

INVERTER SCROLL *CHILLER* AIR



LG Electronics

<http://www.lg.com>
<http://partner.lge.com>

Copyright © 2018 LG Electronics. All rights reserved.

Distributed by





CONTENTS

- 06 HIGH EFFICIENT INVERTER TECHNOLOGIES**
- All Inverter Scroll Compressor
 - Lower Load Operation
 - Vapor Injection
- 08 RELIABILITY & STABILITY**
- Continuous Heating Operation
 - Back Up Operation
 - Corrosion Resistance (Ocean Black Fin)
 - Black Box Function
- 10 CONVENIENCE**
- Compact Size
 - Low Noise Level
 - Silent Operation Function (Cooling Mode)
 - HMI Touch Controller
 - Centralized Control of LG CHILLER (Option)
 - Easy BMS Interface
- 14 APPENDIX**
- Specification – Heat Pump Model

INVERTER SCROLL CHILLER FEATURES & BENEFITS

INVERTER SCROLL
CHILLER AIR



High Efficient Inverter Technologies

- EER 2.93 / COP 3.25 / SEER 4.4 / SCOP 3.3 (@Eurovent condition)
- All Inverter Scroll Compressor
- Water Outlet Temperature Control Without Hunting



Reliability & Stability

- Continuous heating operation
- Back up operation in Emergency Case
- Quick maintenance using black box function
- Corrosion resistance 'Ocean Black Fin'



Convenience

- Smaller footprint due to compact size
- Low noise level
- Silent operation function
- 5 inch HMI touch controller with various functions



※ 65kW Heat pump model comparison

WHY LG INVERTER SCROLL CHILLER?

INVERTER SCROLL
CHILLER AIR

Our CHILLER History

Equipped with a comprehensive, full line-up of HVAC solutions, LG offers optimized solutions tailored to meet customer requirements.

<p>2012 Making a Leap Forward as a Global Company AHRI Certification Acquired</p> <p>1997 Expanding Our Capability Thru Innovation China Factory Established</p> <p>1968 Building Our Base LG CHILLER Business Launched</p>	<ul style="list-style-type: none"> ● 2018 Inverter Scroll Chiller (2nd generation) launched in Europe ● 2017 Oil Free Magnetic-bearing VSD Centrifugal Chiller launched ● 2016 Pyeongtaek New factory established Inverter Scroll Chiller (1st generation) launched in Europe ● 2015 World's First Air-Bearing Oil-Free Centrifugal CHILLER Developed ● 2013 Inverter Scroll Chiller (1st generation) developed ● 2012 Total 92,288RT Centrifugal CHILLERS Provided in Saudi Arabia (Qurayyah IPP) ● 2008 CHILLER Business in Middle East Started (Motor City, 80,000RT, 32Units) ● 2007 2 Stage Centrifugal CHILLER Developed ● 1983 First Shipment of Centrifugal CHILLER for Nuclear Power Plant ● 1970 Water Cooled Centrifugal CHILLER (R11) Produced
---	--



Line-up

Max. 10 chillers can be controlled by 1 central controller up to 2,220kW.

Capacity (kW)		65	74	114	130	148	171	195	222	
Capacity (Kw)	Cooling	65	74	114	130	148	171	195	222	
	Heating	70.3	82	120	140.6	164	180	210.9	246	
Range of Unit Control		Up to 2,220 kW (10 CHILLERS) by ACP (Advanced Control Platform)								
		Up to 1,110 kW (5 CHILLERS) by AC Smart Controller								
		Up to 1,110 kW (5 CHILLERS) by HMI Touch controller								

*Central controller ACP, AC Smart controller are option.

WHY LG INVERTER SCROLL CHILLER?

INVERTER SCROLL
CHILLER AIR

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.

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

Wide operating range via two-stage compression

02. Enhanced Bearing with PEEK Material

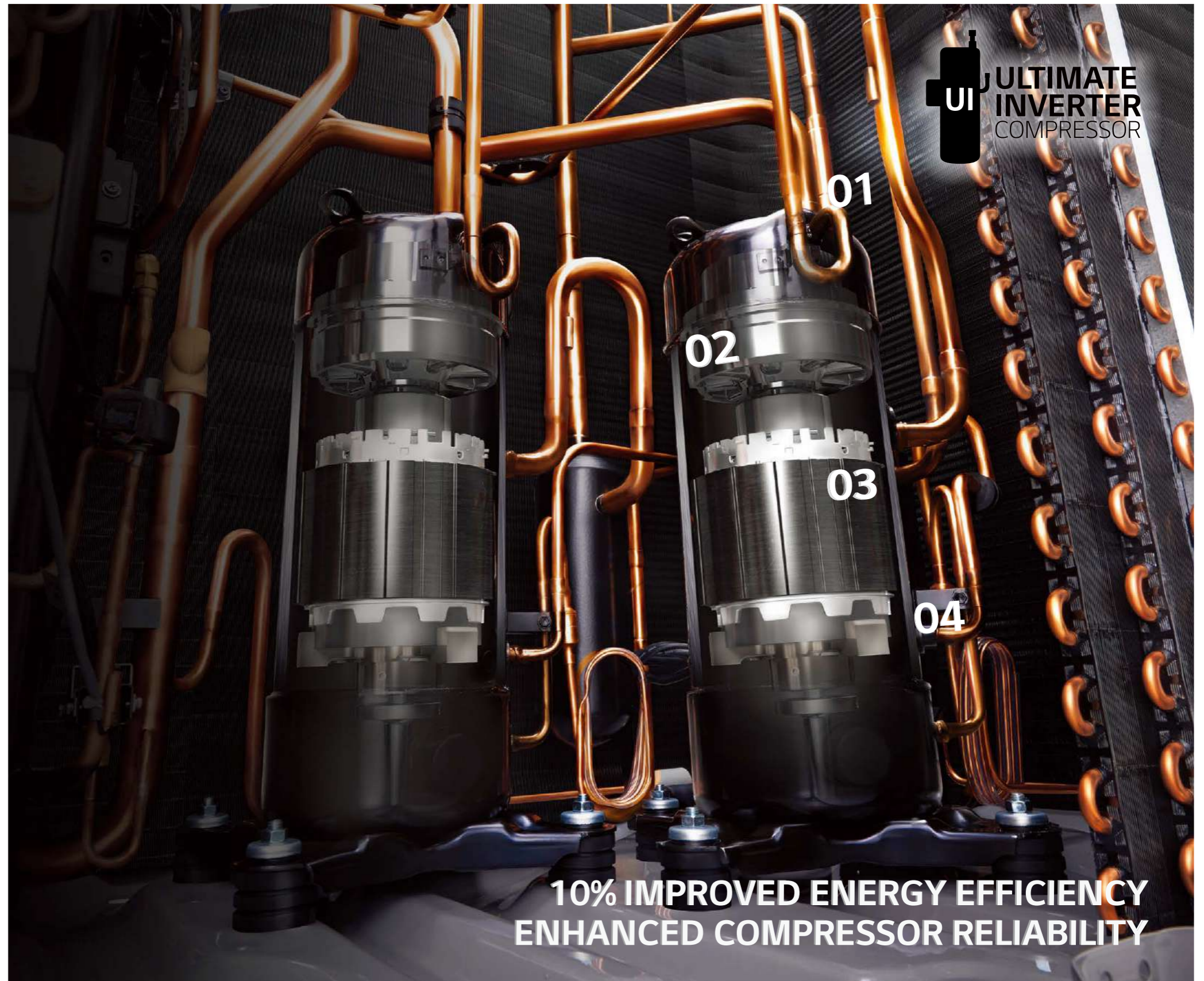
Newly invented system motivated by PEEK (Polyetheretherketone) bearing used for aero engine to increase operation range and durability

03. Wide Operation Range from 30 to 130 Hz

Improved part load efficiency at all operation ranges

04. HiPOR™ (High Pressure Oil Return)

Resolve compressor efficiency loss caused by oil return



**10% IMPROVED ENERGY EFFICIENCY
ENHANCED COMPRESSOR RELIABILITY**

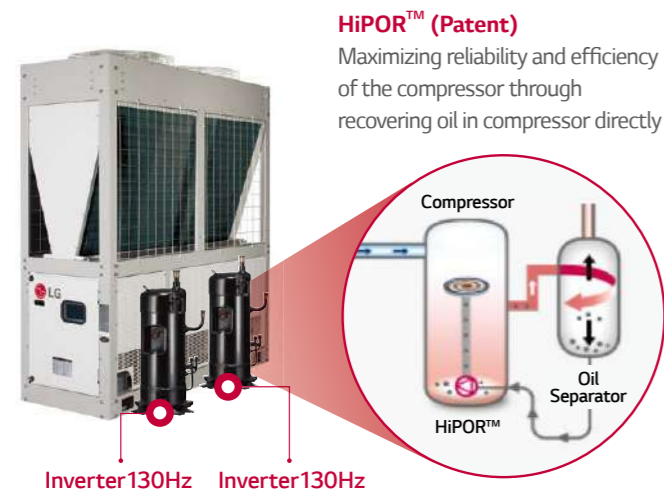
HIGH EFFICIENT INVERTER TECHNOLOGIES

All inverter scroll compressor

All inverter scroll compressor with HiPOR™ (Patent) is applied to improve full load and part load energy efficiency.

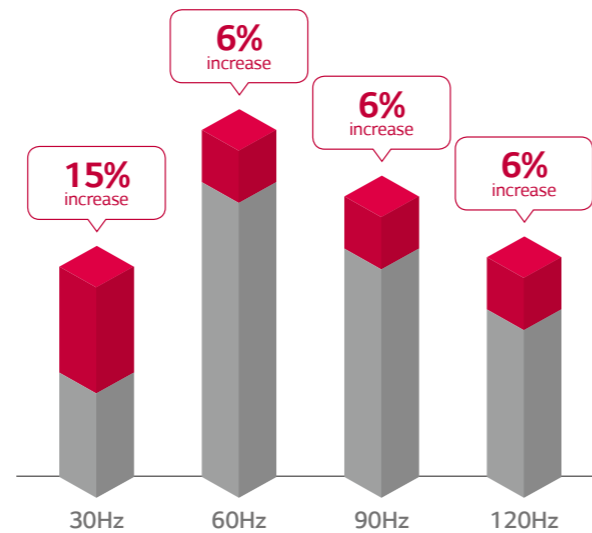
All Inverter System

Wide operation frequency range 30 ~ 130Hz



Compressor Efficiency

Compressor efficiency by Hz is increased through HiPOR™ application

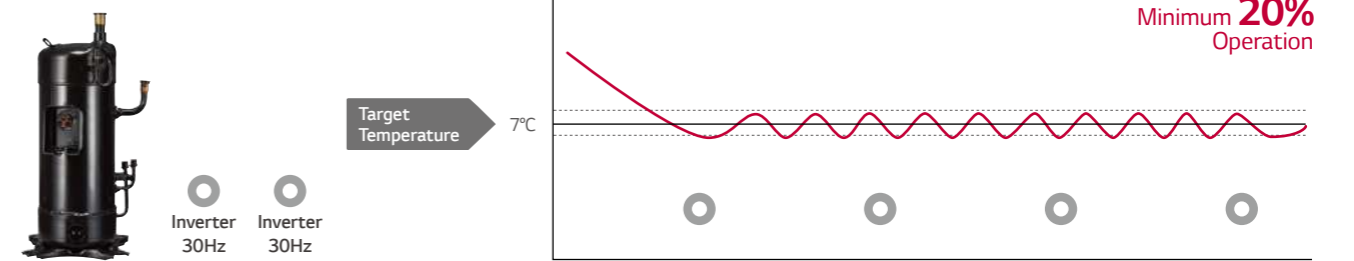


※ Test condition at Tc=54.4°C, Te=7.2°C

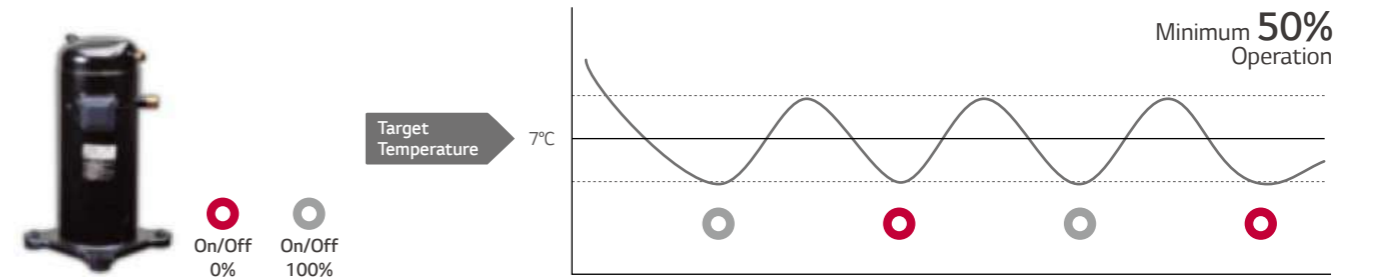
Lower load operation

20% part load operation and minimized water outlet temperature haunting with Inverter scroll compressors.

• LG Inverter Scroll Compressor



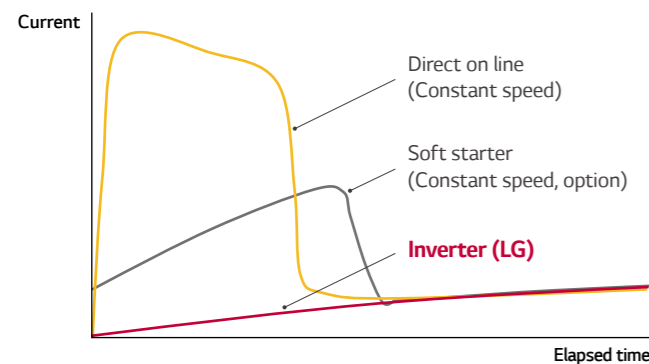
• Normal On/Off Multi Compressor System



App. Inverter comp. vs Constant speed comp.

Inverter compressor is more stable and efficient solution than Constant speed compressor.

• Comparison of starting type



Compressor	Starting type	Starting current (Is / FLA*, %)
Constant speed	Direct on line	About 650 %
	Soft starter	200 ~ 350 %
Inverter (LG)	Inverter	No inrush current

* FLA : Full load ampere

• Inverter's feature & benefits

When starting

- Reduce starting torque below full load torque
➔ Mechanical wear ↓
- Decrease starting current under FLA
➔ Circuit breaker capacity ↓

When operating

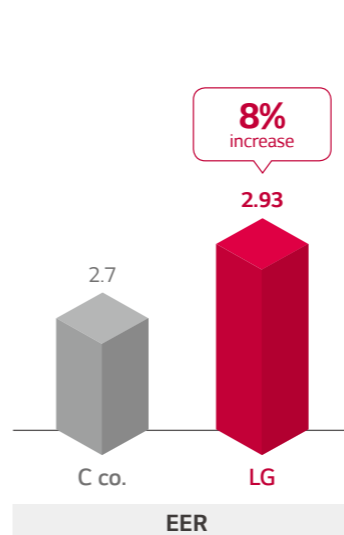
- Low electric loss due to high value of the power factor**
➔ Energy efficient
- Low power input in part load
➔ High SEER
- Continuously adjust compressor output according to the load (Compressor 15~125Hz)
➔ Save energy

** Power factor : Ratio between active power(kW) and total power(kVA)

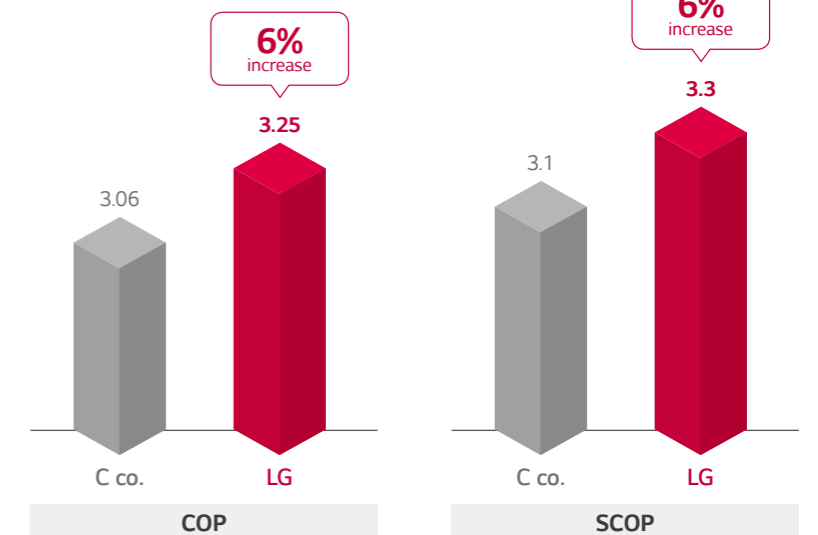
High Energy Efficiency

All inverter scroll compressors with Multi V technologies improve energy efficiency.

• Cooling Performance



• Heating Performance



※ 65 kW Heat pump model comparison

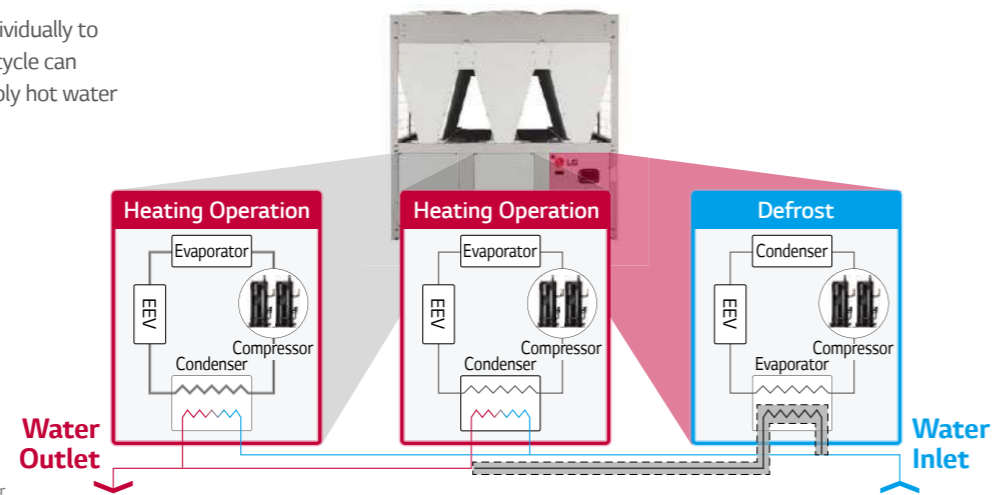
RELIABILITY & STABILITY

INVERTER SCROLL
CHILLER AIR

Continuous heating operation

Continuous heating minimizes the decrease of water outlet temperature during defrosting for multi circuit model.

Multi cycle can defrost each cycle individually to supply hot water continuously multi cycle can defrost each cycle individually to supply hot water continuously



* Applied up to 6 scroll compressors per refrigerator

Back up operation

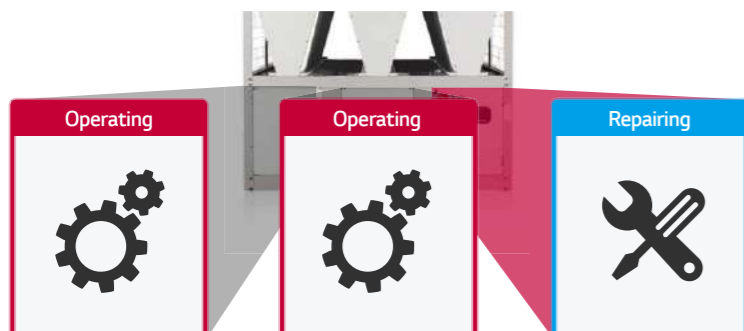
If one compressor or one cycle has a trouble or needs to be repaired, backup operation helps the whole system to operate continuously.

Compressor back up



Automatic
Emergency Backup

Cycle back up



Corrosion resistance (Ocean Black Fin)

'Ocean Black Fin' heat exchanger is highly corrosion resistant, designed to perform in corrosive environments such as contaminated and humid condition.

Ocean Black Fin

- Longer lifespan, lower operational costs
- Strengthened corrosion resistant coating

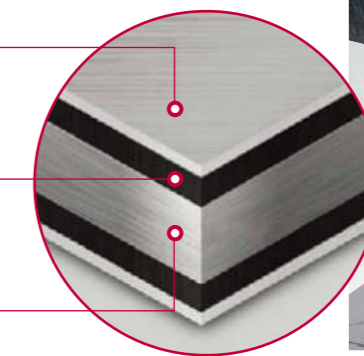
Hydrophilic Coating

The hydrophilic coating minimizes moisture build up on the fin.

Corrosion Resistant Black Coating

The black coating provides strong protection from corrosion.

Aluminum Fin



Black box function

Quick service can be done because operation data can be saved for 180 seconds before system failure.

Without Black Box Function

Check many failure causes and error codes in person

With Black Box Function

Search for the failure cause conveniently using recorded data

Take much service time and undergo trial and error

Save service time and diagnose it more accurately



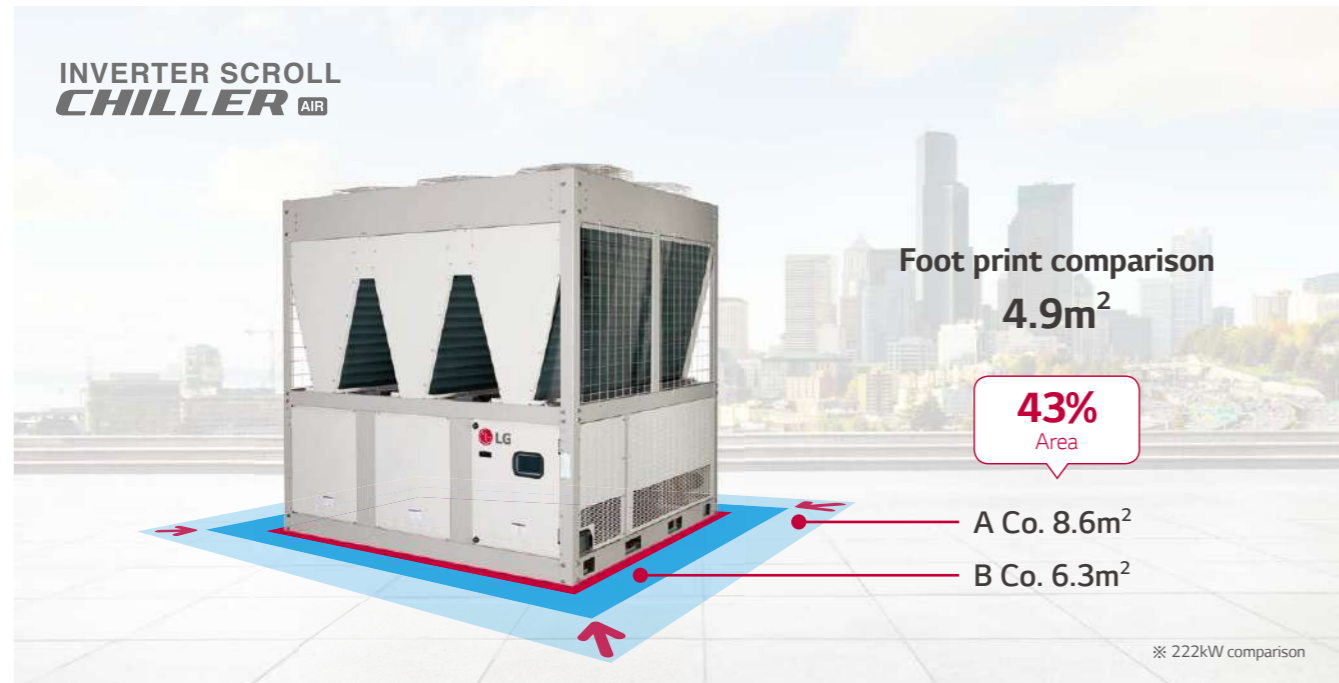
Record operation data for
180 seconds before system failure!

180 seconds

INVERTER SCROLL CHILLER CONVENIENCE

Compact size

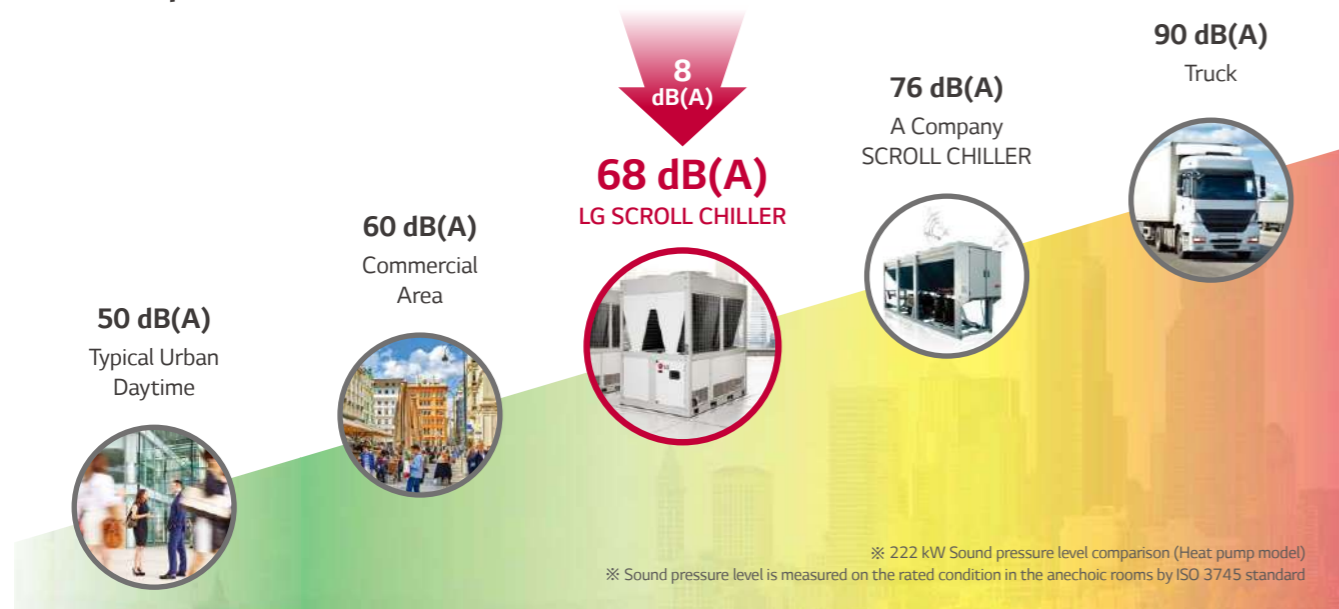
Compact size reduces concern about installation and service space.



Low noise level

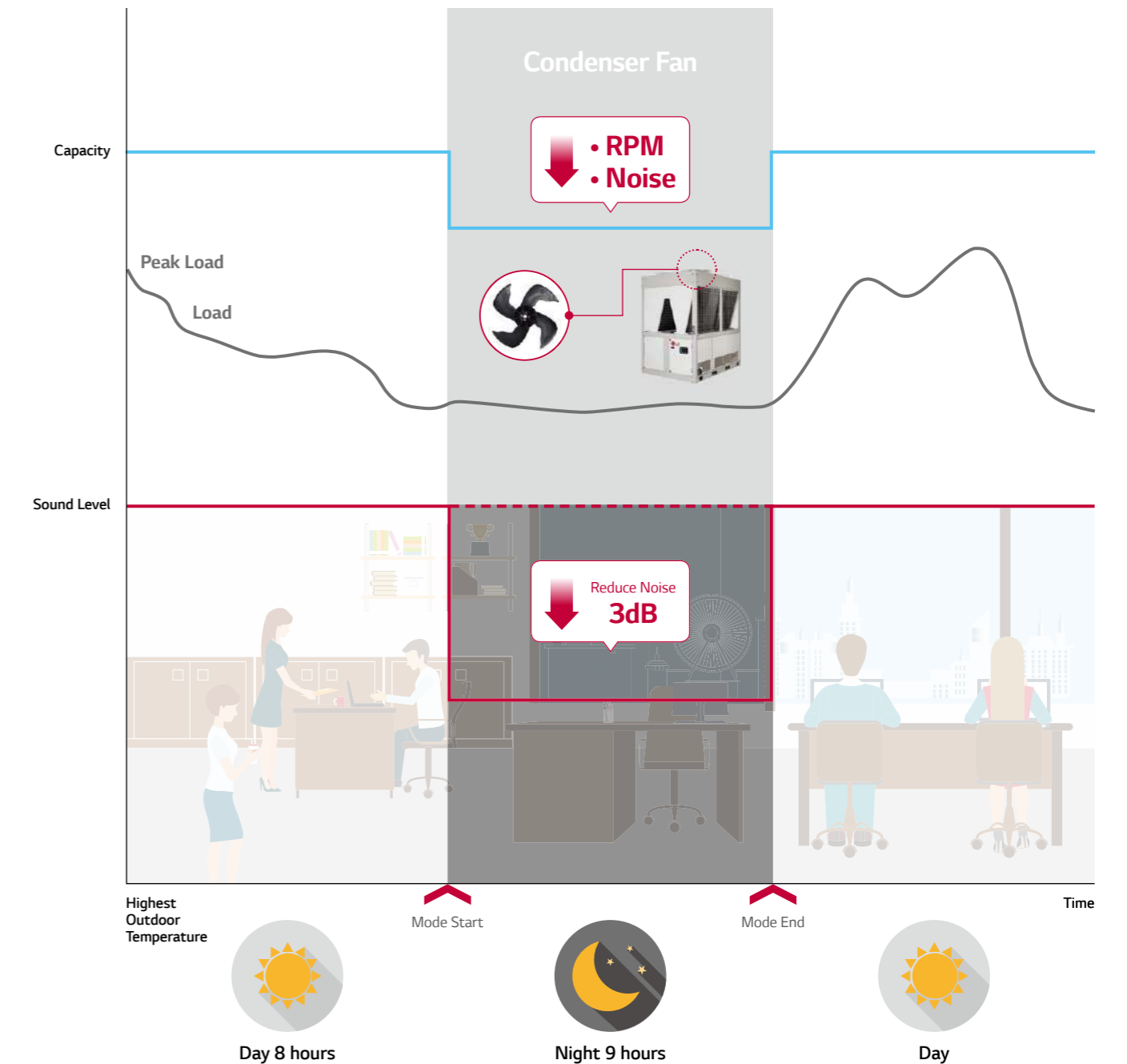
Lower noise can remove complains from noise pollution and provide a quieter environment.

Noise Comparison



Silent operation function (Cooling Mode)

Silent operation function can reduce noise levels at night time by adjusting the fan RPM



INVERTER SCROLL CHILLER CONVENIENCE

INVERTER SCROLL CHILLER AIR

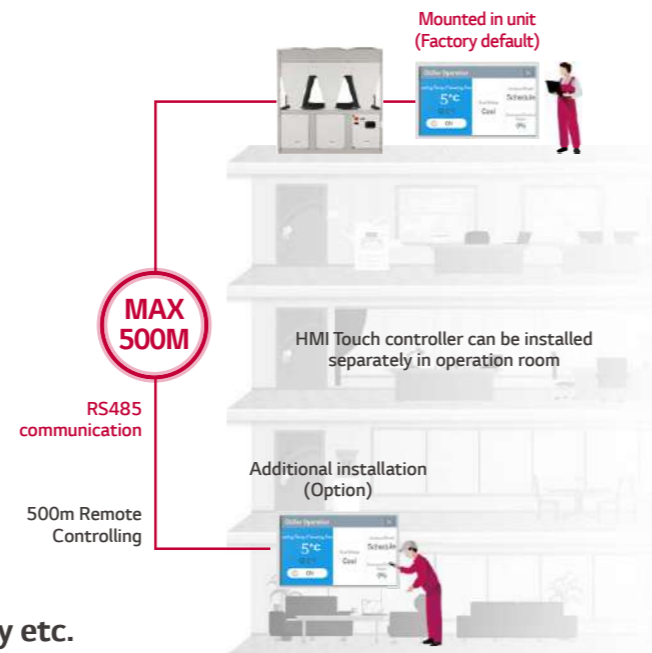
HMI Touch Controller

High level control option is preinstalled such as cycle monitoring, schedule control and demand control with HMI touch controller.

User Friendly HMI Touch Controller



- **Checking chiller information**
(Pump / Flow Status, Pump On / Off, Flow Switch On / Off Etc.)
- **Monitoring chiller operation**
(Each Cycle Operation Status, Air Temperature Etc.)
- **5 chillers multiple control**
- **Scheduling function**
- **Anti-freezing function / displaying error history etc.**
- **RS485 1Port, SD Card (Memory)**



Centralized control of LG Chiller (option)

LG central controller IV series (+Chiller kit) provide chiller remote control and cycle monitoring (ACP IV : Max. 10 chillers, AC Smart IV : Max. 5 chillers).

ACP IV + CHILLER kit



Web Access

- Control and monitor by web access



Various HVAC Units

- Scroll, Screw, Centrifugal Chiller, Absorption Chiller & heater
- A/C, Ventilation, AHU, AWHP



Schedule Operation

- Automatic unmanned operation



Detailed Control and Monitor

- Control and monitor on screen



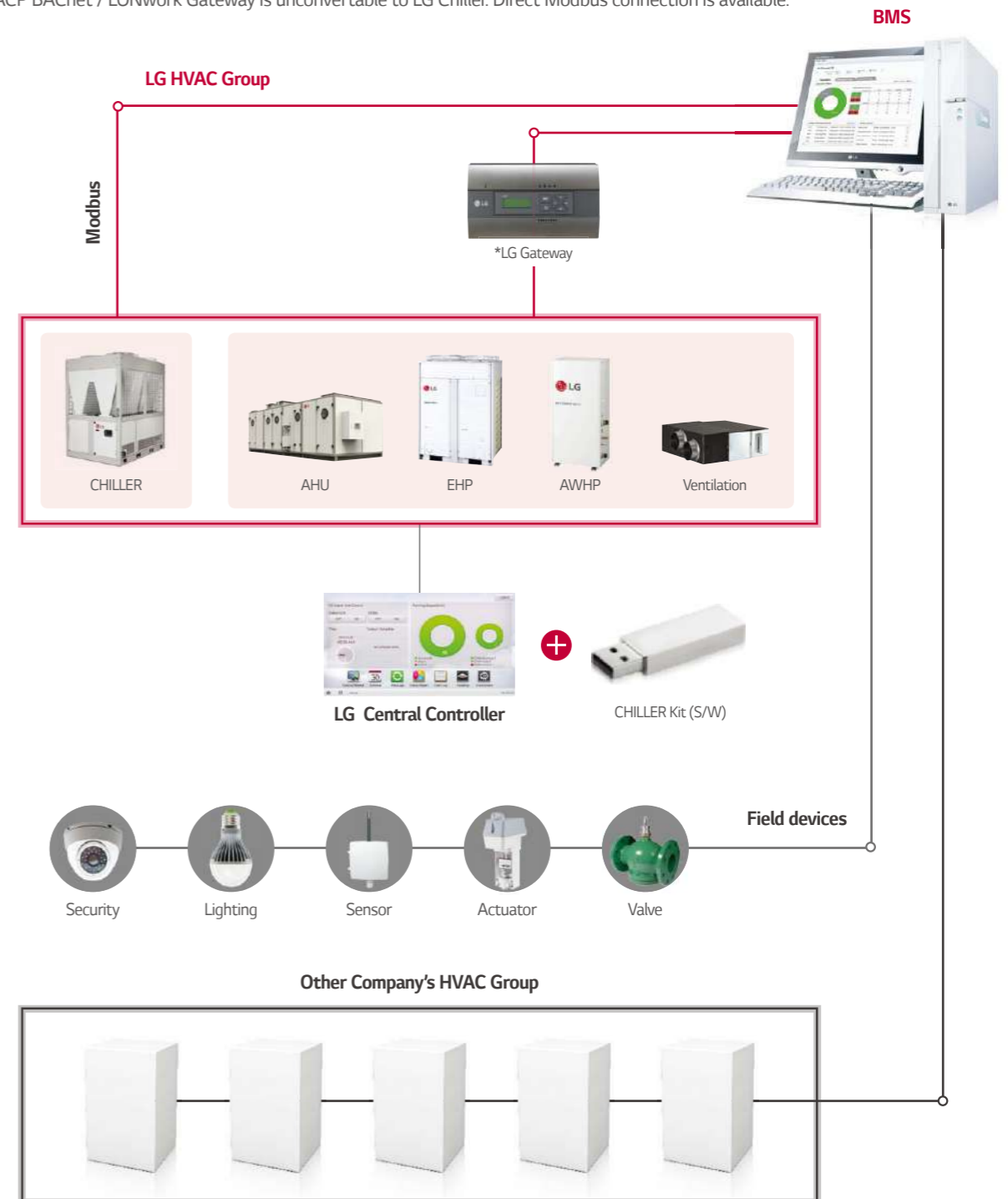
Easy BMS interface

LG provides CHILLER controller system and BMS communication function.

LG HVAC Group

BMS : Building Management System

* LG ACP BACnet / LONwork Gateway is unconvertable to LG Chiller. Direct Modbus connection is available.



INVERTER SCROLL CHILLER SPECIFICATION

INVERTER SCROLL CHILLER AIR

Heat pump model



(LG) participates in the ECP programme for (EUROVENT LCP-HP program).
Check ongoing validity of certificate:
www.eurovent-certification.com

Inverter Scroll Chiller		Model	ACHH020LBAB	ACHH023LBAB	ACHH033LBAB	ACHH040LBAB
			H/P	H/P	H/P	H/P
Power		Phase,Lines,V	3,4,380-415	3,4,380-415	3,4,380-415	3,4,380-415
Capacity	Cooling	kW	65	74	114	130
		RT	18.5	21	32.4	37
Capacity	Heating	kW	70.3	82	120	140.6
		RT	20	23	34	40
Input Power	Cooling	kW	22.2	27.4	36.8	44.4
	Heating	kW	21.6	27.3	35.3	43.3
Max operating Current		A	39	48	72	78
Efficiency	Cooling	W/W	2.93	2.70	3.10	2.93
	Heating	W/W	3.25	3.00	3.40	3.25
SEER		W/W	4.40	4.20	4.50	4.40
SCOP		W/W	3.30	3.30	3.30	3.30
Sound Pressure		dB(A)	67	68	68	68
Sound power	Cooling	dB(A)	86	87	87	90
	Heating	dB(A)	86	87	88	90
Compressor	Type	-	Scroll	Scroll	Scroll	Scroll
	No. of Compressor	EA	2	2	4	4
	Oil Type	-	PVE	PVE	PVE	PVE
	Oil charge	cc	1400*2	1400*2	1400*4	1400*4
	Sump Heater	W	60*2	60*2	60*4	60*4
	Refrigerant	Type	-	R410A	R410A	R410A
Evaporator	Amount of Charged	Kg	7.0 kg X 2	7.0 kg X 2	7.0 kg X 4	7.0 kg X 4
	Type	-	plate	plate	plate	plate
	Pressure drop	kPa	21.5	28.7	18.7	21.5
	Operating maximum pressure (Refrigerant / Water)	kg/cm ²	42/10	42/10	42/10	42/10
Evaporator	Standard Flow (Cooling/Heating)	LPM	186/200	211/235	327/345	372/400
	Inlet/Outlet diameter (Water pipe)	mm	50A/50A	50A/50A	65A/65A	65A/65A
	Type	-	BLDC	BLDC	BLDC	BLDC
Fan motor	No. of Fan	EA	2	2	4	4
	No. of Vanes	EA	4	4	4	4
	Air Flow Rate	CMM	210*2 @1000rpm	210*2 @1000rpm	210*4 @1000rpm	210*4 @1000rpm
	Motor power	W	900*2	900*2	900*4	900*4
Expansion unit		-	EEV	EEV	EEV	EEV
Weight		kg	520	520	970	970
Dimension	W	mm	765	765	1528	1528
	H	mm	2293	2293	2293	2293
	D	mm	2154	2154	2154	2154
Footprint		m ² /RT	0.089	0.078	0.102	0.089
Protection Devices	High/Low Pressure	-	•	•	•	•
	Anti Frost	-	•	•	•	•
Remote Control		-	Modbus	Modbus	Modbus	Modbus
Power	Power Line	mm ²	25.0mm ² ×5C	25.0mm ² ×5C	50.0mm ² ×5C	50.0mm ² ×5C
Outlet Temperature	Cooling	°C	5-20	5-20	5-20	5-20
	Heating	°C	30-55	30-55	30-55	30-55
Ambient Temperature	Cooling	°C	-15-48	-15-48	-15-48	-15-48
	Heating	°C	-30-35	-30-35	-30-35	-30-35
Earth Leakage Breaker		A	75	75	125	125

Notes:

- Due to our policy of innovation some specifications may be changed without prior notification.
- Capacities and Inputs are based on the following conditions
Cooling : Outdoor air temp. 35°C, Water inlet temp. 12°C, Water Outlet temp. 7°C
Heating : Outdoor air temp. 7°C, Water inlet temp. 40°C, Water Outlet temp. 45°C
- Sound pressure level is measured on the rated condition in the anechoic rooms by ISO 3745 standard.
Sound power level is measured ISO 9614:2009 by sound intensity method. Therefore, these values can be increased owing to ambient conditions during operation.

Heat pump model



(LG) participates in the ECP programme for (EUROVENT LCP-HP program).
Check ongoing validity of certificate:
www.eurovent-certification.com

Inverter Scroll Chiller		Model	ACHH045LBAB	ACHH050LBAB	ACHH060LBAB	ACHH067LBAB
			H/P	H/P	H/P	H/P
Power		Phase,Lines,V	3,4,380-415	3,4,380-415	3,4,380-415	3,4,380-415
Capacity	Cooling	kW	148	171	195	222
		RT	42.1	48.6	55.4	63.1
Capacity	Heating	kW	164	180	210.9	246
		RT	47	51	60	70
Input Power	Cooling	kW	54.8	55.2	66.6	82.2
	Heating	kW	54.7	52.9	64.9	82
Max operating Current		A	96	108	117	144
Efficiency	Cooling	W/W	2.70	3.10	2.93	2.70
	Heating	W/W	3.00	3.40	3.25	3.00
SEER		W/W	4.20	4.50	4.40	4.20
SCOP		W/W	3.30	3.30	3.30	3.30
Sound Pressure		dB(A)	68	68	68	68
Sound power	Cooling	dB(A)	91	88	91	92
	Heating	dB(A)	91	88	91	92
Compressor	Type	-	Scroll	Scroll	Scroll	Scroll
	No. of Compressor	EA	4	6	6	6
	Oil Type	-	PVE	PVE	PVE	PVE
	Oil charge	cc	1400*4	1400*6	1400*6	1400*6
	Sump Heater	W	60*4	60*6	60*6	60*6
	Refrigerant	Type	-	R410A	R410A	R410A
Evaporator	Amount of Charged	Kg	7.0 kg X 4	7.0 kg X 6	7.0 kg X 6	7.0 kg X 6
	Type	-	plate	plate	plate	plate
	Pressure drop	kPa	28.7	18.7	21.5	28.7
	Operating maximum pressure (Refrigerant / Water)	kg/cm ²	42/10	42/10	42/10	42/10
Evaporator	Standard Flow (Cooling/Heating)	LPM	411/470	490/518	558/600	633/705
	Inlet/Outlet diameter (Water pipe)	mm	65A/65A	65A/65A	65A/65A	65A/65A
	Type	-	BLDC	BLDC	BLDC	BLDC
Fan motor	No. of Fan	EA	4	6	6	6
	No. of Vanes	EA	4	4	4	4
	Air Flow Rate	CMM	210*4 @1000rpm	210*6 @1000rpm	210*6 @1000rpm	210*6 @1000rpm
	Motor power	W	900*4	900*6	900*6	900*6
Expansion unit		-	EEV	EEV	EEV	EEV
Weight		kg	970	1430	1430	1430
Dimension	W	mm	1528	2291	2291	2291
	H	mm	2293	2293	2293	2293
	D	mm	2154	2154	2154	2154
Footprint		m ² /RT	0.078	0.101	0.089	0.078
Protection Devices	High/Low Pressure	-	•	•	•	•
	Anti Frost	-	•	•	•	•
Remote Control		-	Modbus	Modbus	Modbus	Modbus
Power	Power Line	mm ²	50.0mm ² ×5C	95.0mm ² ×5C	95.0mm ² ×5C	95.0mm ² ×5C
Outlet Temperature	Cooling	°C	5-20	5-20	5-20	5-20
	Heating	°C	30-55	30-55	30-55	30-55
Ambient Temperature	Cooling	°C	-15-48	-15-48	-15-48	-15-48
	Heating	°C	-30-35	-30-35	-30-35	-30-35
Earth Leakage Breaker		A	125	200	200	200

Notes:

- Due to our policy of innovation some specifications may be changed without prior notification.
- Capacities and Inputs are based on the following conditions
Cooling : Outdoor air temp. 35°C, Water inlet temp. 12°C, Water Outlet temp. 7°C
Heating : Outdoor air temp. 7°C, Water inlet temp. 40°C, Water Outlet temp. 45°C
- Sound pressure level is measured on the rated condition in the anechoic rooms by ISO 3745 standard.
Sound power level is measured ISO 9614:2009 by sound intensity method. Therefore, these values can be increased owing to ambient conditions during operation.