

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.



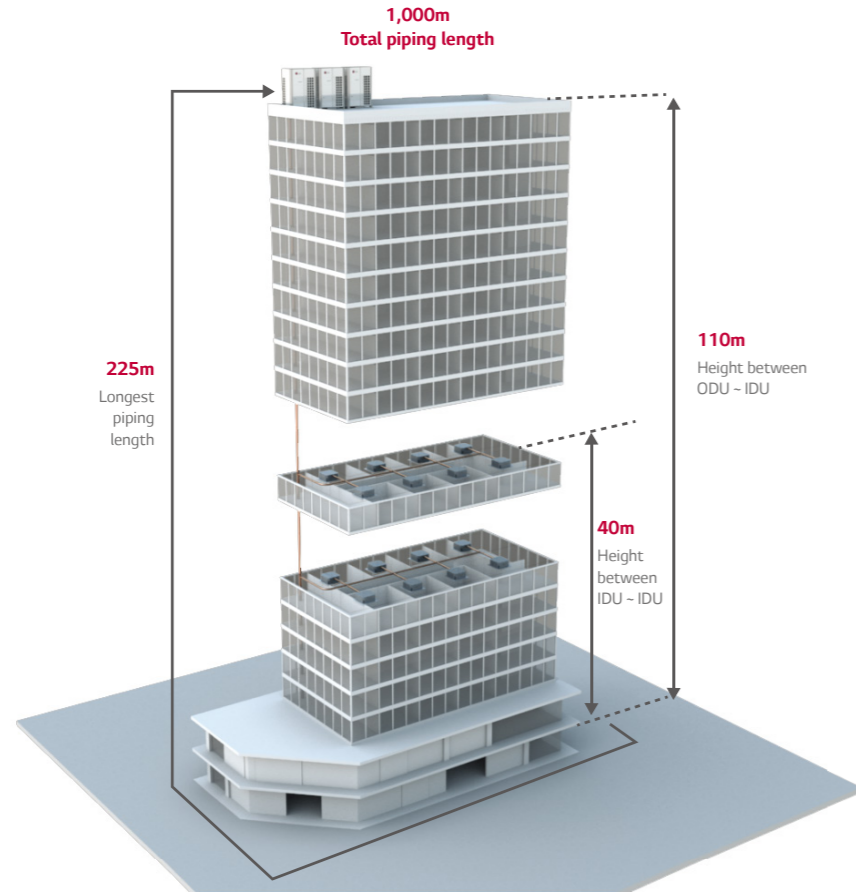
5 MAIN FEATURES

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

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 st 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.

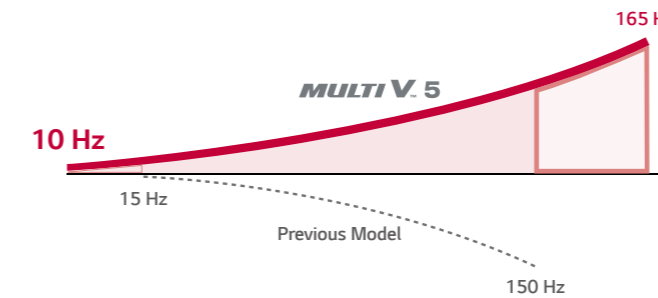


Vapor Injection

- 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

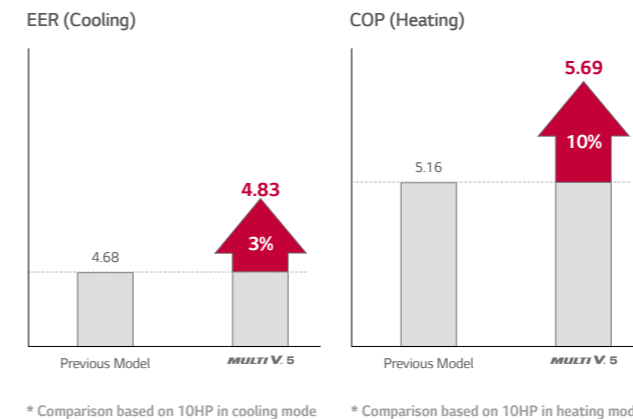
HiPOR™

- Minimizing energy loss with direct oil return

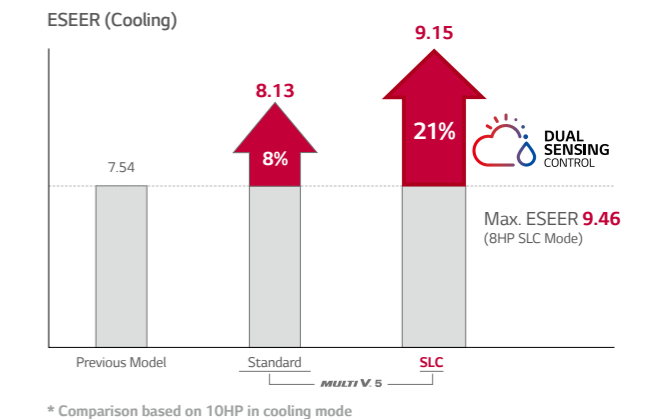
Smart Oil Management

- 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)



MULTI V 5

ULTIMATE EFFICIENCY Smart Load Control (SLC)

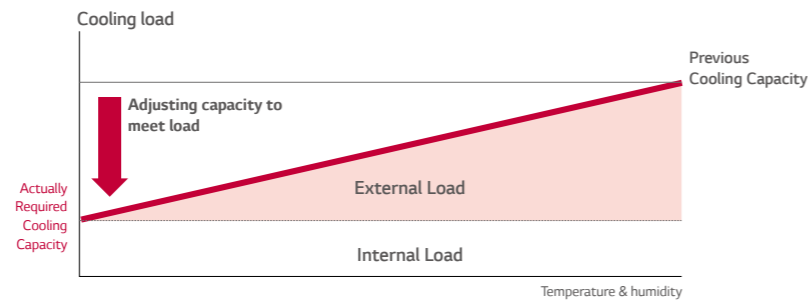
Smart Load Control function enables comprehensive understanding of environmental conditions in order to optimize energy efficiency and maximize indoor comfort level. This technology allows active control of discharge refrigerant temperature which eventually increases the ESEER up to 21% for maximum 26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

Increased Energy Efficiency (SLC ESEER)

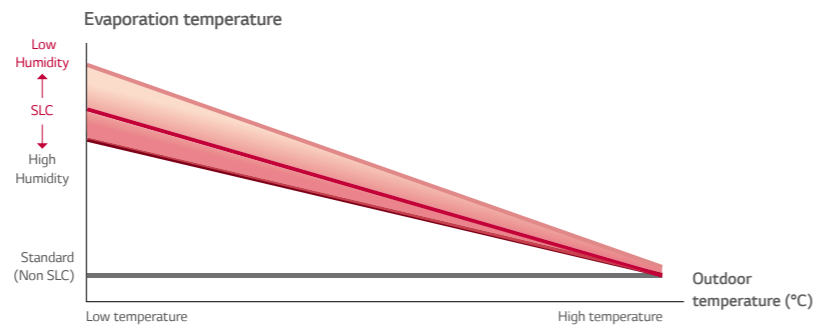
Up to **21%**
Up to **15%** (High humidity) ~ **31%** (Low humidity)



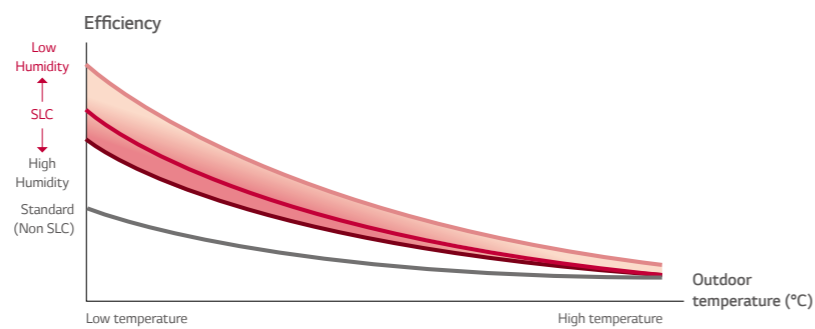
For low temperature, lower load and capacity are required



Lower load and capacity need higher evaporation temperature



Higher evaporation temperature results in higher efficiency

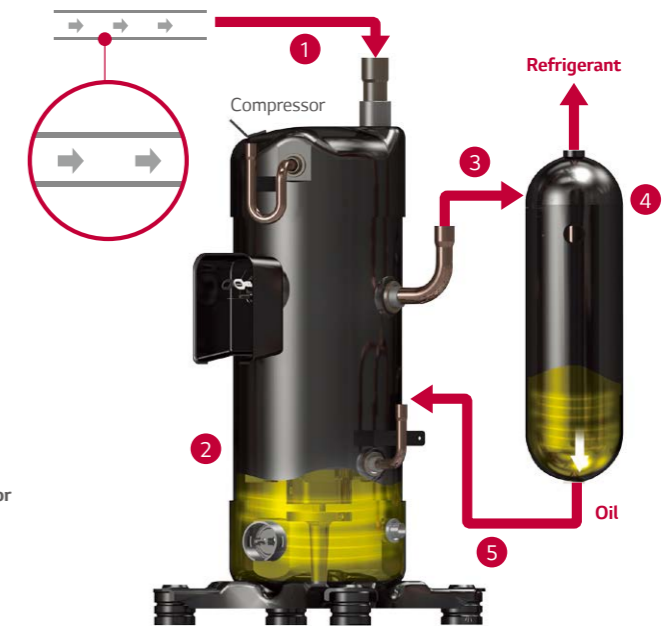
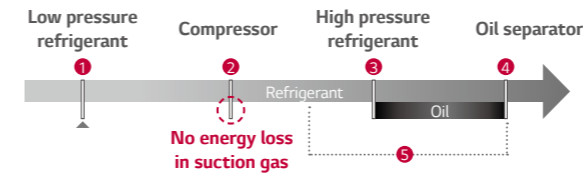
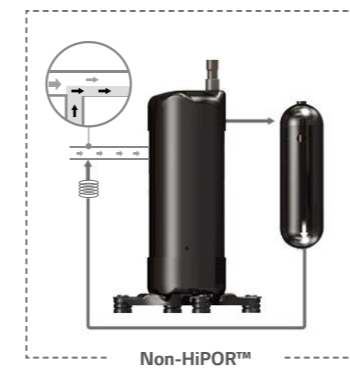


* Low humidity: Below 50% / Standard: 50-70% / High humidity: 70-100%
* Setting is available in indoor (Standard III Remote Controller)

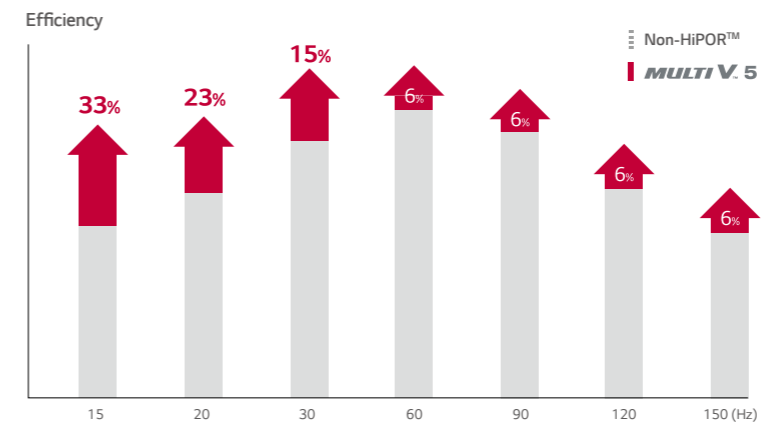
HiPOR™ (High Pressure Oil Return)

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)

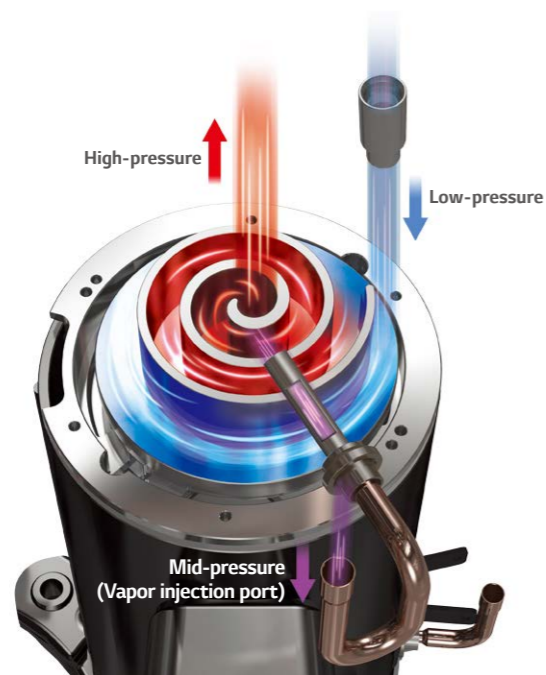
MULTI V 5

ULTIMATE EFFICIENCY

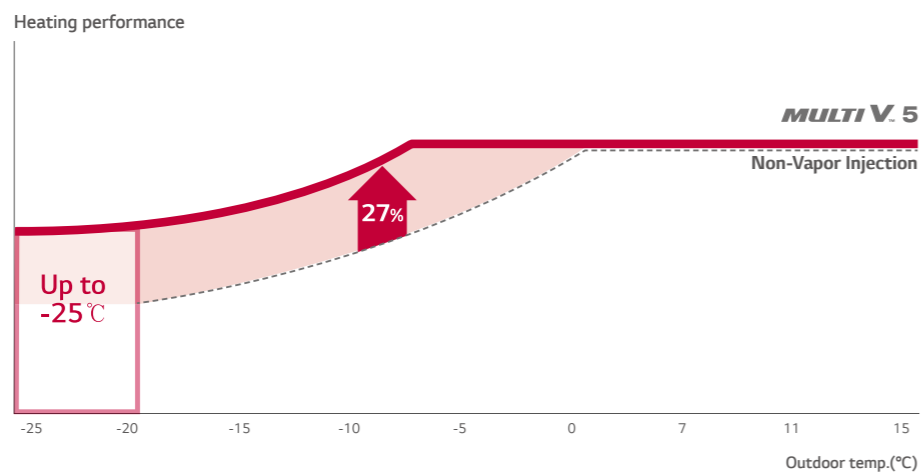
Vapor Injection

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 mechanis



Performance comparison

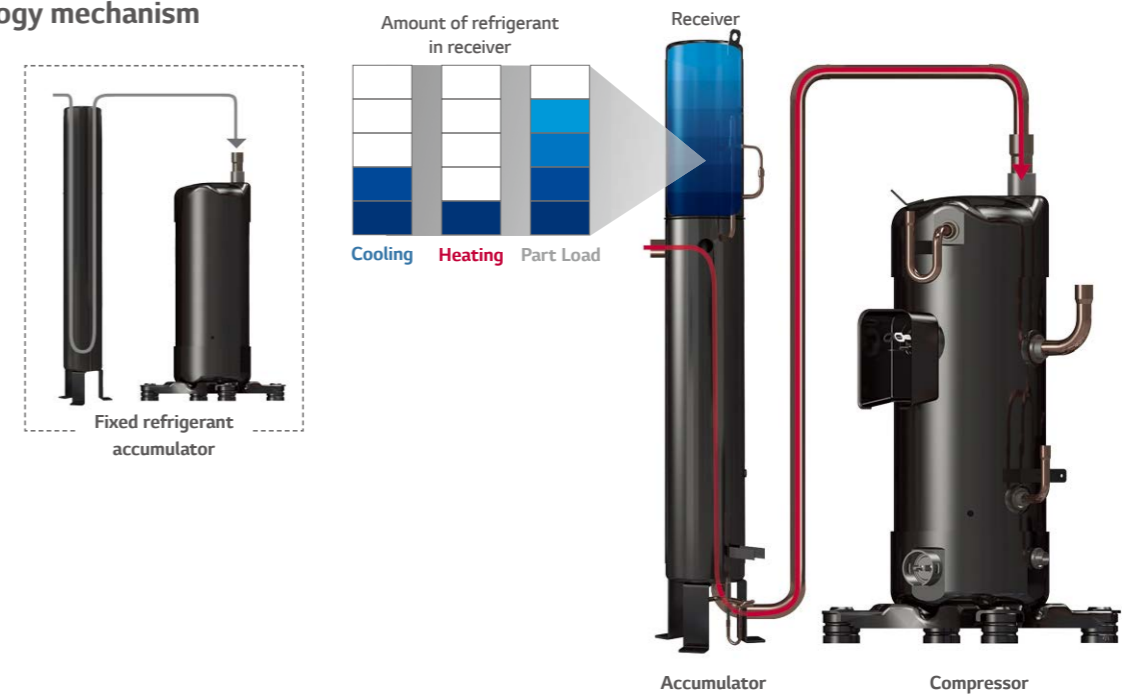


* Improved heating performance by 27%
* Comparison tested on 10HP model

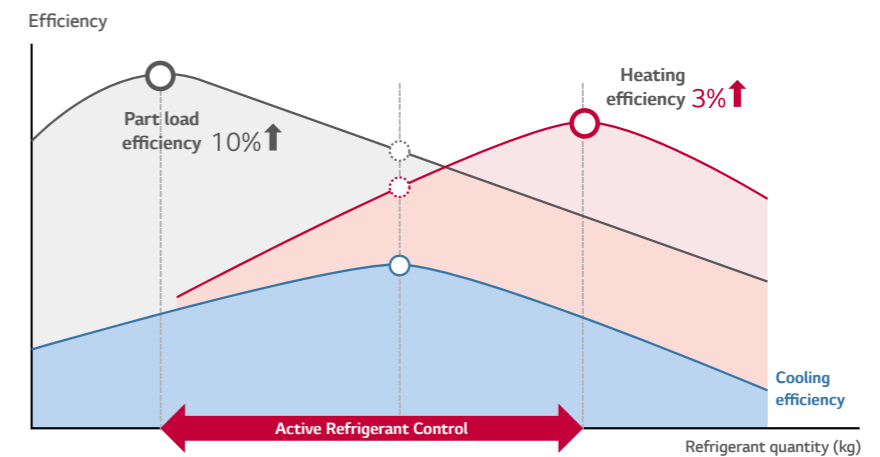
Active Refrigerant Control

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



MULTI V 5

ULTIMATE EFFICIENCY

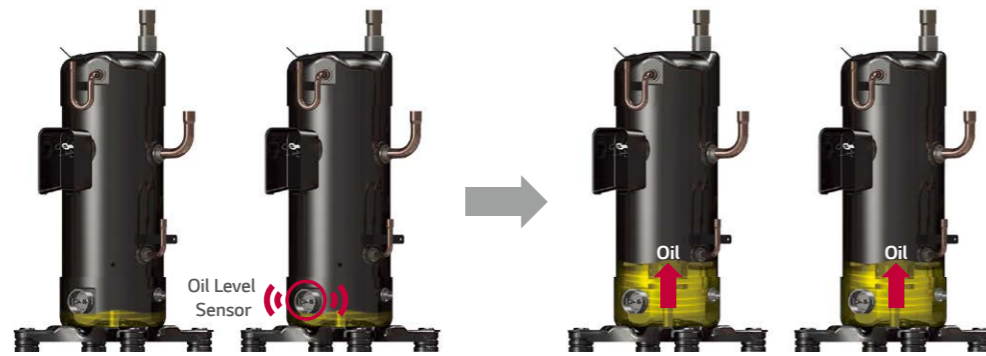
Smart Oil Management

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

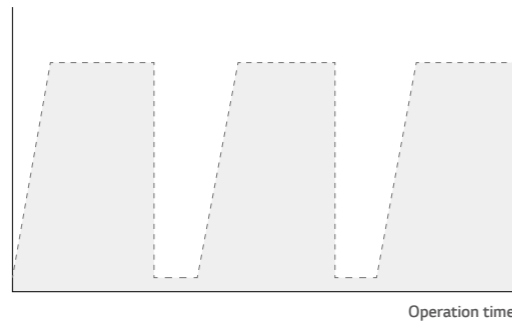


Smart Oil Return

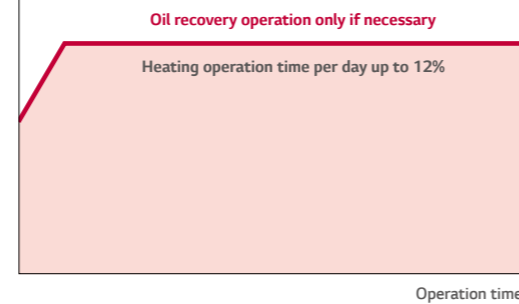


Operation time comparison

• Non-oil sensor model
Heating performance



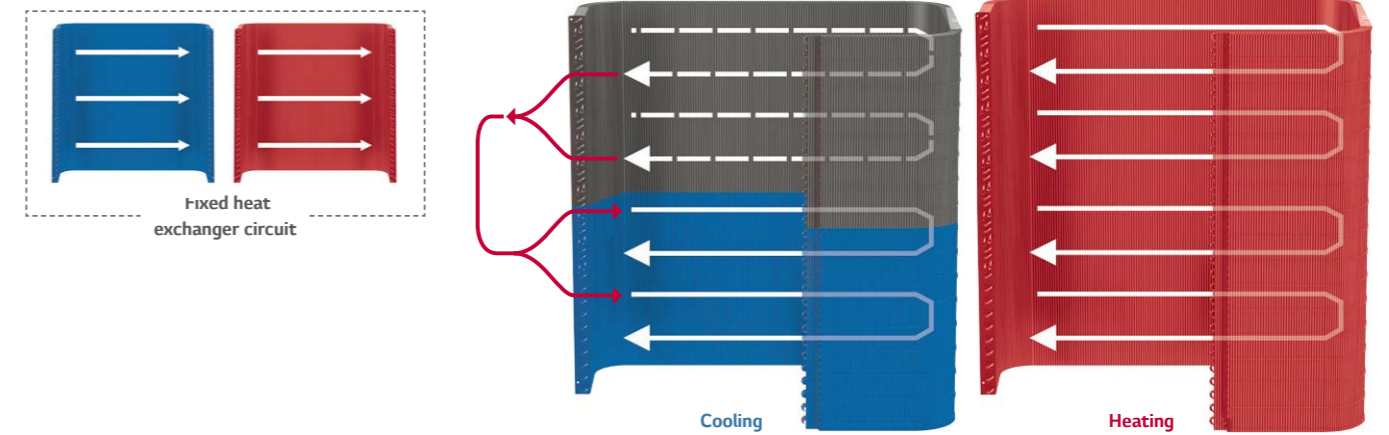
• MULTI V 5
Heating performance



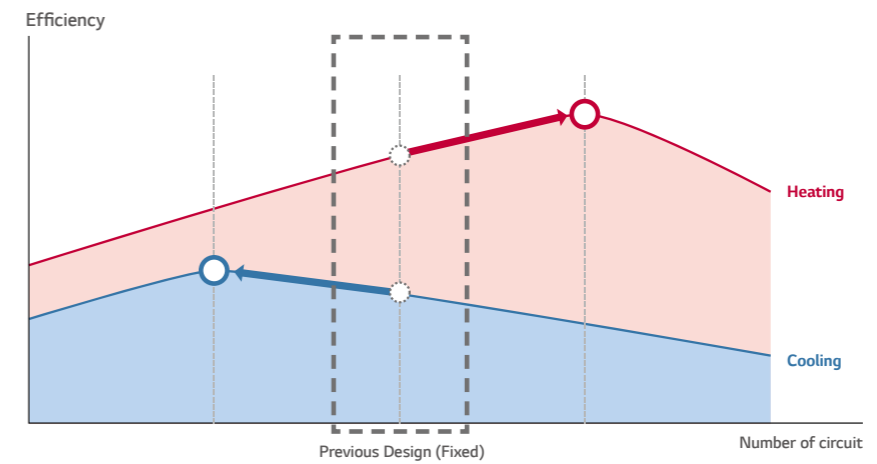
Variable Heat Exchanger Circuit

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

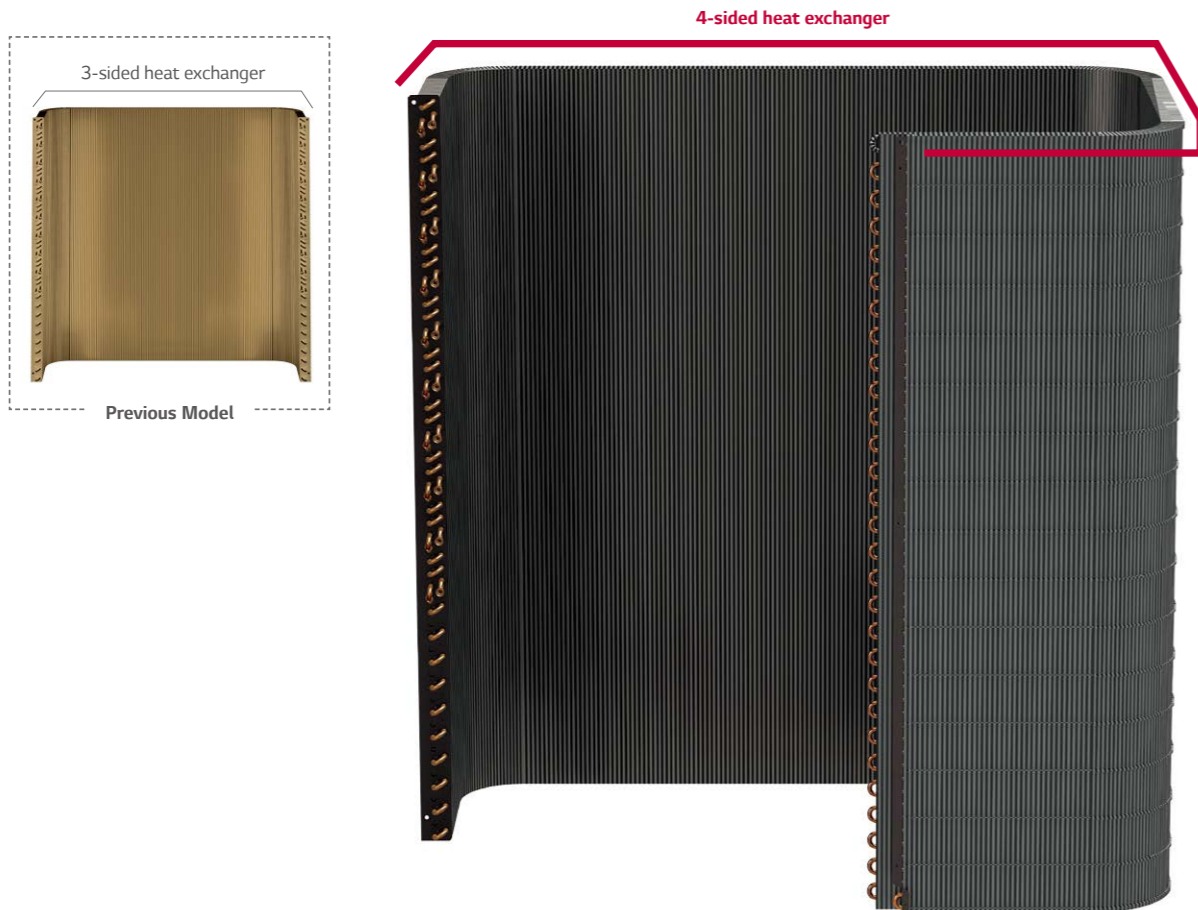


MULTI V 5

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.



**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

Temperature	35°C
Mist of 5% sodium chloride solution	

Condition of gas exposure test

R.H.	NO ₂	SO ₂
95%	10 x 10 ⁻⁵	5 x 10 ⁻⁶

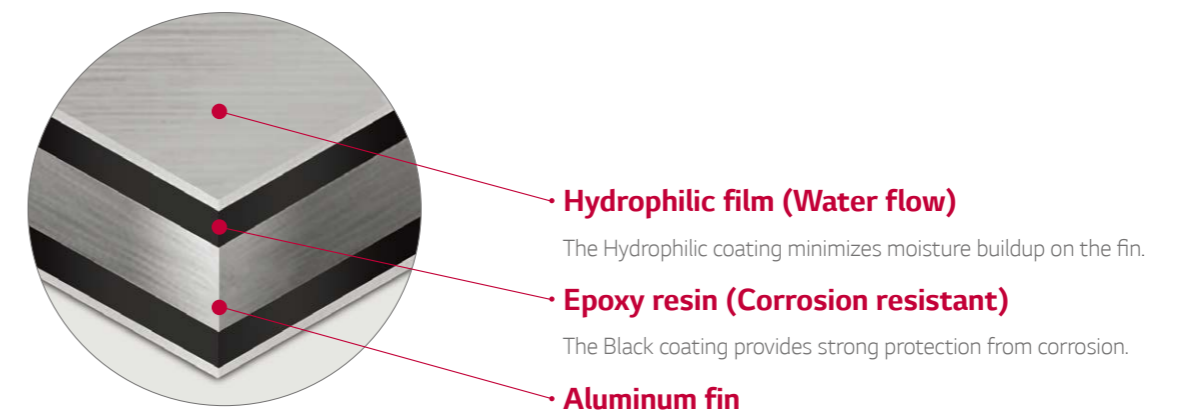


* Test Method B Simulation Validated
(Test condition: Salt contaminated condition + severe industrial/traffic environment(NO₂/SO₂))

* 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.

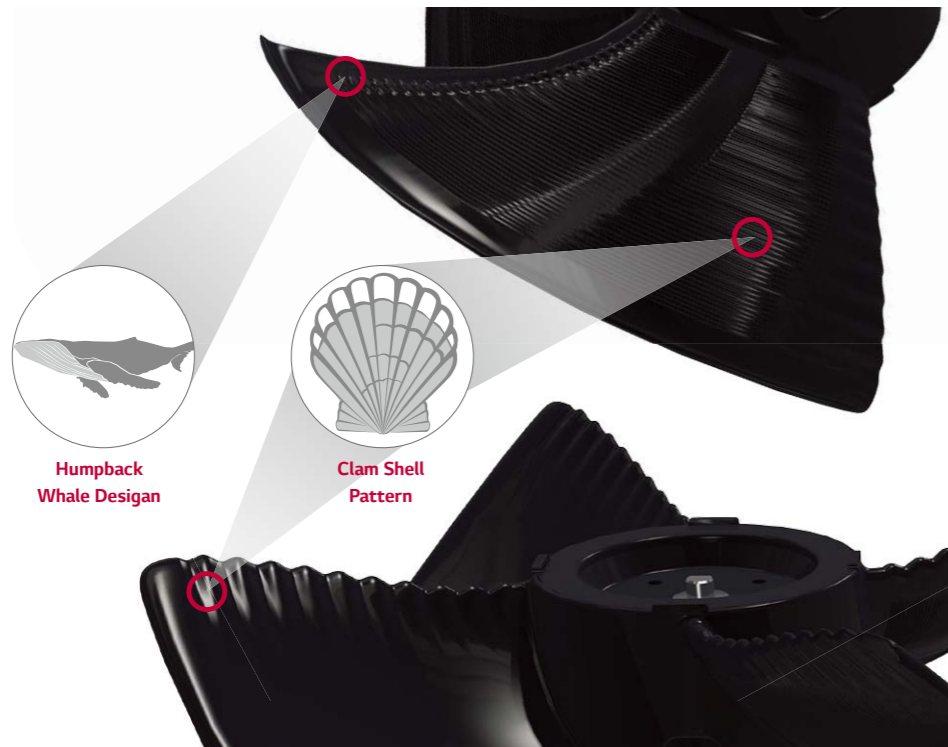


MULTI V 5

ULTIMATE PERFORMANCE

Larger Capacity ODU with Biomimetics Technology Fan

The moire 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.



Flow difference comparison caused by tubercles



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

Increased Air Flow Rate with Bigger Shroud

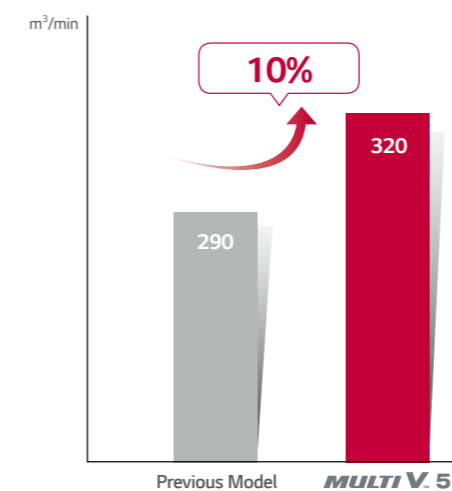
In addition to the biomimetics technology-based fans, extended shroud of MULTI V 5 allows more high static pressure and helps fans to blow higher air volume for efficient operation. With wider air guide, discharged air current is stabilized and noise level is reduced.



Enhanced Performance with Newly Developed Fan

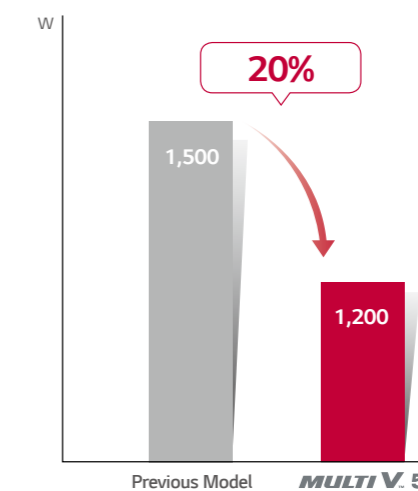
Based on the biomimetics technology, the fans of MULTI V 5 increased air flow rate by 10% in comparison to previous model and reduced its power consumption up to 20%. This eventually results in maximized performance with large capacity.

Air flow rate



* Comparison based on 20HP model

Power consumption



* Comparison based on air volume of 290m³/min

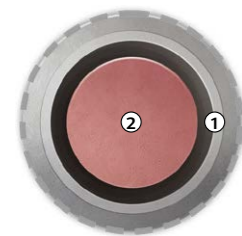
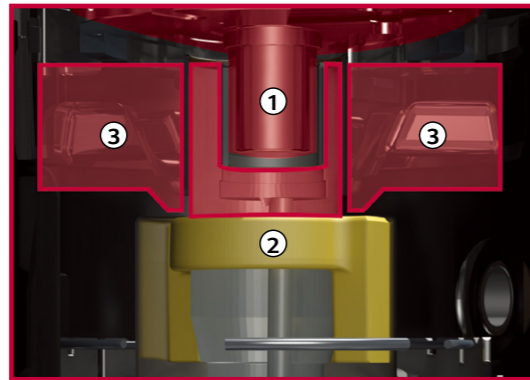
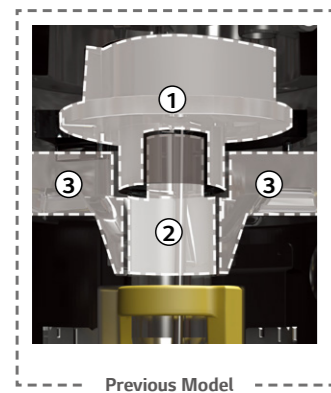
MULTI V 5

ULTIMATE PERFORMANCE

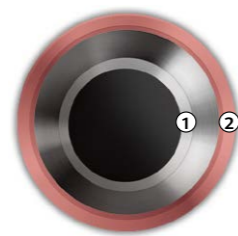
Enhanced Bearing with PEEK Material

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 V 5 to operate longer without oil supply in comparison to the previous models.

Technology mechanism comparison



- ① Material : FR160
- ①+② Structure : Inner Bearing
- ③ Supporter

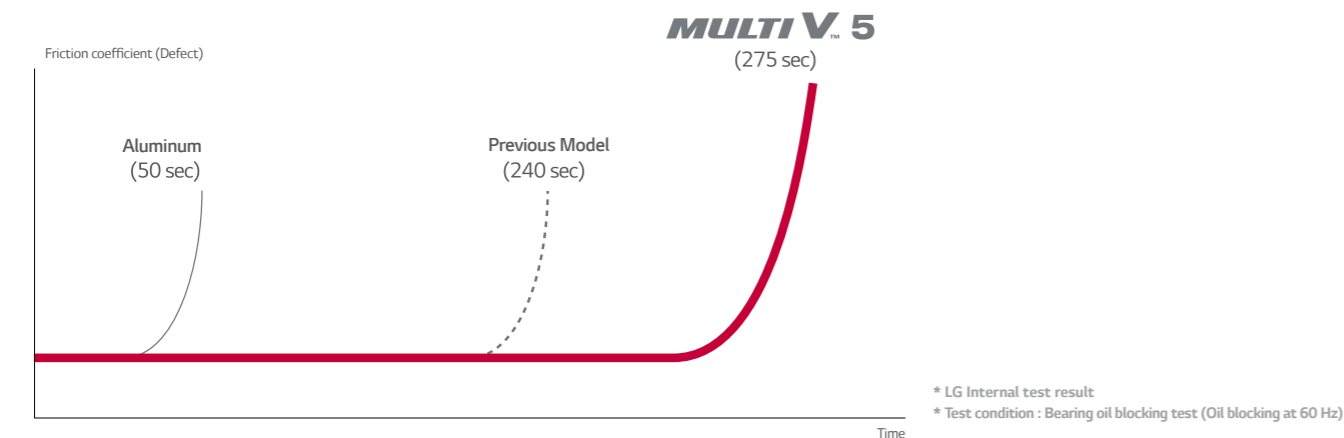


- ① Material : PEEK (Polyetheretherketone)
- ①+② Structure : New Outer Bearing
- ③ Supporter : High speed operation with reduction of bearing load and vibration

Operating time without oil supply
Up to 15%

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

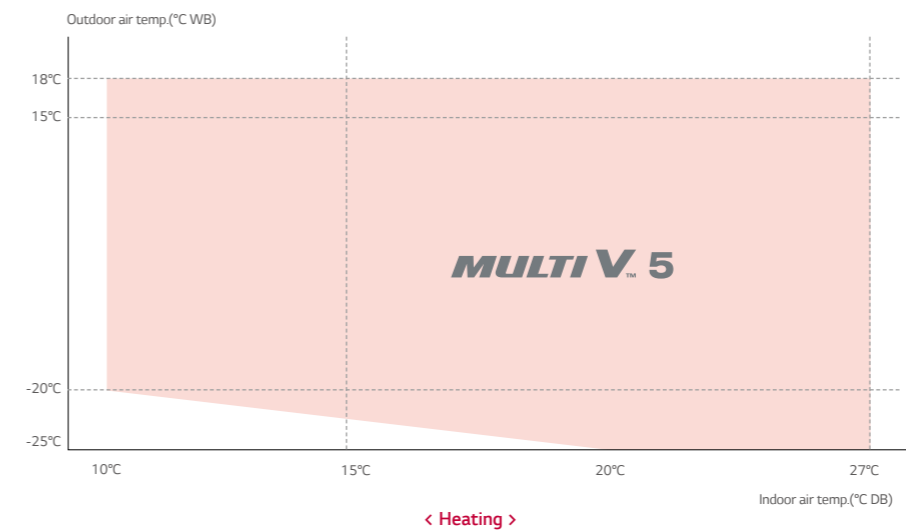
Oilless operation hours comparison



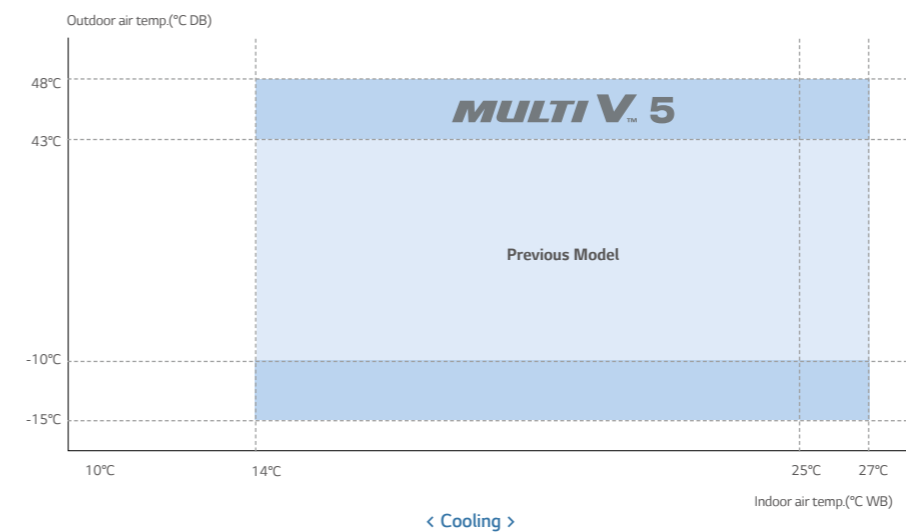
Reliable Performance in Extreme Environment

With enhanced inverter compressor and control technology coming from improved supercooling technology installation, vapor injection and Ocean Black Fin, MULTI V 5 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 V 5'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



MULTI V 5

ULTIMATE COMFORT

Continuous Heating

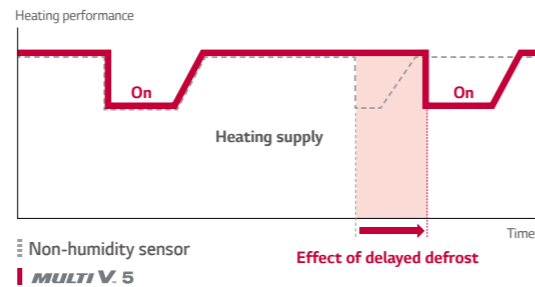
With Dual Sensing Control, partial defrost and smart oil management via oil sensor, continuous heating technology has been improved.

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



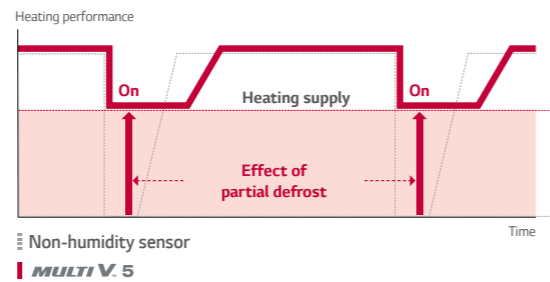
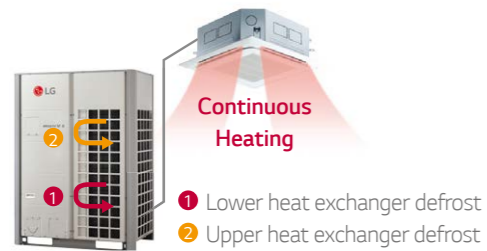
Delayed Defrost via Humidity Sensor of Dual Sensing Control

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



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.

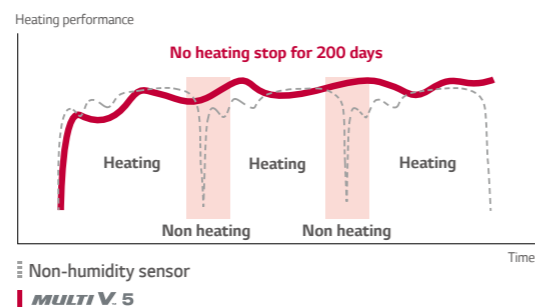


Smart Oil Management

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



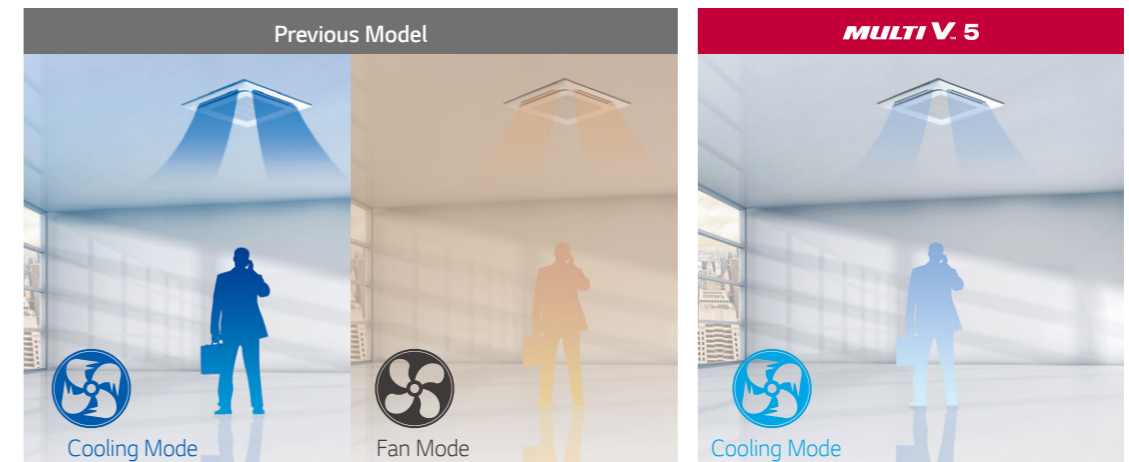
* LG internal test result

Comfort Cooling

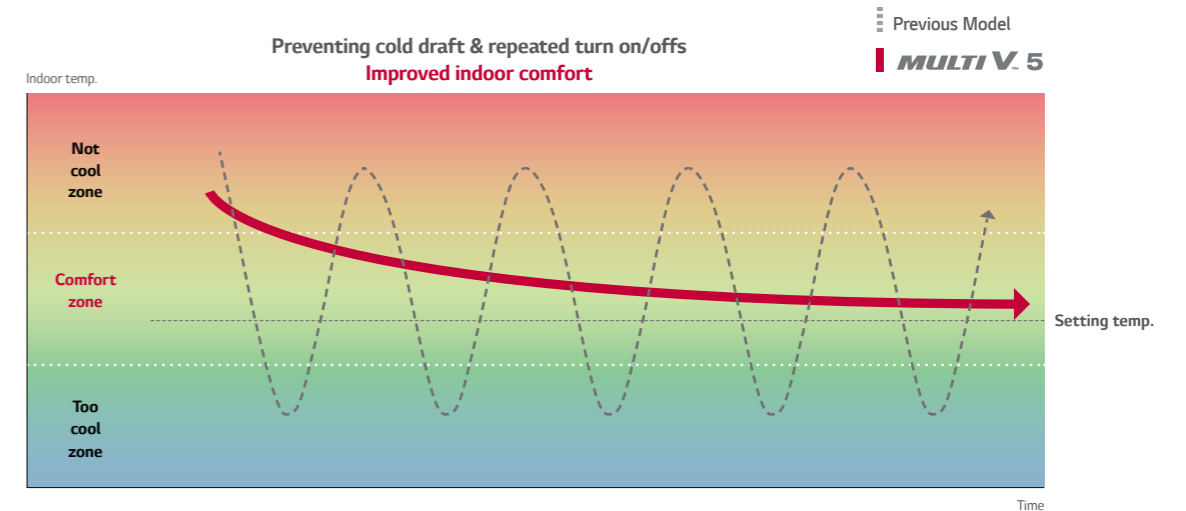
Without stopping in between operations, this function allows MULTI V 5 to maintain operation at mild cooling mode around the set temperature by sensing both temperature and humidity with Dual Sensing Control. By preventing both cold draft and repeated turn on/off's previously required to match the set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



Cooling operation comparison



* Indoor unit set up available with Standard III Remote Controller



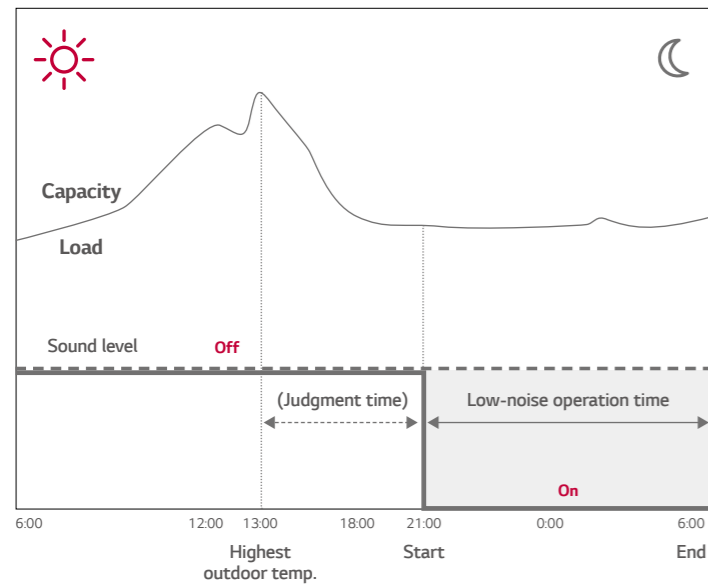
MULTI V 5

ULTIMATE COMFORT Low-Noise Operation

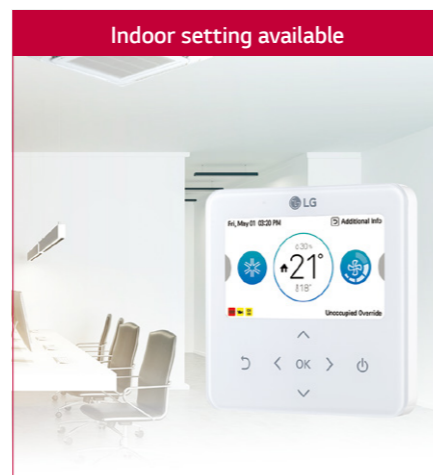
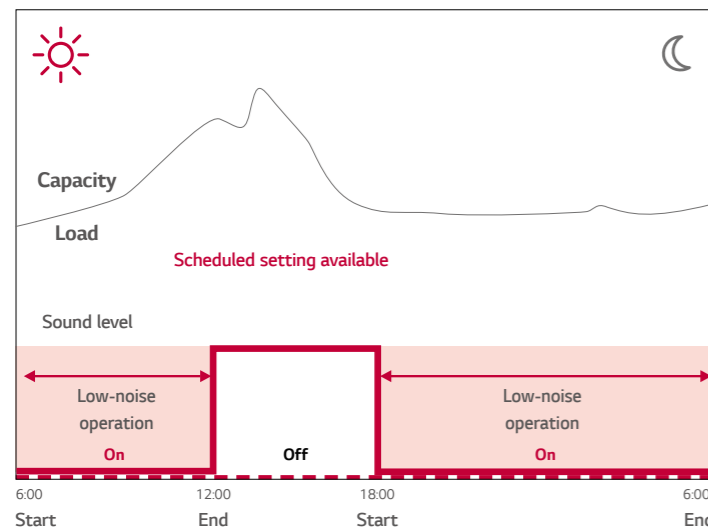
Unlike the previous model which enables Low-Noise Operation only during night after judgment time, the Low-Noise Operation of MULTI V 5 can function regardless of the time at the noise sensitive areas.

Operation hours comparison

Previous Model



MULTI V 5



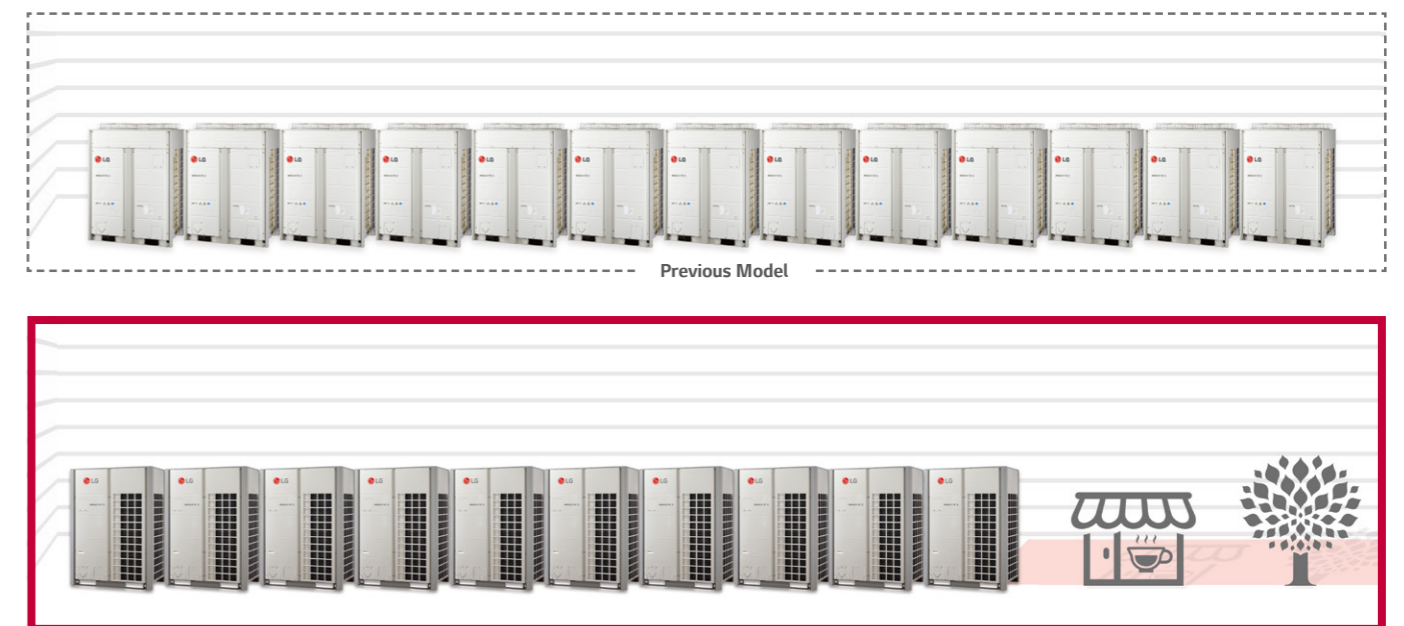
* Indoor unit set up available with Standard III Remote Controller

ULTIMATE FLEXIBILITY

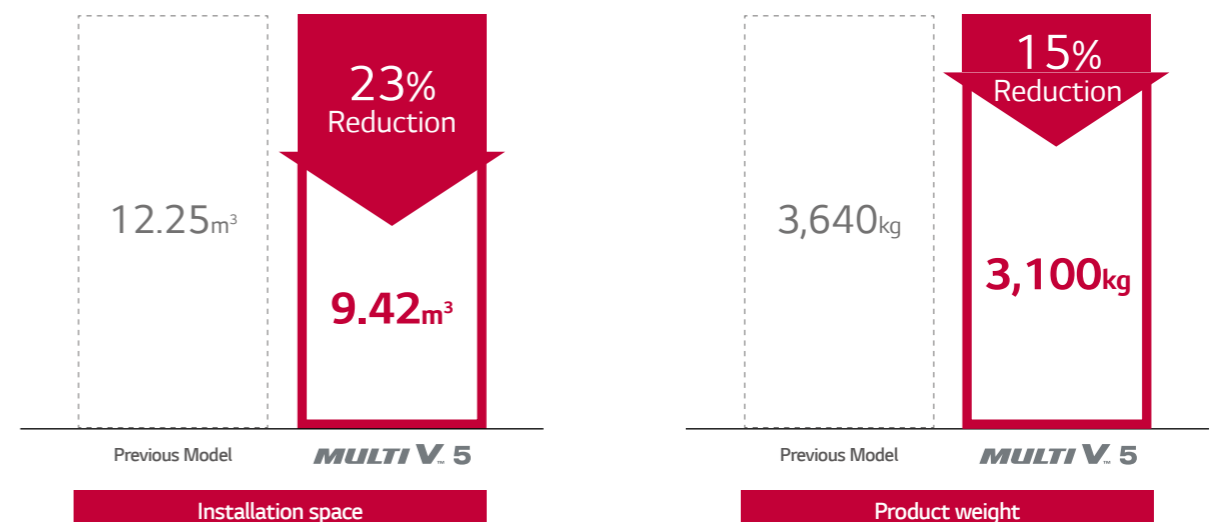
Flexible Installation Space with Large Capacity Outdoor Units

Large capacity outdoor units of MULTI V 5 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

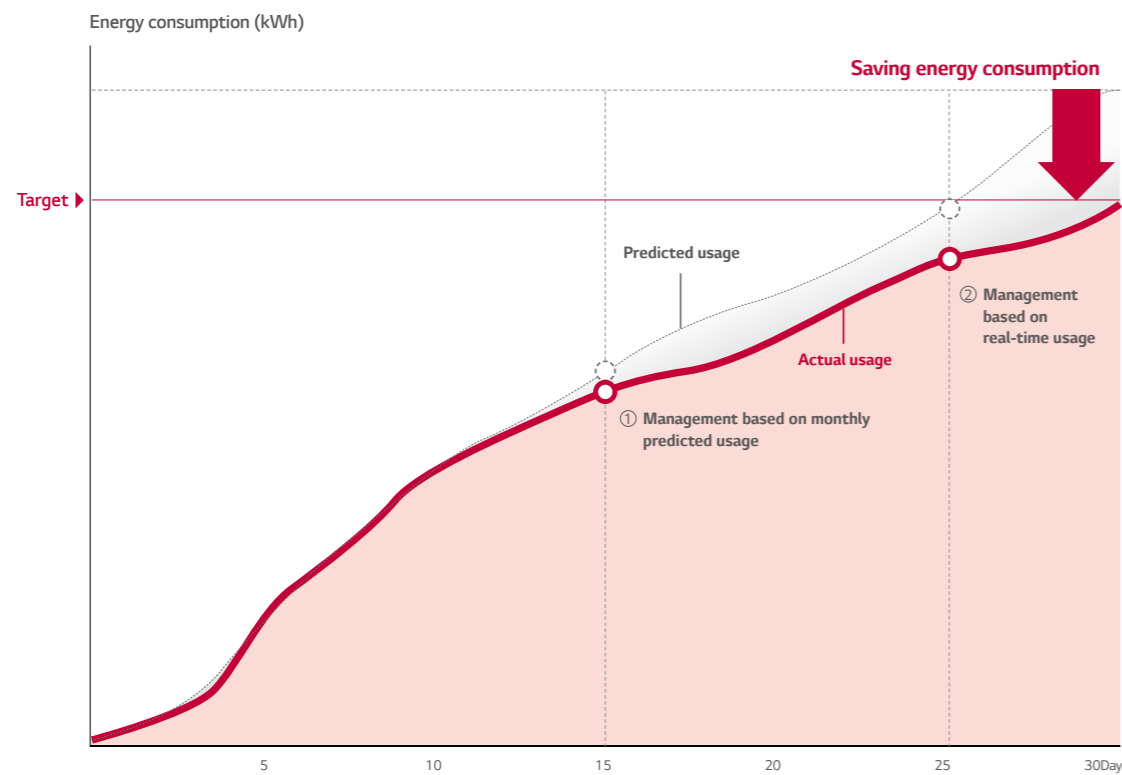


* Comparison basis: 2 Rows of outdoor units 260HP (26HP X 10sets) installation case

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 ACP IV or AC Smart IV and PDI are required for energy management function

AC Smart 5 with Advanced Control Interface

As an advanced central controller, AC Smart 5 offers flexible interface for each user by assessing the device screen and automatically customizing the layout to provide the most optimized interface. Moreover, without additional device, AC Smart 5 provides BACnet/IP and Modbus TCP/IP interface to be integrated by BMS(Building Management System), as well as its own various management function



[PC]

11:00 am
Monitoring room



[Tablet]

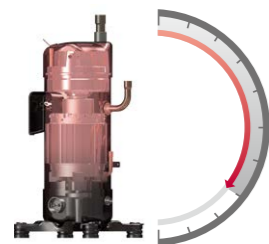
2:00 pm
Checking each room



[Mobile]

5:00 pm
Monitoring at any time, anywhere

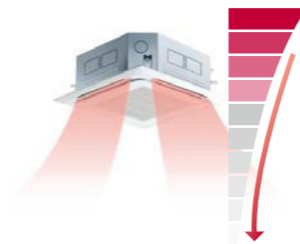
Control methods



Compressor capacity management



Operation rate control of indoor unit



Indoor unit operation management

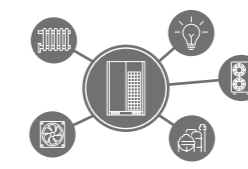
Various functions of AC Smart 5



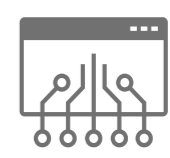
Advanced energy monitoring



Operational trend



Interlocking



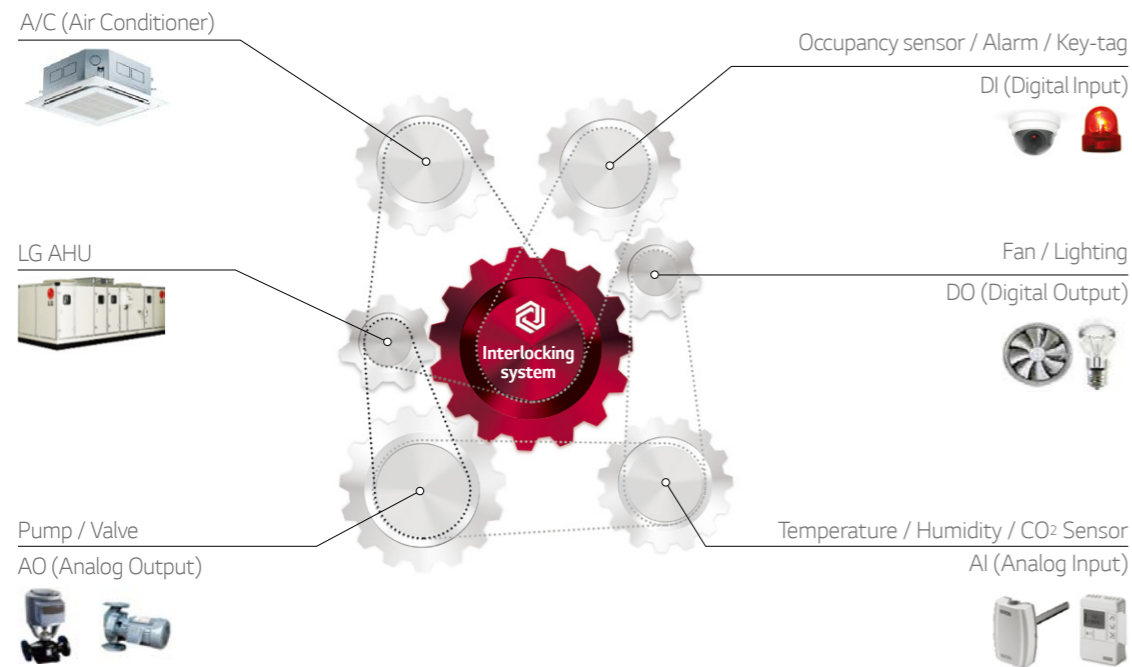
BMS Integration

MULTI V 5

ULTIMATE CONTROL

Expandability & Programmability

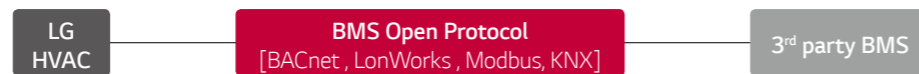
The expandable control system can be interlocked with sensors and facilities of building, as well as air conditioners. It makes building management smart by setting up logic optimized for the site.



System Flexibility

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

Interlock with 3rd party BMS



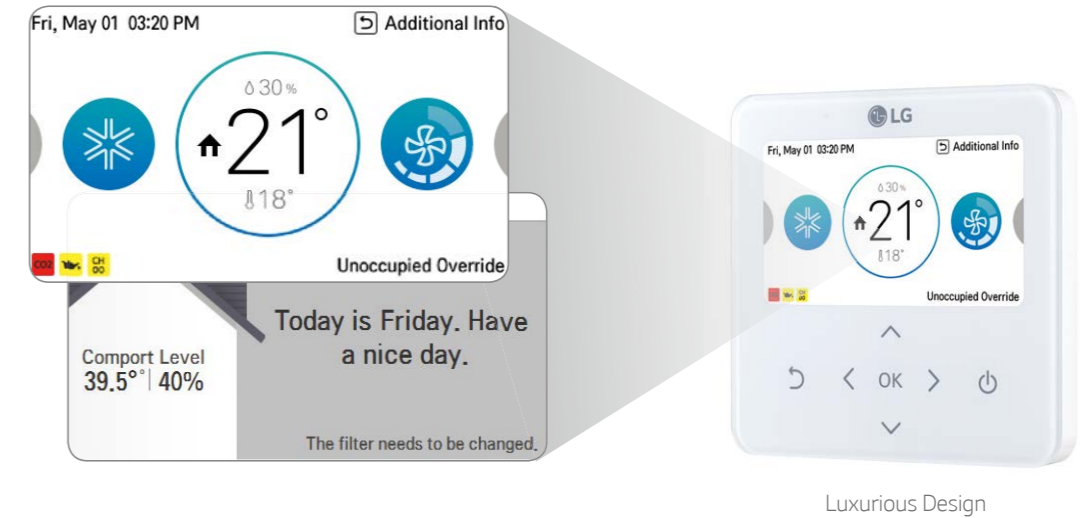
Dry Contact optimized for variable scenario



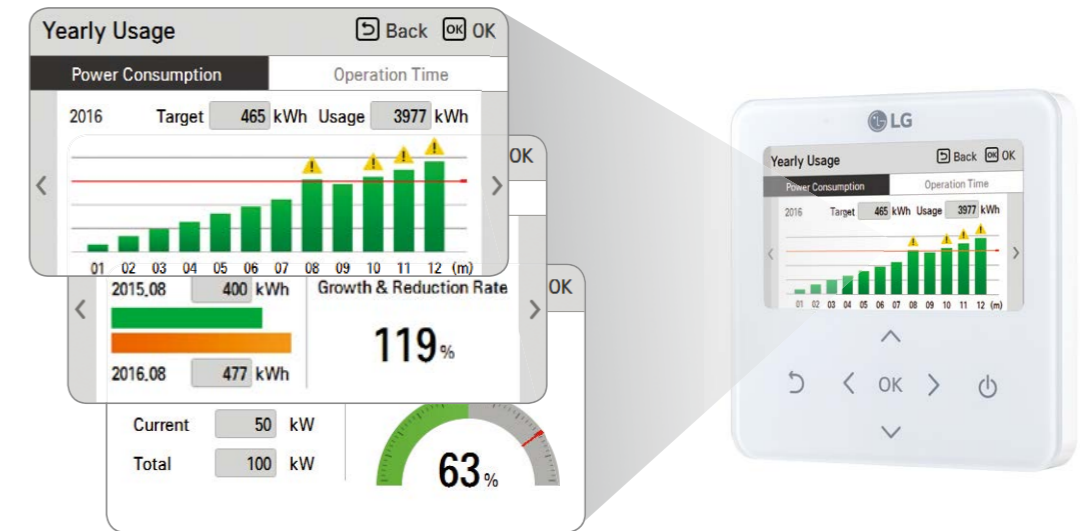
Smart Individual Controller (with Standard III Remote Controller)

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



Energy Management



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

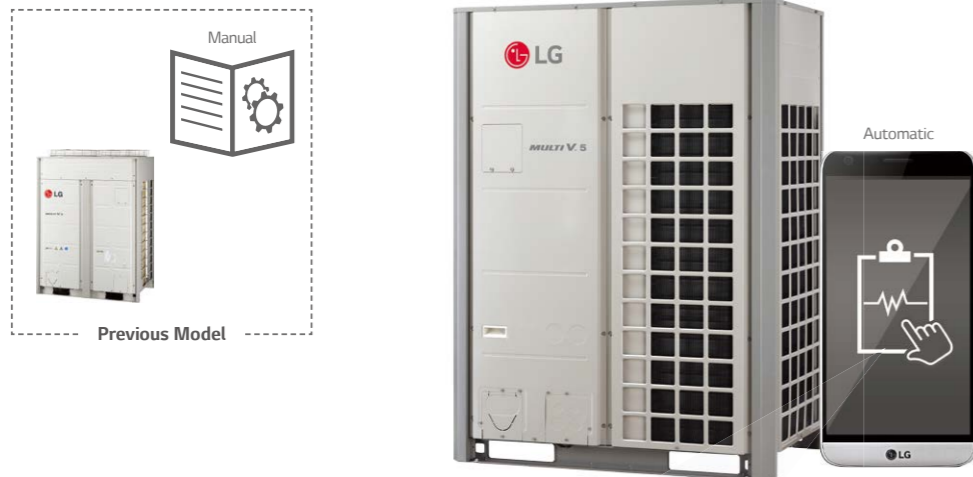
MULTI V 5

ULTIMATE CONTROL

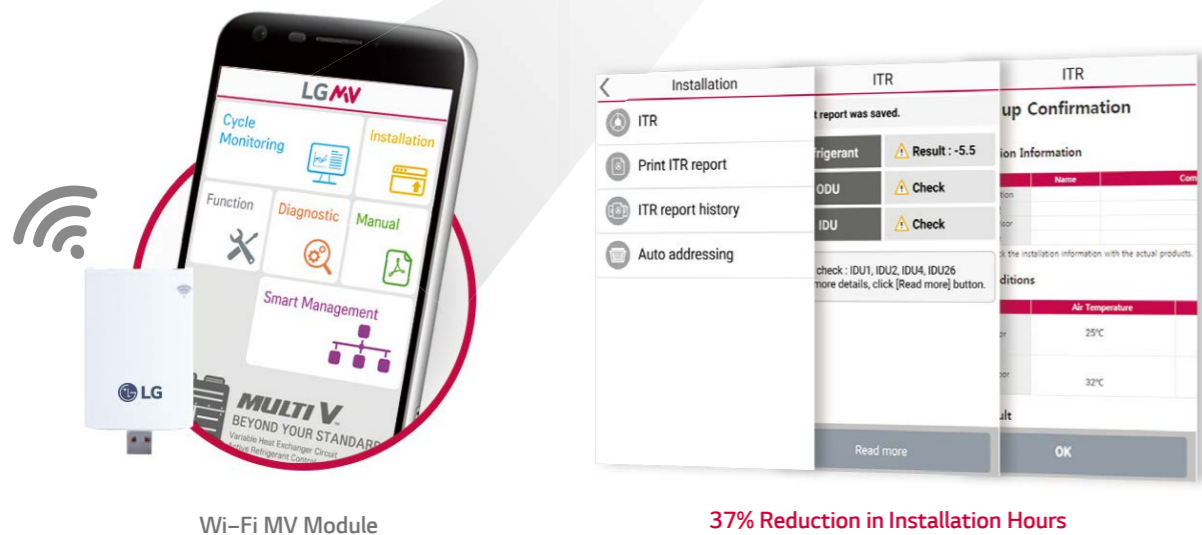
Simple Test Run via LGMV

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

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

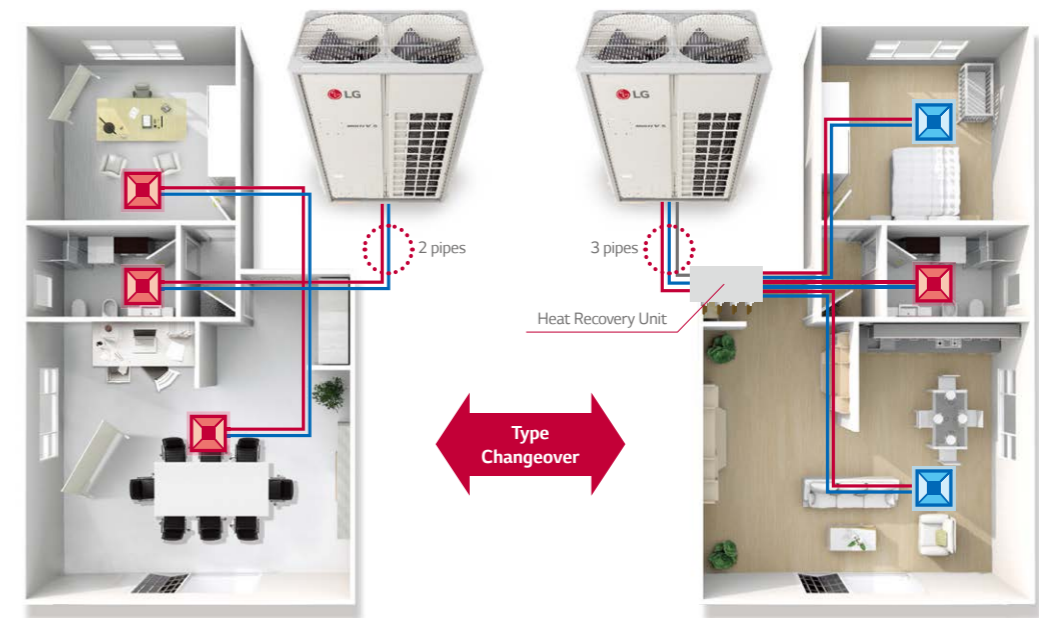
HEAT RECOVERY

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

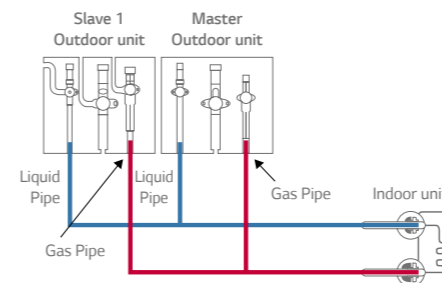
LG MULTI V 5 satisfies users' various needs with just one platform. Heat Pump System works for the sites where either cooling or heating operation is needed, while Heat Recovery System fits perfectly to the sites wherein both the cooling and heating operations are simultaneously needed or locations installed 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

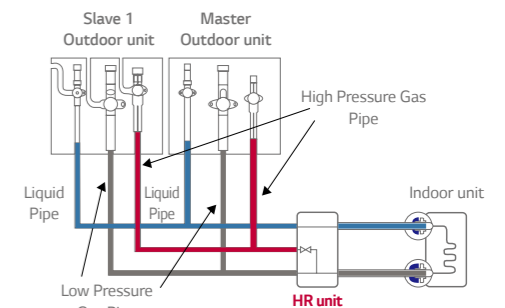
MULTI V 5 allows the building previously installed with Heat Pump System to switch to the Heat Recovery System for changing purpose of the building or remodeling reasons via simple piping construction.



Heat Pump System



Heat Recovery System



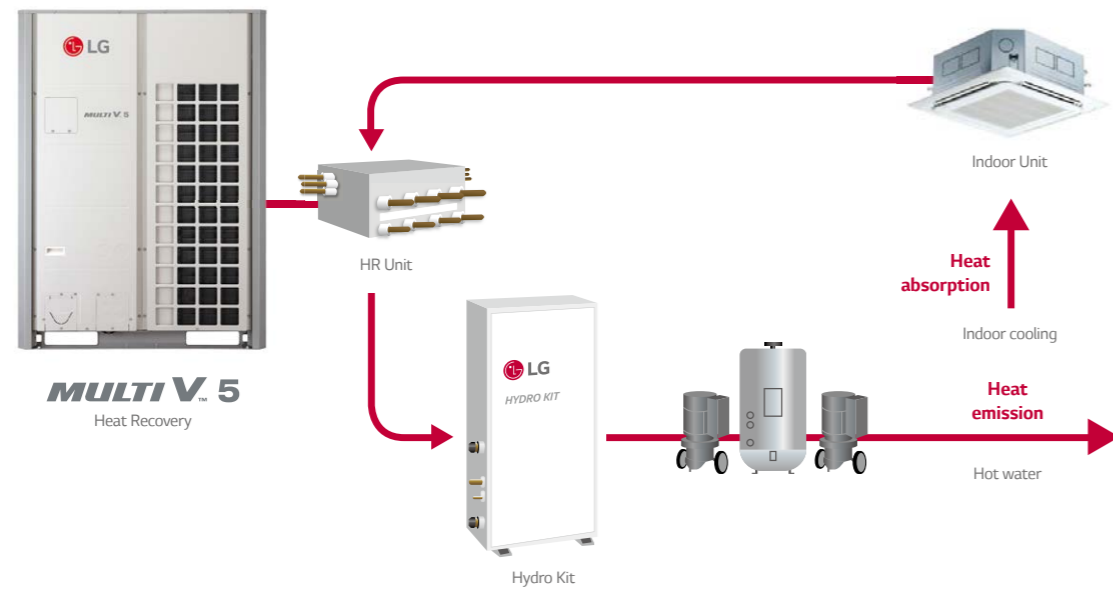
MULTI V 5

HEAT RECOVERY

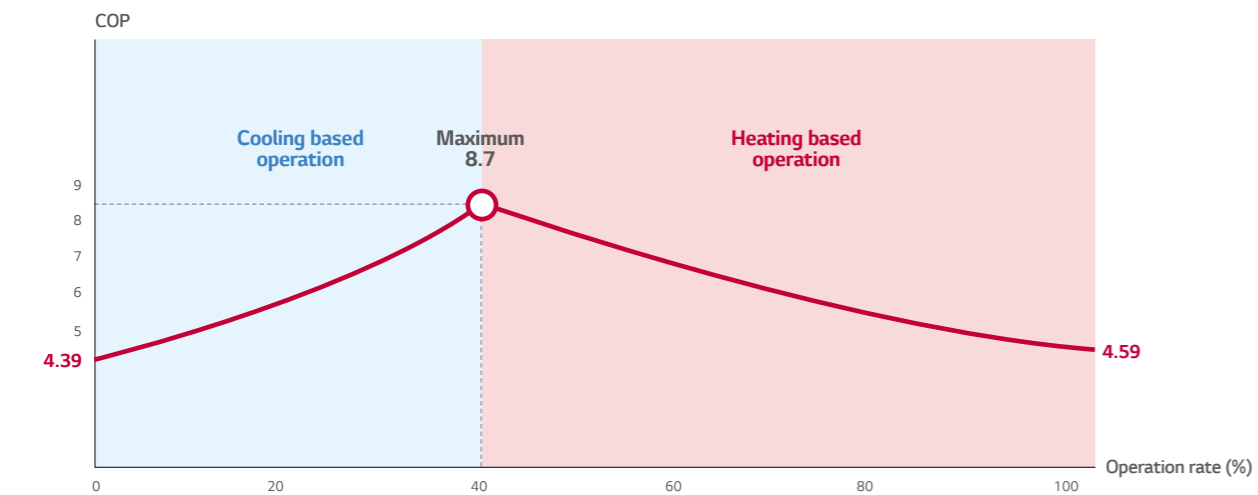
Energy Saving with Simultaneous Operation

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

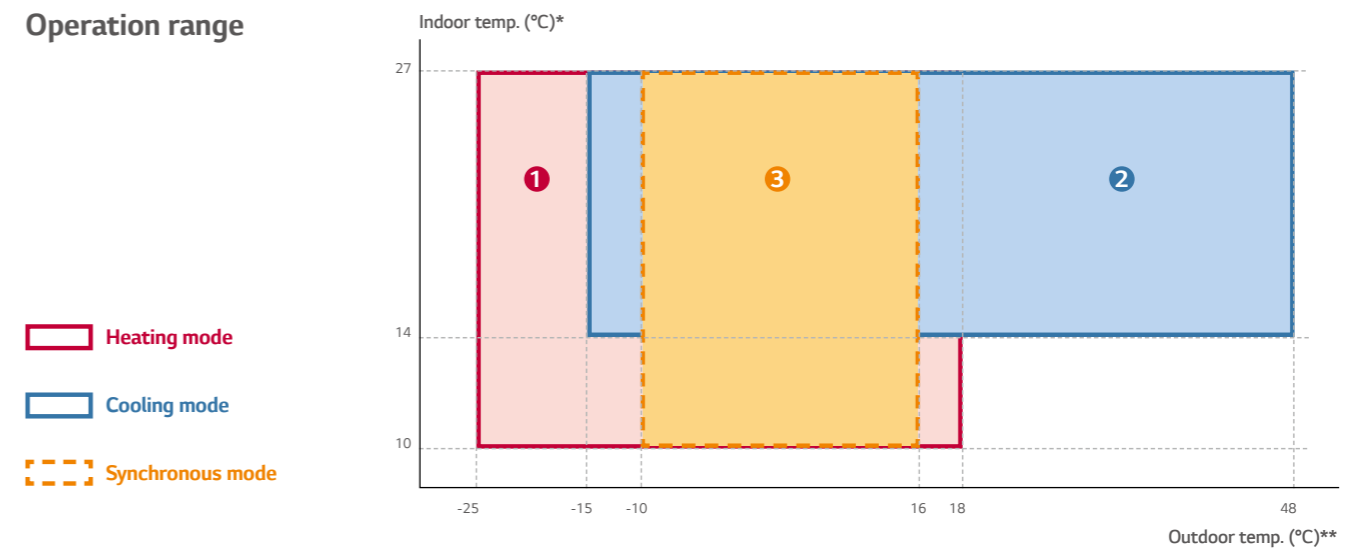


* Outdoor temperature : 7°C DB / 6°C WB
 * Indoor temperature : 20°C DB / 15°C WB
 * ARUM200LTES

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



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

