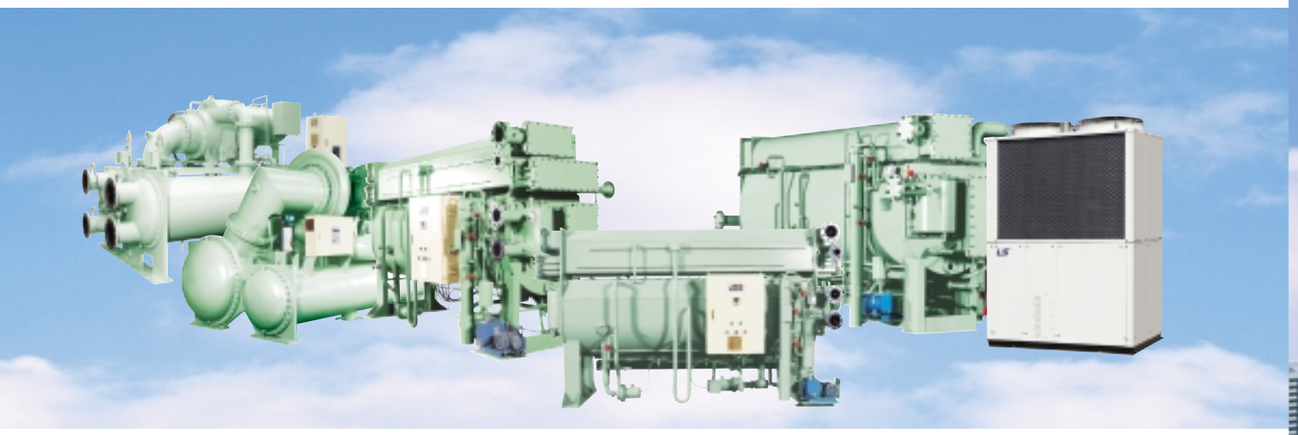

www.lsaircondition.com

Sales Office
200, Dangjeong-dong, Gunpo-si, Gyeonggi-do,
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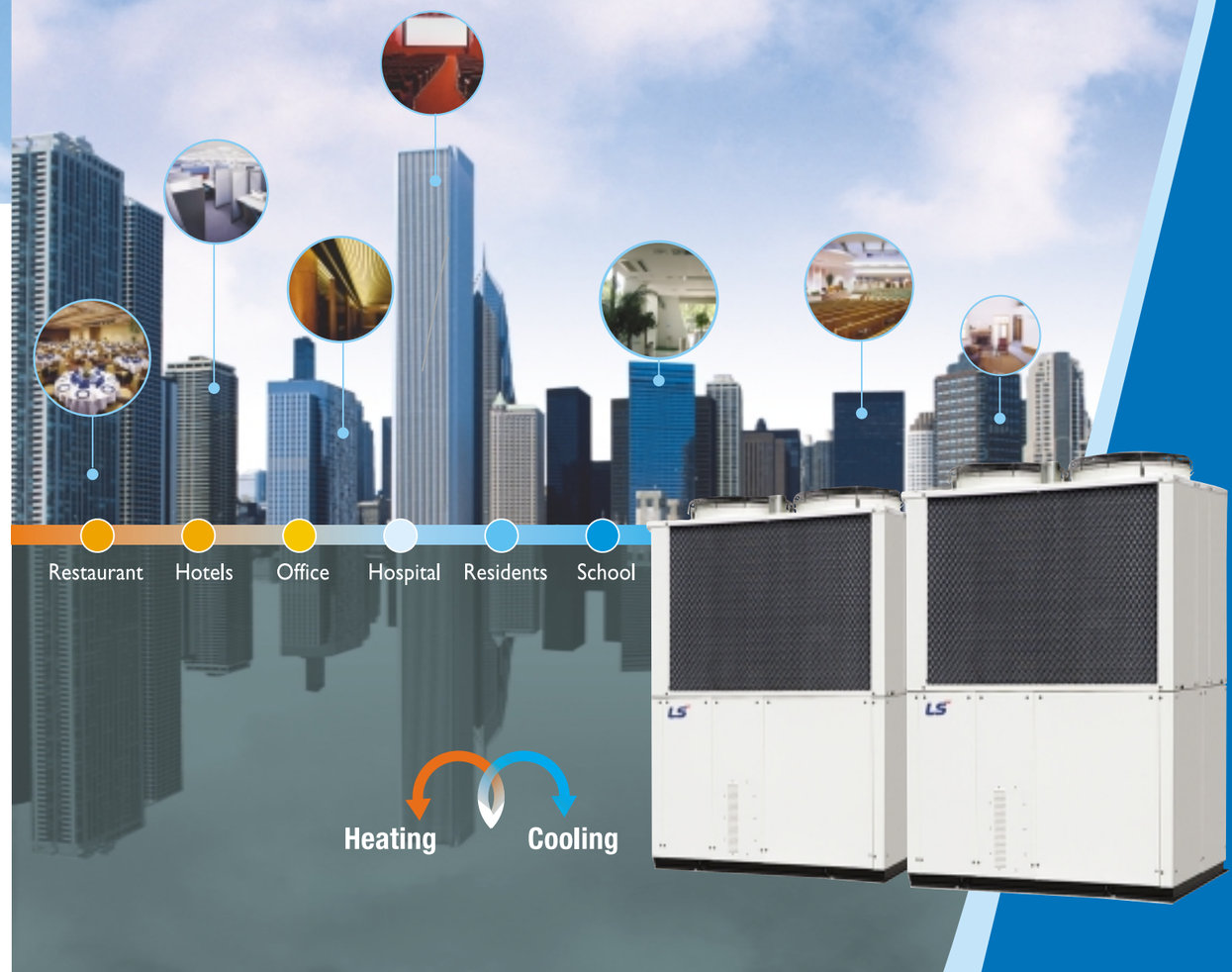
Tel : 82-31-450-3572
Fax : 82-31-450-3152

Factory
778, Yongam-ri, Bongdong-eup, Wanju-gun,
Jeollabuk-do, KOREA 565-902
Tel : 82-63-279-5481
Fax : 82-63-279-5050

LS GHP 001-1000-0603
Printed in Korea

LS GHP

Gas Engine-driven Heat Pump



Leading Solution

LG Cable, LG Industrial Systems and LG-Nikko Copper, Gaon Cable, E1 and Kukdong City Gas are starting with a new name, *Leading Solution, LS.*

LS
- Cable
- Machinery
- Industrial System

LG
- Electronics
- Telecommunication
- Chemical

GS
- Construction
- Energy
- Service

Mar. 2005 LS group spun out from LG Holdings
2002 HST Tractor developed with EATON technology
1999 LG Machinery combined with LG Cable Ltd.
1998 ITI Technical Cooperation for Tractor Reliability Technology

LG
LUCKY GOLD STAR

Jan. 1995 LG group renamed from Lucky-Gold-Star group
LG Machinery renamed from Gold Star Heavy Industry
1984 MHI(Mitsubishi Heavy Industry) Engine Technical Cooperation MAM(Mitsubishi Agricultural Machinery) Tractor Technical Cooperation
1983 Technical Cooperation with Sanyo Electric Double Effect Absorption Chiller

LUCKY GOLD STAR

Jan. 1984 Lucky-Gold-Star Group Conglomerated

GOLD STAR
Electronice('58) & Cable('62)

1983 Gold Star Heavy Industry established Gold Star acquired Tractor business with Gunpo plant from KHIC.
1977 KHIC(Korea heavy Industries & Construction Co.) started tractor business in Gunpo Plant with FLAT(current CNH) technology
1968 KHIC started HVAC business in Gunpo plant
1962 Gold Star Cable Ltd. Established
1958 Gold Star Electronics Ltd. established

LUCKY
LUCKY
Chemical('47) & Energy('67)

1947 Lucky Chemical company established

New Dream, New Start

To become a leader in the competitive global market, LG has been divided into three groups, electronics and chemicals for LG, energy and machineries distribution for GS, Industrial electric · electronic materials for LS based on their business specialties.

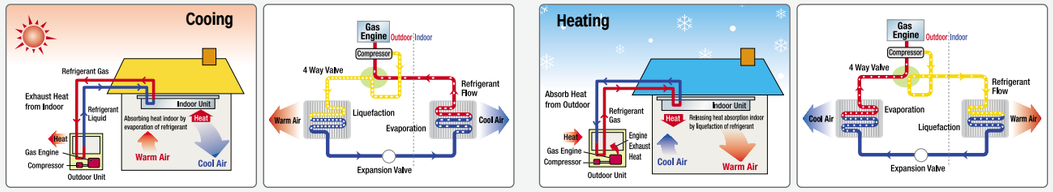
LS' main companies, such as LS cable, LS industrial systems, LS-Nikko copper, Gaon cable, E1 and Kukdong City gas, are ranked as No.1 in their respective industry. However, LS won't just sit back, satisfied with being the best in Korea. We will pave the way for becoming the world's best in Industrial electric · electronics and material industry with the new CI, LS.

Your good partner LG Cable is making a fresh start as LS Cable

LS Cable is No.1 cable maker in Korea and its business fields are telecommunication, electric power, components & materials and machinery. Also, LS Cable is creating new businesses particularly in component and materials industry. LS Cable makes its best to accomplish the vision, 'Your No.1 Creative Partner' and be one of the world leaders with high technology and best level of service.

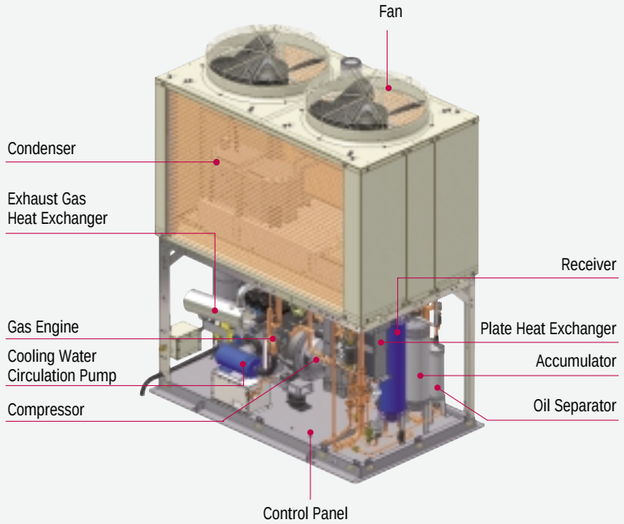
What is GHP?

EHP, electric heat pump, is operated by driving electric compressor which has about 35% energy efficiency. However, GHP, gas engine driven heat pump, is operated by driving gas engine.
GHP, as a gas cooing and heating system, distribute refrigerant from outdoor unit to indoor unit through engine-driven compressor.



LS GHP

Outdoor Unit



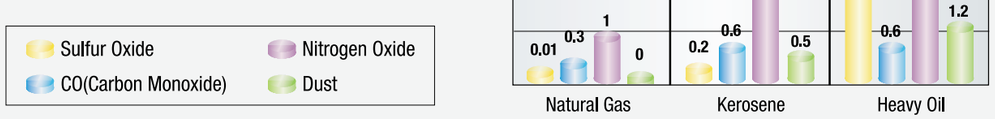
Features

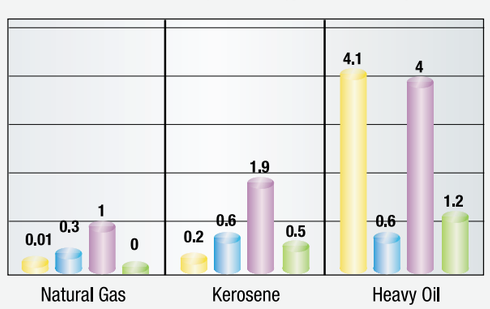
- 20HP(Cooling 56kW, Heating 67kW) 16HP(Cooling 45kW, Heating 54kW)
- COP 1.25 (Average for Cooling and Heating)
- Maximum 16 Connections of Indoor Units
- Adopts exclusively designed Gas Engine
- Individual and Central Control

Clean Energy

GHP consume Natural Gas which is clean fuel and safe energy that has higher ignition point and lower explosive risk

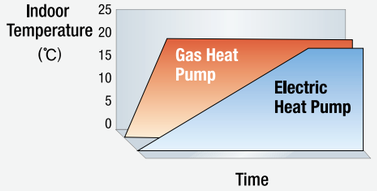
Pollutant Comparison (g/10000kcal)

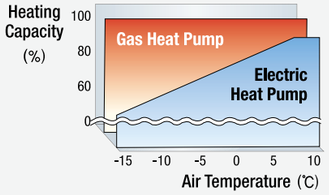




Powerful Heating

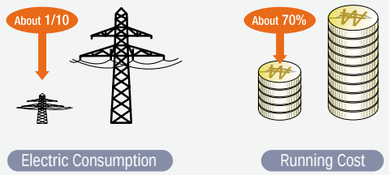
- Exhaust heat from the engine is converted to heating energy.
- No need of defrost control and fast reach comfortable temperature.

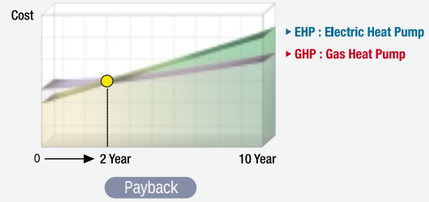




Economical Operation

- Low running cost (Low electric consumption)
- No need of substation





Environmental Friendly

The gas has 20% higher energy efficiency than electricity and reduce the CO2 and NOx emissions around 30% .

Efficient Energy Control

EHP vs. GHP

Sourced by Korea Energy Management Corporation (JULY. 2005)

EHP	GHP
Unstable heating operation at minus ambient temperature	More stable heating operation even at minus ambient temperature
Temperature of hot wind is low	Temperature of hot wind is high
Need defrosting to raise heat efficiency of evaporator	No defrosting
Low response against heating demand.	Fast response against heating demand.
Noise Level • Outdoor unit maximum 46db • Indoor unit maximum 52db	Noise Level • Outdoor unit maximum 41db • Indoor unit maximum 45db

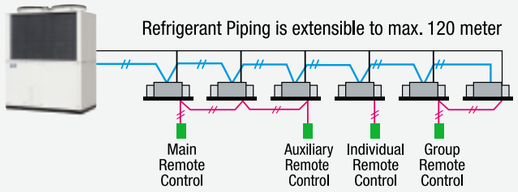
Energy Efficiency Comparison

Type	Gas Cooling	Electric Cooling	Remarks
Primary Energy	Gas	Gas	
Input Energy	Gas	Electricity	
Energy Conversion Efficiency	-	35% (High calorific value)	Statistics standard of Korea Electric Power Corporation (02')
COP	1.0 - 1.35 (High calorific value)	2.5 - 3.5	
Overall Efficiency	**1.0 - 1.35**	**0.88 - 1.23**	**Energy conversion efficiency x Machine efficiency**

High Performance, High Efficiency

Easy installation & Maintenance, Low operation cost

Multi Control System (Max. 16 Indoor Units with 1 Outdoor Unit)



Gas Supply Pressure

kpa/mmAq

Type	LNG
Maximum	2.5/250
Standard	2.0/200
Minimum	1.5/150

GHP Outdoor Unit Model Name

K1 Series	LSGP	O	560	K1	N	
	LS GHP	Outdoor Unit 'O' of Outdoor	Rated Cooling Capa. *1/10 kW	Series (Development Number)	Gas Type L : LNG P : LPG	Option ex) For Cold Region

Specifications

TYPE				450	560
Horse Power				16	20
Model No. (LSGP-)				O450K 1	O560K 1
Electric Power				3 Phase, 380V, 60Hz	3 Phase, 380V, 60Hz
Capacity		Cooling	kW	45.0	56.0
		Heating	kW	54.0	67.0
Dimensions (H x W x L)			mm	2,232 x 1,728 x 1,005	2,232 x 1,728 x 1,005
Weight			kg	970	990
Electric Character-istics	Cooling	Running Current	A	2.5	2.5
		Power Consumption	kW	1.5	1.5
		Power Ratio	%	91	91
	Heating	Running Current	A	2.5	2.5
		Power Consumption	kW	1.5	1.5
		Power Ratio	%	90	90
	Starting Current		A	30	30
Fuel Consumption		Cooling	kW	40.1	49.5
		Heating	kW	37.0	47.5
		Low Temperature Heating	kW	47.1	55.5
Compressor		Refrigerant Oil	/	5	5
		Crank Case Heater	W	70	70
Engine		Lubricating Oil	/	50	50
		Revolution	rpm	800 ~ 1,800	800 ~ 2,000
		Rated Output	kW	12.1	15.0
		Starting Motor		DC12V, 1.7kW	DC12V, 1.7kW
		Starting System		AC / DC Conversion, DC Starter	AC / DC Conversion, DC Starter
		Coolant Charging Volume	/	40	40
		Concentration and Freezing Temperature		50V/V% -35 ℃	50V/V% -35 ℃
Engine Coolant-Pump-Motor Rated Output			kW	0.42	0.42
Refrigerant Volume			kg	22	22
Air Suction Port				Front / Rear	Front / Rear
Air Discharge Port				Upper	Upper
Pipe Dimensions		Refrigerant Gas Pipe		∅ 38.1 (Soldering)	∅38.1 (Soldering)
		Refrigerant Liquid Pipe		∅ 19.05 (Soldering)	∅19.05 (Soldering)
		Fuel Gas Pipe		R 3/4 (Male Screw)	R 3/4 (Male Screw)
		Exhaust Drain Pipe		∅ 27 (Hose)	∅ 27 (Hose)
Noise Level (in operation)			dB(A)	60	60
Fan		Type x Number of Units		Propeller Fan x 2	Propeller Fan x 2
		Rated Air Volume	m³/min	300	300
		Rated Output of Motor	kW	0.45 x 2	0.45 x 2
Drain Filtering Heater			W	50	50
Fuel Heater			W	50	50
Refrigerant Heater			W	250	250
Painting Color				Ivory	Ivory

(*) Cooling and heating capacity are rated capacity.
Capacity is based on : Cooling mode - Indoor unit 27 ℃ DB, 19.5 ℃, WB / Outdoor unit 35 ℃ DB, 24 ℃ WB
Heating mode - Indoor unit 20 ℃ DB / Outdoor unit 7 ℃ DB, 6 ℃ WB

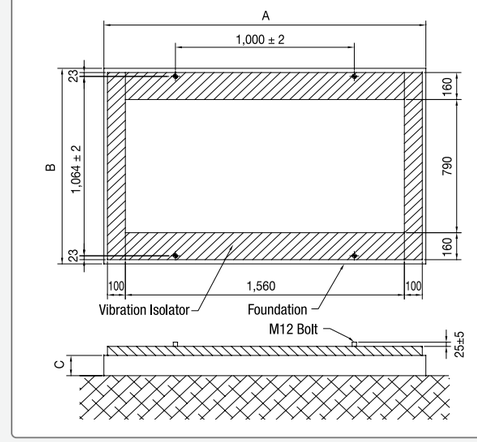
Installation Notice

- Fix the unit on the foundation through vibration isolator.
- Do not use rubber bushing which is not efficient.
- It is strongly recommended to use vibration isolator for rooftop installation.

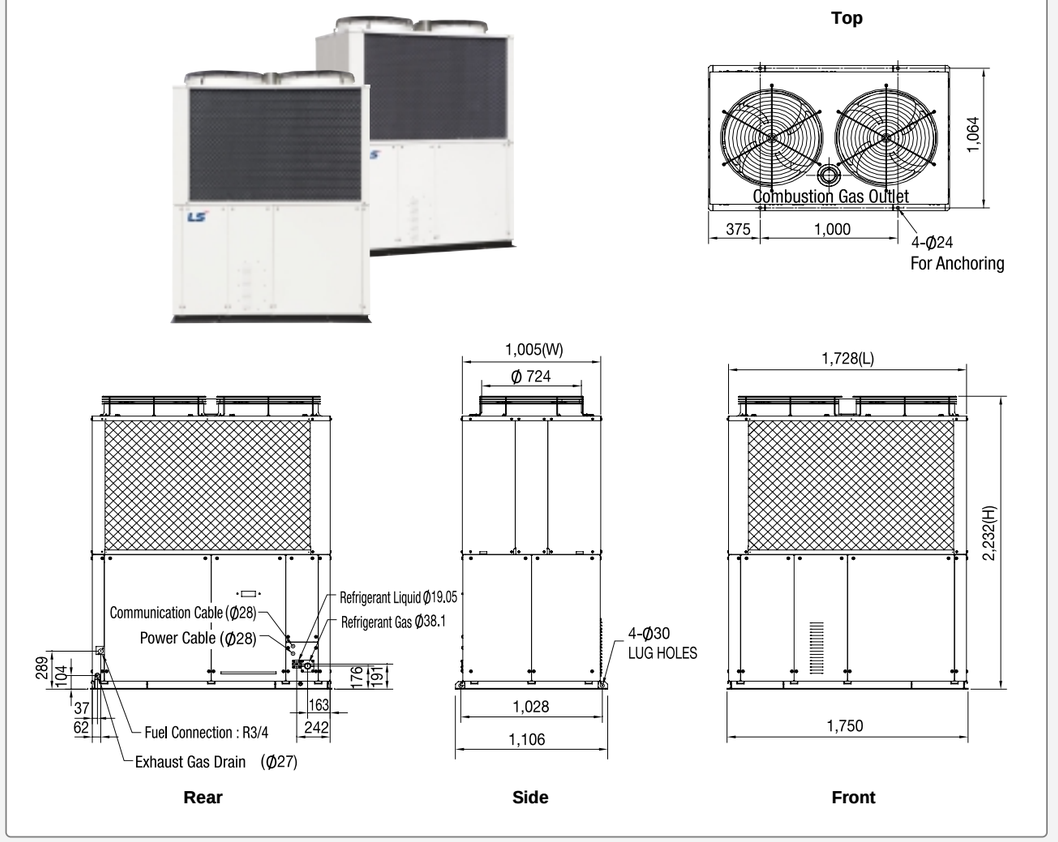
Dimension (mm)

Installation Division	A	B	C
Ground Installation	1,800	1,160	120
Rooftop Installation (Vibration Isolator)	2,000	2,000	140

Foundation



Outline

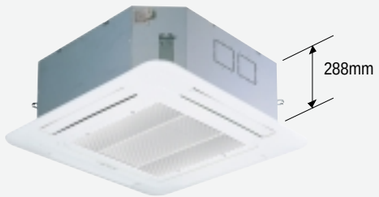


LSRB - N60AT, N72AT, N83AT, N100AT, N110AT, N145AT

Stylish & Elegant Interior Design

Compact Design

Thin and compact design permits smaller installation space.

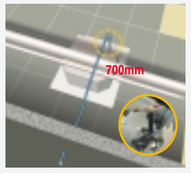


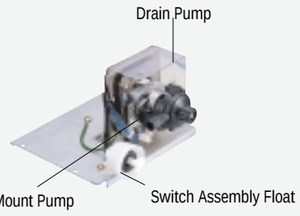
High-Efficient Antibiotic Filter

High-efficient antibiotic filter prevent a dust and germ and front-grill construction allows convenient and easy cleaning.

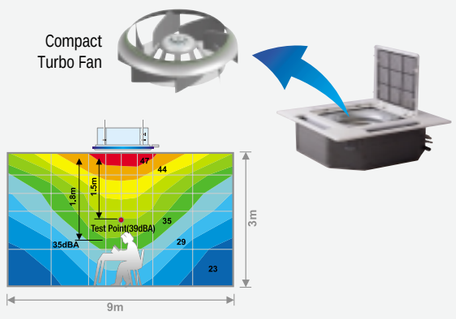
Built-in Automatic Drain Pump

Built-in drain pump simplify piping work and enable efficient drainage due to max. 700 meter of elevation piping.



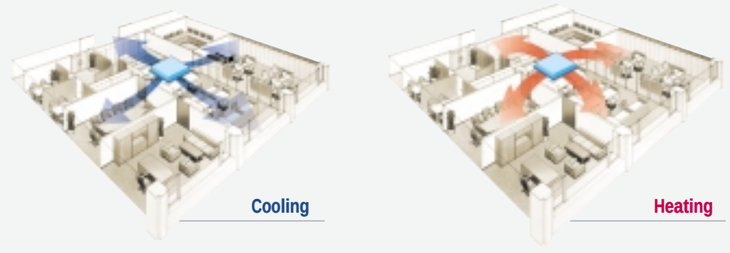


High-Efficiency Turbo-Fan



Powerful Cooling and Heating

Applying wide auto-louver which can blow equal wind from the four directions of the ceiling to every nook and corner as powerful ventilation, and reduce the temperature difference in the room.



Outline

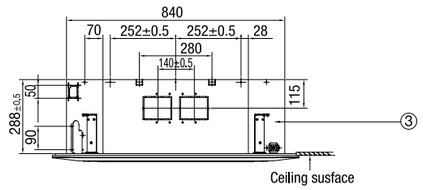
TYPE 60~145

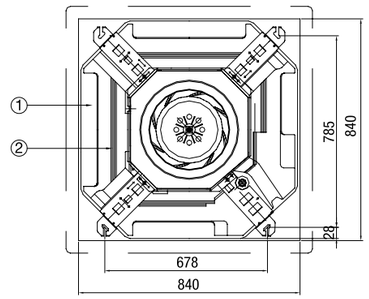
Main Parts

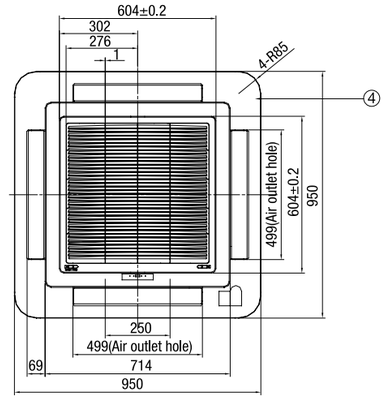
1	BASE ASSY, INDOOR
2	DRAIN ASSY
3	CABINET ASSY
4	FRONT PANEL ASSY

NOTE

1. Indoor unit~Outdoor unit : CVV-SB 1.25 x 2C
   Main power : CV 2.0 x 3C
2. Service valve (Gas pipe) : ∅15.88
3. Service valve (Liquid pipe) : ∅9.52
4. Drain pipe : ∅32 / Soft PVC







Specifications

Model No. [LSRB-]			4 Way Ceiling Cassette					
			N60AT	N72AT	N83AT	N100AT	N110AT	N145AT
								
Electric Power			1 Phase, 220V, 60Hz					
Cooling Capacity		kW	6,000	7,200	8,300	10,000	11,000	14,500
		kcal/h	5,160	6,200	7,100	8,600	9,460	12,500
Heating Capacity		kW	7,200	8,640	9,960	12,000	13,200	17,400
		kcal/h	6,190	7,440	8,520	10,320	11,350	15,000
Power Consumption	Cooling	kW		0.14			0.18	
	Heating	kW		0.14			0.18	
Running Current	Cooling	A		0.69			0.72	
	Heating	A		0.69			0.72	
Blower	Type	-	Turbo					
	Quantity	CMM	17	19	21	23	25	34/32/29
Refrigerant		-	R-22					
Body Size (H x W x L)		mm	288 x 840 x 840					
Panel Size (H x W x L)		mm	30 x 950 x 950					
Type of Filter		-	Long Life (Wrinkles)					
Weight (Including Panel)		kg	32					
Drain	Material	-	PVC					
	External Diameter	Ø/mm	32					
	Insulation	mm	10					
Pipe	Liquid/Gas Pipe	Ø/mm	9.52 / 15.88				9.52 / 19.05	
Cable	Between Indoor and Outdoor Unit	mm	CVV-SB 1.25 x 2C					
Power Line	Indoor Unit	mm^2	CV 2.0 x 3C					

(*) Cooling and heating capacity are rated capacity.
Capacity is based on : Cooling mode - Indoor unit 27℃ DB, 19.5℃, WB / Outdoor unit 35℃ DB, 24℃ WB
Heating mode - Indoor unit 20℃ DB / Outdoor unit 7℃ DB, 6℃ WB

LSRB | 1 Way Ceiling Cassette Type

LSRB - N23AC, N32AC, N40AC

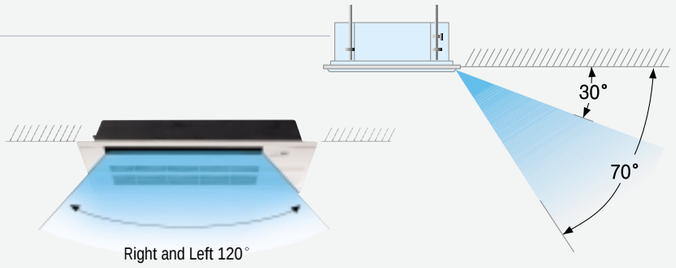
Stylish & Elegant Interior Design

Compact Design

The super thin and compact design allows to save installation space.

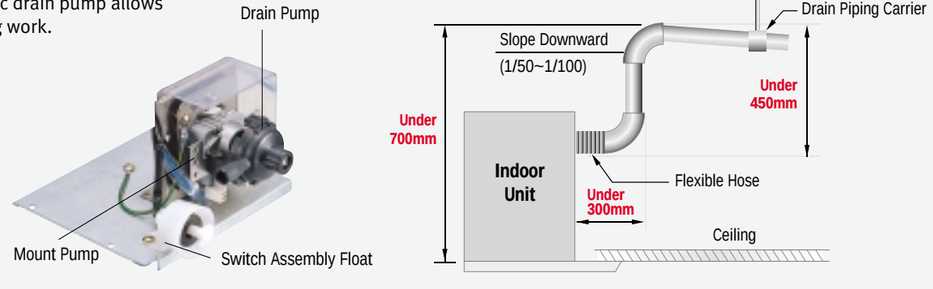
Wide Auto-Louver

Up and down auto-louver and wide type airstream control allow to minimize the temperature declination in the room and provide with more comfortable condition.



Built-in Automatic Drain Pump

Built-in automatic drain pump allows easy drain piping work.



Outline

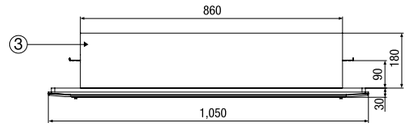
TYPE 23~40

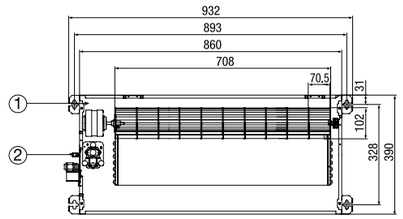
Main Parts

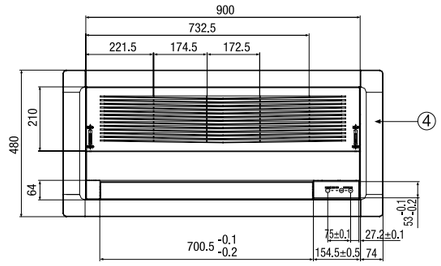
1	BASE ASSY, INDOOR
2	DRAIN ASSY
3	CABINET ASSY
4	FRONT PANEL ASSY

NOTE

1. Indoor unit~Outdoor unit : CVV-SB 1.25 x 2C
   Main power : CV 2.0 x 3C
2. Service valve (Gas pipe) : ∅12.7
3. Service valve (Liquid pipe) : ∅6.35
4. Drain pipe : ∅32 / Soft PVC







Specifications

Model No. [LSRB-]			1 Way Ceiling Cassette		
			N23AC	N32AC	N40AC
					
Electric Power			1 Phase, 220V, 60Hz		
Cooling Capacity		kW	2,300	3,200	4,000
		kcal/h	2,000	2,750	3,440
Heating Capacity		kW	2,760	3,840	4,800
		kcal/h	2,4/00	3,300	4,120
Power Consumption	Cooling	kW	0.05		
	Heating	kW	0.05		
Running Current	Cooling	A	0.22		
	Heating	A	0.22		
Blower	Type	-	C.F.F		
	Quantity	CMM	6.5	7.5	10.5
	Input	W	14		
Refrigerant		-	R-22		
Body Size (H x W x L)		mm	180 x 860 x 390		
Panel Size (H x W x L)		mm	30 x 1,050 x 480		
Type of Filter		-	Long Life (Wrinkles)		
Weight (Including Panel)		kg	17 (14+3)		
Drain	Material	-	PVC		
	External Diameter	∅/mm	32		
	Insulation	mm	10		
Pipe	Liquid/Gas Pipe	∅/mm	6.35 / 12.7		
Cable	Between Indoor and Outdoor Unit	mm	CVV-SB 1.25 x 2C		
Power Line	Indoor Unit	mm²	CV 2.0 x 3C		

(*) Cooling and heating capacity are rated capacity.
Capacity is based on : Cooling mode - Indoor unit 27℃ DB, 19.5℃, WB / Outdoor unit 35℃ DB, 24℃ WB
Heating mode - Indoor unit 20 ℃ DB / Outdoor unit 7 ℃ DB, 6℃ WB

LSRB | Ceiling-Concealed Duct Type

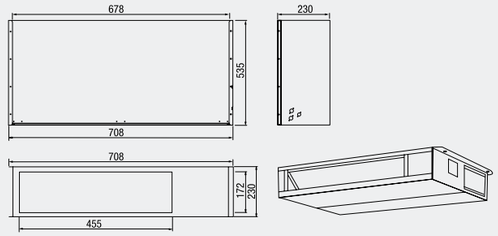
LSRB- N23AL, N32AL, N40AL

LSRB- N52AB, N60AB, N72AB, N83AB, N110AB

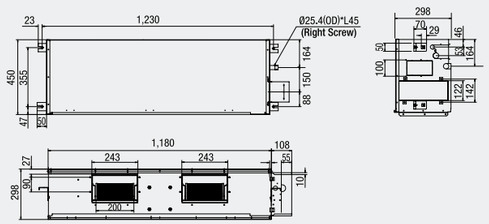
LSRB- N145AB

Outline

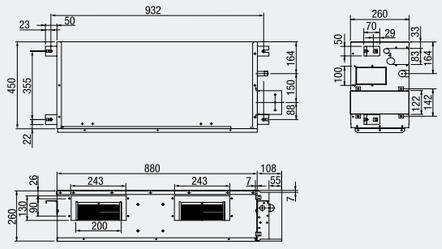
TYPE 23~40



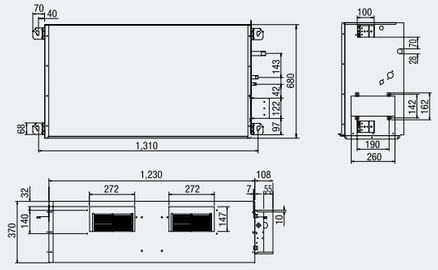
TYPE 52~72



TYPE 83~110



TYPE 145



Specifications

Model No. [LSRB-]			Ceiling-Concealed Duct Type								
			N23AL	N32AL	N40AL	N52AB	N60AB	N72AB	N83AB	N110AB	N145AB
Electric Power			1 Phase, 220V, 60Hz								
Cooling Capacity		kW	2,300	3,200	4,000	5,200	6,000	7,200	8,300	11,000	14,500
		kcal/h	2,000	2,750	3,440	4,450	5,160	6,200	7,100	9,460	12,500
Heating Capacity		kW	2,760	3,840	4,800	6,240	7,200	8,640	9,960	13,200	17,400
		kcal/h	2,400	3,300	4,120	5,340	6,190	7,440	8,520	11,350	15,000
Power Consumption	Cooling	kW	0.068			0.18			0.33		0.88
	Heating	kW	0.068			0.18			0.33		0.88
Running Current	Cooling	A	-			0.92			1.42		4
	Heating	A	-			0.92			1.42		4
Blower	Type	-	SIROCCO			CENTRIFUGAL					
	Quantity	CMM	7.5	9.3	10.5	15.3	15.8	16	25.3	29.6	47.5
			6	8.5	9.5	13.6	13.9	14.1	21.8	26.3	39.5
			5.5	6	7.5	10.3	10.7	11.1	17.6	23.6	32
	Available Static Pressure	mmAg	2			8			8		15
Refrigerant		-	R-22								
Body Size (H x W x L)		mm	230 x 708 x 535			260 x 880 x 450			298 x 1,180 x 450		370x1,230x680
Weight (Including Panel)		kg	32			35			38		70
Drain	Material	-	-			PVC					
	External Diameter	Ø/mm	-			32					
	Insulation	mm	-			10					
Pipe	Liquid/Gas Pipe	Ø/mm	6.35 / 12.7			9.52 / 15.88					9.52/19.05
Cable	Between Indoor and Outdoor Unit	mm	CVV - SB 1.25 x 2C								
Power Line	Indoor Unit	mm²	CV 2.0 x 3C								

(*) Cooling and heating capacity are rated capacity.
Capacity is based on : Cooling mode - Indoor unit 27℃ DB, 19.5℃, WB / Outdoor unit 35℃ DB, 24℃ WB
Heating mode - Indoor unit 20℃ DB / Outdoor unit 7℃ DB, 6℃ WB

LSRB | Wall-Mount Type

Gas Cooling / Heating System

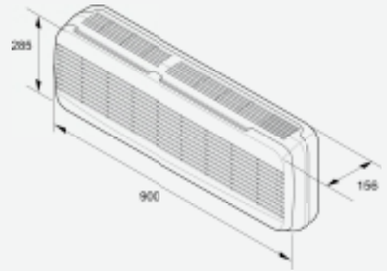
LSRB - N23AR, N40AR, N52AR

Saving of Installation Space & Silent Operation

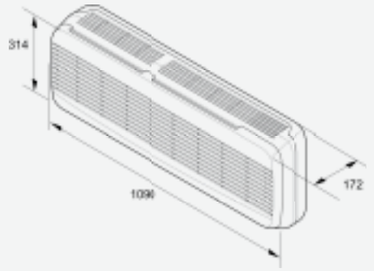
- ***Low Cost*** : This is completely economical for lower price than installed several air-conditioner and also needless extra installed stand.
- ***Saving Installed Space*** : One outdoor unit which connects several indoor unit can save the innovative installed space.
- ***Silent Running*** : Noise in air-conditioner by minimized wind would become silent as good as at the library by means of silent running.

Outline

TYPE 23~40



TYPE 52



Specifications

Model No. [LSRB-]			Wall-Mounted Type			
			N23AR	N32AR	N40AR	N52AR
Electric Power			1 Phase, 220V, 60Hz			
Cooling Capacity		W	2,300	3,200	4,000	5,200
			2,000	2,750	3,440	4,450
Heating Capacity		W	2,760	3,840	4,800	6,240
			2,400	3,300	4,120	5,340
Power Consumption	Cooling	kW	0.04			0.054
	Heating	kW	0.04			0.054
Running Current	Cooling	A	0.2			0.3
	Heating	A	0.2			0.3
Blower	Type	-	C.F.F			
	Quantity	CMM	6.8	9	10	12
Refrigerant		-	R-22			
Body Size (H x W x L)		mm	285 x 900 x 156			314 x 1,090 x 172
Type of Filter		-	Antifungal Filter			
Weight (Including Panel)		kg	9			12
Drain	Material	-	PVC			
	External Diameter	Ø/mm	16			
	Insulation	mm	10			
Pipe	Liquid/Gas Pipe	Ø/mm	6.35 / 12.7			9.52 / 15.88
Cable	Between Indoor and Outdoor Unit	mm	CVV - SB 1.25 x 2C			
Power Line	Indoor Unit	mm²	CV 2.0 x 3C			

(*) Cooling and heating capacity are rated capacity.
Capacity is based on : Cooling mode - Indoor unit 27℃ DB, 19.5℃, WB / Outdoor unit 35℃ DB, 24℃ WB
Heating mode - Indoor unit 20℃ DB / Outdoor unit 7℃ DB, 6℃ WB

Controller

System Controller

Features

■ **Power**

Single-phase 220V

■ **Input / Output**

- Remote Control Input (DC24V)
  Overall Run / Stop, Day Timer
- Remote Control Output (No Voltage Contact)
  Overall Run / Alarming (External Power within DC30V)

■ **Distance of Wiring**

- Max. 1km

Control Function

Item			Content
Function	Operation	Run / Stop	Run / Stop
		Temperature Setting	Temperature Setting Change
		Wind Direction Setting	Wind Direction Change
		Wind Velocity Setting	Wind Velocity Change
		Display	Condition for Indoor and Outdoor Unit
		Ventilation Control	Run / Stop
		Concentrated Address Setting	Address Setting of Each System Controller
		Operation Mode Change	Mode Change of Cooling / Heating / Ventilation
	External Input & Output	External Input	Run / Stop Signal Input (DC24V)
		External Output	Run / Stop / Abnormal Status Output (No Voltage DC30V, less than 100mA)
		Communication	RS 485 (MODBUS)
System Control	Number of Control	Number of Indoor Unit	Max. 64 Units
		Indoor Unit / Group	Max. 16 Units

Control mode can be selected with 10 patterns of operational condition

Mode		Operating Mode	
		Concentrated Control Mode	Remote Control Mode
Control Number Mode	Overall Mode	Overall * Ex) 1	Overall
	Zone 1 Mode	Zone 1 * Ex) 2	Zone 1
	Zone 2 Mode	Zone 2	Zone 2 * Ex) 3
	Zone 3 Mode	Zone 3 * Ex) 4	Zone 3
	Zone 4 Mode	Zone 4	Zone 4 * Ex) 5

Operating Mode : Concentrated control mode, Remote control mode

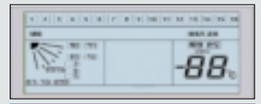
- **Concentrated Control Mode** : System controller is used as a concentrated controller
- **Remote Control Mode** : System controller is used as a remote controller

Control Number Mode : Overall mode, Zone 1 • 2 • 3 • 4 mode

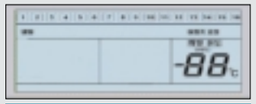
- **Overall Mode** : Can be selected by Overall, Zone, Group
- **Zone 1 • 2 • 3 • 4 Mode** : Indoor unit of one zone can be selected

Wired Remote Controller

Display

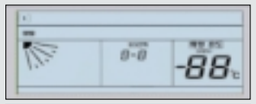


All sides • ceiling rack, two sides • high ceiling one sides



Fill-up at ceiling • fill-up duct one sides cassette

Wall-hanging

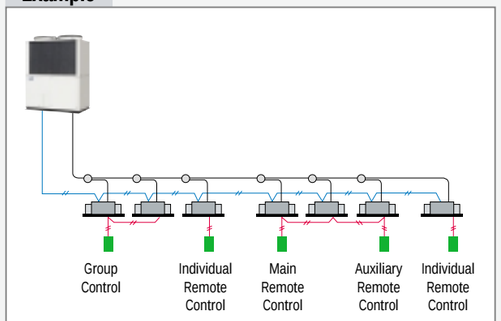


Group control display

※ Group Control Function : Max. 8 Indoor units are controlled through 1 wired remote controller

Automatic Louver

Example

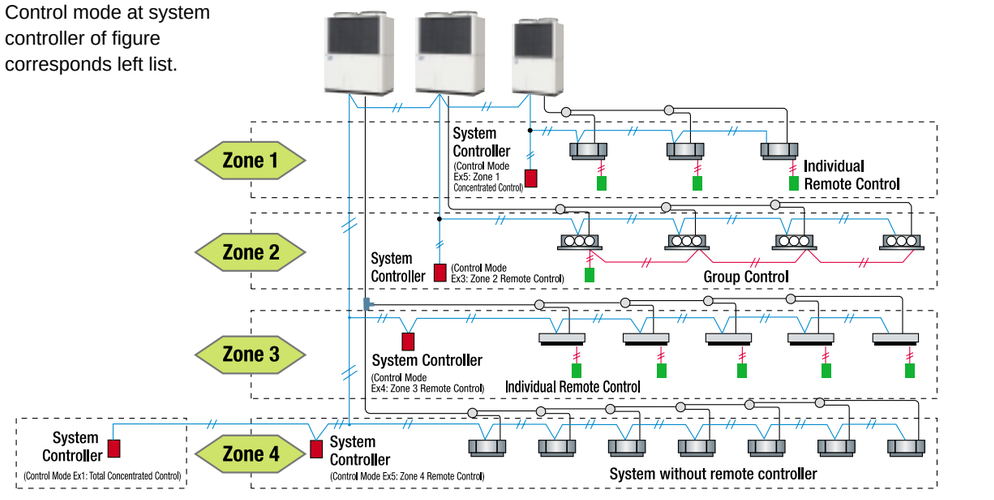


Control Function

Item			Content
Func-tion	Operation	Start/Stop	Start/Stop control of indoor unit
		Temperature Set	Start/Stop control of indoor unit
		Running Mode Change	Cooling/heating/dehumidification/ ventilation mode
		Wind Direction Set	Louver position change
		Wind Velocity Set	Wind velocity change
		Display	Indoor/outdoor unit condition
		Fan Control	Start/Stop ventilated fan of indoor unit
		Concentrated Address Set	Setting address at each system controller
		Reservation Set	Run/stop time setting
	Number of Control	Number of Indoor Unit	Max. 8 units
Connection	Power & Communication		Nonpolar 2 wires

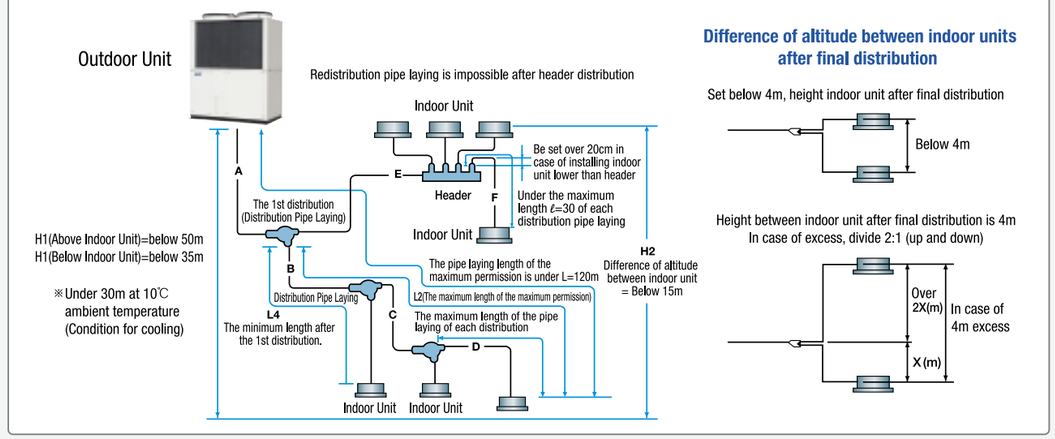
Example

※ Control mode at system controller of figure corresponds left list.



Design • Construction

Refrigerant Pipe Layout



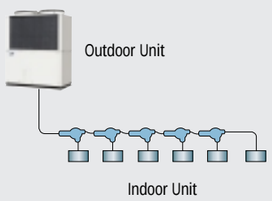
Limit of the Refrigerant Piping Length

Item		Outdoor Unit	Type 560
Individual Running of the Indoor Unit			O
Capacity Ratio of the Indoor Unit per the Outdoor Unit			50 ~ 200%
The Minimum Capacity of the Possible Connect Indoor Unit			23 Type
The Maximum Number of the Possible Connect Indoor Unit (by classification)			16 EA
The Maximum Permission Length of the Pipe (L)*		A+B+C+D	Under 120m (Equivalent length under 145m)
After the First Distribution (Different between maximum and minimum length from the first distribution)		L2 - L4	Under 30m
The Maximum Length of the Pipe (Laying Each Distribution)		I	Under 30m
Difference of Altitude Between Indoor Unit and Outdoor Unit	Outdoor above Indoor Unit	H1	Under 50m
	Outdoor below Indoor Unit	H1	Under 35m(Under 30m in case running at below 10 ℃ temperature)
Difference of Altitude Between Indoor Units		H2	Under 15m
The Maximum Length Between the First and Last T Type Pipe			Under 2m

* The minimum pipe laying length between indoor and out door unit : over 7m

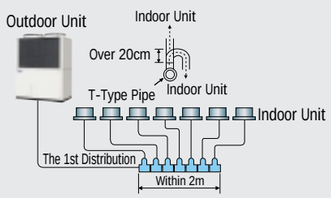
Distribution Method of the Refrigerant Pipe

Line Distribution Method



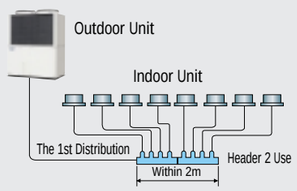
T-type Distribution Method

Notice 1 : Redistribution is impossible after T-type pipe distribution.
Notice 2 : Keep the header headed to upper side of horizontality in case of installing the indoor unit lower than T-type pipe.
Notice 3 : Keep the total length of the distribution parts as under 2m



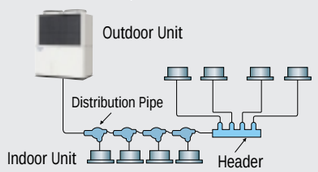
Header Distribution Method

Notice 1 : 4 distribution per each header. In case of over 5 for header method, keep the following picture.(connect two headers)
Notice 2: Header headed to upper of horizontality in case of installing the indoor unit lower than header.



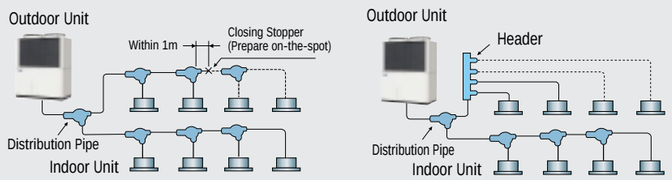
Header+Compositive Distribution Method of the Distribution Pipe

Notice : Redistribution is impossible after the header distributes.

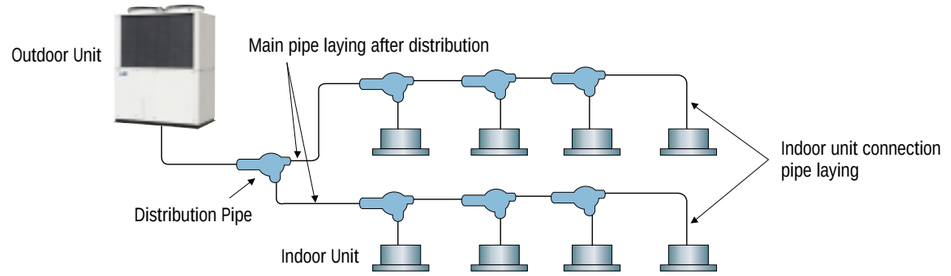


Easy Installing of More Indoor Unit

Notice : Additional installation to existing system keep its total capacity over 50% of outdoor unit capacity.



Size of the Distribution Pipe



Size Selection of the Distribution Pipe Laying

Type	Size of the outdoor pipe laying		Main pipe laying after distribution					Indoor unit connection pipe laying				
			The sum total of connected indoor unit (kW)									
			112.0~35.6	35.5~28.1	28.0~14.3	14.2~9.0	9.0 미만	28.0	22.4	16.0~9.0	8.0~4.5	3.6~2.8
Type 450, Type 560	Gas	∅38.1	∅38.1	∅31.75	∅28.58	∅19.05	∅15.88	∅28.58	∅25.4	∅19.05	∅15.88	∅12.7
	Liquid	∅19.05	∅19.05	∅15.88	∅12.7	∅ 9.52	∅9.52	∅12.7	∅12.7	∅9.52	∅9.52	∅9.52

Size of the Refrigerant Pipe Laying

Type	Size of the outdoor unit pipe laying	
	Gas pipe	Liquid pipe
■ Outdoor Unit		
Type 450, Type 560	∅38.1	∅19.05
■ Indoor Unit		
Type 22~36	∅12.7	∅9.52
Type 45~80	∅15.88	∅9.52
Type 90~160	∅19.05	∅9.5
Type 224	∅25.4	∅12.7
Type 280	∅28.58	∅12.7
Type 355	∅31.75	∅15.88
Type 450	∅31.75	∅19.05
Type 560	∅38.1	∅19.05
Type 900	∅31.75 x 2	∅19.05 x 2

Refrigerant Charge

■ Refrigerant charge amount

Liquid pipe size(mm)	Charge amount per 1m(g/m)
∅9.52	75
∅12.7	125
∅15.88	220
∅19.05	330

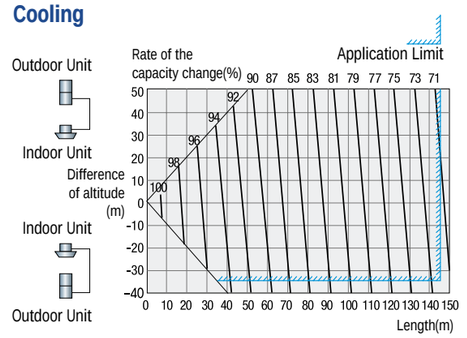
■ Refrigerant charge amount in case of liquid Pipe

330 x (a) + 220 x (b) + 125 x (c) +75 x (d)

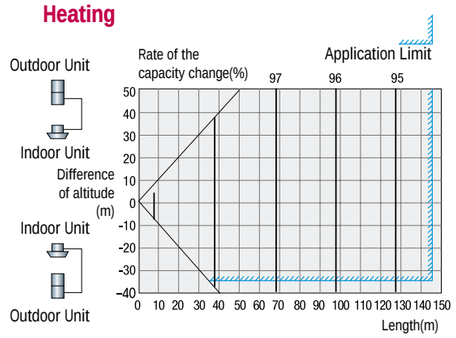
(a) : Liquid pipe total length of ∅19.05 (m)
(b) : Liquid pipe total length of ∅15.88 (m)
(c) : Liquid pipe total length of ∅12.70 (m)
(d) : Liquid pipe total length of ∅9.52 (m)

Capacity Change According to the Length of the Refrigerant Pipe

Cooling



Heating



Caution

Ensure Enough Space for Maintenance

1. Maximum 3 units possibly connected in series.

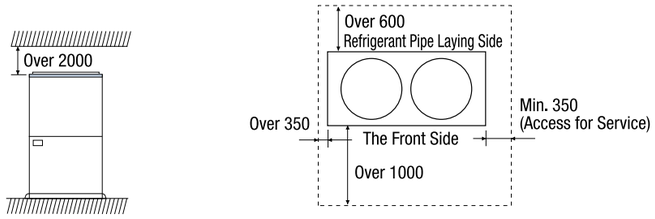
Install outdoor unit as per following the figure with ensuring service space in order to increase ability of the heat exchange at the airy place

2. In case of installing outdoor unit over 8 units.

In case of installing outdoor unit over 8 units in non-ventilated place or being wall around, then be sure that the discharged gas must not be inhaled to the system again.

■ Separate Installation (All Kinds in Common)

Unit : mm

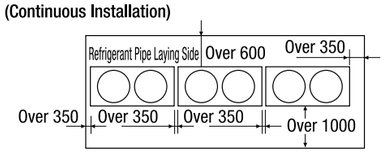


■ Plural Installation (All Kinds in Common)

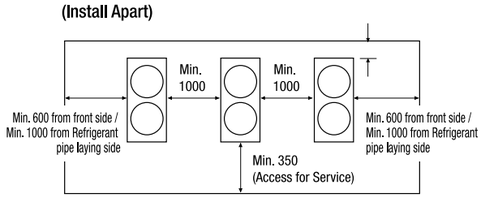
Unit : mm

[Service Space for Installation]

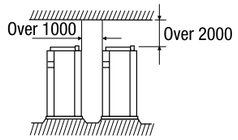
(Continuous Installation)



(Install Apart)

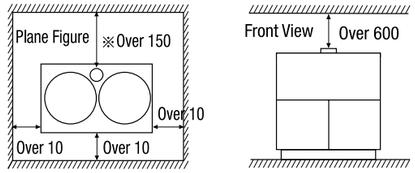


[Distance between the Upper Part and the Barrier]



[Safety Distance of the Combustible circumstances]

※ Safety Distance at an Exhaust Pipe



※ Please, ensure the above measure in installing.

Do not install outdoor unit at the following places

▶ **Place without maintenance space**

You may use many machines and tools for maintenance. So unless you have enough space for it, you will be in trouble about services and maintenance.

▶ **Unventilated place**

Installation at the unventilated place like closed space is strictly prohibited because it can causes accident or function of machine.

▶ **Side of the street lamp and a line of trees**

Many kinds of insects are gathering at the street lamp. Also installation near a line of trees can bring something wrong and normal operation is impossible because the machine can inhale leaves through louver.

▶ **Additional caution**

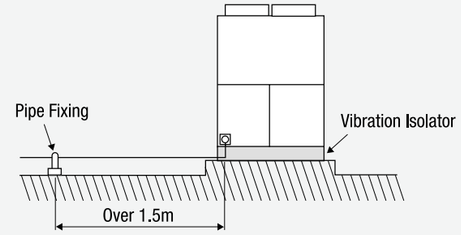
In the place of chemical area, near exhaust gas chimney, strong windy area, near seashore, or next to wall(not the type of sound absorbing wall), the special options like anti-corrosion or soundproof material must be adopted to the outdoor unit.
In case of installing the unit on the ground levels, please make sure that other pollutant like a drop of water or oil remnants must not drop to the outdoor unit.

Caution while Carrying Outdoor Unit

1. When you move outdoor unit, work it on the palette(carrier prepare) or use a lift hole onto (prepared at field) the Lug Hole of the base of the outdoor unit.
2. While carrying in, Lug Hole is surely used for load equally.
3. While carrying in, be careful with the upper frame of outdoor unit in order not to be scratched and transform at trim.
4. When you bring in outdoor unit, do not lay down its sideways. It is going to be a reason of the disorder and damage.

About Vibration Isolator

1. Installation outdoor unit on the roof in where close to living room or conference room can cause vibration to downstair. The outdoor unit requires a vibration isolator and also use flexible hose to protect the refrigerant pipe from vibration.
2. Refrigerant pipe should be fixed over 1.5m apart from outdoor unit.
3. Please follow the instruction manual of the vibration for proper installation.



About Condensed Water Drain Pipe from Exhaust Gas of Outdoor Unit

1. If you lay the drain pipe of condensed water from exhaust gas to drain well which is closed with cover, then the exhaust gas might inflow into building. So please make sure that the drain pipe must be connected to open space.
2. Do not use the drain of the outdoor unit and the drain of the indoor unit pipe in common.
3. In case of installing outdoor unit on the roof of the building, please extend the drain pipe to the waterway of rain following the figure No.2.
4. Please keep the slope of drain above 1/50 slope and keep the pipe straight.
5. In the event of connecting several outdoor unit at the just one drain pipe, open the pipeline sections of drain to the air so that a exhaust gas will not flow backward. If a exhaust gas flows backward, you may fail to start.
6. In the event of being concerned about the drain pipe freezing at the intense cold region, prepare antifreeze for example electric heater .
7. Install at the good position for the condensed water drainage.
8. Materials of the drain pipe should be made of the vinyl chloride or stainless.

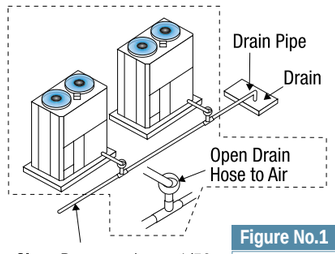


Figure No.1

When exhausted drain is connected with the drain

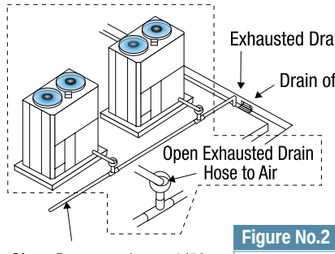
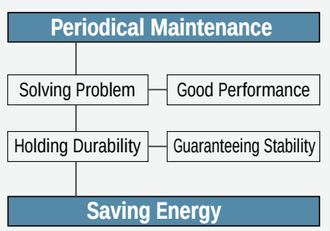


Figure No.2

When exhausted drain is connected with the rain drain

GHP-Periodical Maintenance is surly necessary.



Main Items of the Periodical Maintenance

1. Exchanging engine oil
2. Checking level of cooling water
3. Inspecting chain of engine
4. Confirming a safety of device
5. Inspecting and controlling running condition and data capture.

GHP should be checked regularly alike a car in order to use efficiently.

GHP needs to be inspected regularly for preventing troubles and holding ability because the power sources come from the gas engine.
The contract of the periodical maintenance of LS GHP, is required for good maintenance.