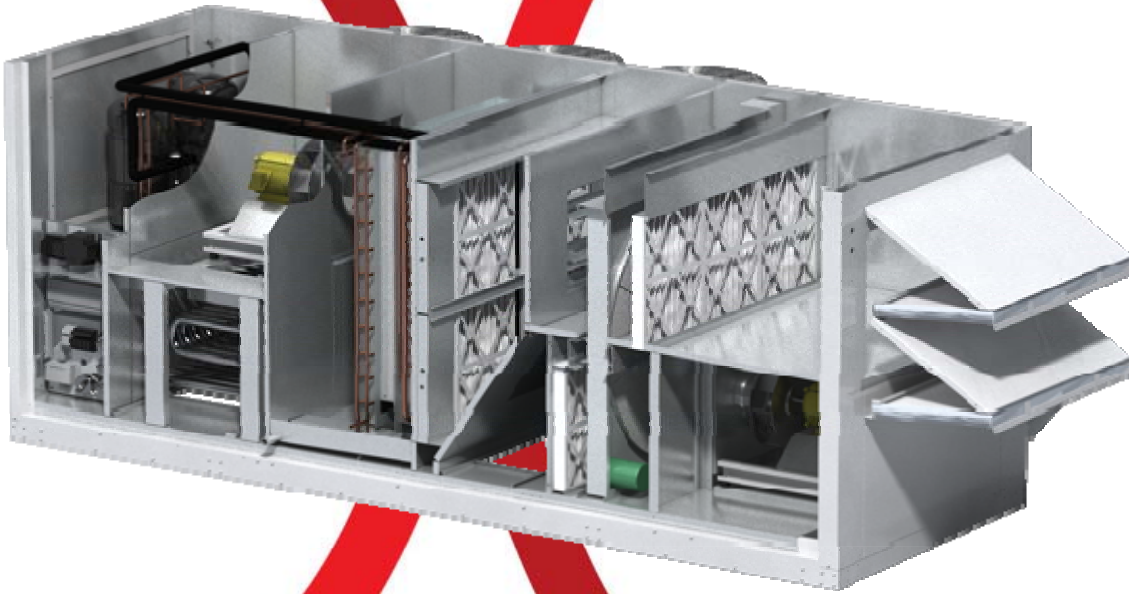
LGH-F1200RX5



PZ-60



# PremiSys Premier **VRF** Ventilation Solutions



**Questions?**