New Altitude of HVAC Solutions

Midea Commercial Air-conditioner
Welcome to Midea CAC

Doha, Nov. 7th

By Peck Zhao
Overseas Marketing Manager, Midea CAC
VRF Technology & Applications
VRF Product portfolio

- Energy efficient inverter compressor
- Modular system concept
- Heat recovery function
- Air cooled or water cooled
- Allow long piping lengths

HEAT PUMP, HIGH AMBIENT TEMP. USE, HEAT RECOVERY TYPE SYSTEMS AVAILABLE.
## Indoor units product portfolio

<table>
<thead>
<tr>
<th>2-Way Cassette</th>
<th>Four-Way Cassette</th>
<th>Ceiling &amp; Floor</th>
<th>High Wall</th>
<th>High ESP Duct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slim body for narrow spaces</td>
<td>For open spaces, 360° air distribution</td>
<td>When you decide to install after the decoration.</td>
<td>For small spaces &amp; low noise</td>
<td>For bigger spaces, 196Pa static pressure</td>
</tr>
</tbody>
</table>
## Indoor units product portfolio

### Wide Product Range – Both AC & DC fan motor

<table>
<thead>
<tr>
<th>Product</th>
<th>Power Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-way cassette</td>
<td>1.8-7.1kW</td>
</tr>
<tr>
<td>2-way cassette</td>
<td>2.2-7.1kW</td>
</tr>
<tr>
<td>4-way cassette</td>
<td>2.8-14kW</td>
</tr>
<tr>
<td>Compact 4-way cassette</td>
<td>1.5-4.5kW</td>
</tr>
<tr>
<td>Low static pressure duct</td>
<td>1.8-7.1kW</td>
</tr>
<tr>
<td>Medium static pressure duct</td>
<td>2.2-14kW</td>
</tr>
<tr>
<td>High static pressure duct</td>
<td>7.1-56kW</td>
</tr>
<tr>
<td>Wall-mounted</td>
<td>1.5-8kW</td>
</tr>
<tr>
<td>Ceiling &amp; Flooring</td>
<td>3.6-16kW</td>
</tr>
<tr>
<td>Floor-standing</td>
<td>2.2-8kW</td>
</tr>
<tr>
<td>Fresh air processing unit</td>
<td>12.5-28kW</td>
</tr>
<tr>
<td>Console</td>
<td>2.2-4.5kW</td>
</tr>
</tbody>
</table>
V5X Overview

- More than a machine
- Much better than any other competitors

1. The best industrial design
2. Largest capacity
   - Single unit capacity: 22HP
   - Combination capacity: 88HP
3. Most energy efficient
   - ESEER: 8.25 W/W
4. Most flexible piping
   - Level difference between Indoor and outdoor units: 110m
   - Level difference between Indoor units: 30m
High efficiency

- High Efficiency Compressor - DC Inverter Scroll Compressor
- Dual Inverter Compressors
- Adopting precise Sine wave by using IPM (Intelligent Power Module), High power factor (due to reducing Inverter loss)
- The world’s leading company: *IR (international Rectifiers)*
High efficiency - Eurovent certified

- 8HP EER up to 4.7 W/W (0.74kW/TR)
- ESEER up to 8.25 (0.42kW/TR)
Space Saving & Economical Installation Cost

Foot print $1.05 \times 4 = 4.2 \text{m}^2$
Stable & Reliable - Cycle Duty Operation

2.5

Cycle Duty Operation

4th Cycle
Midea VRF uses special internal protection circuitry to protect system from wrong power supply: In case of a wrong connection of the three-phase electricity wiring, it’s capable to prevent the damage of electric control devices such as main PCB, Inverter Module, as well as the compressors.
Ease of Installation - ESP. up to 60Pa

Ensure reliable installation and operation even under high external static pressure in places such as high rise building.

Specially applicable for the floor by floor installation in veranda.
Stable & Reliable System – Wide Operation Range

In summer with temperatures up to 54°C, the V5 Plus series will keep on COOLING.

In winter, with temperatures down to -23°C, the V5 Plus series will keep on HEATING.
Reliable system - 5 Stages Oil Control

1st stage
Oil separation in compressor

2nd stage
High efficiency oil separator

3rd stage
Oil balance between compressors in one outdoor unit

4th stage
Oil balance between outdoor units

5th stage
Oil balance controlled by smart procedure
Precise Refrigerant Control Technology

Operating on **full** load

Operating on **part** load

Pressure Sensor

EXV
Ease of installation—— Non-polarity Communication Wiring (optional)

Only one group of communication wire of 2-core, non-polarity, shield wire PQ, achieved communication for indoor & outdoor unit.

2-core shielding wire
Ease of Installation - Flexible Piping

Max. level difference between IDU & ODU is 70m if ODU is above.

- The longest Pipe Length: 200M
- Total Pipe Length: 1000M
- Max. 110m level difference between IDU~ODU (outdoor down)
- Max. 175m actual piping length
- Max. 30m level difference between IDU~IDU
Ease of Installation - 360° Pipe Connection for ODU

The knock-out holes for piping, power, and communication cables are located in a variety of directions, allowing for more convenient installation of V5 Plus since the piping and cable direction can be freely selected from the front, left, and right side.
Ease of Installation - Automatic Addressing
Ease of Service——Dust-clean function

The innovatively designed dust-clean function enables the outdoor unit to prevent the dust by itself. **This function needs to be customized**
Ease of Service —— Black Box Function & Auto Commissioning Function

- By pressing a **button-combination** on outdoor PCB, the system will automatically start the commissioning, such as check if the fan motors, EXVs are normal or not, and whether the stop valves are full open or not.

- **Memory Chip** can storage last 10 times error/protection information and to check through a button on PCB.
Ease of Access and Service

- **Compressors** are located near the front panel, which simplifies checks and enables valve or compressor parts to be replaced easily.

- **An additional auxiliary small PCB** is installed in the side columns, this design greatly help the installer or service man to set Auto-commissioning or CHECK the operation status without removing the front panel.
Durable System - Optional Heavy Anti-corrosion

- Grill
- Steel Sheet
- Coil Fins
- Control Parts Panel Cover
- Screw Nuts
- Basement
Quality Management

700 engineers and inspectors

Quality System Management
Final Quality Control
Supplier Quality Assurance

QSM
FQC
SQA

CSI
PQC
IQC

Customer Service & Improvement
Process Quality Control
Incoming Quality Control

MiDea Commercial Air Conditioner Division
Quality Management

**Inspection**
- Regular
- Incoming
- Supplier factory
- Sample confirm
- RoHS

**FQC**
- Self
- Mutual
- First-sample
- Patrol
- Special

**PQC**
- Structure & Safety
- Performance
- Long-term running
- Simulation & Field
- Life

- 100% helium leakage checks of heat-exchanger
- 100% running and safety tests on the assembly line
Quality Certification
New Product Launching
Midea V6 Series VRF
EMS: Energy Management System

EVI: Enhanced Vapor Injection

Mr. Doctor: Self-diagnosis

32HP × 4
EMS—Energy Management System

4 running modes with different Performance & Energy Efficiency

Improve the efficiency in part load

- Floating Te
- High Te in part load means high efficiency
EMS—Energy Management System

EMS Cooling

- Powerful mode
- Dehumidification mode
- Balance mode
- High efficiency mode

Cooling performance

Efficiency

Cooling effect

Evaporating temp.

t1 (e.g. 3°C)
t2
t3
t4 (e.g. 9°C)
t5
EVI—Enhanced Vapor Injection

New compressor
Cooling Capacity: +8%
Heating Capacity: +20%
Double U-shape refrigerant pipe decrease the IPM temperature and enhance the reliability: Cooling from -15°C to 54°C
2-Stage Sub-cooling Control

Enhancing the sub-cooling degree of the refrigerant and reducing the pressure loss in the refrigerant flowing process.

Air-cooled heat exchanger
6°C of sub-cooling degree.

Plate heat exchanger
18°C of sub-cooling degree.

The system can achieve a 10% increment in efficiency.
More comfort - Less indoor temp. fluctuation

Create a better living environment for users

High precision temp. sensor

- The temperature detection precision of the sensor is ±0.5°C
- Less temperature fluctuations.

Midea VRF temp. sensor
Auto Refrigerant Charging and Cycling

Auto Refrigerant Charging

Auto Refrigerant Cycling
New Controller

Wired Controller
- Multi page
- 1 to 16 indoor units
- Main and Sub setting when 2 controllers
- System parameter check

Touch Screen Controller
- Touch Screen (6 inch and 10 inch)
- Max. up to 64 IDUs
- Schedule management / Data statistics / Log management / Warning message / Permission management.
IMM Controller for VRF

IMM Pro

One key installation
Monitor and control
2048 units
SOFTWARE

New Diagnosis Software

- All operating parameters
- Detailed information
- Diagnosis function, convenient to check the refrigerant piping diagram, the real-time running status and the history running status chart of indoor and outdoor units.

- Window 7 and Windows 10 compatible
New Generation of VRF

To be in 2017
Why VRF

Utilizing VRF with LEED

The VRF (variable refrigerant flow) air conditioning system is engineered for sustainable green buildings and provides opportunities for designers to claim numerous LEED® prerequisites and points.

Energy and Atmosphere: VRF Can achieve up to **21 points**

Environmental Quality: VRF can achieve up to **7 points**

LEED NC 3.0

Certified: 40-49 points
Silver: 50-59 points
Gold: 60-79 points
Platinum: 80 + points
Why VRF

Utilizing VRF with LEED

How does VRF help claim numerous LEED® prerequisites and points?

1. VRF system uses refrigerant R410A (LEED point).
2. Unlike traditional applied air conditioning systems using chilled water or condenser water, the air-to-air VRF system does not use water or evaporative cooling that requires make-up water nor does it require any water treatment chemicals.
3. The VRF system offers exceptional energy performance by using state-of-the-art controls, In addition, a three pipe system with heat recovery units that can move heat from zones requiring cooling to zones that need heat, providing ultimate individual comfort control with minimal power consumption.
4. The modular design of the VRF system uses multiple indoor units allowing the designer to provide individualized control for each occupant.
5. Complete local, central, building management controllers, and communication gateways make it easy to monitor energy usage and control the VRF system operations based on building usage or indoor air quality.
LEED Projects - 2014 FIFA Brazil World Cup Stadiums

- **Country:** Brazil
- **City:** Porto Alegre
- **Completion Year:** 2014
- **Outdoor Units:** 3 pipe heat recovery VRF
- **Total Capacity:** 1,016 HP

Leadership in Energy and Environmental Design
Why choose Midea VRF

- **In efficiency**
  - DC Inverter compressor and cutting-edge driving technology Contributes to greater energy savings and comfort
  - Variable Refrigerant Temperature technology leading to excellent energy efficiency
  - Indoor units with advanced sensing technology

- **In comfort**
  - Variable Refrigerant Temperature technology preventing cold droughts
  - 13 different indoor unit types and 100+ models
  - Low sound indoor and outdoor units

- **In aesthetics**
  - Stylish cassettes integrated in the ceiling
  - Ceiling suspended cassettes
  - Elegant wall mounted units
Why choose Midea VRF

- **In installation**
  - Automatic refrigerant charge function
  - Self-addressing control system after installation
  - Flexible connection possibilities for indoor and outdoor units (non-polarity cable or even wireless communication)

- **In control**
  - Intelligent Manager of Midea— a PC based integrated control solution
  - Centralized Controller
  - Easy integrating with third party BMS (Lonworks, BACnet, KNX, Modbus, etc.)
  - Dedicated control solutions for applications such as offices, shops, hotels, schools, etc.
Why choose Midea VRF

- **In after market support**
  - Nationwide field support organization
  - Local Training facilities
  - Dedicated tech support team
  - Support from Midea HQ (500 R&D engineers + 50 sales engr. + 10 service engr.)

- **In reliability**
  - Refrigerant-cooled or patented Air-cooled PCB in outdoor unit
  - 100% online testing before leaving the factory
  - Spare parts available in local office
  - ISO 9001 compliant manufacturing + most robotic automatic procedures
  - One of the best warranties* in the industry for Midea Branded VRF (5+2)

- **In system design**
  - User friendly sizing and selection software
  - CAD drawings
  - Comprehensive engineering manuals
  - Support from Midea HQ and Local distributor
Midea VRF Benefits

Consulting engineers

Midea VRF technology maximizes flexibility and leads the way in customization to match individual building requirements in comfort and energy — all designed to reduce the total life cycle costs.

- Maximum flexibility to meet customer requirements
- Advanced software tools assist with system design

(Windows Version)  (AutoCAD Version)
Midea VRF Benefits

Installers & Architects

✓ Wide range of outdoor units up to 88 HP (V5 X)
✓ One supplier equals one point of contact
✓ Maximum flexibility to meet customer requirements
✓ Customized training to maximize expertise
✓ Indoor units with a sleek and sophisticated design
✓ Space efficient outdoor units
✓ Low sound levels for both indoor and outdoor units
✓ Wide range of indoor units to allow installation in most environments
Midea VRF Benefits

Building owners

✓ Midea VRF is the ultimate in customized comfort and intelligent control tailored to your individual needs and used to maximize energy efficiency.

✓ Optimized life cycle cost

✓ No more cold droughts with variable refrigerant temperature

✓ Single point of contact for the design of your climate system

✓ Integrated system, combining air conditioning, heating, ventilation, etc., enables optimized system function

✓ Multiple systems can be managed in exactly the same way for key accounts

✓ Dedicated after-sales service to ensure fast on-site support
2016 Rio de Janeiro Olympics Stadiums
100% won the bids of all the new venues in the Rio Olympics

- **Country**: Brazil
- **City**: Rio de Janeiro
- **Completion Year**: 2016
- **Outdoor Units**: V5 X series VRF + Carrier Chiller
- **Total Capacity**: 1,684 HP (VRF)
Sports Stadiums

2014 World Cup Brazil Beira Rio Stadium
Porto Alegre, Brazil

2015 Youth Olympic Games Stadiums
T'bilisi, Qatar

Barcelona, Spain
FC Barcelona Camp Nou football Stadium

The 27th Southeast Asian Games Stadium
Nay Pyi Taw, Myanmar

2014 African Games Stadiums
Brazzaville, Congo

2010 Asian Game Stadiums
Guangzhou, China
Residential Buildings

Largest VRF Project in the World—Ain Al Fayda, Abu Dhabi, U.A.E.
HVAC Market

A closer look at World & Qatar HVAC market
World Air-conditioning market

World AC Market by value in 2015, **US$94 billion/ -5% growth rate**

Source: The Building Services Research and Information Association (BSRIA)
World Air-conditioning market

World AC Market by value in 2015, **US$94 billion/ -5% growth rate**

AC Sales 2015 (US$bn) - Top 12 Countries

Source: The Building Services Research and Information Association (BSRIA)
World Air-conditioning market

World AC Market by value by Product 2015, US$94 billion

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>VRF</td>
<td>11% (9.7$bn)</td>
</tr>
<tr>
<td>Chiller</td>
<td>8% (7.7 $bn)</td>
</tr>
<tr>
<td>AHU &amp; FCU</td>
<td>8% (7 $ bn)</td>
</tr>
<tr>
<td>Ducted Splits (Including US ducted)</td>
<td>11% (9.6 $bn)</td>
</tr>
<tr>
<td>Rooftops</td>
<td>4% (3.6 $bn)</td>
</tr>
<tr>
<td>Total CAC</td>
<td>30% - 40%, 29-38 billion USD</td>
</tr>
</tbody>
</table>
World Air-conditioning market

Mini Split AC Sales (excl. US ducted)

<table>
<thead>
<tr>
<th>Country</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>46,555,254</td>
</tr>
<tr>
<td>Japan</td>
<td>8,640,916</td>
</tr>
<tr>
<td>Brazil</td>
<td>4,137,111</td>
</tr>
<tr>
<td>India</td>
<td>3,326,745</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2,672,140</td>
</tr>
<tr>
<td>Thailand</td>
<td>1,873,687</td>
</tr>
<tr>
<td>Vietnam</td>
<td>1,417,170</td>
</tr>
<tr>
<td>South Korea</td>
<td>1,959,786</td>
</tr>
<tr>
<td>Russia</td>
<td>1,483,800</td>
</tr>
<tr>
<td>Argentina</td>
<td>1,271,893</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1,199,744</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>846,715</td>
</tr>
</tbody>
</table>

2015 Totally: 103,272,149

Source: The Building Services Research and Information Association (BSRIA)
World Air-conditioning market

Global VRF Unit Sales 2014 to 2020

Source: The Building Services Research and Information Association (BSRIA)
World Air-conditioning market

Global VRF Unit Sales by outdoor units by Country 2015

Source: The Building Services Research and Information Association (BSRIA)
World Air-conditioning market

Global Chiller Sales 2014 to 2020 (US$m)

Chiller Sales 2015 (US$m)
Top 10 Countries

Source: The Building Services Research and Information Association (BSRIA)
World Air-conditioning market

China Domination – Production and Size

Source: The Building Services Research and Information Association (BSRIA)
Middle East Air-conditioning market

- The Middle Eastern AC market had a scale of **5.6 million units in 2015**, a 3% increase.

- Exports of air conditioners from China to the Middle East came to **5.58 million units** in 2015, 1.57 million units to Saudi Arabia, 1.2 million units to Iraq, 947,000 units to the UAE.

- Middle Eastern VRF market grew to **20,000 units** in 2014 on an outdoor unit basis.

- **Shift From Chillers/ Ducted Systems To VRF (Multi Head)**

- Chillers are much more commonly used in the Middle East. In recent years, however, the number of green buildings constructed in the region has been rising, which is pushing up demand for high-efficiency VRF systems.

- By country, the UAE has the largest VRF market in the region (World Expo 2020).

- In Saudi Arabia, VRF demand is growing by 5% or more, considerably higher than growth in RAC.

- **VRF demand in Qatar is also expanding as the country gears up to host the 2022 FIFA World Cup.**

- **Market Acceptance Of R410A**
Economics and GDP of Qatar

GDP trends and forecasts, GDP % growth, 2013-2017F

- The government is putting all its efforts into the preparations for the 2022 Football World Cup and its 2030 Vision Plan, which includes the continued development of the country’s infrastructure.

Source: IMF
### Qatar HVAC Industry Overview

**Applications for packaged products, % by value, 2015**

<table>
<thead>
<tr>
<th>Application</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single splits (Unducted)</td>
<td>22.8%</td>
</tr>
<tr>
<td>Single splits (Ducted)</td>
<td>15.9%</td>
</tr>
<tr>
<td>Multi splits</td>
<td>0.0%</td>
</tr>
<tr>
<td>VRF</td>
<td>6.8%</td>
</tr>
<tr>
<td>Window / through the wall</td>
<td>9.3%</td>
</tr>
<tr>
<td>PTAC</td>
<td>0.0%</td>
</tr>
<tr>
<td>Moveables / portables</td>
<td>0.1%</td>
</tr>
<tr>
<td>Rooftops</td>
<td>11.3%</td>
</tr>
<tr>
<td>Indoor packaged</td>
<td>0.0%</td>
</tr>
<tr>
<td>Chillers</td>
<td>19.1%</td>
</tr>
<tr>
<td>AHU</td>
<td>10.2%</td>
</tr>
<tr>
<td>Fan coils</td>
<td>4.4%</td>
</tr>
</tbody>
</table>
Middle East Air-conditioning market

Qatar - the 4th largest AC market in ME

Packaged and central plant CAGR by US$ value, 2014-20120F

<table>
<thead>
<tr>
<th>Product Type</th>
<th>CAGR 2014-2020F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single splits (Unducted)</td>
<td>1.9%</td>
</tr>
<tr>
<td>Single splits (Ducted)</td>
<td>4.9%</td>
</tr>
<tr>
<td>Multi splits</td>
<td>0.0%</td>
</tr>
<tr>
<td>VRF</td>
<td>11.5%</td>
</tr>
<tr>
<td>Window / through the wall</td>
<td>-6.7%</td>
</tr>
<tr>
<td>PTAC</td>
<td>0.0%</td>
</tr>
<tr>
<td>Moveables / portables</td>
<td>2.0%</td>
</tr>
<tr>
<td>Rooftops</td>
<td>3.3%</td>
</tr>
<tr>
<td>Indoor packaged</td>
<td>0.0%</td>
</tr>
<tr>
<td>Chillers</td>
<td>7.2%</td>
</tr>
<tr>
<td>AHU</td>
<td>-2.4%</td>
</tr>
<tr>
<td>Fan coils</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Qatar Vertical Market Opportunities: **10%+ VRF Growth by value**
Qatar Air-conditioning market

Qatar- the 4th largest VRF market in ME (UAE 8,000, IRAN 3,200, KSA 2,000)
Why Midea Air Conditioner

An innovative company

- 15+ Years in VRF
- 30+ years in AC
- 50+ years in Chiller
Our brand promise...

At Midea, we promise to provide surprisingly friendly solutions...
Surprisingly Friendly

**Surprisingly friendly** is rooted in and delivered by our:

- Products
- Services
- Employees
- Communication
To be The Global Leader of the HVAC Industry
Video about the CAC Global Projects

It's about 18,000 tons of refrigeration.
THANK YOU

Technology Inspires Possibilities