

# LG AIR SOLUTION

## AS A TOTAL HVAC & ENERGY SOLUTION PROVIDER



\* LG Air-Solution production sites

The LG Electronics Air Solution Business Unit is a provider of total HVAC and energy solution. The company offers a broad portfolio of air conditioner products that are compatible with any building anywhere, including compact residences, towering skyscrapers, massive factories and giant concert halls. As a true total HVAC and energy solution provider, LG also supplies even the largest buildings and industrial facilities with central air conditioning systems such as chillers and efficient control solutions.

The history of the business unit goes back to 1968, when LG (then called GoldStar) rolled out Korea's first residential air conditioner. As the company first began making chillers for large commercial buildings in 1970, the commercial air conditioning business has grown exponentially, especially within the last 20 years. In 2008, LG sold its 100 millionth air conditioning

# INFRASTRUCTURE IN EUROPE



## LG Air Conditioning Academy

LG has set up 19 official air conditioning academies in Europe, teaching much needed skills to thousands of current industry professionals including installers, consultants, designers, sales staff and service technicians. The academy program is being used to share expertise and cultivate these HVAC experts by providing a cutting-edge technical educational technology and equipment. Moreover, as LG's entire product range is installed on site, professionals can be trained in a realistic way that offers them the chance to experience the latest products first-hand.



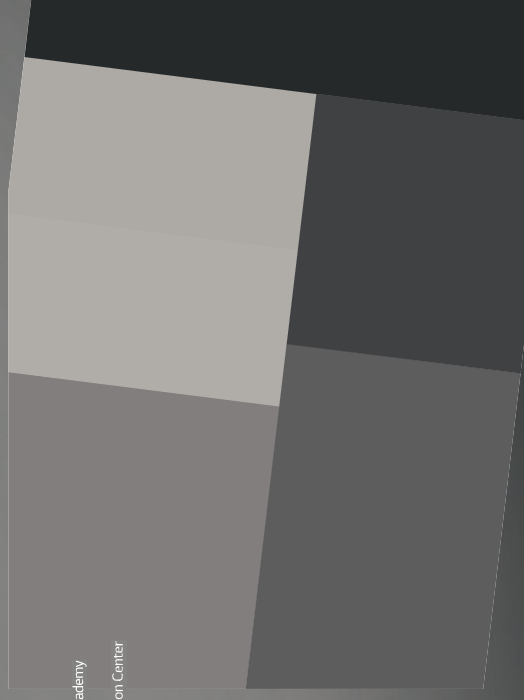
## LG Energy Lab in Europe

Committed to meet all requirements regarding energy efficiency and environmental demands, LG has been running Energy Lab. LG Energy Lab is an innovative site dedicated to commercial and residential products in heating, ventilation and the latest energy efficient air conditioning solutions. Also as a showcase, LG Energy Lab is equipped with complete monitoring and control systems. The performance of all products will be tracked and analyzed by a team of Research and Development engineers based in France and Korea, ensuring efficiency and reliability during the whole product lifecycle.



## European Air Conditioning Distribution Center

LG's European Air Conditioning Distribution Center is located in Oosterhout, the Netherlands. Supplying and delivering products all over Europe, this distribution hub has contributed to smooth and rapid delivery, direct shipping for smaller orders and delivery tailored to air conditioners. The hub tries to manage inventory efficiency by taking advantage of LG EU's established inventory pool.



Air Conditioning Academy

European Distribution Center

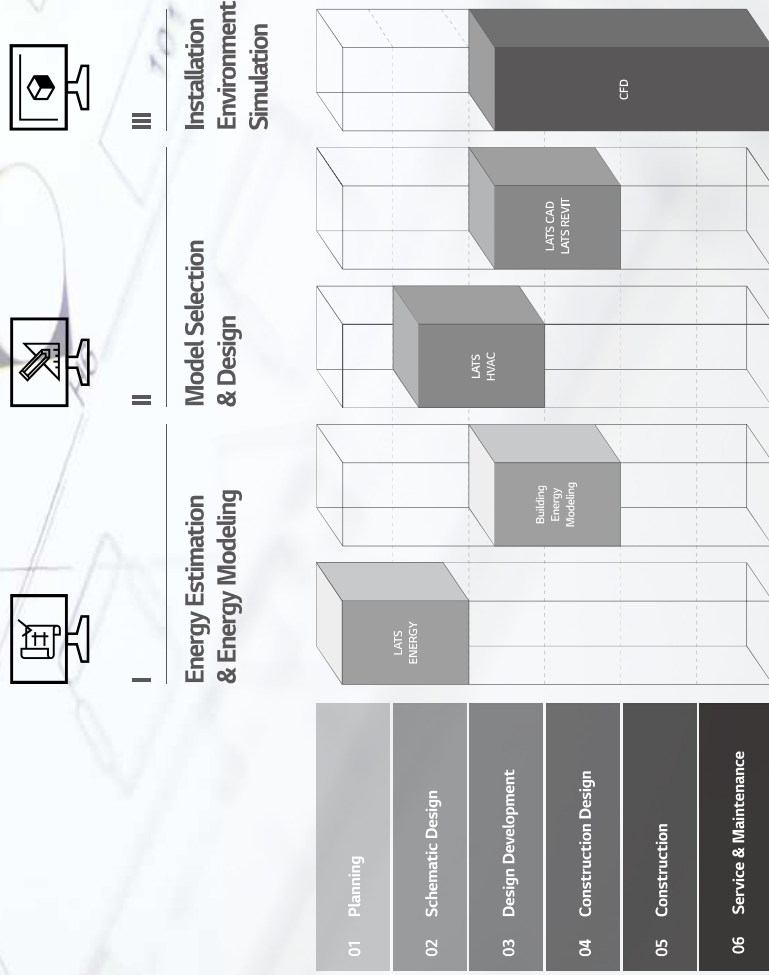
Europe Energy Lab

# ENGINEERING CAPABILITY :HVAC TOOL & SUPPORT

From planning to service & maintenance and then to de-construction, an architectural project goes along many stages from the beginning to the end of its lifecycle. Along those stages, various engineering tools are applied to solve the diverse issues happening in each stage, with the most optimal solution possible. Due to the usage of such tools, buildings are effectively designed, built, supervised, and maintained throughout the lifecycle.

Dedicated to provide the best HVAC engineering support, LG Electronics Air-Solution Business Unit offers several engineering tools and solutions focused on HVAC, during the overall lifecycle of a building, related to the three categories: I. Draft Energy Estimation & Energy Modeling, II. Model Selection & Design, and III. Installation Environment Simulation. Among them, the LATS\* Program series has been developed to offer the best and the most optimized tool for LG HVAC systems, providing our customers a faster, easier, and a more accurate way in everyday duties of Model-selection, Draft Energy Estimation & Designing, and many more.

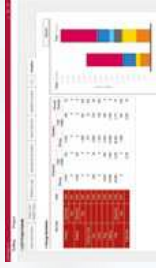
## \* LATS : LG Air-conditioner Technical Solution



### 01 Draft Energy Estimation

#### LATS Energy

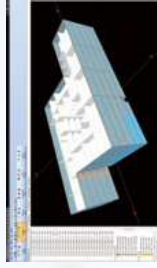
LATS Energy program is a draft energy estimation program, self-developed by LG. This program helps estimate the draft energy usage and analyzes the life cycle cost of LG VRF models during the early stage of a project.



### 02 Building Energy Modeling

#### eQuest, EnergyPro, Trace 700 and More

These are certified commercial programs which assess the HVAC system efficiency and building's annual energy saving for building standard or certification like LEED. LG HQ supports these programs for the project stages of Design Development and Construction Design wherein the overall designing is finished.



### 03 Model Selection

#### LATS HVAC

LATS HVAC is an integrated model selection program of LG HVAC products, enabling an accurate and quick selection on the best model suitable to each site. In addition to model selection, faster estimation on refrigerant piping diameter and additional refrigerant is possible, along with auto printing of reports.



### 04 Design

#### LATS CAD

LATS CAD enables faster and a more accurate design of LG HVAC products. Moreover, it offers not only designing, but also quotation and installation review in order to minimize problems during installation processes.



#### LATS Revit

LATS REVIT is developed to make 3D designing of LG HVAC products easier than the previous program. It enables engineers to check 3D images from designing stage and prevents possible issues of the installation stage.



### 05 Installation Environment Simulation

#### CFD Analysis

CFD Analysis is applied in areas of estimating indoor airflow and temperature distribution while operating VRF products, outdoor airflow distribution, and noise level. By running a simulation before construction, engineers estimate possible issues and find optimal solutions of malfunction that could occur after construction.



# LG CONTROL SOLUTION

MULTI V 5 offers a diverse range of effective control solutions that satisfy specific needs of each building and its user scene. These controlling systems are equipped with user friendly interface, flexible interlocking environment, energy management and smart individual controller for optimized controlling conditions and smart building management.



Integration Solution



**reddot award**  
communication design

# OUTDOOR UNIT

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MULTIV 5

MULTIV 5

MULTIV WATER IV (Heat Pump / Heat Recovery)

MULTIV WATER 5





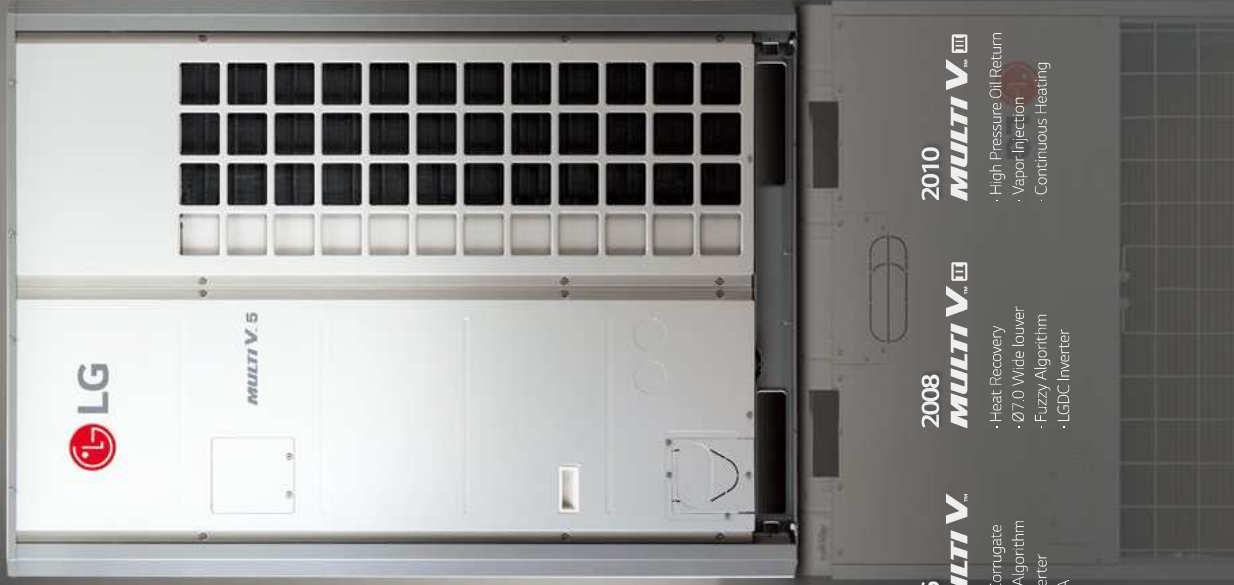
# MULTI V™ BRAND HISTORY

From the moment when LG introduced Korea's first residential air conditioner in 1968, the company has continuously enhanced its technological innovation and credibility. As a result of sustained improvement, LG VRF launched the first generation of MULTI V in 2006 and achieved significant development. With world's top class compressor and innovative technology competency applied on every part, cycle and controlling solutions, it has evolved to be one of the world's most efficient and reliable VRFs.

Following the first and second generations with Inverter technology and non-ozone depleting refrigerant, MULTI V III has advanced its efficiency with diverse cutting-edge technologies such as HIPORTM that directly returns oil to compressor and Vapor Injection that allows double compression by adding mid-pressure refrigerant. As acknowledged by the Eurovent Certification, the innovative technologies of 4th generation secured MULTI V brand the product leadership based on efficient system like Smart Load Control that controls operational load according to external temperature and other technologies that are optimized to manage refrigerant and heat exchange for all cooling, heating and part load operations. Moreover, MULTI V developed wide range of VRF line-up that could satisfy various types and size of building. MULTI V S is the VRF with side discharge, designed for small to mid-sized building and MULTI V WATER is the water-cooled VRF solution with variable water flow controlling technology.

In 2017, finally, the time has arrived for the ultimate VRF system, MULTI V 5. This generation has fully improved its technological potential with ever powerful and reliable yet economical LG's Ultimate Inverter Compressor, Ocean Black Fin with the most effective corrosion resistance performance and biomimetics technology-applied, enlarged fans. At the same time, the Dual Sensing Control offers users the most pleasant environment while minimizing the unnecessary energy loss with system that senses both the temperature and humidity to efficiently manage cooling, heating and part load operations.

With MULTI V 5 that has been solely designed for the ultimate efficiency, performance, flexibility, comfort and control, we are highly confident to bring the ultimate pleasant air experience.



2017  
**MULTI V 5™**



- Dual Sensing Control
- Ultimate Inverter Compressor
- Large Capacity ODU with Biomimetics Technology Fan
- Continuous Heating
- Ocean Black Fin

2013  
**MULTI V™**

- Eurovent Certification
- Active Refrigerant Control
- Variable Heat-Exchanger Circuit
- Smart Load Control
- Smart Oil Return
- Vapor Injection (Advanced)

2010  
**MULTI V™**

- High Pressure Oil Return
- Vapor Injection
- Continuous Heating

2008  
**MULTI V™**

- Heat Recovery
- Ø7.0 Wide Louver
- Fuzzy Algorithm
- LGDC Inverter

2006  
**MULTI V™**

- Ø7.0 Corrugate
- Fuzzy Algorithm
- AC Inverter
- R410A

# DUAL SENSING CONTROL

The cooling load is based on the amount of both sensible heat load and latent heat load. Most importantly, the cooling load is keen to, and thus, greatly affected by external humidity rather than the outdoor temperature. For this reason, MULTI V 5's Dual Sensing Control applied function senses both temperature and humidity and applies sensed data for load control in order to obtain in-depth understanding of sensible heat load and latent heat load. This helps preventing excessive cooling load supply and offers the most pleasant and comfortable cooling environment the users want combined with reduction in energy consumption.

Regular VRF : Single Sensing



Were you aware that until now VRF has only sensed a single referenced value?



DUAL SENSING CONTROL

MULTI V 5™ : Dual Sensing



### Smart Load Control (SLC)

This comprehensive understanding of environmental conditions allows optimized energy efficiency and maximized indoor comfort level.

ESEER

Up to 21%  
(vs. standard mode at 20hP)

### Comfort Cooling

This maintains operation at mild cooling mode around set temperature without stopping in between operations for maximized user comfort.

Improved Indoor Comfort

# ULTIMATE INVERTER COMPRESSOR

As the core technology of the air conditioning system, the Ultimate Inverter Compressor of MULTI V 5 boasts its ultimate efficiency and durability, designed based on the unique technology and innovation of LG HVAC.

## 10% IMPROVED ENERGY EFFICIENCY ENHANCED COMPRESSOR RELIABILITY

### All Inverter

Provide high efficiency with low vibration and low noise

### Six By-pass Valves

Prevent compressor damage due to excessively compressed refrigerant more efficiently than 4 by-pass valves

### 01. Vapor Injection

Maximize heating capacity via two-stage compression

### 02. Enhanced Bearing with PEEK Material

Newly invented system motivated by PEEK (Polyether etherketone) bearing used for aero engine to increase operation range and durability

### 03. Wide Operation Range from 10 to 165Hz

Improved part load efficiency at all operation ranges

### 04. HiPOR™ (High Pressure Oil Return)

Resolve compressor efficiency loss caused by oil return

### 05. Smart Oil Management

Oil level detection in real time

ULTIMATE  
INVERTER  
COMPRESSOR

01

02

03

04

05



**10% IMPROVED AIR FLOW RATE**  
**20% REDUCED POWER CONSUMPTION**

\*Based on 290 m<sup>3</sup>/min



**LARGE  
CAPACITY**  
WITH BIOMIMETICS TECH

# LARGE CAPACITY ODU WITH BIOMIMETICS TECHNOLOGY FAN

As a result of the biomimetics technology invented through years of joint study with Department of Mechanical and Aerospace Engineering of Seoul National University, the fan of MULTI V 5 increased wind capacity while it reduced its power consumption when operating.



## Humpback Whale Design

Inspired by the bumps on the humpback whale's flipper, the tubercles on the back side increased wind power by reducing flapping.



## Clam Shell Pattern

Like the clam shell textures, the range difference created by moire pattern reduced noise level.



## Increased Air Flow Rate

With extended shroud, discharged air current is stabilized and power consumption is reduced.

## Large Capacity Outdoor Unit

Enhanced core parts like biomimetics technology-based fans, 4-sided heat exchanger as opposed to 3-sided heat exchanger of previous model and compressor with increased efficiency and capacity allow large capacity for outdoor units. A single unit of MULTI V 5 can provide up to 26HP.

# CONTINUOUS HEATING



Improved technologies such as Dual Sensing Control, Partial Defrost and Smart Oil Management enhance Continuous Heating for increased heating capacity and indoor comfort. The delayed and partial defrost technologies minimize unnecessary operational consumption to provide consistent heating.



\* LG internal test result  
 \* test condition - Outdoor 2/1°C, Indoor 20/15°C, Humidity 83%



Dual Sensing Control



Partial Defrost

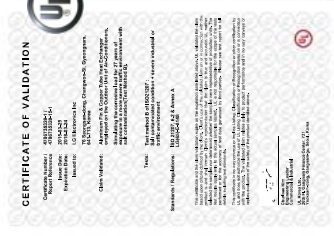


Smart Oil Management

# OCEAN BLACK FIN HEAT EXCHANGER

LG's exclusive "Ocean Black Fin" heat exchanger is specially designed for durable and long-lasting performance even in corrosive environments. The black coating is applied for protection from various corrosive external conditions and the hydrophilic film keeps water from accumulating on the heat exchanger's fin, minimizing moisture buildup. This improvement in durability prolongs the product's lifespan and lowers both the operational and maintenance costs.

# Ocean Black Fin



\* Test Method B Simulation Validated  
 (Test condition: Salt contaminated condition -severe industrial/traffic environment (No.)\_SD0)  
 \* Based on 1,500 UL test hours



MULTI V 5

# CONSULTANTS & HVAC DESIGNERS

From accurate 3D-based building modeling to strong system capability regardless of the building size and climate conditions, MULTI V 5 offers the most efficient and flexible installation environment for consultants and HVAC designers. Indeed, MULTI V 5 is the most reasonable HVAC system that has achieved the best efficiency through LG's enhanced inner parts, operational cycle and controlling technology.

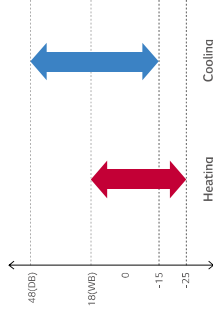
## 01 Improved designing effectiveness and accuracy via LATS Revit, the BIM application

LG provides 3D-based BIM simulation tool, LATS Revit, in order to offer product selection, positioning and piping from installation, interference check to correction phases based on systematic consideration of the load. This enables the easiest, yet the most accurate system modeling support.



## 02 Applicable to various climate conditions and purposes based on wide operational range for both heating and cooling operations

Even in the extreme climate situations, MULTI V 5 can perform stable heating and cooling operations. Due to LG's improved inner parts and cycle technology, it can perform heating operation at extremely cold temperature as low as -25°C. For cooling performance, MULTI V 5 can operate from -15°C to 48°C. With wide operational range, it can perfectly perform heating operation in cold environment, making the product adequate for uses in specialized venues like server rooms.



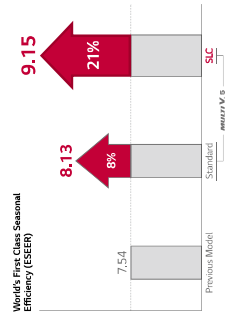
## 03 Flexible construction design available due to long piping technology

Through the world's best class piping technology, MULTI V 5 provides the perfect solution for various types of building with diverse size and purposes. The longest piping length offered by MULTI V 5 is 22.5m and height difference between outdoor unit and indoor unit stretches up to 110m.

Total Piping Length	1,000m
Actual longest piping length	22.5m
Longest piping length after 1 <sup>st</sup> branch (conditional application)	40m (90m)
Height between ODU - IDU	110m
Height between ODU - IDU	40m
Height between ODU - ODU	5m

## 04 The most economical solution with the world's top class energy efficiency

Improved reliability based on LG's Ultimate Inverter Compressor and other core parts, as well as the most developed controlling technology due to optimal cycle operation and Dual Sensing Control that recognizes both the temperature and humidity achieved the world's best class seasonal efficiency (ESEER) of 9.15. As a result, this enables the most economical system capability for MULTI V 5 in comparison to any other existing HVAC systems.



\* Comparison based on 10HP in cooling mode

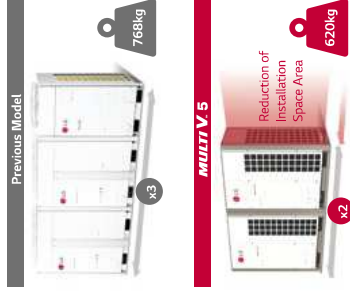
MULTI V 5

# INSTALLERS

Due to increased capacity provided by single outdoor units, installation became simpler with reduced number of outdoor unit combination. Moreover, solutions connected to and operated by smart devices significantly shortened physical hours required for test run, diagnose and monitoring of multiple services while making these controlling more accurate.

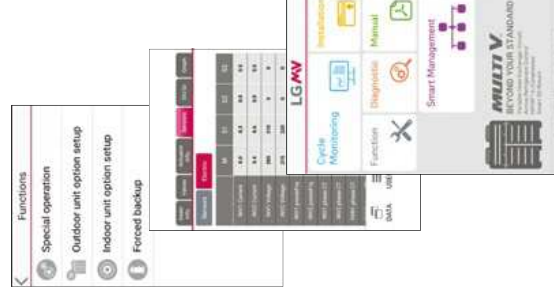
## 01 Increased installation convenience due to large capacity units reducing number of outdoor units required for combination

By providing up to 26HP for single unit line up, MULTI V 5 decreases the total number of required outdoor units in order to ultimately simplify installation process, when compared to previous models. For example, previous system required a combination of a 20HP outdoor unit, a 18HP outdoor unit and a 10HP outdoor unit to run a total of 48HP. For MULTI V 5, however only 2 outdoor units with each providing 24HP can cover the same amount. This significantly reduces installation hours, especially those that used to take long time such as using crane to properly place outdoor units on the rooftop.



## 02 Simple and easy installation and service with Mobile LGMV

With LGMV, the smarter SVC application, hours and resources spent for installation are significantly reduced and more accurate installation and service can be offered.



### Auto test run

Mobile application allows automatic address setting and test run report releasing.

### Refrigerant diagnose solution

By regularly checking the amount of refrigerant, it automatically reloads if current amount is not enough.

### Easier setting for installers

Unlike before when set up had to be done via DIP Switch of Outdoor unit, installers can simply manage setting via mobile app for MULTI V 5. Indeed, settings for SLC steps, Dual Sensing Control and outdoor unit fan's maximum RPM control can be easily managed via LGMV.

### Smart management

By checking test run history, black box review and other previous records, site information can be managed efficiently.

\* LGMV application is available for Android and iOS (iphone/ipad)

MULTI V 5

# BUILDING OWNERS

With increased reliability of core parts such as compressor and heat exchanger, as well as high operational efficiency, building owners can significantly reduce operational costs in comparison to other systems. At the same time, large capacity outdoor units minimize installation space which eventually allow better use of the floor space. Moreover, MULTI V 5 prevents overuse of the operational costs by planning and consuming the projected monthly energy usage.

## 01 Corrosion resistance via Ocean Black Fin

Protection certified by UL (Underwriters Laboratories), LG's exclusive Ocean Black Fin is applied on the heat exchanger of MULTI V 5 in order to perform even in corrosive environments. The protection from various corrosive external environments such as seaside with high salt contamination and industrial cities with severe air pollution caused by fumes from factories keeps MULTI V 5 operating without breakdown.

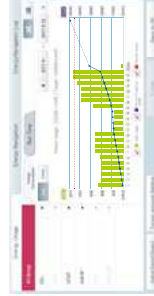


## 02 Minimized installation footprint via large capacity outdoor units for flexible usage of the saved floor space

MULTI V 5 provides up to 26HP for single unit line up. Considering that a total of 260HP is being installed, the total installation space is saved up to 23% while the overall product weight decreases up to 15% in comparison to previous model. This eventually resulted in the maximized use of the saved floor space. Moreover, reduced product weight of MULTI V 5 makes installation easier with less limitation on product weight installed on the building's rooftop.

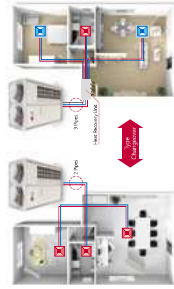
## 03 Operational costs management by presetting energy consumption

Energy management function allows MULTI V 5 to preset monthly energy usage and consume what has been previously planned. By analyzing and comparing previous consumption and planned energy usage for the month, overuse of the HVAC system operational costs can be prevented.



## 04 Easy building remodeling with Integral system that offers both the Heat Pump & Heat Recovery

MULTI V 5 offers HVAC solution with integrated system that offers both the Heat Pump and the Heat Recovery Systems. Even if the site has been previously installed with Heat Pump System, user can easily replace it with Heat Recovery System or Hot Water Solution when necessary through simple piping construction which eventually allows more rooms for future remodeling plans.



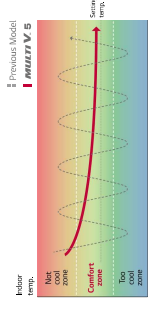
MULTI V 5

# END USERS

LG's inverter technology and capability to actively respond to the building's both internal and external environment allow users to quickly arrive at the desired ambient and systematically maintain such condition. Moreover, users can control the indoor environment remotely via smartphone from wherever and whenever. Lastly, new Standard III Remote Controller with simple user interface and premium design provides users the optimal controlling experience.

## 01 More comfortable cooling environment via Dual Sensing

With the performance of LG's Ultimate Inverter Compressor MULTI V 5 can quickly approach at user's desired temperature. At the same time, the dual sensing technology controls and maintains indoor temperature pleasantly based on its recognition of both the temperature and humidity in order to offer the optimal user comfort.



## 02 Continuous heating operation

Due to improved technologies of MULTI V 5 such as delayed defrost via Dual Sensing Control, partial defrost, and smart oil management, users can enjoy pleasant and comfortable indoor environment with no stopping of heating operations in between.



## 03 Optimal controlling environment with new Standard III Remote Controller

MULTI V 5's new wired remote controller offers simple and easy controlling experience via simplified user interface and 4.3-inch large colored LCD screen. Moreover, it provides diverse information such as indoor temperature, humidity, cleanliness and real-time check on energy consumption.



## MULTI V 5 Certified to Meet New EUROVENT Efficiency Regulations

The MULTI V range has always been at the forefront of energy efficiency. LG takes customers' concerns about energy savings very seriously. The company also strives to protect the environment by continuously improving MULTI V technology, thereby reducing its carbon footprint. In European Union countries, the energy efficiency of variable refrigerant flow (VRF) products has become a policy of its own. While European policymakers encourage technology improvements of VRF products, they also recently set minimum efficiency boundaries. This is to ensure that less energy-efficient VRF products are no longer sold, while environmentally friendly VRF units are promoted. As a result, beginning in 2018, VRF products will have to meet minimum energy efficiency standards, also taking into account the seasonal operation of the product in both heating and cooling modes.

Preserving the environment is LG's top priority, and MULTI V 5 will meet the stricter efficiency standards from day one. As a company, LG is pleased that mandatory regulations on energy efficiency will allow easier comparisons between manufacturers offering similar products. Efficiency assessments will be done on an equal footing, thus allowing customers to make informed choices measured according to European regulations and standards. However, LG's transparent communication

regarding the energy performance of MULTI V 5 units does not stop there. MULTI V 5 will also have its performance certified through independent third party organizations, such as Eurovent certification for VRF.

MULTI V 5 performances will be assessed and certified so LG customers will be able to make the most of national incentive policies that require certified data when implementing VRF technology. Eurovent certification for MULTI V 5 will allow customers to accelerate their business and to reduce their workload to minimal levels. Eurovent certification for MULTI V 5 will be even more important as the EU rules for the energy efficiency of VRF products do not require energy labeling to be displayed with the units. However, designers and construction companies consulting the Eurovent database will find information about the energy performance of MULTI V 5 at a glance.



# 5 MAIN FEATURES

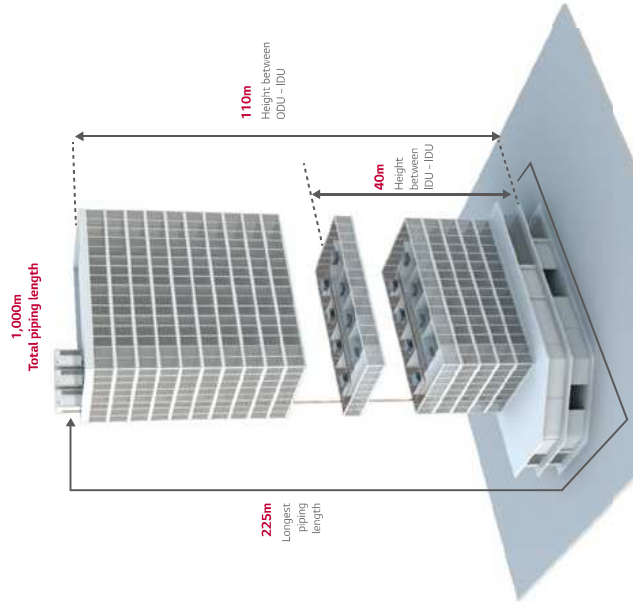
- ULTIMATE EFFICIENCY
- ULTIMATE PERFORMANCE
- ULTIMATE COMFORT
- ULTIMATE FLEXIBILITY
- ULTIMATE CONTROL
- HEAT RECOVERY

# OUTDOOR UNIT KEY FEATURES

## MULTI V 5

Due to improved supercooling circuit and refrigerant controlling technologies, MULTI V 5 allows users to install world's best class piping lengths, which results in more flexible installation design.

### Piping length



### Piping capabilities

Total Piping Length	1,000m
Actual longest piping length (Equivalent)	200m (225m)
Longest piping length after 1" branch (conditional application)	40m (90m)
Height between ODU - IDU	110m
Height between IDU - IDU	40m
Height between ODU - ODU	5m

## ULTIMATE EFFICIENCY

### LG's Ultimate Inverter Compressor

The newly designed bearing of the Ultimate Inverter Compressor allows low-frequency operation at 10 Hz from the previously lowest speed at 15 Hz, increasing the ultimate efficiency and reliability of MULTI V 5.

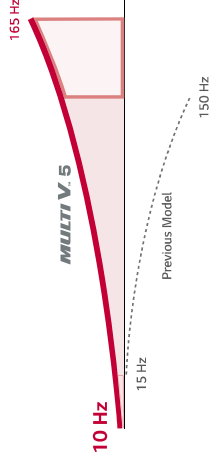


#### Vapor Injection

- Maximize heating capacity via two-stage compression
- Provide powerful heating in low temperature conditions
- Improve energy efficiency and heating performance

#### Extended Compressor Speed from 10 Hz

- Increase part load efficiency at all operation ranges
- Rapid operation response
- Capable of reaching required temperature quickly



#### Enhanced Bearing with PEEK Material for Increased Durability and Reliability

- Applied newly invented scroll system driven by PEEK (Polyetheretherketone) bearing used for aero engine
- Can operate longer without oil supply
- Increase durability and reliability

#### Concentration Motor

- 10% increase of magnetic flux density

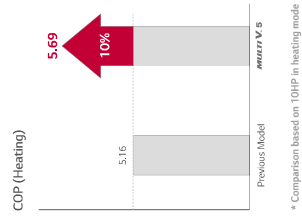
#### HIPOR™

- Minimizing energy loss with direct oil return

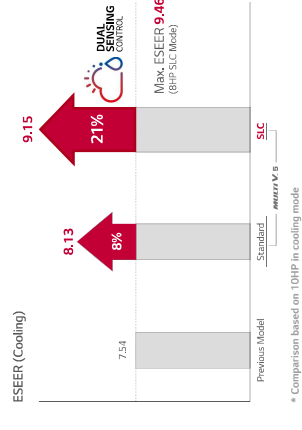
#### Smart Oil Management

- Measuring the presence of oil through the oil sensor

### World's First Class, Rated Efficiency (Eurovent Test Condition)



### World's First Class Seasonal Efficiency (ESEER)



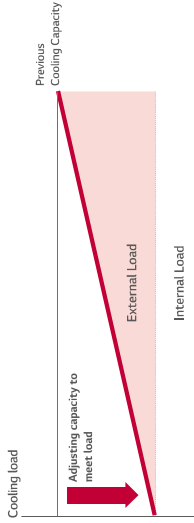
OUTDOOR UNIT KEY FEATURES  
**MULTI V 5**

**ULTIMATE EFFICIENCY**  
**Smart Load Control (SLC)**

Smart Load Control function enables comprehensive understanding of environmental conditions in order to optimize energy efficiency and maximize indoor comfort level. This technology allows active control of discharge refrigerant temperature which eventually increases the ESEER up to 21% for maximum 26 HP and 15% for average outdoor units in comparison to the previous models.

**Increased Energy Efficiency (SLC ESEER)**

**Up to 21%** (High humidity) ~ **31%** (Low humidity)



For low temperature, lower load and capacity are required



Lower load and capacity need higher evaporation temperature

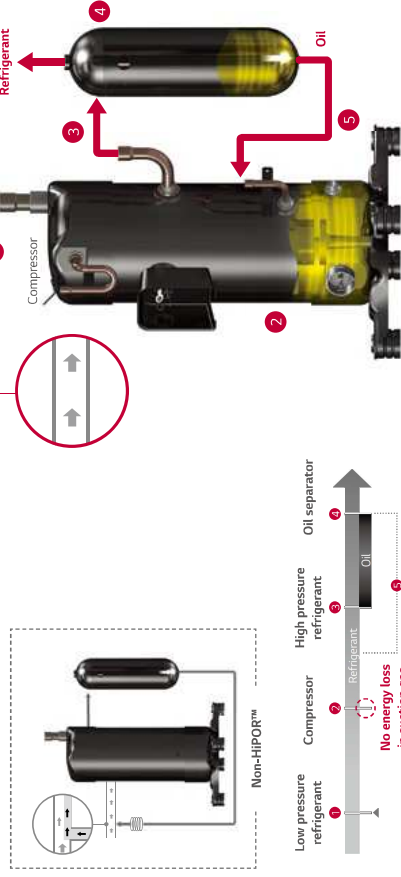


Higher evaporation temperature results in higher efficiency

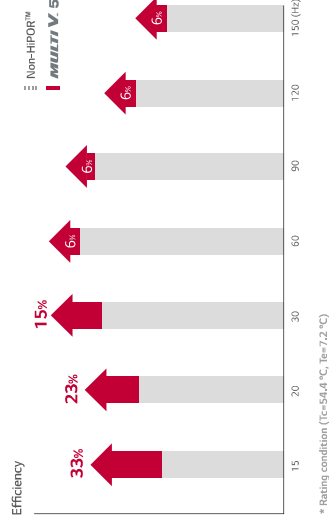
**HiPOR™ (High Pressure Oil Return)**

HiPOR™ technology enables oil to return directly into the compressor, instead of returning through the refrigerant suction pipe in order to minimize energy losses while maximizing the efficiency of compressor. The previous model compressor that caused loss of low pressure refrigerant return to the refrigerant pipe. However MULTI V 5 maximizes reliability and efficiency of the compressor by reducing high pressure refrigerant loss.

**Process comparison**



**Efficiency comparison**



\* Rating condition (Tc=54.4 °C, Te=-7.2 °C)

\* Low humidity: Below 50% / Standard: 50-70% / High humidity: 70-100%  
\* Setting is available in indoor (Standard III Remote Controller)

# OUTDOOR UNIT KEY FEATURES

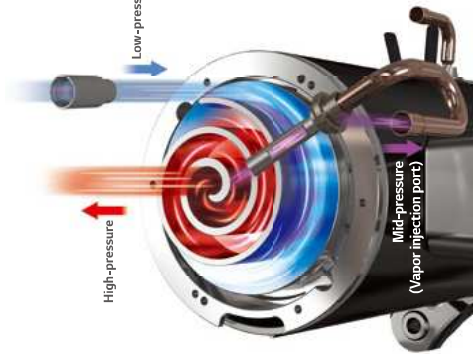
## MULTI V 5

### ULTIMATE EFFICIENCY

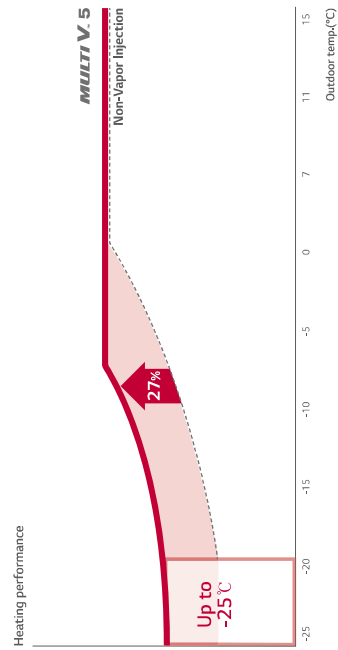
#### Vapor Injection

Vapor Injection uses a two-stage compression effect, which is designed to provide efficient heating in very cold environments. Combined with HIPOR™, this system boosts heating performance and enhances heating temperature range.

#### Technology mechanism



#### Performance comparison

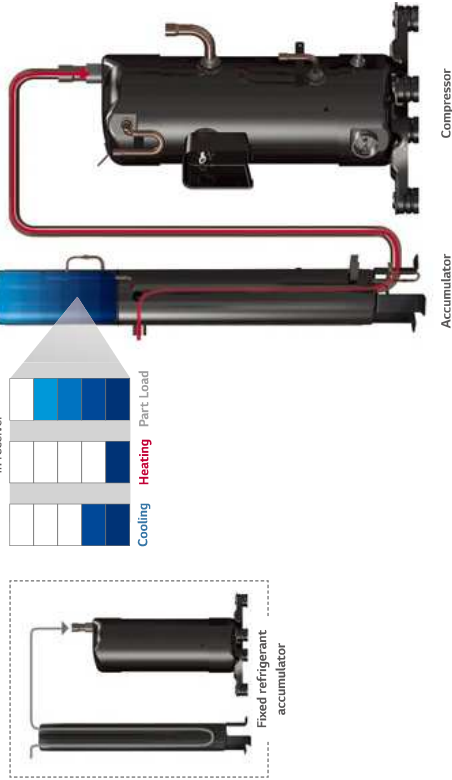


\* Improved heating performance by 27%  
 \* Comparison tested on 10HP model

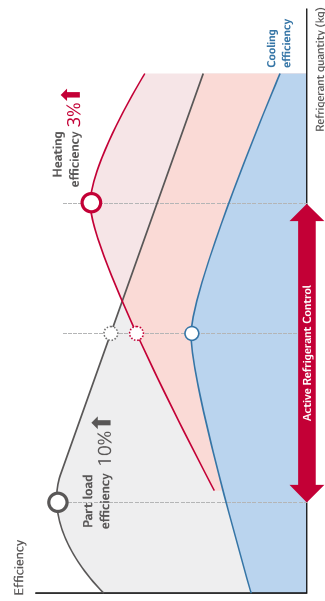
#### Active Refrigerant Control

Active Refrigerant Control monitors and adjusts the quantity of circulating refrigerant during each cycle to maximize efficiency in real time when it runs cooling and heating operation, as well as the part load operation. This five step control leads to an improvement in energy efficiency, unlike when fixed amount of refrigerant is provided to the compressor regardless of operation mode, which limits optimal efficiency for each operation.

#### Technology mechanism



#### Efficiency performance





OUTDOOR UNIT KEY FEATURES  
**MULTI V 5**

**ULTIMATE EFFICIENCY**  
**Smart Oil Management**

Compressor reliability and Efficiency are improved with an oil sensor that allows oil balancing and oil return. The value of the capacitance between the electrodes can measure the presence of oil in real-time. This real-time measurement of oil in the compressor reduces energy loss, providing consistent heating for the indoor environment. With Smart Oil Return, heating operation time per day has increased up to 12% in comparison to previous model.

**Auto Oil Balancing**

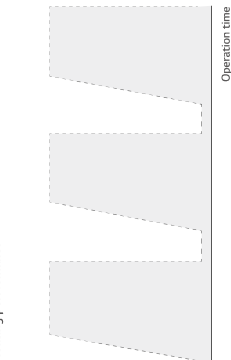


**Smart Oil Return**

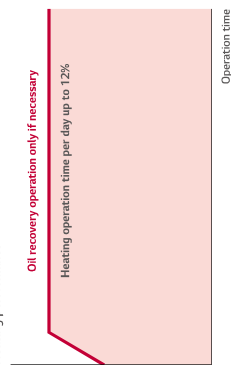


**Operation time comparison**

• Non-oil sensor model  
Heating performance



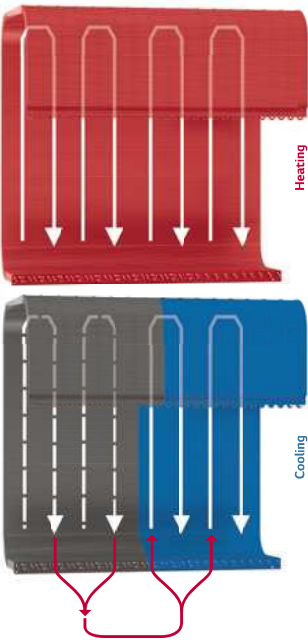
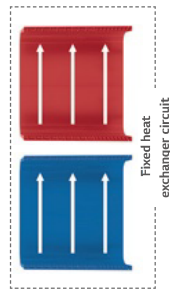
• **MULTI V 5**  
Heating performance



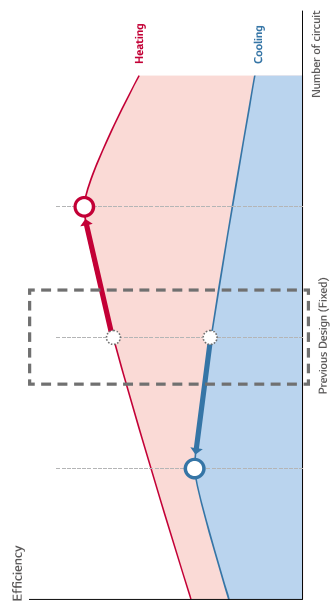
**Variable Heat Exchanger Circuit**

Variable Heat Exchanger Circuit intelligently selects the optimal path for both heating and cooling operations. With this smart path selection technology, an average of 6% increase in the efficiency of both operations has been achieved. The paths number and circuit velocity are adjusted to match temperatures and operation modes in order to maximize efficiency instead of compromising efficiency for each operation when the number and direction of paths are fixed independently of temperature operation mode.

**Technology mechanism**



**Efficiency performance**



OUTDOOR UNIT KEY FEATURES  
**MULTI V 5**

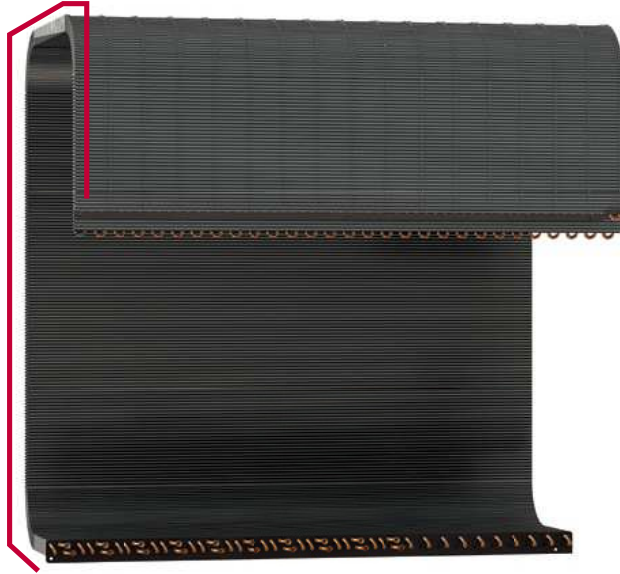
**ULTIMATE PERFORMANCE**

**Heat Exchanger with Ocean Black Fin for Corrosion Resistance**

LG's exclusive Ocean Black Fin is applied on the heat exchanger of MULTI V 5 in order to perform even in corrosive environments. The strong protection from various corrosive external environments such as seaside with high salt contamination and industrial cities with severe air pollution caused by fumes from factories keeps MULTI V 5 operating without breakdown. This improvement in durability prolongs the product's lifespan and lowers both the operational and maintenance costs.



4-sided heat exchanger



**Ocean  
 Black Fin**

**Corrosion Resistance Proven by Certified Tests**

LG Corrosion Resistance solution passed ISO accelerated corrosion test conducted by an independent test organization and the result has been certified by prestigious global certification organization, UL (Underwriters Laboratories).

**Certified protection**



Condition of salt spray test

<b>Temperature</b>	35°C
Mist of 5% sodium chloride solution	

Condition of gas exposure test:

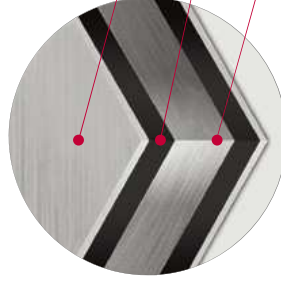
<b>R.H.</b>	95%	<b>NO<sub>2</sub></b>	10 x 10 <sup>-6</sup>	<b>SO<sub>2</sub></b>	5 x 10 <sup>-6</sup>
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\* Test Method B Simulation Validated  
 (Test condition: Salt contaminated condition + severe industrial/traffic environment(100/50.))

\* Based on 1,500 UL test hours

**Enhanced Coating Layers**

The black coating with enhanced epoxy resin is applied for strong protection from various corrosive external conditions such as salt contamination and air pollution including fumes from factories. Moreover, the hydrophilic film keeps water from accumulating on the heat exchanger's fin, minimizing moisture buildup and eventually making it even more corrosion resistant.



**Hydrophilic film (Water flow)**

The Hydrophilic coating minimizes moisture buildup on the fin.

**Epoxy resin (Corrosion resistant)**

The Black coating provides strong protection from corrosion.

**Aluminum fin**

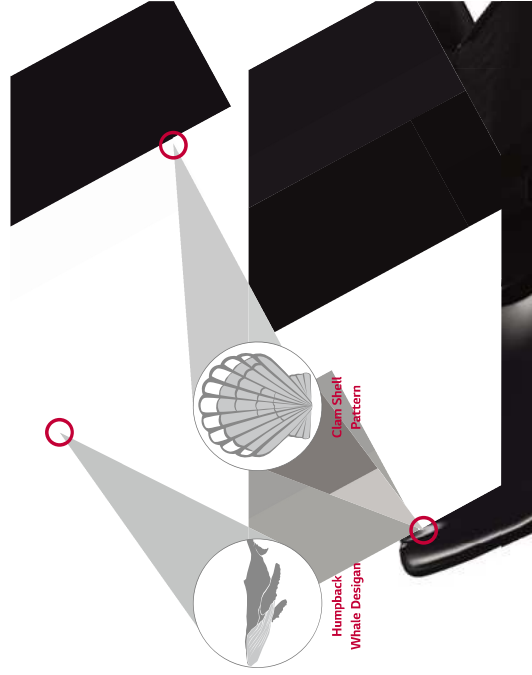
OUTDOOR UNIT KEY FEATURES

# MULTI V 5

## ULTIMATE PERFORMANCE

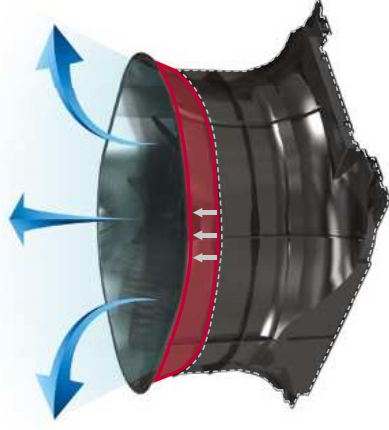
### Larger Capacity ODU with Biomimetics Technology Fan

The moiré pattern from external texture of clam shells has been applied on fans to create the range difference which results in reduction of noise level. At the same time, unlike the fans installed in previous products that generate separation of flow due to absence of tubercles, the bumpy back design inspired by the bumps on the humpback whale's flipper is applied as the tubercles on the back side of the fans, increasing wind power by reducing flacking.



### Increased Air Flow Rate with Bigger Shroud

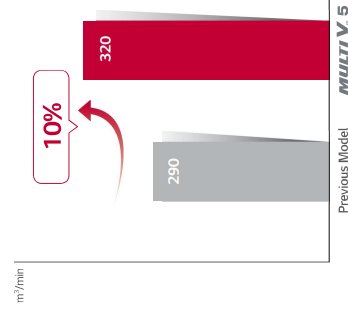
In addition to the biomimetics technology-based fans, extended shroud of MULTI V 5 allows more high static pressure and helps fans to blow higher air volume for efficient operation. With wider air guide, discharged air current is stabilized and noise level is reduced.



### Enhanced Performance with Newly Developed Fan

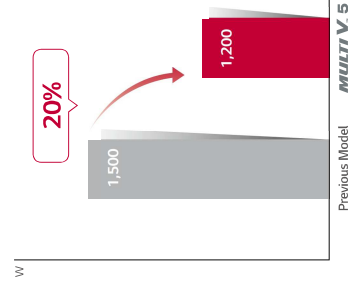
Based on the biomimetics technology, the fans of MULTI V 5 increased air flow rate by 10% in comparison to previous model and reduced its power consumption up to 20%. This eventually results in maximized performance with large capacity.

Air flow rate



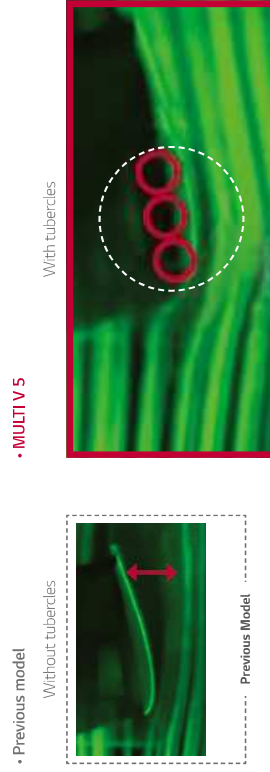
\* Comparison based on 20HP model

Power consumption



\* Comparison based on air volume of 290m³/min

### Flow difference comparison caused by tubercles



\* Biomimetic refers to human-made processes, substances, devices, or systems that imitate nature.

OUTDOOR UNIT KEY FEATURES

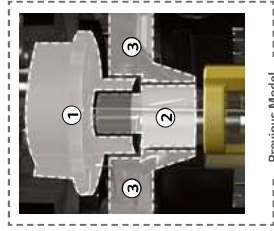
# MULTI V5

## ULTIMATE PERFORMANCE

### Enhanced Bearing with PEEK Material

Motivated by the lubricative material of PEEK(Polyetheretherketone) bearing used for aero engines, the newly invented scroll system with refined shape increases durability and reliability of compressor. It also helps MULTI V5 to operate longer without oil supply in comparison to the previous models.

#### Technology mechanism comparison



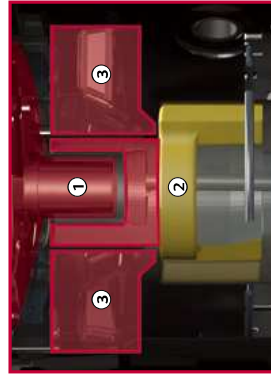
- ① Material: FRT160
- ①+② Structure: Inner Bearing
- ③ Supporter



- ① Material: PEEK (Polyetheretherketone)
- ①+② Structure: New Outer Bearing
- ③ Supporter: High speed operation with reduction of bearing load and vibration

Operating time without oil supply  
**Up to 15%**

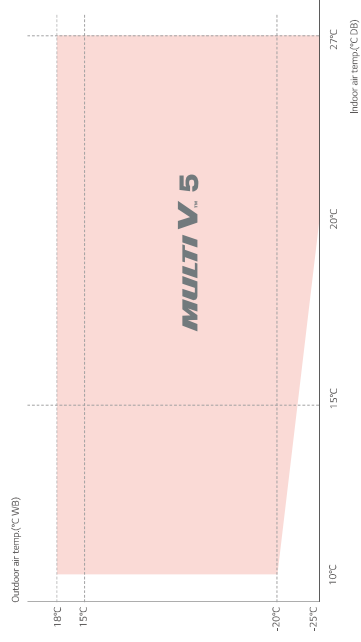
Noise Level (Max. Sound Pressure)  
**Down to 3dB**



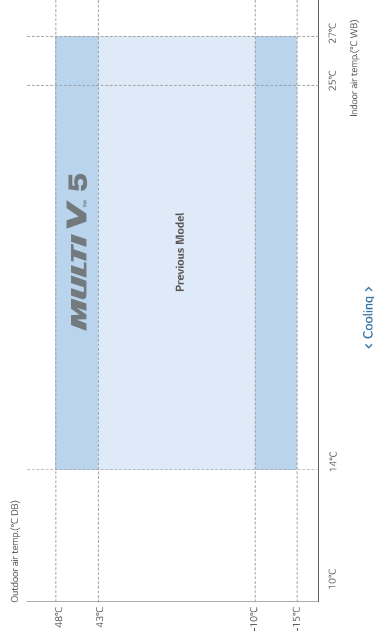
### Reliable Performance in Extreme Environment

With enhanced inverter compressor and control technology coming from improved supercooling technology, installation, vapor injection and Ocean Black Fin, MULTI V5 extended range of cooling and heating operations. For heating, it can operate at as low as -25°C to perform properly even at very cold environment. Moreover, MULTI V5's cycle technology with enhanced durability enables optimal cooling performance at high temperature that increases up to 48°C. It is improved perfectly to fully function at extreme conditions such as performing cooling operation at -15°C, making the product adequate for uses in specialized venues like technical rooms.

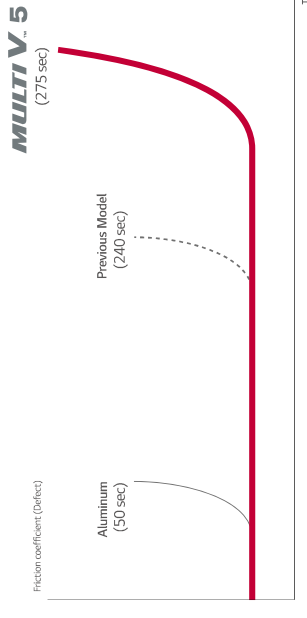
#### Wider operational range for each performance



\* Under the condition of -25°C for outdoor temperature and 20°C for indoor temperature



#### Oilless operation hours comparison



\* LG Internal test result  
\* Test condition: Bearing oil blocking test (Oil blocking at 60 Hz)

# OUTDOOR UNIT KEY FEATURES

## MULTI V 5

### ULTIMATE COMFORT

#### Continuous Heating

With Dual Sensing Control, partial defrost and smart oil management via oil sensor, continuous heating technology has been improved.

- 11% Increase in Heating Operation Time Per Day
- 7% Reduction in Power Input



**CONTINUOUS HEATING**



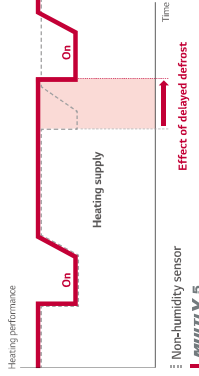
**DUAL SENSING CONTROL**

### Comfort Cooling

Without stopping in between operations, this function allows MULTI V 5 to maintain operation at mild cooling mode around the set temperature by sensing both temperature and humidity with Dual Sensing Control. By preventing both cold draft and repeated turn on/off's previously required to match the set temperature, users can experience more comfortable indoor environment.

### Delayed Defrost via Humidity Sensor of Dual Sensing Control

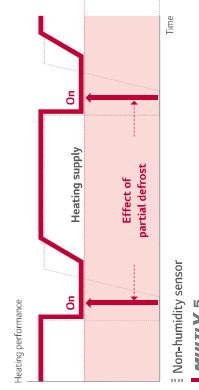
By controlling the evaporation temperature considering the humidity, heating operation time is improved.



**DUAL SENSING CONTROL**

### Partial Defrost

Unlike the previous model that stopped heating operation for one-time defrost, MULTI V 5 partially defrosts the heat exchanger by dividing it to lower and upper parts in order to provide consistent heating for the indoor environment and improve heating capacity.



### Smart Oil Management

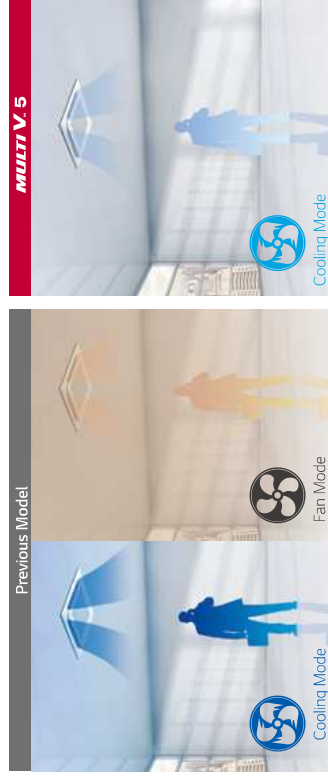
Oil sensor of the Ultimate Inverter (UI) Compressor enables smart oil management to provide enhanced heating operation without periodic oil recovery operation.



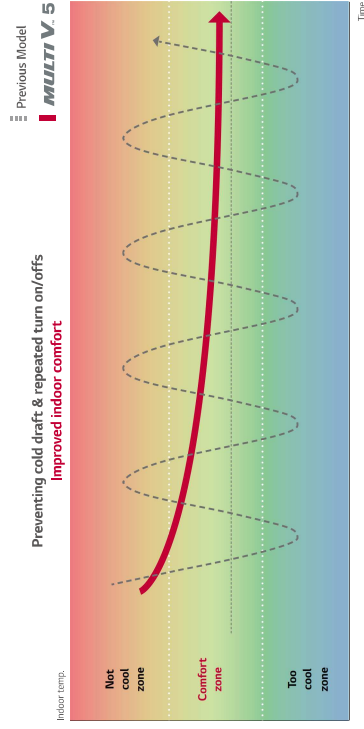
Eliminated Unnecessary Oil Return via Oil Sensor

\* LG internal test result

### Cooling operation comparison



\* Indoor unit set-up available with Standard III Remote Controller



Preventing cold draft & repeated turn on/off's  
Improved indoor comfort

# OUTDOOR UNIT KEY FEATURES

## MULTI V5

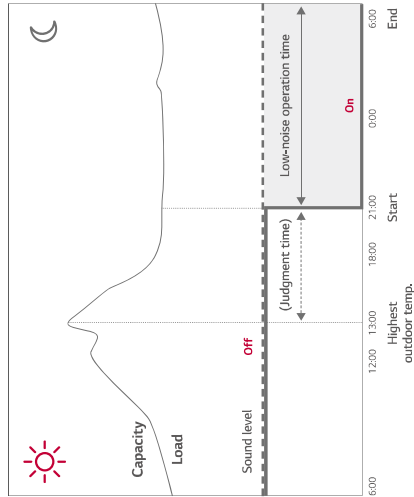
### ULTIMATE COMFORT

#### Low-Noise Operation

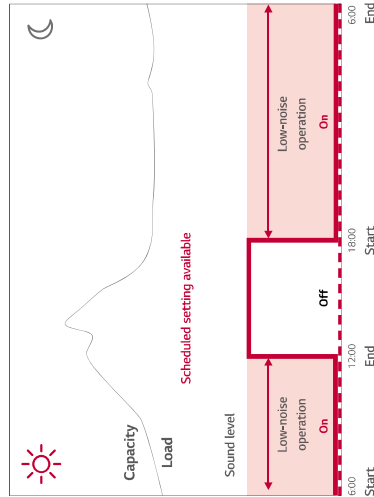
Unlike the previous model which enables Low-Noise Operation only during night after judgment time, the Low-Noise Operation of MULTI V5 can function regardless of the time at the noise sensitive areas.

#### Operation hours comparison

Previous Model



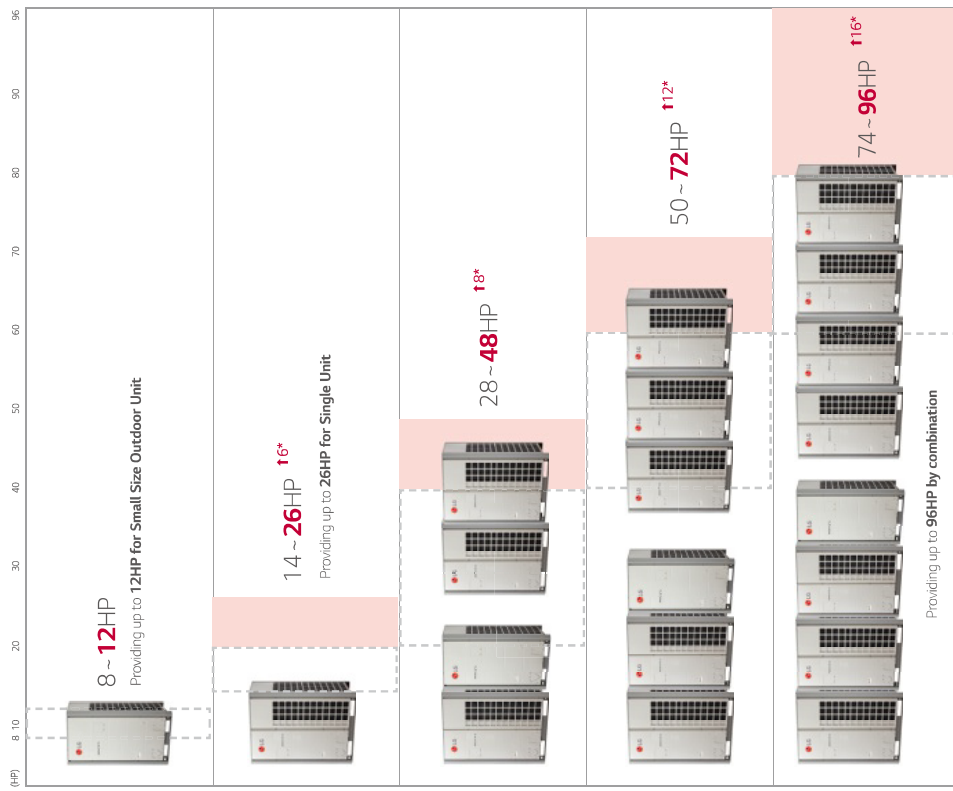
MULTI V5



\* Indoor unit set up available with Standard III Remote Controller

### ULTIMATE FLEXIBILITY

#### MULTI V5 Outdoor Unit Line Up



\* Capacity increase compared to previous model

OUTDOOR UNIT KEY FEATURES

# MULTI V5

## ULTIMATE FLEXIBILITY

### Flexible Installation Space with Large Capacity Outdoor Units

Large capacity outdoor units of MULTI V5 minimizes installation space that spares valuable floor space and significantly decreases total installed weights. This allows users the flexible design potential and better use of the saved space.

#### Comparison on installation space



#### Installation space area and product weight comparison



\* Comparison basis: 2 Rows of outdoor units 260HP (26HP X 10sets) installation case

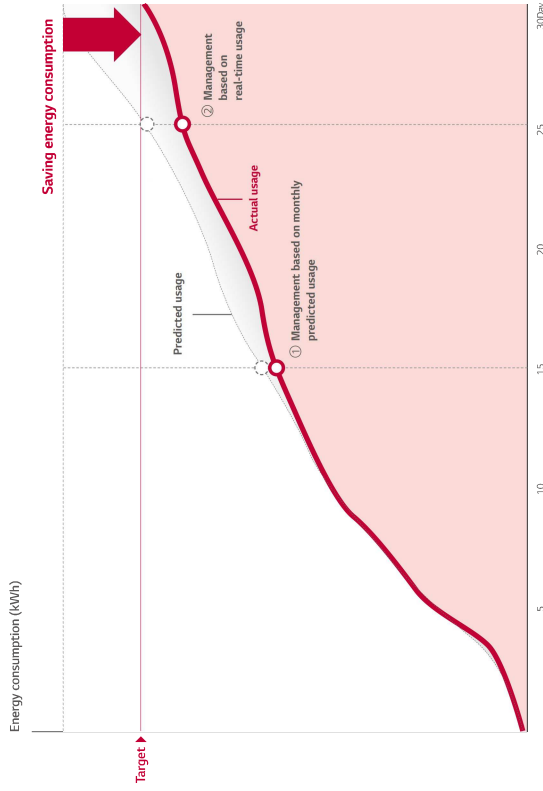
# OUTDOOR UNIT KEY FEATURES

## MULTI V 5

### ULTIMATE CONTROL

#### Energy Management

Energy Management allows MULTI V 5 to analyze previous data in order to forecast energy usage beforehand and prevent from exceeding the monthly energy consumption plan by systematically controlling the cooling volume. With energy consulting program that provides automatic operation options for 7 levels of energy management such as compressor capacity management and indoor unit operation level control, users can monitor energy usage anytime and efficiently manage their energy bills.



Management setting example  
 ① When predicted usage is 120%  
 ② When the real-time usage is 90%  
 \* Energy Management allows maximum 7 steps (Input format is percent for predicted and real-time usage)  
 \* Central control kit such as ACPV or AC Smart IV and PIB are required for energy management function

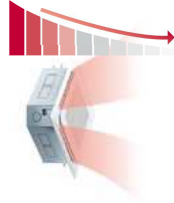
#### Control methods



Compressor capacity management



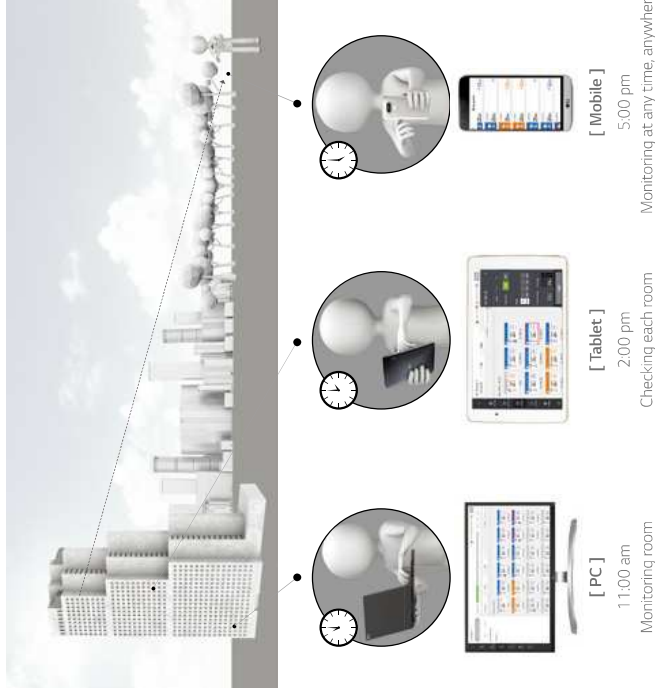
Operation rate control of indoor unit



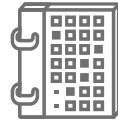
Indoor unit operation management

### AC Manager 5 with User Friendly Interface

As an advanced central controller, AC Manager 5 offers flexible interface for each user by assessing the device screen and automatically customizing the layout to provide the most optimized interface. Moreover, it provides effective system air conditioner management through user friendly interface and various functions.



#### Various functions of AC Manager 5



Schedule Function



Advanced energy monitoring



Operational trend



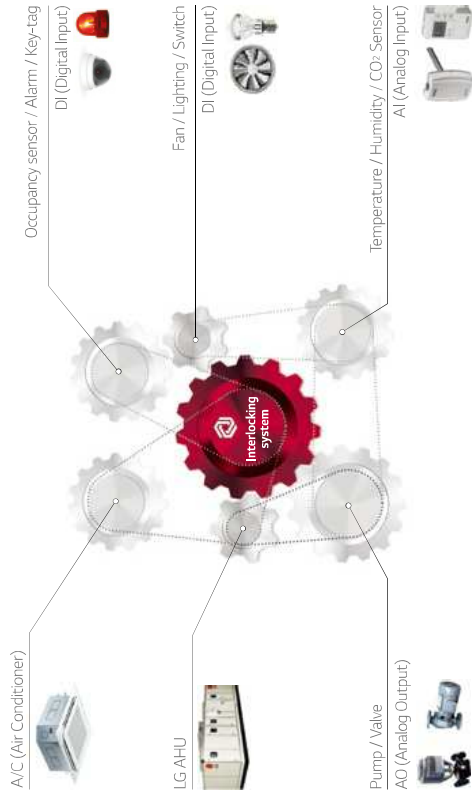
# OUTDOOR UNIT KEY FEATURES

## MULTI V 5

### ULTIMATE CONTROL

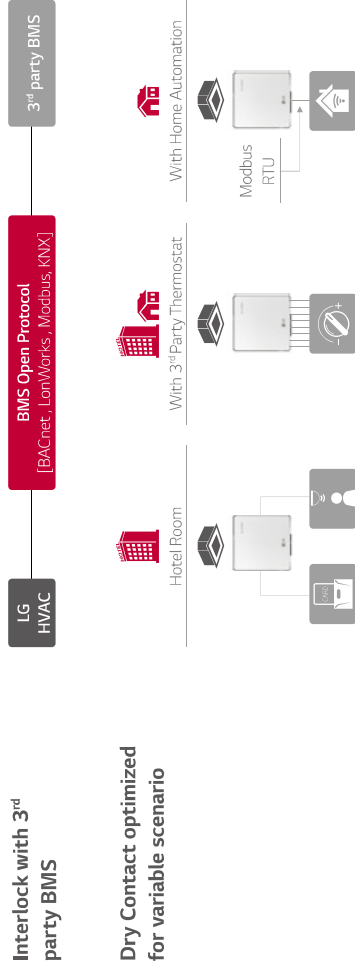
#### Expandability & Programmability

The expandable control system can be interlocked with sensors and facilities of building, as well as air conditioners. It makes building management smart by setting up logic optimized for the site.



### System Flexibility

It can be linked with 3rd party BMS via Gateway and provide flexible control system for each site via Dry Contact.



### Smart Individual Controller (with Standard III Remote Controller)

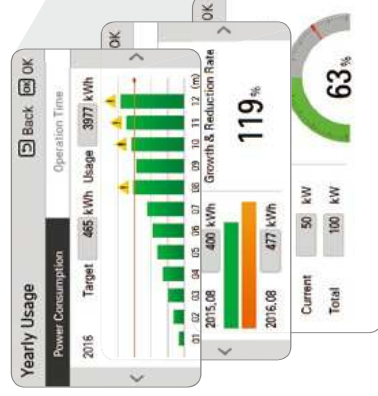
New Standard III Remote Controller of MULTI V 5 offers 4.3-inch large LCD screen with neat and premium design. This luxurious design well-matches interior design through large colored LCD screen with curved display and simple button layout which makes it easier to control. With diverse information offered such as temperature, humidity and cleanliness information, users can check on currently consumed power in real-time and electricity consumption data (weekly/monthly/annually) to predict and plan power consumption usage. Moreover, simple and geometrically neat design of user interface makes data comprehension visually easy. With circular visual theme, information are labelled in different-sized circles based on their priorities.

#### Intuitive & Emotional Interface



Luxurious Design

#### Energy Management



\* Central control kit such as ACP IV or AC Smart IV and PDI are required for energy management function

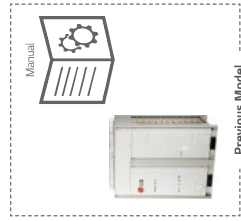
## OUTDOOR UNIT KEY FEATURES **MULTI V 5**

### **ULTIMATE CONTROL**

#### **Simple Test Run via LGMV**

In order to bring out performance to the 100% level, proper product test run is necessary. For previous product, professional engineer who is well-aware of more than 40 different functional settings and 200+ error codes had to check main parts in order to make sure that the test run had succeeded. With Mobile LGMV of MULTI V 5, however, fast and accurate auto test run can be executed and the professional installer running the test can receive test results via email, which shortens installation hours and increases overall efficiency in installation processes.

#### **Test run comparison**



#### **LGMV smartphone application setting pages**



**37% Reduction in Installation Hours**

Wi-Fi MV Module

\* This feature is provided only to qualified professional installers  
\*\* LGMV Application is available for Android and iOS (iphone/ipad)

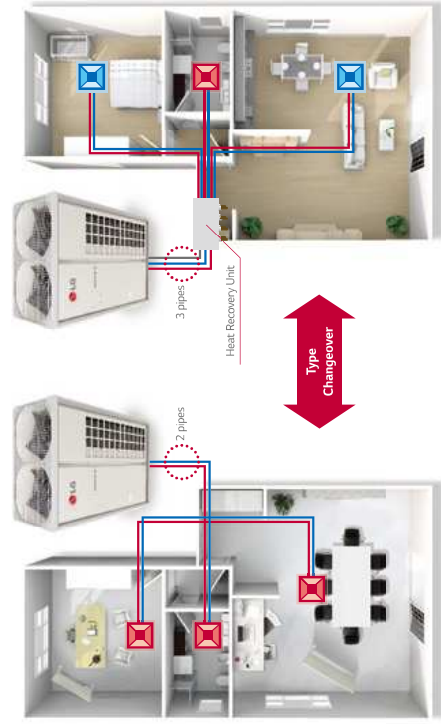
### **HEAT RECOVERY**

#### **Applicable for Various Building Types with Heat Pump & Heat Recovery Systems**

LG MULTI V 5 satisfies users' various needs with just one platform. Heat Pump System works for the sites where either cooling or heating operation is needed, while Heat Recovery System fits perfectly to the sites wherein both the cooling and heating operations are simultaneously needed or locations installed with Hot Water Solution to provide hot water and heating via radiator. By providing suitable solutions that cater to any building types and their requirements, MULTI V 5 offers the best HVAC system.

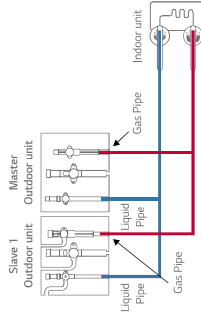
#### **Simple Piping System Changes**

MULTI V 5 allows the building previously installed with Heat Pump System to switch to the Heat Recovery System for changing purpose of the building or remodeling reasons via simple piping construction.



#### **Heat Pump System**

#### **Heat Recovery System**



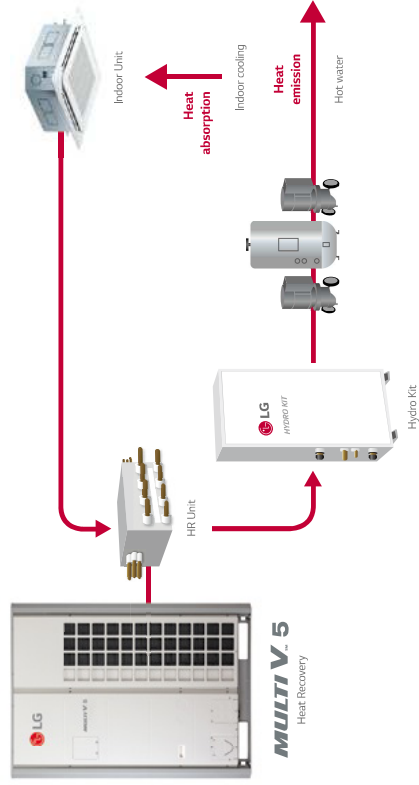
# OUTDOOR UNIT KEY FEATURES MULTI V 5

## HEAT RECOVERY

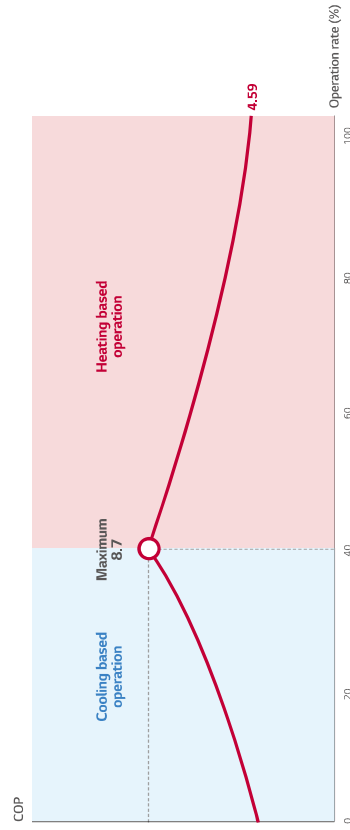
### Energy Saving with Simultaneous Operation

MULTI V 5 Heat Recovery system with HR Unit can perform both cooling and heating operations simultaneously. For continuous operation, it minimizes in order to switch mode while it increases efficiency with simultaneous operation. Moreover, it allows the COP to reach up to 8.5 under circumstances of 40% cooling and 60% heating operations, which results in the decreased energy consumption up to 30%.

#### Technology mechanism



#### COP with simultaneous operation

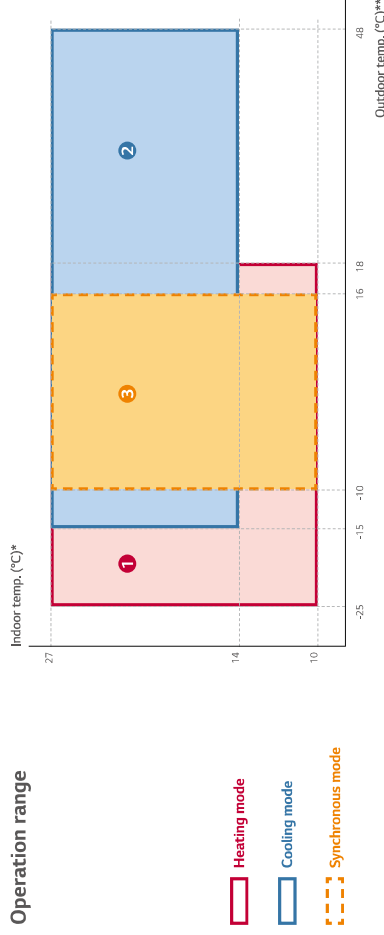


\* Outdoor temperature : 7°C DB / 6°C WB  
 \* Indoor temperature : 20°C DB / 15°C WB  
 \* ARMU200LTES

## Wide Operation Range

Both the low and high temperature operation ranges are expanded through condenser with various control. For heating mode, the outdoor temperature can go from as low as -25°C to 24°C, and from -15°C to as high as 48°C for cooling mode. As for the synchronous mode, it can run from -10°C to 16°C.

#### Operation range



- 1 Heating mode
- 2 Cooling mode
- 3 Synchronous mode

#### Outdoor Temperature

1 Heating mode : - 25°C WB - 18°C WB 2 Cooling mode : - 15°C DB - 48°C 3 Synchronous mode : - 10°C WB - 16°C WB

\* Heating (°C DB), Cooling (°C WB), Synchronous (°C DB) \*\* Heating (°C WB), Cooling (°C DB), Synchronous (°C WB)

## Flexible Connection of Heat Recovery Unit

LG MULTI V 5 Heat Recovery Unit allows flexible connection both in series and in a row. With the zone control function, up to 8 indoor units can be connected to a branch while the maximum of 32 indoor units can be connected to a HR unit, saving the installation cost by flexible connection.

#### Zoning control

