SAFETY

[Heating and Cooling Operation]

1. The air conditioning units introduced in this catalogue are for human environment use. Don't use them for specialised purposes such as food, precision machinery, artworks or animals. They could cause deterioration or other problems.
2. Don't use these air conditioning units in vehicles or ships. Damage due to vibration, salt, etc. could cause water leakage, oil leakage, or short circuits.

[Before Use]

1. Before using this equipment, be sure to read the handling instructions, warranty, etc. carefully.

[Installation]

1. Entrust placement and installation work to your dealer or specialist. Improper installation can cause water or oil leakage, electric shocks or fire, etc.
2. Be sure to use the type of gas specified for your external unit.
3. Be sure to use only air cleaners, humidifiers, etc. specified by Yanmar. Entrust placement and installation work to your dealer or specialist. Improper installation can cause water or oil leakage, electric shocks or fire, etc.
4. When installing a unit in a small room, care must be taken to ensure that the concentration of the coolant, in case of leakage, does not exceed the permissible concentration. The specified coolant is safe, being non-poisonous and non-flammable, but if a leak occurs in a small room of less than the specified volume, there is a danger of suffocation. Accordingly, counter measures must be taken to ensure that the permitted coolant concentration is not exceeded.
5. Both the indoor and outdoor units must be placed in locations that can support their weight.
6. Electrical work should be performed by a qualified electrician in accordance with the technical standards for electrical installation, internal wiring regulations and the installation instructions. The rated power source, capacities and electrical specifications of circuit breakers, switches and wires must all be properly observed, and proper earthing must be provided.
7. In dusty environments, etc., dust deposits may lower performance and cause breakdowns or damage. Conduct regular inspections and cleaning according to the operational circumstances.
8. If moving and reinstalling indoor or outdoor units, entrust the work to your dealer or a specialist.

[Place of Use]

1. Place the outdoor unit in a place with free air flow where exhaust emissions will not accumulate. Also, beware that exhaust emissions can cause poisoning if they can enter the building through ventilation ducts, windows, pipes, etc.
2. Don't install the outdoor or indoor units in places liable to leaks, flows or accumulation of inflammable gas, places with volatile gases, or places with free carbon fiber.
3. Avoid installation in unusual atmospheres, such as those with high acidity or alkalinity, (hot spring regions with sulfurous gas, places with incinerator fumes), because the heat exchange unit, etc. is liable to corrode. In coastal areas exposed to sea winds, avoid installation in places directly exposed to the wind. Use of an outdoor unit with special salt-resistance is recommended.
4. Ordinary air conditioning units are liable to malfunction in oily air, when the oil accumulates on the heat exchanger, etc. The heat exchange performance may deteriorate, synthetic resin parts may be deformed and damaged, the heat exchanger may be corroded, insulating materials may become detached, etc.
5. High frequency signals and noise should be considered when selecting the installation site. It is especially recommended to place the indoor unit some distance away from electronic instruments, etc.
6. In a place with a high ceiling, install ceiling fans or circulators.
7. Maintain sufficient space around the units for regular inspection and maintenance work. When installing in a high location, be sure to attach safety handrails, fences, etc.

[Regular Inspection]

1. The gas heat pump air conditioning unit must be inspected regularly. Failure to do so will lead to breakdowns. Be sure to enter a regular inspection contract with your dealer or a specialist.
2. Specialist knowledge is required for cleaning inside the indoor unit. Entrust the work to your dealer or a specialist.

YANMAR ENERGY SYSTEM CO.,LTD.

Overseas Marketing Dept.
5-12-39 Oyodonaka, Kita-ku, Osaka, Japan 531-0076
Phone: +81-(0)6-6451-4503 Fax: +81-(0)6-6451-7955

Head Office
5-12-39 Oyodonaka, Kita-ku, Osaka, Japan 531-0076
Phone: +81-(0)6-6451-7838 Fax: +81-(0)6-6451-1039

CERTIFICATION INTERNATIONAL ISO 14001:2004 Cert No: CI/5129E UKAS ENVIRONMENTAL MANAGEMENT 063

CERTIFICATION INTERNATIONAL ISO 9001:2000 Cert No: CI/5129 UKAS QUALITY MANAGEMENT 063

N1 8283

YANMAR www.yanmar.co.jp/en/energy/

Product inquiries can be made at any Yanmar office, branch office, or sales office.

This catalogue is printed on 100% recycled paper.
- This catalogue is effective from October 2008.
- Specifications in this catalogue are subject to change without notice in order to incorporate improvements, etc.
- Product colours in this catalogue may differ slightly from those of actual products.

YANMAR

GHP General Catalogue August 2008

Creating Air-Conditioned Comfort

YANMAR

Gas Heat Pump Air Conditioning Unit

Eco Compact H1 Series

R410A

YANMAR ENERGY SYSTEM CO.,LTD.

Great for Comfort and Great for the Environment. People-Friendly Yanmar Gas Heat Pump Systems.

The excellent power and performance provided by gas makes gas heat pump air conditioning units the ideal way to comfortably heat or cool large spaces. Variable engine speed control operation and a range of air-distribution functions work together to eliminate any noticeable temperature fluctuations and provide constant comfort. Sound levels are low and air is pure.

Gas heat pump units also offer outstanding cost-performance and operational efficiency. As well as being energy-saving, they do not require large electrical power supplies. This means it is not necessary to install additional incoming electrical power equipment.

These air conditioning units are perfect for shops such as boutiques, restaurants, and convenience stores, and also offices, schools, daycare centres, sports clubs, recreational facilities, and factories. Year-round comfort is waiting for you.

CONTENTS

People- and Environment-friendly, comfortable air conditioning

Eco Compact
H1 Series

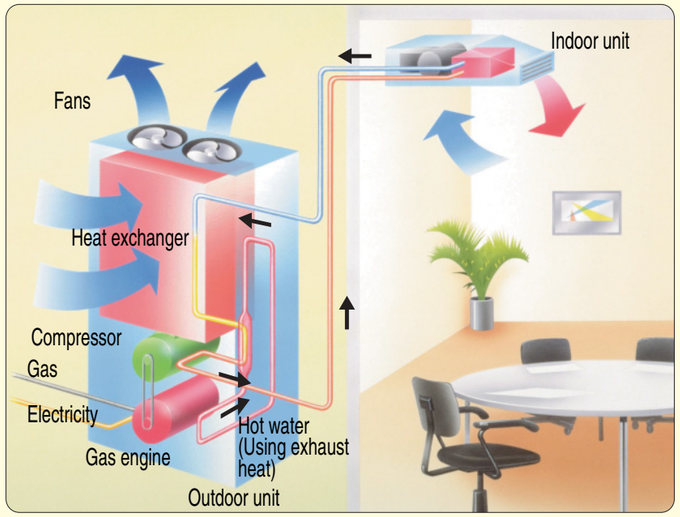
Gas Heat Pump Mechanism

Dependable Power and Outstanding Energy Savings
Our Advanced Gas Engine is the Key to Air-conditioned Comfort

GHP system construction

In gas heat pump (GHP) air conditioning units, a gas engine rotates the compressor to provide heating and cooling based on the heat pump cycle. The GHP indoor units and system operation are the some as for an electric system and no gas is combusted indoors.

The only difference from an electric heat pump air conditioning unit is that a gas engine rather than an electric motor drives the compressor. However, this one difference produces major benefits.



Heat pump cycle

When a liquid evaporates, it usually takes heat from its environment. Conversely, when vapor condenses and liquefies, it releases heat. This characteristic is utilised in the process called the "heat pump cycle." In this cycle, coolant circulated by the compressor is repeatedly mechanically evaporated and condensed to produce heating and cooling.

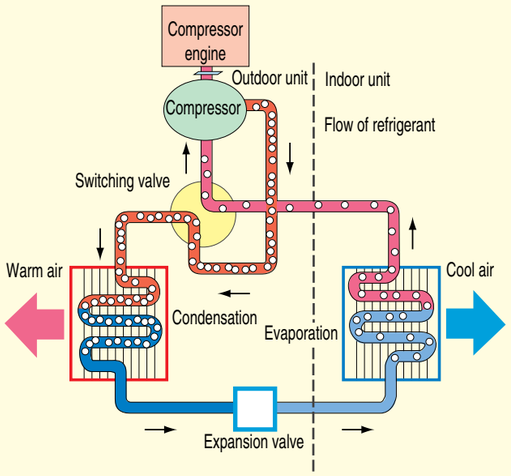
Cooling principle

If you dab a little alcohol on your arm, you will feel a cool sensation as the alcohol evaporates. This is because the alcohol draws heat from your skin during evaporation.

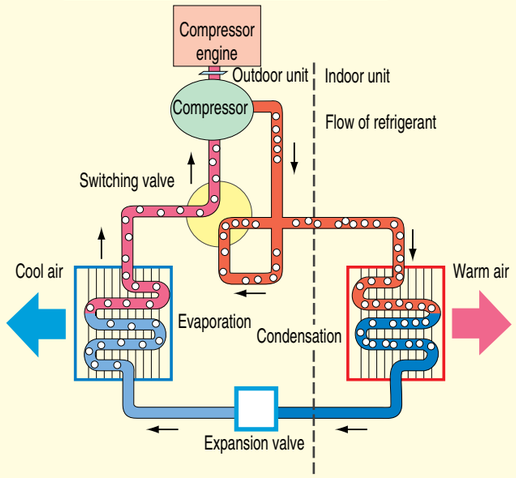
Heating principle

If you move your hand close to the steam of a boiling kettle, your hand will feel hot. This is because when the high-temperature steam touches your low-temperature hand and the vapor changes to liquid, it releases heat onto your hand.

Cooling Cycle



Heating Cycle



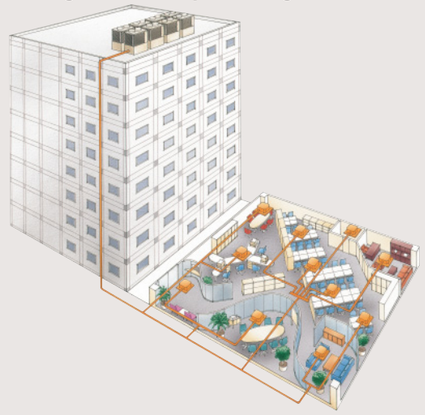
Introduction to the Gas Heat Pump Series

Building Multi System

Flexibly meets the varied air-conditioning requirements of different building sizes and space usages

The wide-ranging requirements presented by the variety of volumes and shapes of enclosed spaces, as well as the variety of air-conditioning uses found in different buildings, are met by individual indoor units chosen to suit each application. The incorporation of the main refrigerant piping into a single system also gives flexibility in planning and installation.

Indoor units are available in a range of model variations to simplify selection of the unit that best fits the use, installation space, and, of course, room decor. In addition, the ability to simultaneously control indoor units of different capacities and types using a centralized control system allows even more precise individual operation of the air-conditioning system.



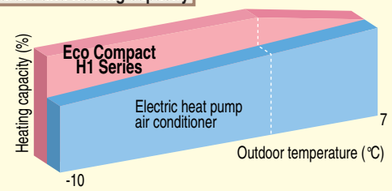
Gas Heat Pump Merits

A Gas Air-Conditioning System Efficiently Uses Valuable Energy Resources to Provide Exceptional Economy and Comfort

Powerful heating

Exhaust heat from the gas engine is used for efficient heating. Comfort is maintained even during low outdoor temperatures.

Outdoor temperature and heating capacity

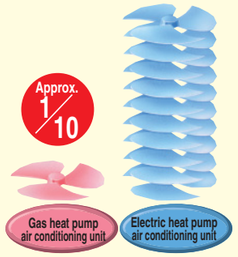


Many different savings

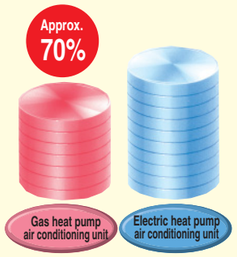
A GHP unit is driven by a gas engine, meaning only the fan and peripheral equipment consume electricity. This reduces power consumption to only approximately 10% of an electric air conditioning unit of similar class. This reduction in electricity consumption may allow reduced contracted power charges and the reduction of incoming power supply equipment costs.

As well as cutting power consumption, the use of economical gas as the main energy source also offers reductions in running costs. In addition, the GHP control system adjusts the engine speed to match the indoor load, which makes economical and comfortable, high-efficiency operation possible.

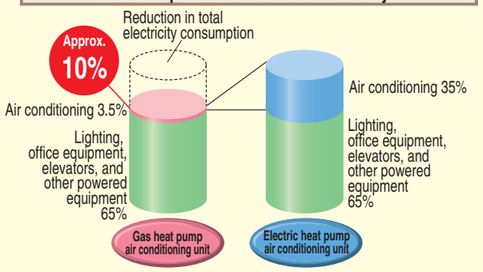
Reduction of Power Consumption



Running Costs



Rate Comparison for Contract Electricity



Your exact savings will depend upon local energy costs.

Unlike large systems that use cooling towers, GHP air conditioning units do not need to use our precious water resources for cooling. This can reduce the water consumption in a typical large building by around 20%.

Eco Compact H1 Series

Environmentally Friendly 1

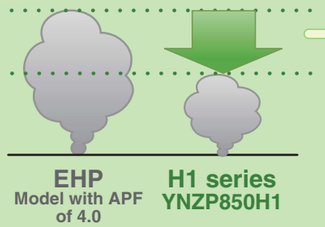
High-Efficiency Yanmar GHP Dramatically Reduces CO_2 Emissions

Estimate CO_2 Reduction for 300 HP (30 HP x 10 units) Installation Running on Natural Gas or Propane Gas

Annual reduction in CO_2 emissions of around

55 t (Natural gas)
43 t (Propane gas)

Comparison of Annual CO_2 Emissions



Natural gas
41% less

Propane gas
33% less

Natural gas

This is equivalent to the annual CO_2 adsorption power* of

Around 3,900

Japanese cedar trees.

Propane gas

This is equivalent to the annual CO_2 Adsorption Power* of

Around 3,100

Japanese cedar trees.

* A single Japanese cedar can adsorb around 14 kg of CO_2 per year.
Source: Report on using the adsorption power of greenery to prevent global warming by the Forestry Agency of the Japanese Ministry of the Environment.

Conditions for Estimate

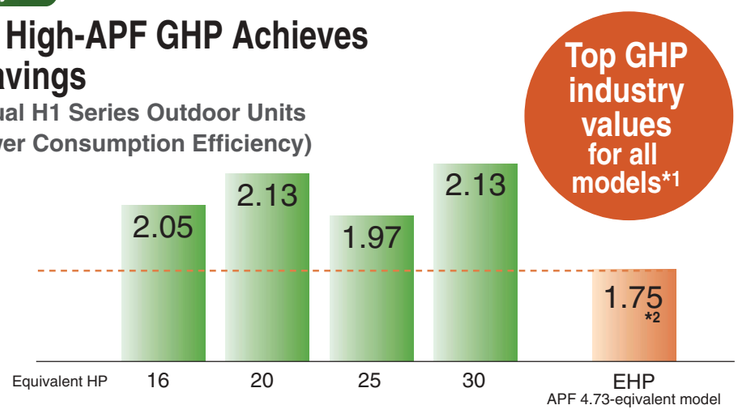
- Indoor units
  50 Hz P140 4-way cassette model x 6 units
  The units are part of an office system operated in Tokyo, Japan.
- Outdoor units
  30 HP GHP YNZP850H1 model x 10 units
  APF: 2.14 Total annual load: 766,730 kWh; Estimated annual gas volume: 335,050 kWh; Annual power consumption: 23,700 kWh
  The APF, total annual load, estimated annual gas volume, and annual power consumption are calculated based on JIS B 8627.
- APF: 4.0 Annual power consumption: 191,680 kWh
  (The same total annual load as for a GHP system is used, and the value is back-calculated from the APF for an EHP system.)
- CO_2 emission coefficient for electric power: 0.69 kg-CO_2/kWh
  Interim Report by the Goal Achievement Scenario Subcommittee of the Global Environmental Section of the Central Environmental Council. Environmental report guidelines for FY2007 issued by Japan's Ministry of the Environment.
- CO_2 emission coefficient for Natural gas: 0.0506 kg-CO_2/MJ, Propane gas: 0.0598 kg-CO_2/MJ
  Manual for the calculation and reporting of greenhouse gas emissions issued by Japan's Ministry of the Environment and Ministry of Economy, Trade and Industry in June 2007.

Environmentally Friendly 2

High-Efficiency, High-APF GHP Achieves Major Energy Savings

APFs for Individual H1 Series Outdoor Units (Year-Round Power Consumption Efficiency)

Models: Standard type
Area: Tokyo, Japan
Application: Office-use



Top GHP industry values for all models*1

*1 Based on Yanmar research as of December 2007.
*2 Based on incoming electrical generation efficiency of 0.369.

APF Provides a Clearer Indication of Actual Efficiency

Until now…

COP — Power consumption efficiency [Coefficient Of Performance]

$$COP = \frac{\text{Rated capacity (kW)}}{\text{Gas consumption (kW) + Electricity consumption (kW)}}$$

Operational efficiency at fixed temperature conditions

The COP indicates the heating/cooling capacity per 1 kW of electricity/gas consumption during rated heating/cooling operation.

Highway only

Imagine fuel consumtion when driving on a highway at constant high speed.
Not realistic

From now…

COP+ APF — Year-round power consumption efficiency [Annual Performance Factor]

$$APF = \frac{\text{Capacity production during heating/cooling periods (kWh)}}{\text{Electricity/gas consumption during heating/cooling periods (kWh)}}$$

Operational efficiency close to the actual usage conditions based on the building application and usage period

The APF indicates the heating/cooling capacity per 1 kW of electricity/gas consumption based on the year-round usage conditions for an air conditioner.

All roads

Imagine fuel consumtion including driving around town.
More realistic

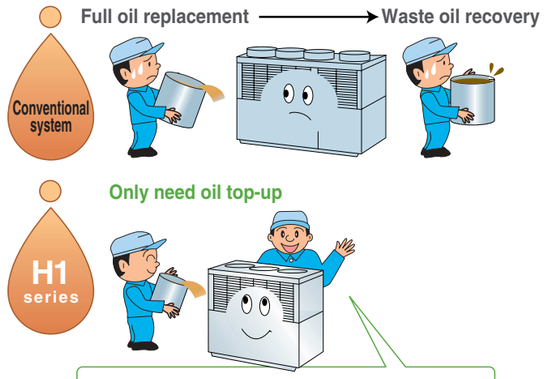
Note: The relative values for COP and APF will not always match.

Environmentally Friendly 3

Doubling of the Period between Oil Changes Reduces Resource Usage

While it was previously necessary to change the engine oil every 10,000 hours, this is now only required after 20,000 hours. (After 10,000 hours only an oil top-up is needed.*)

* Complete replacement of all oil is required at the 20,000 hour mark. If the system is operated under high-load conditions, the oil may sometimes require replacement after only 10,000 hours.)

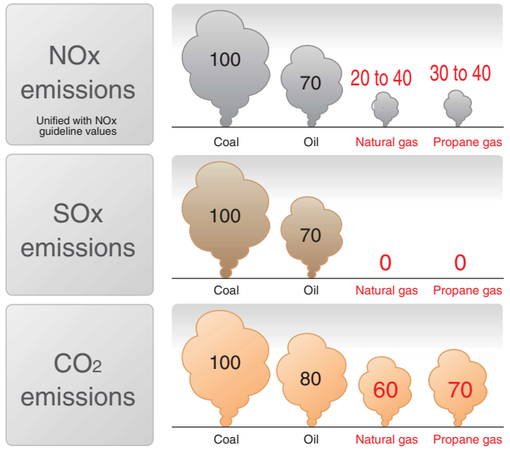


This doesn't just mean less oil is used. Not having to recover the waste oil also cuts down on work and makes maintenance easy. This system means we can use resources more effectively, which is really important these days.

Environmentally Friendly 4

Natural Gas Is a Key Source of Green Energy

In Japan, natural gas is the main fuel used for municipal gas supply. Compared to oil and coal, this energy source generates lower levels of environmentally damaging substances such as NOx, SOx, and CO_2.



Notes
1. The above graphics are based on IEA, "Natural Gas Prospects 2010," 1986; The Institute of Applied Energy, "Report of the Corroborative Study of Assessment of the Impact of Thermal Power Plants on the Atmosphere," March 1990.
2. The above comparisons use the emissions produced by coal as a baseline of 100.

Environmentally Friendly 5

GHP Systems Use Ozone-Friendly R410A Refrigerant

GHP systems use R410A refrigerant, which has an ozone depletion potential of zero. As well as helping to preserve the ozone layer, R410A boosts the operational efficiency of the air-conditioning system.

Outdoor Unit Lineup

Standard GHP				Hot Water Recovery GHP
ANZP450H1 16 HP P450	ANZP560H1 20 HP P560	ANZP710H1 25 HP P710	ANZP850H1 30 HP P850	AHZP850H1 30 HP P850

Specifications

Model			Unit	ANZP450H1 (16 HP)	ANZP560H1 (20 HP)	ANZP710H1 (25 HP)	ANZP850H1 (30 HP)	AHZP850H1 (30 HP)
Capacity	Cooling capacity		kW	45.0	56.0	71.0	85.0	85.0
	Heating capacity		kW	50.0	63.0	80.0	95.0	95.0
	Low-temp. heating		kW	53.0	67.0	84.0	95.0	95.0
	Cold-weather heating		kW	53.0	67.0	78.0	95.0	95.0
Hot Water recovery	Quantity of exhaust heat recovery		kW	–				30.0
	Hot water temperature	Outlet	˚C	–				70.0
	Hot water flow volume		L/min	–				43.0
Dimensions	Height		mm	2,170				
	Width		mm	1,690		2,100		
	Depth		mm	800				
Weight			kg	820	840	1,020		1,040
Indoor units connection	Total capacity of indoor units		%	50 to 130				
	Minimum capacity of indoor units type		–	P22				
	Maximum no. of units connectable		–	26	32	40	48	48
Electrical characteristics	Power supply		V	Single phase 240 V				
	Frequency		Hz	50				
	Operating current	Cooling	A	4.12	4.99	6.71	7.60	7.60
		Heating	A	3.85	4.76	6.30	6.91	6.91
	Power consumption	Cooling	kW	0.90	1.09	1.45	1.66	1.66
		Heating	kW	0.84	1.04	1.36	1.51	1.51
Fuel consumption LHV	Natural gas	Cooling	kW	30.9	42.6	54.0	60.9	60.9
	LHV	Heating	kW	30.7	41.9	53.6	59.7	59.7
	Propane gas	Cooling	kW	30.9	41.4	50.8	60.6	60.6
	LHV	Heating	kW	30.7	40.7	50.4	59.5	59.5
Gas engine	Manufacturer		–	YANMAR				
	Model		–	3GPH88		4GPH88		
Specified lubricant			–	Yanmar genuine GHP oil				
Cooling water	Specified coolant		–	Yanmar genuine LLC (for GHP)				Yanmar genuine LLC (for CP)
	Freezing temp.		˚C	–35				
Sound pressure level	Normal mode		dB(A)	57	58	61	62	62
	Quiet mode		dB(A)	54	55	58	59	59
Fans	Type		-	Propeller fan				
	Number of units		-	2		3		
	Rated air flow		m³/min	360	380	540	570	
	Motor output		W	370 x 2		370 x 3		
Refrigerant	Type		-	R410A				
	Charge		kg	11.8				
Piping	Refrigerant gas pipe		mm	ø 28.6		ø31.8		
	Refrigerant liquid pipe		mm	ø12.7	ø15.9	ø19.1		
	Fuel gas pipe		–	R3/4				
	Exhaust vent (Outside dia.)		mm	60.5				
	Drain pipe (Inside dia.)		mm	15				
	Hot water pipe	Inlet	–	–				Rc1
		Outlet	–	–				Rc1
Allowable refrigerant piping length (Equivalent length/Real length)			m	200/170				
Total piping length			m	640 or less				
Allowable piping length (after the first branch)			m	90				
Allowable height difference between indoor and outdoor units		Above outdoor units	m	50				
		Below outdoor units	m	50				
Allowable height difference between indoor units			m	15				
External coating color (Munsell no.)				Yanmar warm ivory (5Y7.5/1)				

Measurement conditions

1. Capacities, electrical characteristics and fuel consumptions are calculated for a standard indoor/outdoor unit combination with a 7.5 m piping length and 0 m level difference.

Cooling capacity 27 ˚CDB / 19 ˚CWB indoor suction air temp. 35 ˚CDB outdoor suction air temp.	**Low-temp. heating capacity** 20 ˚CDB indoor suction air temp. 2 ˚CDB / 1 ˚CWB outdoor suction air temp.
Heating capacity 20 ˚CDB indoor suction air temp. 7 ˚CDB / 6 ˚CWB outdoor suction air temp.	**Cold-weather heating capacity** 20 ˚CDB indoor suction air temp. -7 ˚CDB / -8 ˚CWB outdoor suction air temp.

2. Sound pressure levels are measured at a height of 1.5 m, 1 m from the front of the outdoor unit. These are anechoic conversion values. These values are normally somewhat higher during actual operation as a result of ambient conditions.
3. Gas consumptions (m^3N/h) are calculated as follows:
   Gas consumption (m^3N/h) = Fuel consumption (kW) / LHV of gas (kWh/m^3N)
4. Water heating is only available in the cooling mode.
   Water heating capacity is dependent upon the operating conditions.
5. Specifications are subject to change without notice due to product improvements.

Outdoor Unit Lineup

Standard GHP				Hot Water Recovery GHP
PNZP450H1 16 HP P450	PNZP560H1 20 HP P560	PNZP710H1 25 HP P710	PNZP850H1 30 HP P850	PHZP850H1 30 HP P850

Specifications

Model			Unit	PNZP450H1 (16 HP)	PNZP560H1 (20 HP)	PNZP710H1 (25 HP)	PNZP850H1 (30 HP)	PHZP850H1 (30 HP)
Capacity	Cooling capacity		kW	45.0	56.0	71.0	85.0	85.0
	Heating capacity		kW	50.0	63.0	80.0	95.0	95.0
	Low-temp. heating		kW	53.0	67.0	84.0	95.0	95.0
	Cold-weather heating		kW	53.0	67.0	78.0	95.0	95.0
Hot Water recovery	Quantity of exhaust heat recovery		kW	–				30.0
	Hot water temperature	Outlet	˚C	–				70.0
	Hot water flow volume		L/min	–				43.0
Dimensions	Height		mm	2,170				
	Width		mm	1,690		2,100		
	Depth		mm	800				
Weight			kg	820	840	1,020		1,040
Indoor units connection	Total capacity of indoor units		%	50 to 130				
	Minimum capacity of indoor units type		–	P22				
	Maximum no. of units connectable		–	26	32	40	48	48
Electrical characteristics	Power supply		V	Single phase 240 V				
	Frequency		Hz	50				
	Operating current	Cooling	A	4.63	5.68	7.65	8.65	8.65
		Heating	A	4.32	5.42	7.17	7.96	7.96
	Power consumption	Cooling	kW	0.90	1.09	1.45	1.66	1.66
		Heating	kW	0.84	1.04	1.36	1.51	1.51
Fuel consumption LHV	Propane gas	Cooling	kW	30.9	41.4	50.8	60.6	60.6
	LHV	Heating	kW	30.7	40.7	50.4	59.5	59.5
	Butane gas	Cooling	kW	31.1	40.7	53.5	61.7	61.7
	LHV	Heating	kW	30.5	40.6	54.9	60.5	60.5
Gas engine	Manufacturer		–	YANMAR				
	Model		–	3GPH88		4GPH88		
Specified lubricant			–	Yanmar genuine GHP oil				
Cooling water	Specified coolant		–	Yanmar genuine LLC (for GHP)				Yanmar genuine LLC (for CP)
	Freezing temp.		˚C	–35				
Sound pressure level	Normal mode		dB(A)	57	58	61	62	62
	Quiet mode		dB(A)	54	55	58	59	59
Fans	Type		-	Propeller fan				
	Number of units		-	2		3		
	Rated air flow		m³/min	360	380	540	570	
	Motor output		W	370 x 2		370 x 3		
Refrigerant	Type		-	R410A				
	Charge		kg	11.8				
Piping	Refrigerant gas pipe		mm	ø 28.6		ø31.8		
	Refrigerant liquid pipe		mm	ø12.7	ø15.9	ø19.1		
	Fuel gas pipe		–	R3/4				
	Exhaust vent (Outside dia.)		mm	60.5				
	Drain pipe (Inside dia.)		mm	15				
	Hot water pipe	Inlet	–	–				Rc1
		Outlet	–	–				Rc1
Allowable refrigerant piping length (Equivalent length/Real length)			m	200/170				
Total piping length			m	640 or less				
Allowable piping length (after the first branch)			m	90				
Allowable height difference between indoor and outdoor units		Above outdoor units	m	50				
		Below outdoor units	m	50				
Allowable height difference between indoor units			m	15				
External coating color (Munsell no.)				Yanmar warm ivory (5Y7.5/1)				

Notation of Model Names

A N Z P 560 H 1 P

- **Regions** — A: Australia, P: Pacific Island, Y: Japan
- **Category** — N: Standard model, H:Hot Water model
- **Product category** — Z: Building Multi Type
- **Refrigerant description** — P: R410A
- **Rated cooling capacity** (kW x 10)
- **Series**
- **Minor change**
- **Gas type** — J: Natural gas, P: Propane gas, T: Butane gas

Hot Water Recovery GHP

GHP: Gas Powered Air Conditioning Unit with Hot Water Recovery

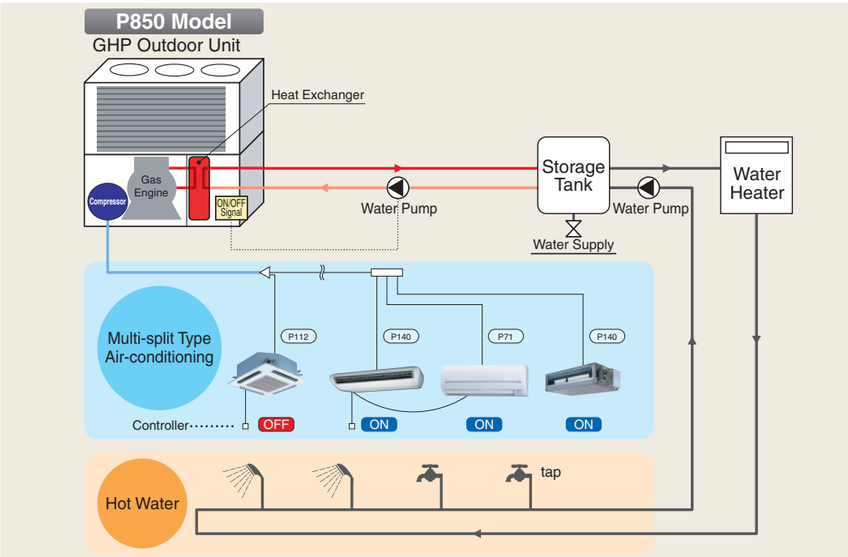
Water heating function available in cooling mode.

Operation utilises heat recovered from the gas engine.

Higher Performance (COP)

System Design

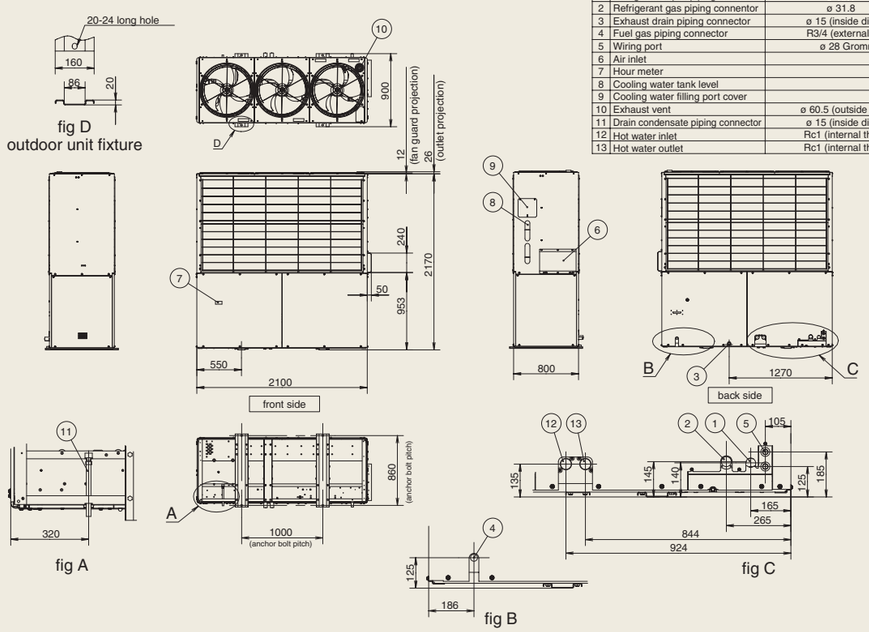
Models available for natural gas and LPG.



1. Every indoor unit or group can be individually operated and set.
2. Different configuration and capacity indoor units can be connected.
3. The total capacity of connectable indoor units is 50 to 130% of the outdoor unit capacity.

* Water pumps, storage tank, water heater, etc. are to be locally supplied.

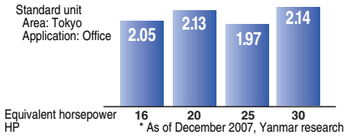
AHZP850H1, PHZP850H1



No	Description	Remarks
1	Refrigerant liquid piping connector	ø 19.1
2	Refrigerant gas piping connentor	ø 31.8
3	Exhaust drain piping connector	ø 15 (inside dia.)
4	Fuel gas piping connector	R3/4 (external thread)
5	Wiring port	ø 28 Grommet
6	Air inlet	
7	Hour meter	
8	Cooling water tank level	
9	Cooling water filling port cover	
10	Exhaust vent	ø 60.5 (outside dia.)
11	Drain condensate piping connector	ø 15 (inside dia.)
12	Hot water inlet	Rc1 (internal thread)
13	Hot water outlet	Rc1 (internal thread)

Industry's Top* APF for All Horsepowers

H1 series outdoor unit
APF† for Individual Models
(Annual Energy Consumption Efficiency)

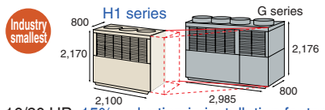


† Annual Performance Factor: Calculated by summing the total heating and cooling capacity throughout the year and then dividing it by the total gas and electricity consumption for the same period.

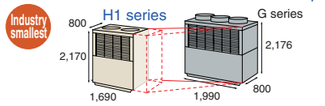
Industry's Most Compact 16 to 30 HP Models

Comparison of Footprints

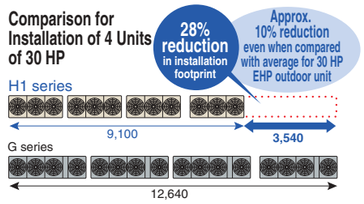
30 HP 30% reduction in installation footprint



16/20 HP 15% reduction in installation footprint



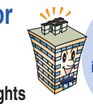
Comparison for Installation of 4 Units of 30 HP



Comparison of Installation Space

Width		Depth		
	G series	H1 series	G, H1 series	Footprint reduction
30 HP	2,985 mm	2,100 mm	800 mm	30 %

Industry's Lightest 30 HP Outdoor Units



A light weight means a small load, providing higher installation flexibility even in existing buildings.

Comparison of Weights

30 HP (standard model) **260 kg** Reduced weight!

Industry lightest 1,020 kg

20 HP (standard model) **130 kg** Reduced weight!

820kg

Higher Number of Connectable Indoor Units

Even Greater Design Flexibility

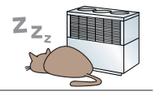
Planning is now even easier for hotels, hospitals, senior care centers, and other facilities with high numbers of both private rooms and small-capacity indoor units. Minimum capacity indoor units (P22) can be connected to all outdoor units.

Outdoor unit capacity	P450	P560	P710	P850
Connectable indoor units	26 units	32 units	40 units	48 units
Conventional G series	20 units	20 units	–	32 units

Industry's Lowest Sound Levels

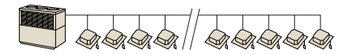
Outstanding Comfort with Quiet Operation

Even 20 HP equivalent outdoor units (standard model) operate at 58 dB (A). Activating quiet mode can also reduce operation sound by a further 3 dB (A).



Industry's Longest* Piping Length of 200 m (Equivalent Length)

Long refrigerant piping means a system can be installed even if the location for the outdoor unit is removed from the indoor units.



H1 series Actual piping length: 170 m (equivalent length: 200 m)
Conventional G1 unit Actual piping length: 165 m (equivalent length: 190 m)

*1 As of December 2007, Yanmar research
*2 To reduce installation expenses and also prevent decreases in operational efficiency, the refrigerant piping length should be kept as short as possible.

External Static Pressure of 30 Pa

The ability to both install units on verandas and handling of short-circuits in airflow has been improved. This further increases installation flexibility.

To accommodate an external static pressure of 30 Pa, settings must be made in the outdoor unit. Contact your nearest Yanmar Energy Systems branch office or dealer for information on these settings. Select louvers, hoods, ducts, etc. that will maintain the external static pressure at 30 Pa or less.

Long Maintenance Interval

The H1 series offers an industry-leading maintenance interval of 10,000 hours. As well as lowering maintenance costs, this supports the reduction in overall running costs.

Expansion of Control System Capacity Flexible Application even with Large-Scale Projects

Extending the communication functions (H-LINK → H-LINK II) has expanded the capacity of the control system.

	Conventional system	H1 series
Connectable units (Number of individual adaptors and indoor units)	145	200
Connectable outdoor units	16	64
Connectable indoor units	128	160

System expansion is only possible if the indoor/outdoor units and central control system are all compatible with H-LINK II. For more information, refer to the relevant facility design materials.

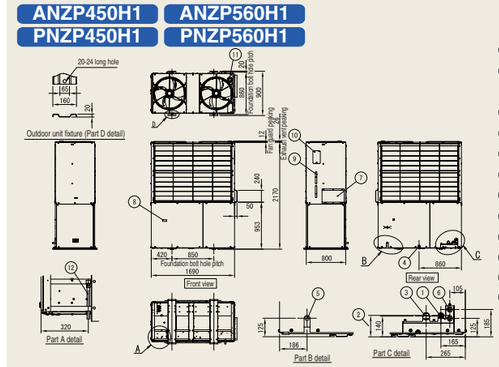
Snow Sensor Input Available

Function for Activating Quiet Mode with Signal Input from External Contact Point

Heating Operation in Temperatures of –10 °C

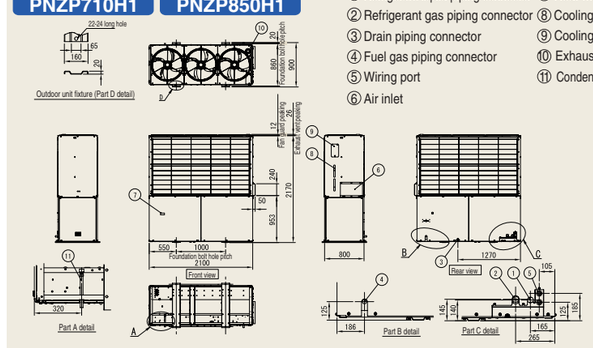
The cold region specification allows heating operation in temperatures of down to –10 °C. This demonstrates the stable, high-performance heating that is available with GHP units. H1 systems also offer non-defrost operation, which helps to maintain comfort levels.

ANZP450H1 ANZP560H1
PNZP450H1 PNZP560H1



① Refrigerant liquid piping connector
② X dimension (P450: 140, P560: 145)
③ Refrigerant gas piping connector
④ Drain piping connector
⑤ Fuel gas piping connector
⑥ Wiring port
⑦ Air inlet
⑧ Hour meter
⑨ Cooling water tank level
⑩ Cooling water filling port cover
⑪ Exhaust vent
⑫ Condensation water drain vent

ANZP710H1 ANZP850H1
PNZP710H1 PNZP850H1



① Refrigerant liquid piping connector
② Refrigerant gas piping connector
③ Drain piping connector
④ Fuel gas piping connector
⑤ Wiring port
⑥ Air inlet
⑦ Hour meter
⑧ Cooling water tank level
⑨ Cooling water filling port cover
⑩ Exhaust vent
⑪ Condensation water drain vent

4-Way Cassette Type

PCAP-FSN2

Remote Control Switch
PLPAR

Wireless Remote Controller
PC-LH3A

Remote control switch and wireless remote controller are both options.

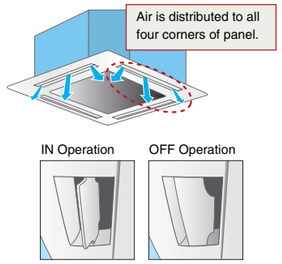
Extremely Quiet Operation and Elegant Design Matching Any Interior

Industry-leading Low Sound Pressure Level

Highly-advanced low sound pressure level, 30 dB (A) (P28 to P56: at HIGH speed operation) is realized by adopting the new DC fan motor and the vibration-proof structure which protects the turbo fan from abnormal sound. The low sound pressure level is 2 dB lower than the conventinal units and further quiet operation is achieved.

Newly Developed "Wide Air Flow Wing"

- "Wide Air Flow Wing" is installed turning to the both sides of the air outlet to allow the air distribution in every four corners of the panel. Consequently, the sophisticated and outstandingly comfortable air-conditioned environment without temperature irregularity is provided.
- The Shutter function is newly adopted to conceal the air outlet with the louvers when the operation is stopped. The louvers cover the air outlet horizontally with providing the neat appearance.



Simplified Panel Wiring

The panel wiring connector is shifted to the air inlet grille inside. No need to open the electrical box cover for panel wiring work.

Specifications

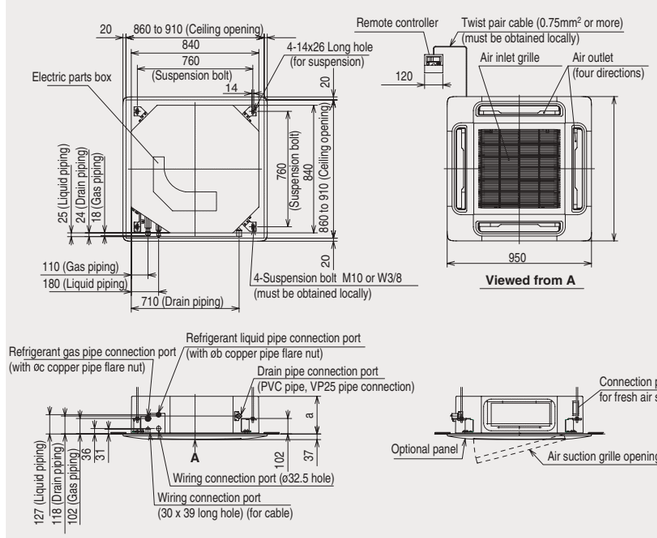
		Model	PCAP28FSN2	PCAP45FSN2	PCAP56FSN2	PCAP71FSN2	PCAP80FSN2	PCAP112FSN2	PCAP140FSN2
Capacity		Cooling (kW)	2.8	4.5	5.6	7.1	8.0	11.2	14.0
		Heating (kW)	3.2	5.0	6.3	8.0	9.0	12.5	16.0
		Low temp. heating (kW)	3.4	5.3	6.7	8.5	9.5	13.2	17.0
Dimensions Unit (Standard panel)		Height (mm)	248 (37)	248 (37)	248 (37)	248 (37)	298 (37)	298 (37)	298 (37)
		Width (mm)	840 (950)	840 (950)	840 (950)	840 (950)	840 (950)	840 (950)	840 (950)
		Depth (mm)	840 (950)	840 (950)	840 (950)	840 (950)	840 (950)	840 (950)	840 (950)
Weight		Unit (Panel) (kg)	23 (6)	23 (6)	24 (6)	24 (6)	26 (6)	29 (6)	29 (6)
Power supply			Single phase, 240 V, 50 Hz						
Electrical characteristics 50 Hz	Power consumption	Cooling (kW)	0.03	0.03	0.04	0.06	0.07	0.13	0.16
		Heating (kW)	0.02	0.02	0.03	0.05	0.06	0.12	0.15
	Running current	Cooling (A)	0.2	0.2	0.2	0.3	0.3	0.6	0.7
		Heating (A)	0.1	0.1	0.2	0.2	0.3	0.6	0.7
	Power factor	Cooling (%)	86	86	85	86	86	88	86
		Heating (%)	85	85	87	86	86	85	85
Air filter			Polypropylene, mould proof						
Fan	Type		Single air inlet, multi-blades fan (turbo fan)						
	Motor output	(kW)	0.056	0.056	0.056	0.056	0.056	0.124	0.124
	Airflow volume	H (m^3/min.)	13	15	16	20	21	32	34
		M (m^3/min.)	12	13.5	14	17	18	28	29
		L (m^3/min.)	11	12	12	15	15	24	25
	External static pressure (Pa)		–						
Sound pressure level		H (dB (A))	30	30	30	32	32	38	39
		M (dB (A))	28	28	28	30	30	35	37
		L (dB (A))	27	27	27	28	28	33	35
Piping connection	Refrigerant (Flare connections)	Liquid (mm)	ø6.4	ø6.4	ø6.4	ø9.5	ø9.5	ø9.5	ø9.5
		Gas (mm)	ø12.7	ø12.7	ø12.7	ø15.9	ø15.9	ø15.9	ø15.9
	Drain piping		VP25, external						
Colour		Munsell number	Silky white (2.5Y8.9/1)						
Standard panel		Model name	PPCN23WA						
Remote controller		Model name	PLPAR						

(1) The rated capacity is the system performance by a standard indoor/outdoor unit combination with a 7.5 m piping length and 0 m level difference.
Cooling capacity: 27 ˚CDB/19 ˚CWB indoor suction air temp., 35 ˚CDB outdoor suction air temp. Heating capacity: 20 ˚CDB indoor suction air temp., 7 ˚CDB/6 ˚CWB outdoor suction air temp. Low-temp. heating capacity: 20 ˚CDB indoor suction air temp., 2 ˚CDB/1 ˚CWB outdoor suction air temp.
(2) The sound pressure level is the value measured at a height of 1.5 m, 1 m from the front of the unit and calculated with zero echo considered. When the unit is actually installed, the sound pressure level will be affected by ambient noise and echoes and will normally be more than the values specified above.
(3) The values above are for a single indoor unit.
(4) Capacity characteristics vary according to the combination of indoor and outdoor units.
(5) Specifications are subject to change without notice due to product improvements.

Dimensions

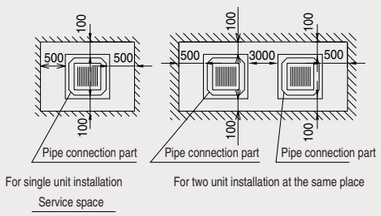
(Unit: mm)

P28 to P140



Dimensions correspondence chart

Size \ Model	P28 to P56	P71	P80	P112 to P140
a	248	248	298	298
b	6.4	9.5	9.5	9.5
c	12.7	15.9	15.9	15.9



In-the-Ceiling Type

PDAP-FSN2

Remote Control Switch
PLPAR

Wireless Remote Controller
PC-LH3A

Remote control switch and wireless remote controller are both options.

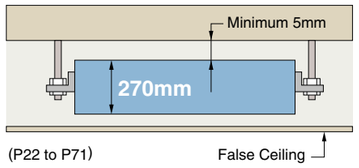
Quiet Operation and Low Height Design for Limited Space Inside of the Ceiling

Broader range of external static pressure. Flexibly supports a wide range of installation conditions at site, e.g. longer ducts.

In addition to the standard Hi-Me-Lo, the speed-up tap can be set by remote control. Available for external static pressure of up to 80 Pa for P22 to P71 and 170 Pa for P90 to P140.

Space-saving Design

Less than 270 mm in height, this unit can be fit into practically any previously existing false ceiling or formerly ducted space without substantial modification (P22 to P71).



Dimensions correspondence chart

Size \ Model	P22	P28	P45	P56	P71	P90	P112	P140
Ⓐ	650	650	650	900	900	900	900	1,300
Ⓑ	730	730	730	980	980	980	980	1,380
Ⓒ	1	1	1	2	2	2	2	3
Ⓓ	300	300	300	600	600	600	600	900
Ⓔ	215	215	215	190	190	190	190	240
Ⓕ	553	553	553	803	803	803	803	1,203
Ⓖ	583	583	583	833	833	833	833	1,233
Ⓗ	6.35	6.35	6.35	6.35	9.53	9.53	9.53	9.53
Ⓘ	12.7	12.7	12.7	15.88	15.88	15.88	15.88*	15.88*
Ⓙ	70	70	70	77	77	78	81	81
Ⓚ	92	92	92	92	95	95	95	95
Ⓛ	10	10	10	12	12	12	12	14

*: In case of using R407C or R22, use ø19.05.

Size \ Model	P22	P28	P45	P56	P71	P90	P112	P140
Ⓜ	676	676	676	676	676	756	756	756
Ⓝ	720	720	720	720	720	800	800	800
Ⓟ	23	23	23	23	23	103	103	103
Ⓠ	270	270	270	270	270	350	350	350
Ⓡ	182	182	182	182	182	204	204	204
Ⓢ	222	222	222	222	222	244	244	244
Ⓣ	43	43	43	43	43	123	123	123
Ⓤ	220	220	220	220	220	300	300	300
Ⓥ	100	100	100	100	100	140	140	140
Ⓦ	200	200	200	200	200	280	280	280
Ⓧ	226	226	226	226	226	306	306	306
Ⓨ	For the Ⓨ dimensions, install the drain pipe at a height that ensures sufficient slope.							

Specifications

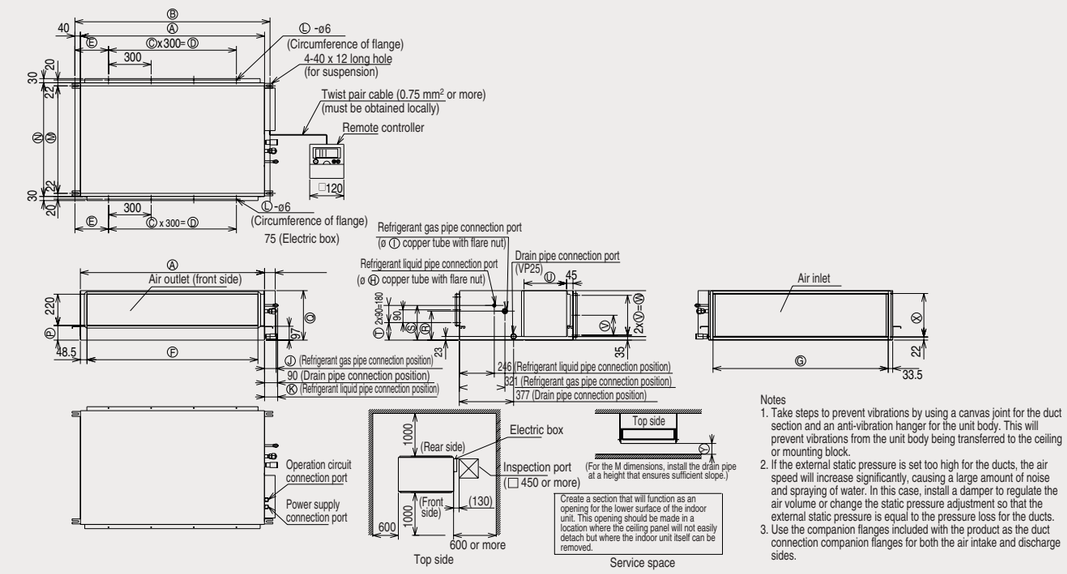
		Model	PDAP22FSN2	PDAP28FSN2	PDAP45FSN2	PDAP56FSN2	PDAP71FSN2	PDAP90FSN2	PDAP112FSN2	PDAP140FSN2
Capacity		Cooling (kW)	2.2	2.8	4.5	5.6	7.1	9.0	11.2	14.0
		Heating (kW)	2.5	3.2	5.0	6.3	8.0	10.0	12.5	16.0
		Low temp. heating (kW)	2.8	3.4	5.3	6.7	8.5	10.6	13.2	17.0
Dimensions Unit (Standard panel)		Height (mm)	270	270	270	270	350	350	350	350
		Width (mm)	650 + 75	650 + 75	650 + 75	900 + 75	900 + 75	900 + 75	900 + 75	1300 + 75
		Depth (mm)	720	720	720	720	720	800	800	800
Weight		Unit (Panel)(kg)	26	26	26	35	35	46	46	58
Power supply			Single phase, 240 V, 50 Hz							
Electrical characteristics 50 Hz	Power consumption	Cooling (kW)								
		Heating (kW)								
	Running current	Cooling (A)								
		Heating (A)								
	Power factor	Cooling (%)								
		Heating (%)								
Air filter			Polypropylene, mould proof							
Fan	Type		Sirocco fan							
	Motor output	(kW)	0.06	0.06	0.06	0.075	0.075	0.29	0.29	0.29
	Airflow volume	H (m^3/min.)	8	8	13	15	16	25	27	37
		M (m^3/min.)	7	7	11	13	14	21	23	31
		L (m^3/min.)	6	6	9	11	12	17	19	25
	External static pressure (Pa)		50 (L: 30 H: 80)					120 (L: 60 H: 170)		
Sound pressure level		H (dB (A))	36	36	36	36	37	43	45	46
		M (dB (A))	34	34	34	34	35	40	42	43
		L (dB (A))	32	32	32	32	33	36	38	39
Piping connection	Refrigerant (Flare connections)	Liquid (mm)	ø 6.4	ø 6.4	ø 6.4	ø6.4	ø9.5	ø9.5	ø 9.5	ø9.5
		Gas (mm)	ø 12.7	ø 12.7	ø 12.7	ø12.7	ø 15.9	ø 15.9	ø 15.9	ø15.9
	Drain piping		VP25, external							
Colour		Munsell number	Galvanized steel sheet							
Remote controller		Model name	PLPAR							

(1) The rated capacity is the system performance by a standard indoor/outdoor unit combination with a 7.5 m piping length and 0 m level difference.
Cooling capacity: 27 ˚CDB/19 ˚CWB indoor suction air temp., 35 ˚CDB outdoor suction air temp. Heating capacity: 20 ˚CDB indoor suction air temp., 7 ˚CDB/6 ˚CWB outdoor suction air temp. Low-temp. heating capacity: 20 ˚CDB indoor suction air temp., 2 ˚CDB/1 ˚CWB outdoor suction air temp.
(2) The sound pressure level is the value measured at a height of 1.5 m, 1 m from the front of the unit and calculated with zero echo considered. When the unit is actually installed, the sound pressure level will be affected by ambient noise and echoes and will normally be more than the values specified above.
(3) The values above are for a single indoor unit.
(4) Capacity characteristics vary according to the combination of indoor and outdoor units.
(5) Specifications are subject to change without notice due to product improvements.

Dimensions

(Unit: mm)

P22 to P140



Notes
1. Take steps to prevent vibrations by using a canvas joint for the duct section and an anti-vibration hanger for the unit body. This will prevent vibrations from the unit body being transferred to the ceiling or mounting block.
2. If the external static pressure is set too high for the ducts, the air speed will increase significantly, causing a large amount of noise and spraying of water. In this case, install a damper to regulate the air volume or change the static pressure adjustment so that the external static pressure is equal to the pressure loss for the ducts.
3. Use the companion flanges included with the product as the duct connection companion flanges for both the air intake and discharge sides.

Ceiling Suspended Type

PHAP-FSN2

Remote Control Switch
PLPAR

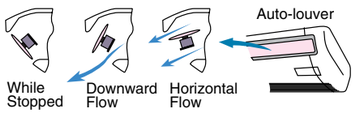
Wireless Remote Controller
PC-LH3A

Remote control switch and wireless remote controller are both options.

Quiet Operation, Easy Installation and Space-Saving Slim Design

Amenity improved by auto-louver at air opening.

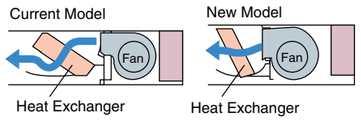
The round, lower part of the air opening complements the gentle, quiet operation. The auto-louver in the upper part of the opening automatically controls upward and downward motion of airflow, while the grille serves as a shutter when stopped.



Noise and vibration drastically reduced by our original design.

The large fan and improved resistance of the airflow path lower the r.p.m. of the blower, thus reducing noise and vibration.

Improved Resistance of Airflow Path



Simple Installation and Maintenance

- Installation time is much shorter.
  *By 30% (Manufacture's comparison)
- A long-life filter (mildew-proof) is fitted as standard. No maintenance is required for about 2,500 hours of operation.
  *For ordinary offices

Each part of the system is fully functional.

The wireless light receiver kit (option) can be installed easily through the hole in the lower cover.

Specifications

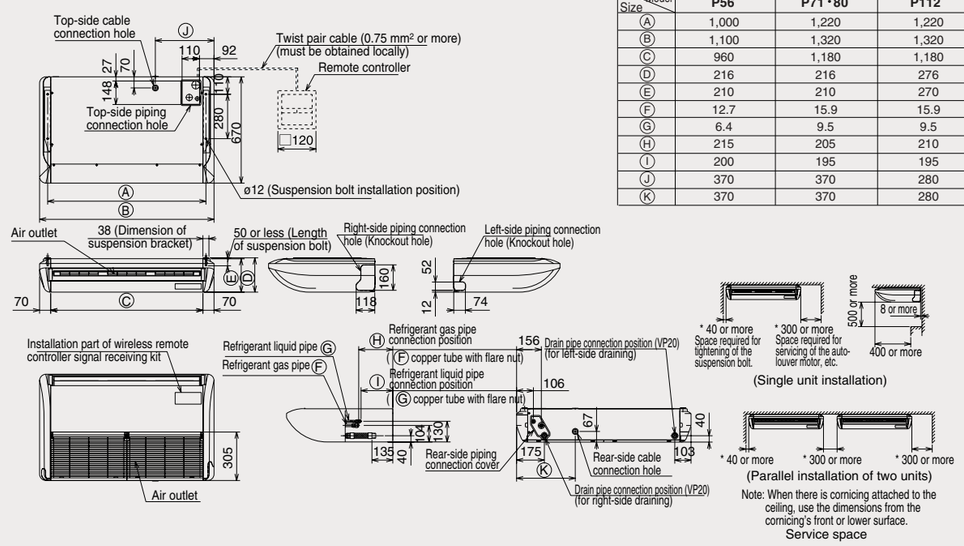
Model			PHAP56FSN2	PHAP71FSN2	PHAP80FSN2	PHAP112FSN2	PHAP140FSN2
Capacity		Cooling (kW)	5.6	7.1	8.0	11.2	14.0
		Heating (kW)	6.3	8.0	9.0	12.5	16.0
		Low temp. heating (kW)	6.7	8.5	9.5	13.2	17.0
Dimensions Unit (Standard panel)		Height (mm)	210	210	210	270	270
		Width (mm)	1100	1320	1320	1320	1580
		Depth (mm)	670	670	670	670	670
Weight		Unit (Panel) (kg)	26	30	30	34	42
Power supply			Single phase, 240 V, 50 Hz				
Electrical characteristics 50 Hz	Power consumption	Cooling (kW)	0.08	0.105	0.105	0.165	0.19
		Heating (kW)	0.08	0.105	0.105	0.165	0.19
	Running current	Cooling (A)	0.3	0.4	0.4	0.7	0.8
		Heating (A)	0.3	0.4	0.4	0.7	0.8
	Power factor	Cooling (%)	89	88	88	90	90
		Heating (%)	89	88	88	90	90
Air filter			Polypropylene, mould proof				
Fan	Type		Sirocco fan				
	Motor output (kW)		0.035	0.050	0.050	0.095	0.135
	Airflow volume	H (m^3/min.)	14	18	18	25	33
		M (m^3/min.)	12	15	15	21	28
		L (m^3/min.)	10	12	12	18	23
	External static pressure (Pa)		–				
Sound pressure level		H (dB (A))	41	41	41	45	45
		M (dB (A))	38	38	38	42	42
		L (dB (A))	35	35	35	39	39
Piping connection	Refrigerant (Flare connections)	Liquid (mm)	ø6.4	ø9.5	ø9.5	ø9.5	ø9.5
		Gas (mm)	ø12.7	ø15.9	ø15.9	ø15.9	ø15.9
	Drain piping		VP20, external				
Colour	Munsell number		Silky white (2.5Y8.9/1)				
Remote controller	Model name		PLPAR				

(1) The rated capacity is the system performance by a standard indoor/outdoor unit combination with a 7.5 m piping length and 0 m level difference.
Cooling capacity: 27 ˚CDB/19 ˚CWB indoor suction air temp., 35 ˚CDB outdoor suction air temp. Heating capacity: 20 ˚CDB indoor suction air temp., 7 ˚CDB/6 ˚CWB outdoor suction air temp. Low-temp. heating capacity: 20 ˚CDB indoor suction air temp., 2 ˚CDB/1 ˚CWB outdoor suction air temp.
(2) The sound pressure level is the value measured at a height of 1.5 m, 1 m from the front of the unit and calculated with zero echo considered. When the unit is actually installed, the sound pressure level will be affected by ambient noise and echoes and will normally be more than the values specified above.
(3) The values above are for a single indoor unit.
(4) Capacity characteristics vary according to the combination of indoor and outdoor units.
(5) Specifications are subject to change without notice due to product improvements.

Dimensions

(Unit: mm)

P56 to P140



Dimensions correspondence chart

Size \ Model	P56	P71・80	P112	P140
Ⓐ	1,000	1,220	1,220	1,480
Ⓑ	1,100	1,320	1,320	1,580
Ⓒ	960	1,180	1,180	1,440
Ⓓ	216	216	276	276
Ⓔ	210	210	270	270
Ⓕ	12.7	15.9	15.9	15.9
Ⓖ	6.4	9.5	9.5	9.5
Ⓗ	215	205	210	210
Ⓘ	200	195	195	195
Ⓙ	370	370	280	280
Ⓚ	370	370	280	280

Wall-Mounted Type

PAAP-FSNM2

Remote Control Switch
PLPAR

Wireless Remote Controller
PC-LH3A

Remote control switch and wireless remote controller are both options.

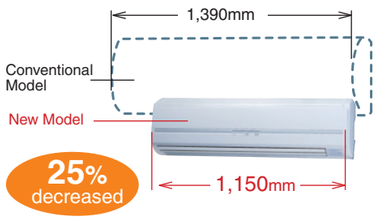
Industry-Leading Compactness and Flat Panel at The Front

Stylish Design and Maintenance

Flat panel is adopted in a front part of all models. This flat panel also contributes to an easy maintenance. P56 and P71 have been included as new-line-up of flat panel.

Top-Class Compact and Light Weight Design

More Choice to select the installation place thanks to the reduction of wideness in P71.



User Friendly

Easy switching from wireless to wired remote controller by Dip Switch built-in the receiver part.

Direct connection with terminal board is available in P56 and P71 when being connected to wired remote controller.

All alarm code is displayed when using wireless remote controller by combining the flashing times of “Timer,” “Filter/Defrosting” (All models).

Specifications

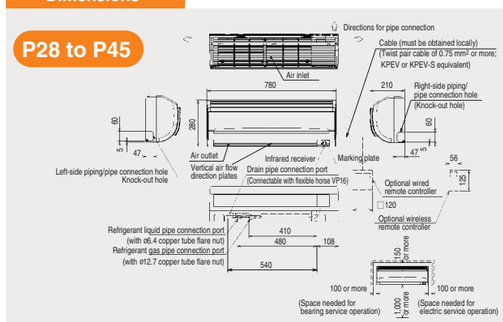
		Model	PAAP28FSNM2	PAAP45FSNM2	PAAP56FSNM2	PAAP71FSNM2
Capacity		Cooling (kW)	2.8	4.5	5.6	7.1
		Heating (kW)	3.2	5.0	6.3	8.0
		Low temp. heating (kW)	3.4	5.3	6.7	8.5
Dimensions Unit (Standard panel)		Height (mm)	280	280	295	333
		Width (mm)	780	780	1030	1150
		Depth (mm)	210	210	208	245
Weight		Unit (Panel) (kg)	10	10	12	18
Power supply			Single phase, 240 V, 50 Hz			
Electrical characteristics 50 Hz	Power consumption	Cooling (kW)	0.03	0.04	0.05	0.05
		Heating (kW)	0.03	0.04	0.05	0.05
	Running current	Cooling (A)	0.2	0.2	0.2	0.2
		Heating (A)	0.2	0.2	0.2	0.2
	Power factor	Cooling (%)	86	85	85	86
		Heating (%)	86	85	85	86
Air filter			Polypropylene, mould proof			
Fan	Type		Through flow fan			
	Motor output	(kW)	0.02	0.02	0.02	0.03
	Airflow volume	H (m^3/min.)	10	11	14	17
		M (m^3/min.)	8	10	12	16
		L (m^3/min.)	7	9	10	14
	External static pressure (Pa)		–			
Sound pressure level		H (dB (A))	38	40	41	43
		M (dB (A))	36	38	39	40
		L (dB (A))	34	36	37	37
Piping connection	Refrigerant (Flare connections)	Liquid (mm)	ø6.4	ø6.4	ø6.4	ø9.5
		Gas (mm)	ø12.7	ø12.7	ø12.7	ø15.9
	Drain piping		VP16, external			VP20, external
Colour		Munsell number	White (6.8GY8.5/0.1)		White (7.3GY8.3/0.2)	White (7.3G8.3/0.2)
Remote controller		Model name	PLPAR			

(1) The rated capacity is the system performance by a standard indoor/outdoor unit combination with a 7.5 m piping length and 0 m level difference.
Cooling capacity: 27 ˚CDB/19 ˚CWB indoor suction air temp., 35 ˚CDB outdoor suction air temp. Heating capacity: 20 ˚CDB indoor suction air temp., 7 ˚CDB/6 ˚CWB outdoor suction air temp. Low-temp. heating capacity: 20 ˚CDB indoor suction air temp., 2 ˚CDB/1 ˚CWB outdoor suction air temp.
(2) The sound pressure level is the value measured at a height of 1.5 m, 1 m from the front of the unit and calculated with zero echo considered. When the unit is actually installed, the sound pressure level will be affected by ambient noise and echoes and will normally be more than the values specified above.
(3) The values above are for a single indoor unit.
(4) Capacity characteristics vary according to the combination of indoor and outdoor units.
(5) Specifications are subject to change without notice due to product improvements.

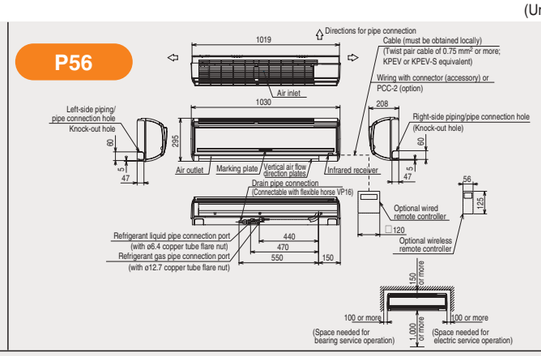
Dimensions

(Unit: mm)

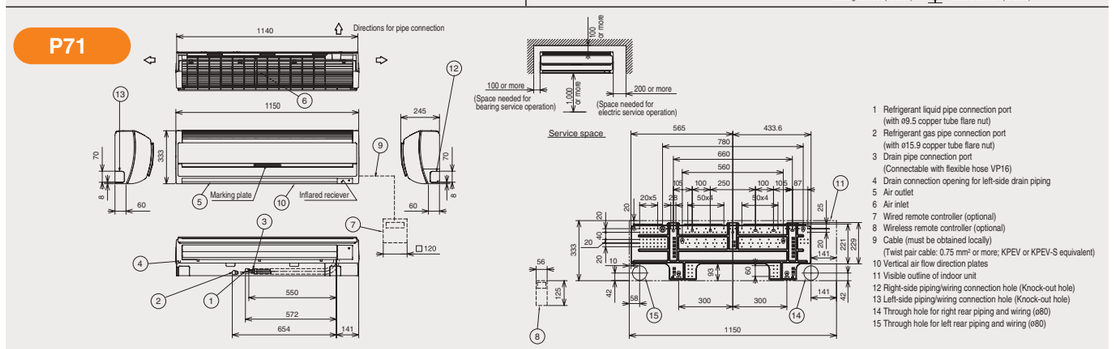
P28 to P45



P56



P71



Control System

Wide Range of Optional Remote Controllers

Individual Control

PLPAR Remote Control Switch

- Large LCD
- Timer can be set at half-hour intervals up to 24 hours.
- If a problem occurs, an alarm code immediately shows the details of the trouble. A self-diagnosis function is incorporated.
- All the functions of the indoor unit can be selected by remote control switches.
- A remote control thermostat function is provided.

PC-LH3A Wireless Remote Control Switch

- No wiring work is required.
- Two or more units can be operated simultaneously by remote control.

ELA1T 7 Days Timer

- By using with ELA64S and PLPAR controllers, the air conditioners controlled by them can be operated according to a weekly schedule.
- The timer can be set at 7-day intervals, and operation start/stop can be set 3 times daily.
- Remote control can be prohibited in accordance with the OFF timer (when used with ELA64S and PLPAR).
- Two types of weekly schedule (A and B) can be set, and can easily be changed for summer and winter.
- Settings are all digitally displayed, allowing operations and settings to be checked easily.
- The power failure backup function prevents the timer from being stopped by a power failure lasting up to 2 weeks.

Centralized Control

ELA64S Central Station

- By connecting to H-LINK, a group of up to 16 remote controls can be used and up to 128 indoor units can be controlled.
- Up to 8 units can be connected to H-LINK.
- In addition to the basic functions, the operation mode and temperature setting, air quantity, or auto louver can be set.
- If a problem occurs, an alarm code immediately shows the details of the trouble.
- An external input terminal is provided as standard. External signals enable the following functions. Central operation start/stop Demand control emergency stop.
  - Central operation output
  - Central alarm output

ELA16RS One-Touch Controller

- The one-touch controller is only able to perform start/stop operation via the remote controller for each indoor unit.
- By connecting to H-LINK, a group of up to 16 remote controls can be used and up to 128 indoor units can be connected.
- Up to 8 units can be connected to H-LINK.
- An external input/output terminal is provided as standard. External signals enable the following functions: Central operation start/stop and emergency stop.
  - Central operation output
  - Central alarm output

CS-NET

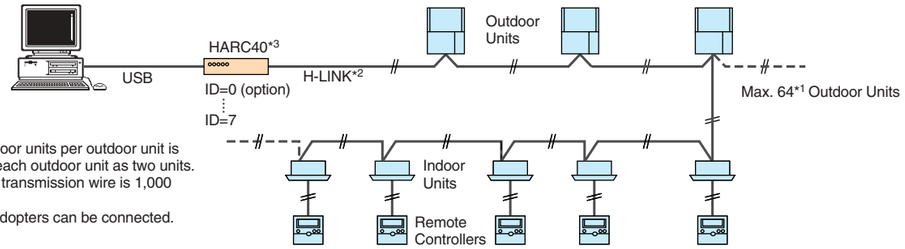
Central Station W

HARC 40

By using an HARC 40 adapter connectable to a personal computer by USB, the air conditioners can be centrally controlled.

Specifications

Connection Method to Upper System	• Connection by USB (Universal Serial Bus) to PC		
Quantity of Connection	• 128 Indoor Units		
Control Item at Upper System	• On/Off Control • Operation Mode Setting • Temperature Setting [Cooling: 19 ˚C to 30 ˚C, Heating: 17 ˚C to 30 ˚C]	• Air Direction Setting • Remote Control Fully Allowed/Prohibited • Remote Control Partially Allowed/Prohibited	• Fan Speed Setting • Filter Sign Resetting • Air Direction Setting (Cannot be set by wireless remote control)
Monitoring Item at Upper System	• On/Off • Operation Mode • Set Fan Speed • Set Air Direction	• Set Temperature • Remote Control Prohibition Setting • Filter Sign	• Alarm • Alarm Code • Air Inlet Temperature



*1: If the number of indoor units per outdoor unit is 17 or more, count each outdoor unit as two units.
*2: Max. total length of transmission wire is 1,000 meters.
*3: Up to 8 HARC 40 adopters can be connected.

Installation Examples

Shopping mall — 2,054.5 HP

School — 45 HP

Restaurant — 20 HP

Restaurant — 30 HP

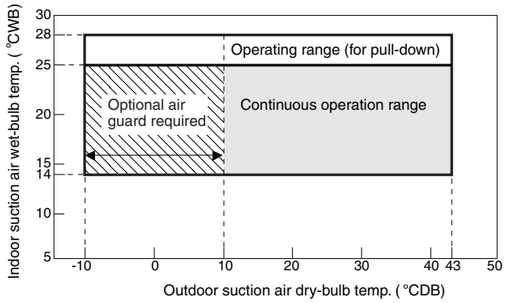
Shopping centre — 300 HP

Toy store — 150 HP

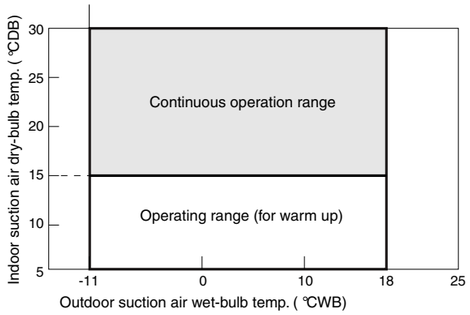
1. Operating Conditions for Cooling and Heating

Use the outdoor units inside the following range of operating conditions.

Operating conditions for cooling



Operating conditions for heating



Cooling operation	Indoor temperature/humidity	20 to 30 ˚CDB, 80 % or less (Can be operated at 30 to 34 ˚CDB for pull-down)
	Outdoor suction temperature	- 10 to 43 ˚CDB
Heating operation	Indoor temperature	15 to 30 ˚CDB
	Outdoor suction temperature	- 10 to 35 ˚CDB (Some operations are partially limited to use at 26 to 35 ˚CDB.)

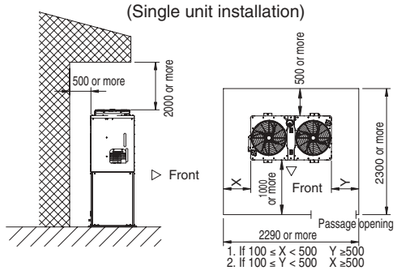
* The range shown in the above table and graphs is the operating range of the outdoor units.
* Neither heating operation at an outdoor temperature of more than 35 ˚CD.B. nor cooling operation at an outdoor temperature of less than -10 ˚CD.B. is possible due to operational limitations. (The outdoor temperature values are those detected by the built-in outdoor air sensor inside the outdoor unit.)
Note: Pull-down refers to the operation from the start up of cooling until the unit enters the continuous operation region.
Warm-up refers to the operation from the start up of heating until the unit enters the continuous operation region.

2. Installation Procedure

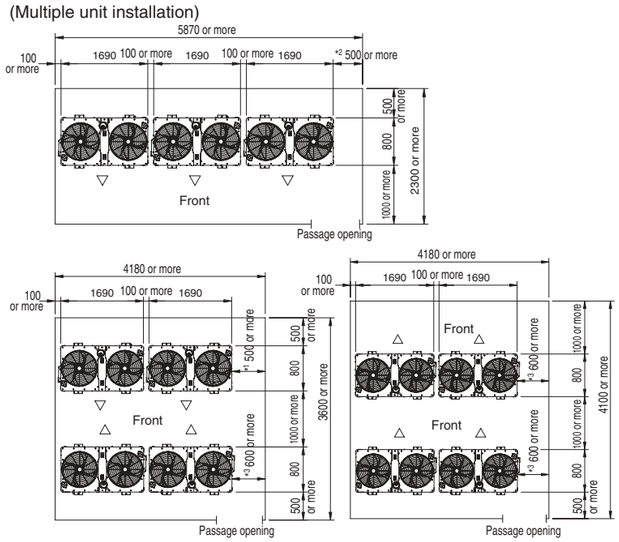
When the outdoor units are installed, a service space must be provided for the performance of periodic maintenance work, etc. This service space should be designated according to the diagram below. Decide the appropriate space after considering the minimum area practically required for the installation of the outdoor units.

Installation space P450, P560

(Single unit installation)



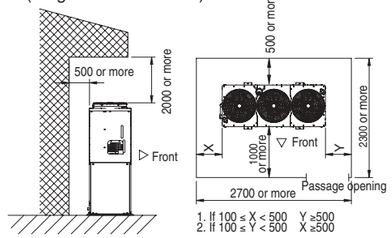
(Multiple unit installation)



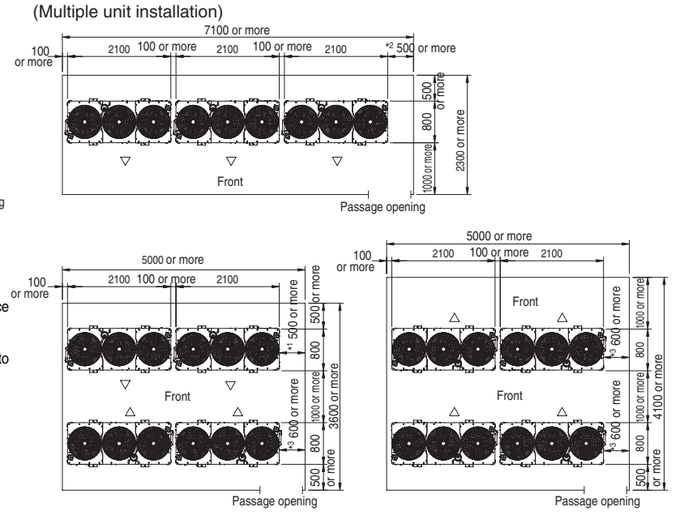
*1. Provide maintenance access with a width of 500 mm or more on either side of the unit.
*2. In the case of the installation of multiple outdoor units, provide maintenance access with a width of 500 mm or more on either side of each group of three units.
*3. Provide a passage from the entrance to the outdoor unit installation site to the front of each outdoor unit with a width of 600 mm or more.
*4. If you wish to install four or more outdoor units together, please consult your nearest Yanmar dealer.
*5. Decide the appropriate installation space after considering the minimum area practically required for the installation of the outdoor units.
*6. Provide an appropriate isolation distance between the outdoor units and flammable substances as designated by the Fire Prevention Evaluation Label.
*7. Install the outdoor units in a location that is able to appropriately support their weight.

Installation space P710, P850

(Single unit installation)



(Multiple unit installation)

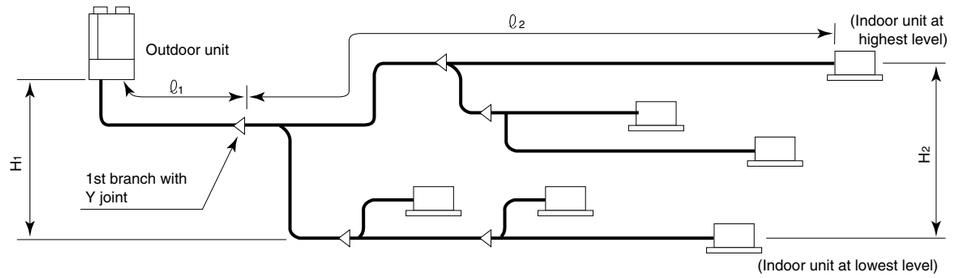


*1. Provide maintenance access with a width of 500 mm or more on either side of the unit.
*2. In the case of combined installation of outdoor units, provide maintenance access with a width of 500 mm or more on either side of each group of three units.
*3. Provide a passage from the entrance to the outdoor unit installation site to the front of each outdoor unit with a width of 600 mm or more.
*4. If you wish to install four or more outdoor units together, please consult your nearest Yanmar dealer.
*5. Decide the appropriate installation space after considering the minimum area practically required for the installation of the outdoor units.
*6. Provide an appropriate isolation distance between the outdoor units and flammable substances as designated by the Fire Prevention Evaluation Label.
*7. Install the outdoor units in a location that is able to appropriately support their weight.
*8. The shape of the outdoor units shown in the top view will differ slightly from the actual appearance following combined installation.

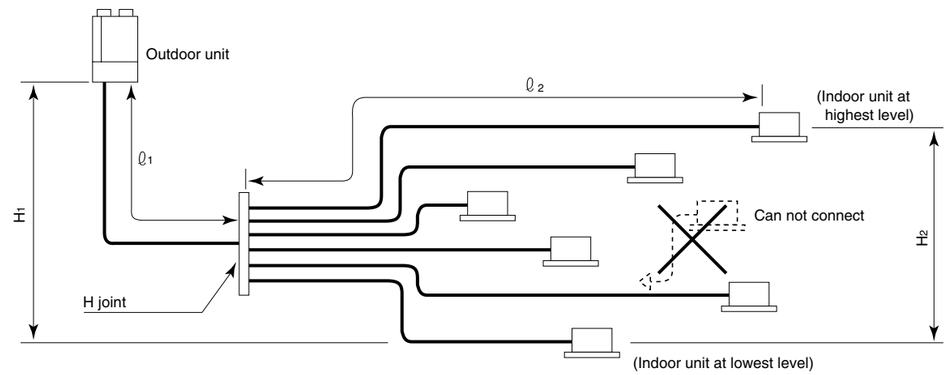
3. Refrigerant Piping

Piping Method of Refrigerant Branching

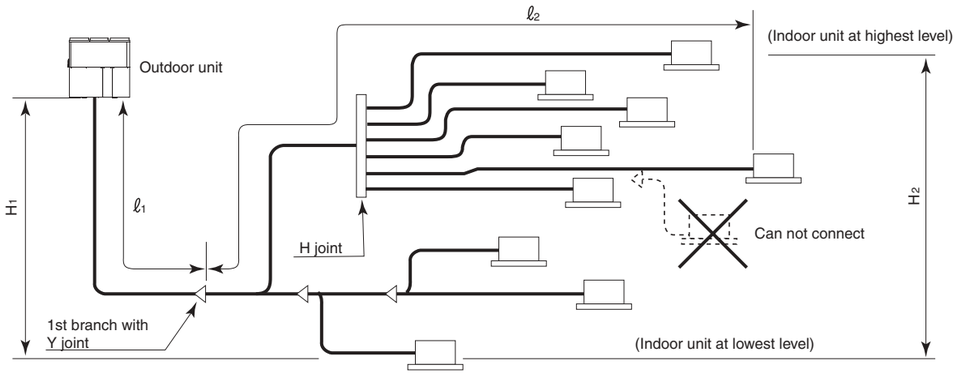
1. Refrigerant branching with Y Joints



2. Refrigerant branching with H Joints



3. Refrigerant branching with Y Joints and H Joints



L (actual piping length) = ℓ1 + ℓ2

L' (equivalent piping length) = L (actual piping length) + (equivalent length of Y joint/H joint and L joint)

Note: No rebranching is allowed after the H joint. P280 type or larger units can not be connected after the H joint.

Allowable Piping Length and Allowable Level Difference

Model			Building Multi Type
			ANZP450H1/PNZP450H1, ANZP560H1/PNZP560H1 ANZP710H1/PNZP710H1, ANZP850H1/PNZP850H1 AHZP850H1/PHZP850H1
Allowable maximum length*1	Actual piping length	L	170
	Equivalent piping length	L'	200
Allowable level difference	Level difference between indoor and outdoor units	H_1	50
	Level difference between indoor units	H_2	15*3
Allowable length after 1st branch*2		ℓ2	90*3
Total piping length			640

*1 The piping length from the outdoor unit to the furthest indoor unit.
*2 The first branch looking from the outdoor unit.
*3 If the length after the first branch exceeds 40 m, calculate the elevation difference between indoor units according to the following formula.

ℓ2 = 40 to 60 m: H2 = 37 – 11/20 x ℓ2 (m)
ℓ2 = 60 to 90 m: H2 = 11 – 7/60 x ℓ2 (m)

Equivalent piping length

Calculate the equivalent piping length for the gas side refrigerant piping using the following formula.

Equivalent piping length (m) = (Actual piping length to the furthest outdoor unit) + ∑ (Equivalent piping length of joint x number of joints)

Table for calculating equivalent piping length of joints

(Unit : m)

Descriptions \ Pipe diameter	ø6.4	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø25.4	ø28.6	ø31.8	ø38.1	ø44.5
L joint	0.16	0.18	0.20	0.25	0.35	0.40	0.45	0.50	0.55	0.65	0.75

Y joint	0.5

H joint	1.0

Selecting a Y Joint and H Joint

First branch with Y joint
(the first branch looking from the outdoor unit)

Capacity of outdoor units	Refrigerant: R410A Part number of Y joint
P450, P560	RBPP72Y
P710, P850	RBPP104P

First branch with H joint
(the first branch looking from the outdoor unit)

Total capacity of indoor units (kW)	Refrigerant: R410A Part number of H joint
Less than 22.4	RBPP22H
22.4 - 33.0	RBPP33H
33.0 - 71.0	RBPP72H
71.0 - 104.0	RBPP104H
104.0 or more	–

Second branch and after with Y joint

Total capacity of indoor units (kW)	Refrigerant: R410A Part number of Y joint
Less than 22.4	RBPP22Y
22.4 - 33.0	RBPP33Y
33.0 - 71.0	RBPP72Y
71.0 - 104.0	RBPP104Y
104.0 or more	RBPP218Y

* Rebranching cannot be done downstream of the H joint. Indoor units above the P280 type cannot be connected downstream of the H joint.
* The kits for R22, R407C, and R410A are not compatible. Be sure to use those exclusive to R410A.

Calculation of Additional Refrigerant Charge

Preshipment refrigerant charge

Outdoor unit		P450	P560	P710	P850
Amount of sealed refrigerant	(kg)	11.8	11.8	11.8	11.8
A	(kg)	3.7	5.0	11.8	12.6

Calculation of additional refrigerant charge

Calculate the additional amount to charge R on the basis of the piping size and length of the extended piping. Calculate R using the following formula rounded to the nearest 0.1 kg.

Note: The additional amount of refrigerant needs to be calculated with an accuracy of less than ±5 %.

Additional charge amount

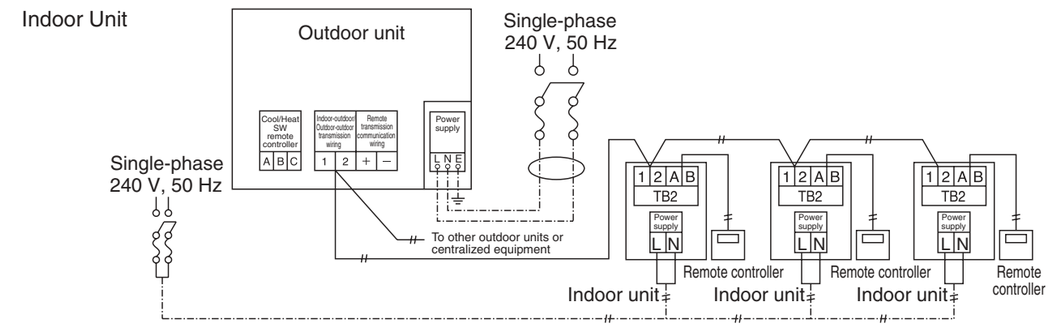
R (kg) = A + (L1 x 0.25) + (L2 x 0.17) + (L3 x 0.11) + (L4 x 0.054) + (L5 x 0.022)

L1: Total length (m) of ø 19.1 mm piping
L2: Total length (m) of ø 15.9 mm piping
L3: Total length (m) of ø 12.7 mm piping
L4: Total length (m) of ø 9.5 mm piping
L5: Total length (m) of ø 6.4 mm piping

4. Wiring

Wiring Procedure

While there are a variety of wiring methods for branch circuits, the appropriate selections should be made for the branch switches, branch overcurrent breakers, and wire sizes based on the local wiring regulations. The diagram below shows one example of wiring.



Wiring

For the specifications of the power supply and minimum wire diameter (power supply wiring, communication wiring, and remote controller wiring), refer to the following table.

Models		Power supply					Communication	Remote controller
		Power supply			Maximum current	Wire diameter	Wire diameter	Wire diameter
		Phase	Voltage	Frequency	At start-up	EN60335-1	EN60335-1	EN60335-1
		–	V	Hz	A	mm²	mm²	mm²
Indoor units	All models	ø 1	240	50	–	0.75	0.75	0.75
Outdoor units	ANZP450H1/PNZP450H1	ø 1	240	50	19	2.5	0.75	0.75
	ANZP560H1/PNZP560H1	ø 1	240	50	19	2.5	0.75	0.75
	ANZP710H1/PNZP710H1	ø 1	240	50	24	2.5	0.75	0.75
	ANZP850H1/PNZP850H1 AHZP850H1/PHZP850H1	ø 1	240	50	24	2.5	0.75	0.75

Table 1

Selection according to EN60335-1	
Current i (A)	Wire size (mm²)
i ≤ 6	0.75
6 < i ≤ 10	1
10 < i ≤ 16	1.5
16 < i ≤ 25	2.5
25 < i ≤ 32	4
32 < i ≤ 40	6
40 < i ≤ 63	10
63 < i	*1

*1 If the current exceeds 63 A, do not connect the cables in series.

⚠ CAUTION

- Follow local codes and regulations when selecting field wires.
- The above wire sizes are selected at the maximum current of the unit according to the European Standard, EN60335-1. Use the wires which are not lighter than the ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- Use shielded wires for communication wires, and connect both ends of the shielded part to the earth screw in the electrical box.
- In the case the indoor unit power cables are connected in series, add each unit maximum current and select wires table 1.
- The earth cable size complies with local code: IEC245, No. 571.

5. Gas and Drain Piping Work

Fuel Gas Piping Work

Use galvanized steel pipes for the gas piping to the outdoor unit and install the equipment as shown in the illustration on the right.

(1) Use a reinforced gas hose (approved for gas) or low-pressure gas hose with a joint fixture for liquefied petroleum gas to link the fuel gas piping to the outdoor unit.
Note: If a vibroisolator is used, in particular, the outdoor unit will vibrate when starting up. Carefully consider the layout of the reinforced gas hose.

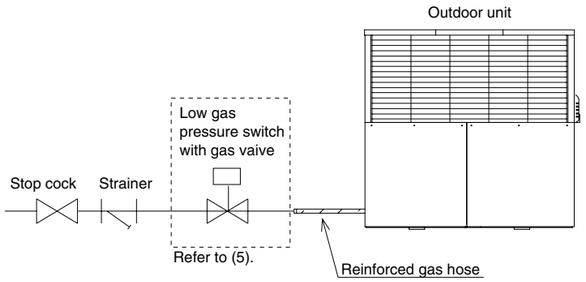
(2) Install a strainer between the reinforced gas hose and the stop cock to respond to the degree of dust in the fuel gas piping interior due to the piping work.

(3) After completing pipe connections, apply soapy water to the joints to check them for gas leaks.

(4) When sealing tape is used for screw threads, the tape will get into the valve seat of the gas regulator, resulting in gas leaks. To prevent gas leaks, use paste type sealant.

(5) When required by national or regional legislation, a low gas pressure switch has to be mounted in the safety loop.

(6) Installation must be according local and national standards or legislation.



Gas Supply Pressure (Unit: kPa)

Gas type / Gas pressure	Natural gas	Propane gas	Butane gas
Max. gas pressure	2.5	3.3	2.2
Standard gas pressure	2.0	2.8	1.5
Min. gas pressure	1.0	2.0	0.7

Adjust the gas supply pressure at the inlet for the outdoor unit so that it conforms to the relevant values in the above table.
Note: Determine the gas piping bore and gas meter by approximately doubling the values for rated gas consumption.

Outdoor Units Drain Piping Work

1) Exhaust drain piping

Fit drain hoses supplied to extend the drain piping to the drain ditch or rainwater channel. Fix the pipe end. If two or more outdoor units are installed, lay independent piping for each unit.

(1) Do not use common piping for the exhaust from the outdoor unit and drain from the indoor units. Exhaust gas will flow backward into the rooms, causing poisoning and the substrates in the indoor units to corrode. This will result in malfunctions.

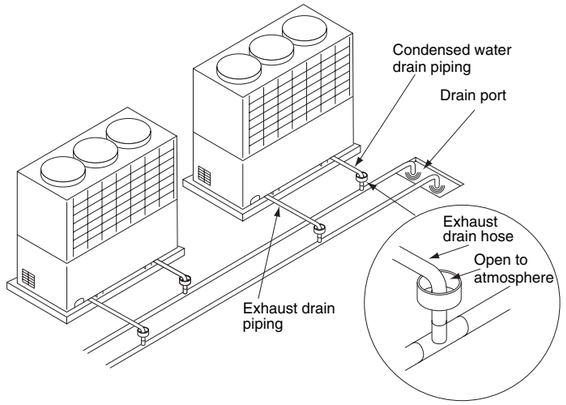
(2) When discharging exhaust from the outdoor unit into a sealed drain or tank, or when discharging both exhaust from the outdoor unit and drain from the indoor units into the same location, use piping that vents exhaust gas the atmosphere.

(3) Ensure that the extension hose is not lifted or clogged. If drain water freezes in the pipe during the winter, it may lead to operation problems in the engine. To prevent this, cut the drain piping at a point that can be sloped at a steep angle. Then, fix the pipe to a drain ditch or rainwater channel to route the drain water to a drain port. As the direct discharge of drain water onto concrete surfaces may cause discolouring or staining, extend the piping to a rainwater outlet for the roof (roof drain port) or a rainwater channel.

(4) If the drain pipes from two or more outdoor units are combined, lay the combined piping so that it does not receive exhaust pressure. If the combined piping receives exhaust pressure, the exhaust will enter the outdoor units that are not running, causing malfunctions.

(5) When installing the outdoor unit on a veranda or rooftop whose surface is finished with a waterproof coating, take care not to break the waterproof coating when extending the exhaust piping from the outdoor unit to the roof drain port.

(6) Use rigid polyvinyl chloride drain pipes. (local supplies)



Cautions
Be sure to install piping separately from the exhaust drain piping, and not to let the exhaust gas from the exhaust drain pipe flow back. If the exhaust gas flows back, the equipment in the engine room will rust and problems will occur.

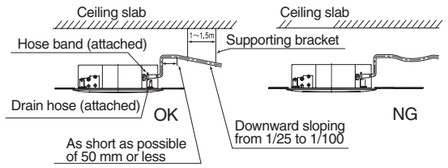
2) Condensed water drain piping

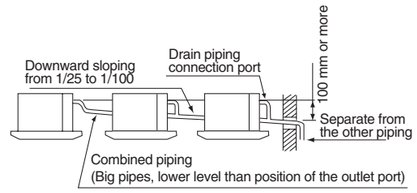
To drain condensed water into the rainwater drain, extend the condenser drain piping as required.

3. Indoor Unit Drain Piping

(1) Install drain pipes.

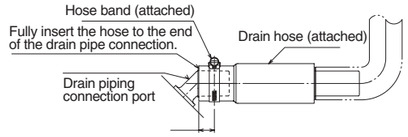
- The diameter of a drain pipe should be greater than or equal to that of the connecting pipe (vinyl tube).
- Keep the drain pipe short and sloping downward at a gradient of at least 1/100 to prevent air pockets from forming.
- If the drain hose can not be sufficiently sloped, install raised drain piping (available as an optional kit).
- To keep the drain hose from sagging, space hanging wires every 1 to 1.5 m.
- Use the supplied drain hose and clamp. Tighten the clamp firmly on the drain hose.
- Insulate the clamp with the attached insulating material.
- If combining multiple drain pipes, install them according to the procedure below.
- Select combined drain pipes with a gauge suitable for the operating capacity of the unit.





<Precautions for Raised Drain Piping>

- When installing raised drain pipes, do not exceed the specified height.
- Install the drain raising pipes vertically and as close as possible to the unit.



(2) After piping work is finished, check that drainage flows smoothly.

- Open the water inlet lid, add water gradually and check the drainage flow.

Note: Do not install indoor unit drain pipes into the same drainage channel or piping as those used for engine exhaust gas, exhaust drainage, or harmful gases including sulfur-based gas. Exhaust gas will flow backward into rooms and cause poisoning.