MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow eco Changes

Air-cooled Chilling Units

Ecological and Tough

e R32 -series

The new e-series uses R32

R32

Reduced impact on Earth with the use of R32 and a reduction in refrigerant volume

The GWP of R32 is 33% of R410A, and the amount of refrigerant required is reduced by as much as approximately 68%.

High Efficiency

The high efficiency of the e-series is achieved by high quality key components and cooperation among units

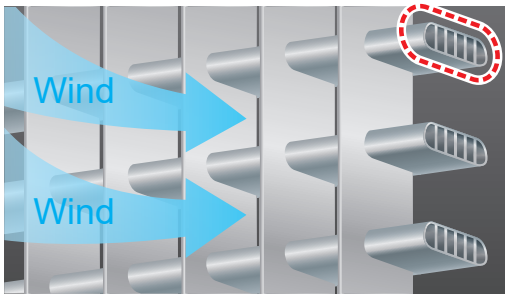
The new inverter compressor and flat tube heat exchanger contribute to improved performance rating and seasonal efficiency. Furthermore, by linking multiple units, efficient operation in the system is also realized.

Ecological

Key technology

Flat tube heat exchanger

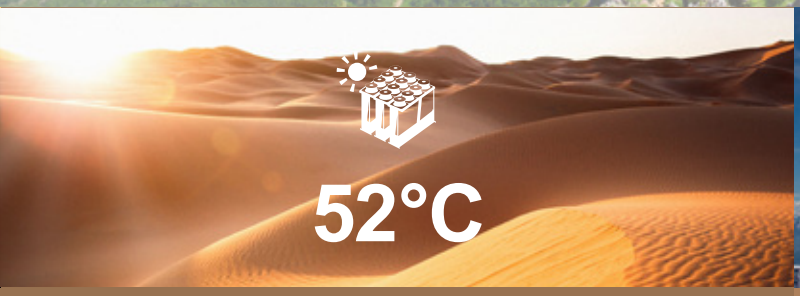
The installation of fins inside the flat tube to divide the flow path of refrigerant improves heat exchange effectiveness. It contributes to greater energy efficiency, reduction in refrigerant volume, and a wider operating range.

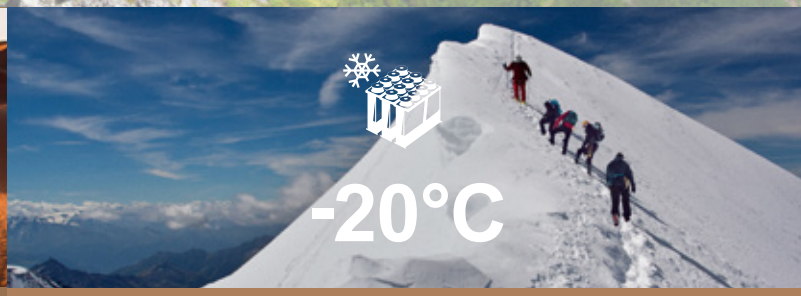


(Illustration)

R32-compatible inverter compressor

A new compressor with a suction chamber injection mechanism and an inverter control system that automatically controls the operating frequency realize the use of R32 refrigerant and a wide water operating range.





Operable in cooling mode at an intake air temperature of up to 52°C.

The maximum operable intake air temperature has increased from 43°C to 52°C. This extends the cooling performance of the units in intense heat.

Operable in heating mode at an intake air temperature of down to -20°C.

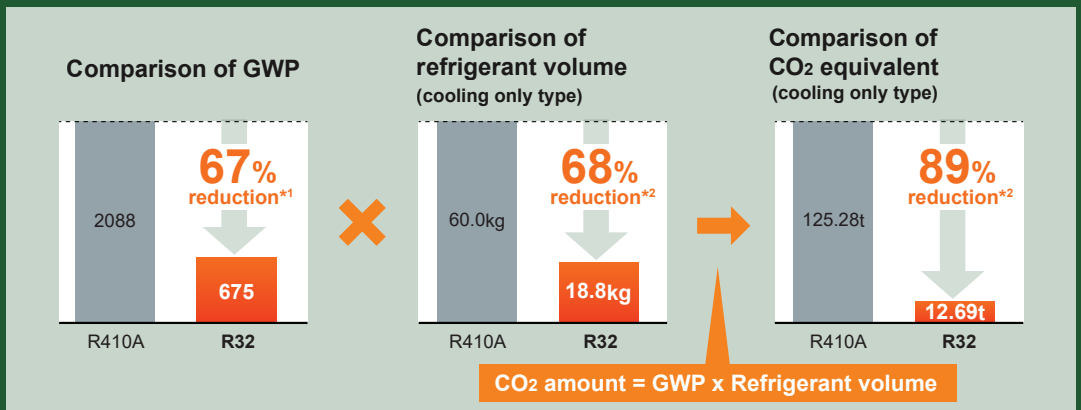
The standard minimum intake air temperature for heating operation has expanded from -15°C to -20°C. The new model helps to create warm, comfortable spaces during the harsh winter.

Tough

Ecological

Reduced impact on the environment by using R32 refrigerant

Compared to R410A, the refrigerant used in conventional models, R32 has a one-third lower GWP. The use of the R32-compatible compressor and flat tube heat exchanger allows for an approximately 68% reduction in refrigerant volume and approximately 89% reduction in CO_2 equivalent in cooling only models.



*1 Source: IPCC 4th Assessment Report, global warming potential (GWP) 100-year value. Comparison of 2088 (R410A) and 675 (R32) based on Regulation(EU) No517/2014.
*2 Source: R410A EACV-P1500/1800YBL, R32 EACV-M1500/1800YCL

High efficiency

Eurovent efficiency class Rank A achieved

Model		
M1500 (50HP)	EER	3.28*1
	COP	3.47*2

Rated efficiency

Improved major components achieve high energy saving performance. The 50 HP model has a high EER rating corresponding to energy saving class A.

*1 Under normal cooling conditions at outdoor temp 35°DB/24°WB(95°FDB/75.2°FWB) outlet water temp 7°C(44.6°F) inlet water temp 12°C(53.6°F). Pump input is included in cooling capacity and power input based on EN14511.
*2 Under normal heating conditions at outdoor temp 7°DB/6°WB(44.6°FDB/42.8°FWB) outlet water temp 45°C(113°F) inlet water temp 40°C(104°F). Pump input is included in heating capacity and power input based on EN14511.

Model		
M1500 (50HP)	SEER	5.52*1
	SCOP (Low)	3.31*1
M1800 (60HP)	SEER	5.36*1
	SCOP (Low)	3.31*1

Seasonal efficiency

Seasonal efficiency is improved in both 50HP and 60HP units.

*1 The values are calculated in accordance with EN14511.

Comparison of SEER

Model	Conventional model (R410A)	New model (R32)
M1500	4.62	5.52
M1800	4.58	5.36

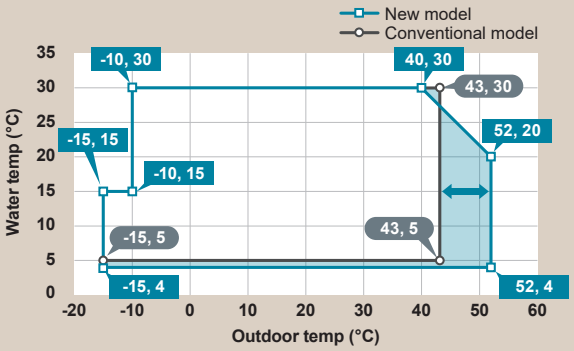
Comparison of SCOP (Low)

Model	Conventional model (R410A)	New model (R32)
M1500	3.24	3.31
M1800		

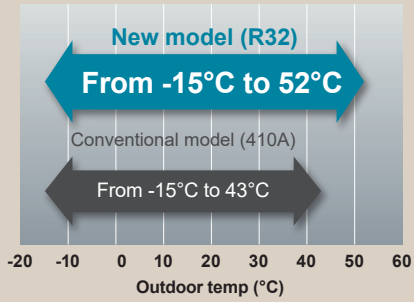
Operable in cooling mode at an intake air temperature of up to 52°C.

Cooling

The use of the flat tube heat exchanger has made it possible to increase the maximum intake air temperature from 43°C to 52°C in cooling mode, extending the cooling performance of the units in intense heat and in collective installation.

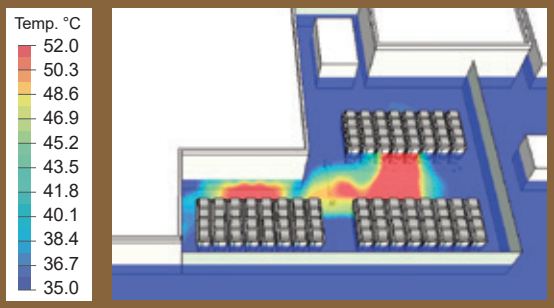


Operable intake air temperature range in cooling mode



In built-up areas with a high density of buildings, wind may be blocked, causing an accumulation of warm air in the vicinity of the unit. The new model is guaranteed up to 52°C, so operation remains stable even in such situations.

*The figure shows an installation example. Actual conditions vary. Units must be adequately spaced to ensure optimum performance.

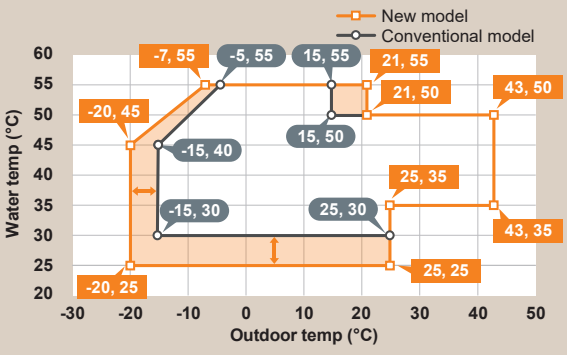


Example of flow analysis

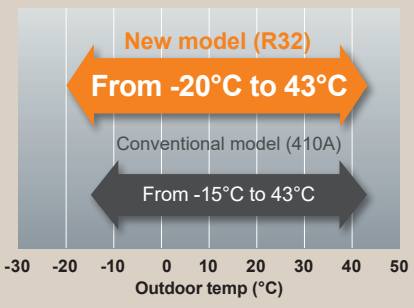
Operable in heating mode at an intake air temperature of down to -20°C.

Heating

The new model has a greater heating capacity range due to the flat tube heat exchanger and the suction chamber injection mechanism of the compressor. It is operable at the minimum intake air temperature of -20°C and the minimum outlet water temperature of 25°C. The new model is suitable for use in manufacturing lines requiring heating throughout the year.



Operable intake air temperature range in heating mode



*The function to protect the units is triggered when the units are operated at a temperature outside the operating temperature range listed above. When this happens, the units will either be operated in the capacity-save mode or come to a stop and will be unable to supply water at the target temperature. Also, the units may be operated in the capacity-save mode at the start of heating operation (while warming up) due to the protection function.

High functionality of modular chillers

- Up to six units can be connected to each group.
- Optimum frequency control is performed based on the system load.
- Operation is rotated to even out the operation time among units.
- Units not undergoing maintenance are operable while other units are being maintained.

More energy-efficient

Optimum frequency control for greater energy saving

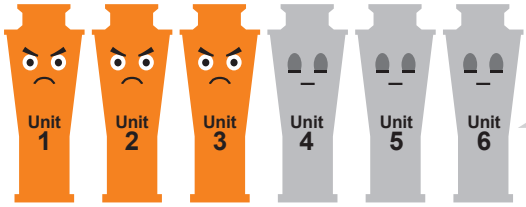
A maximum of six units is connectable to each group to increase the capacity of the system. The optimum number of units is put in operation by using a unique automatic frequency control function to achieve maximum efficiency based on the system load demand.

In low load operation

Without optimum frequency control

Normal system efficiency

Units 1 to 3 operate at 100%.



Units 4, 5, and 6 stay in Thermo-OFF.

With optimum frequency control

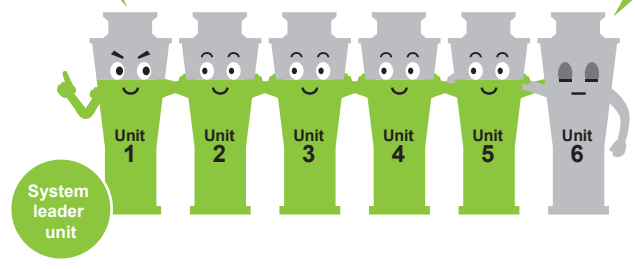
High system efficiency

Based on the total frequency of all connected units, the system leader unit decides how many units should go into operation to achieve optimal efficiency.

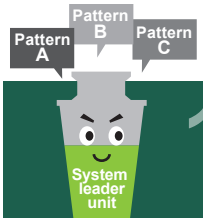
Units 1 to 5 go into operation

Operates in accordance with the command sent from the system leader unit.

Unit 6 stands by until the next command is received.



No need for metering devices to perform optimum frequency control.



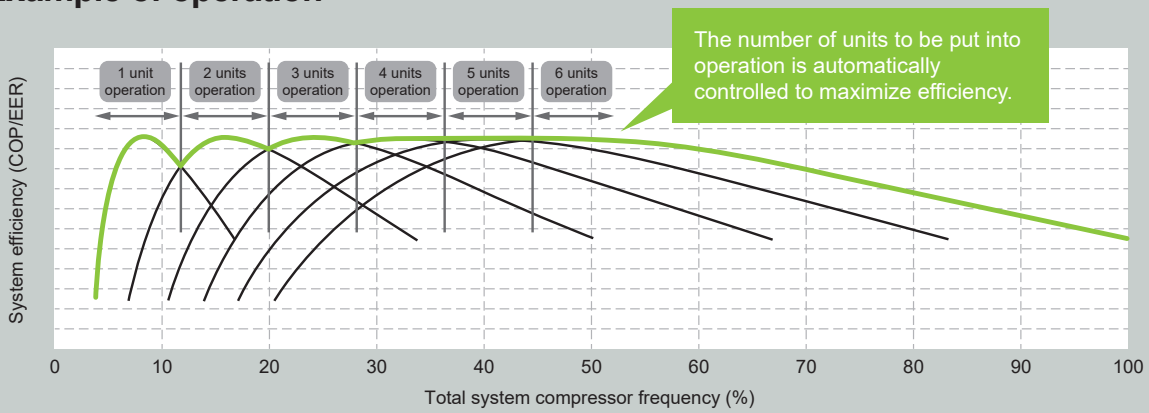
1 Based on the total frequency of all units, the system leader unit calculates the number of units to be operated to maximize efficiency.

2 The system leader unit sends a command to each unit to go into operation or remain stopped.

3 Each unit controls the water temperature in accordance with the command sent from the system leader unit.

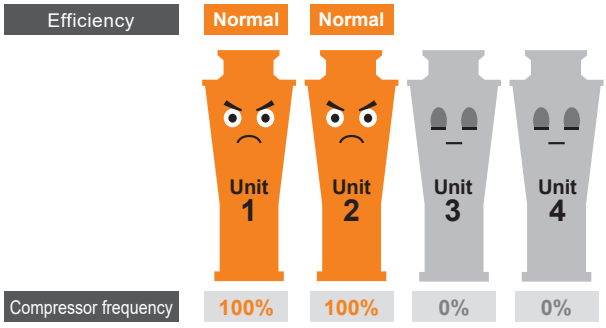
*Dip switch setting is required to use this function.

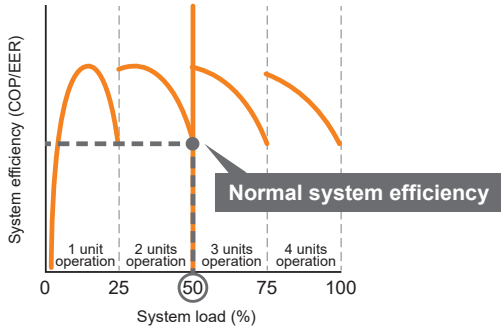
Example of operation



When the overall system load is 50%

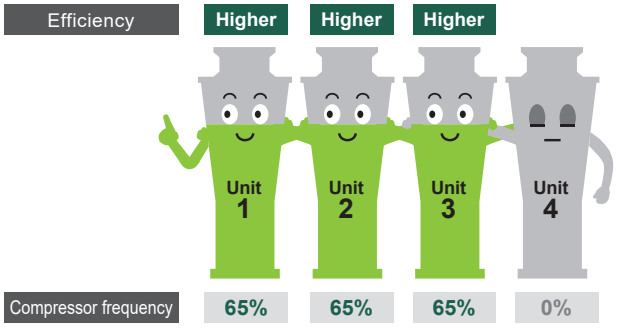
Without optimum frequency control

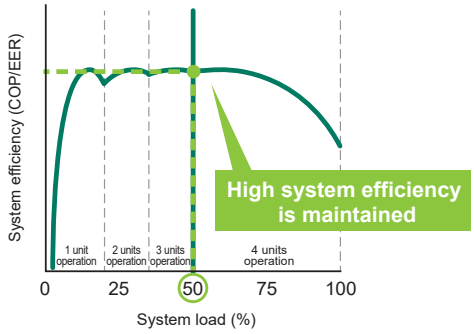




Without optimum frequency control, it is only possible to turn the unit on or off, and compressor frequency cannot be adjusted according to the required capacity.

With optimum frequency control





Each unit has inverter compressors, and the operating frequency and the number of units to be operated are controlled to maximize the operational efficiency of each unit based on the total system compressor frequency for the entire group. This function improves system efficiency when operating at low to medium loads.

High functionality of modular chillers

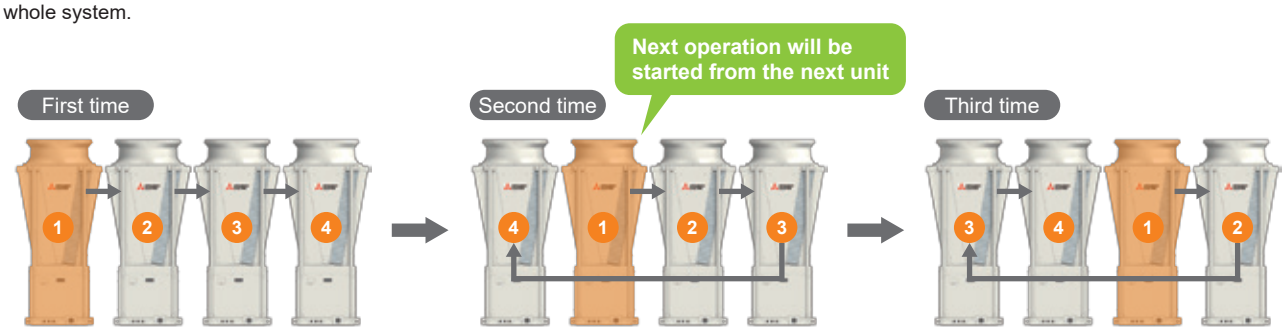
More reliable operation

Rotation operation and easy maintenance

Module chiller systems have an advantage of being able to operate the units in rotation, so the operating time of each unit is controled to be equalized. They also have an additional advantage: only the ones being serviced need to be stopped while others are kept in operation during maintenance. The capacity of the backup units can also be suppressed.

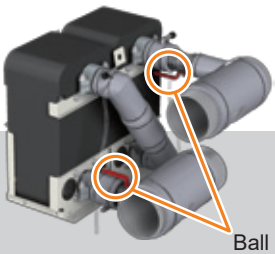
Rotation operation

When multiple units are installed, the operating time of each unit in the same system is controled to be equalized according to the load of the whole system.



Easy maintenance

With the module chiller system, even if one unit is under maintenance, the other units can continue to operate.

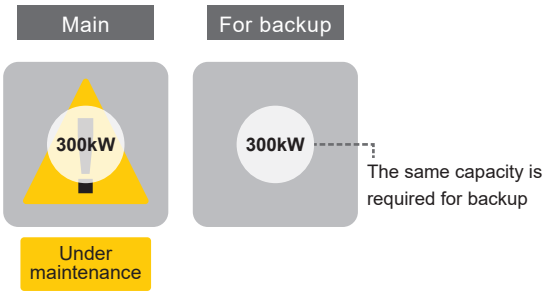


Water heat exchanger (built-in header types only)

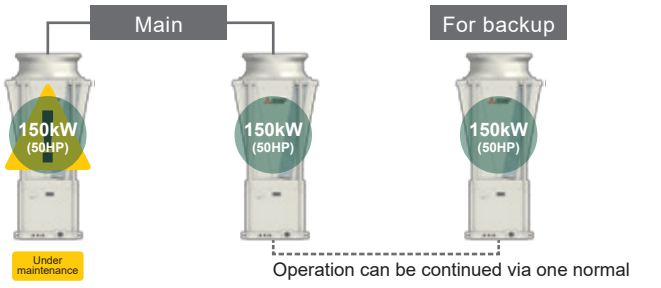
Because the pipe connecting the header pipe and the unit have ball valves, water supply to each unit from the header pipe can be stopped simply with the turn of the valve during maintenance.

When a non-modular chiller is used as the main 300kW unit, as in the below example, the same capacity would also be required as a backup. However, when e-series modular chillers are used, two units can still operate even if one unit is under maintenance. This reduces the backup capacity requirement.

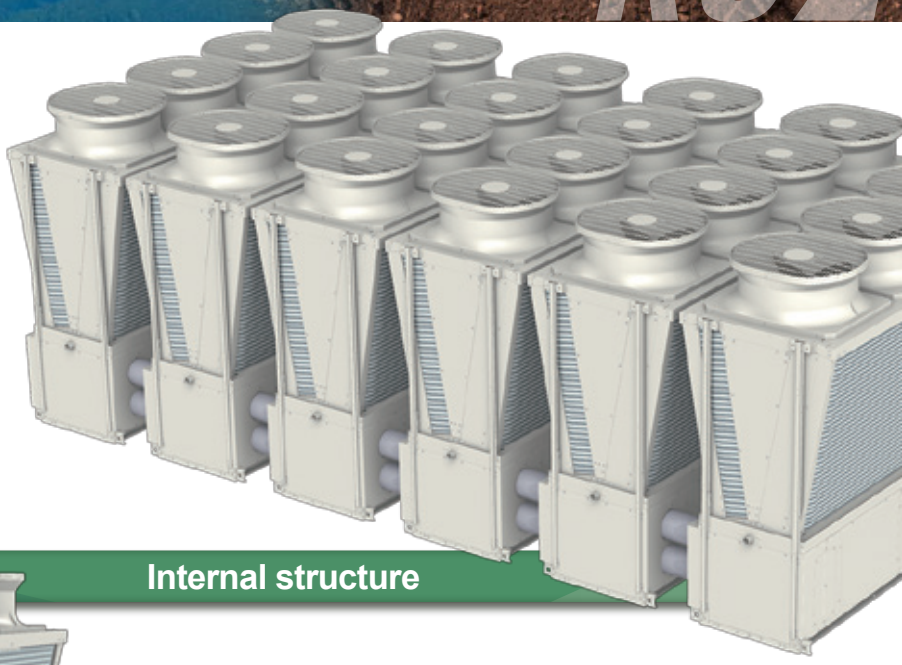
Non-modular chiller



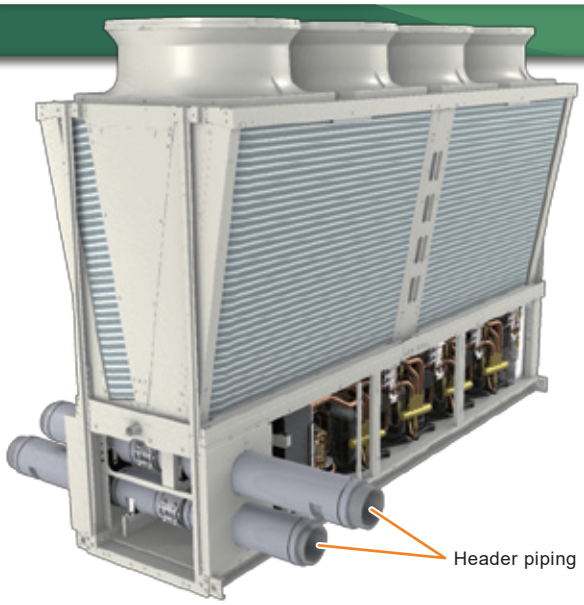
Mitsubishi Electric's e-series modular chiller



Units with built-in header pipings take less space and offer easier installation and maintenance.



Internal structure



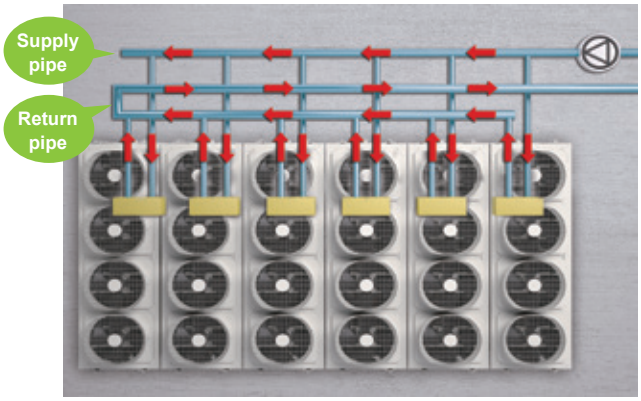
Built-in header type

Header pipings, which are normally required for connecting the unit to local water pipes, are built into the unit. Multiple units are easily connectable by using optional parts. This eliminates the need to procure water pipes for connecting the units, and reduces installation work.

*This photo shows the angle from the piping side.

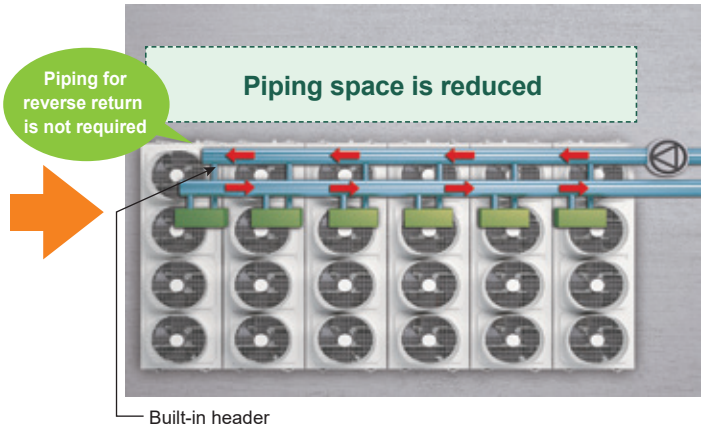
Less space and equipment cost

Standard piping construction



With standard piping construction, the customer must determine and design the return piping.
The supply pipe and return pipe of each unit should have the same overall length and piping resistance to keep a balance among the flow rates to the units. Therefore, piping space and equipment costs are required.

Built-in header type



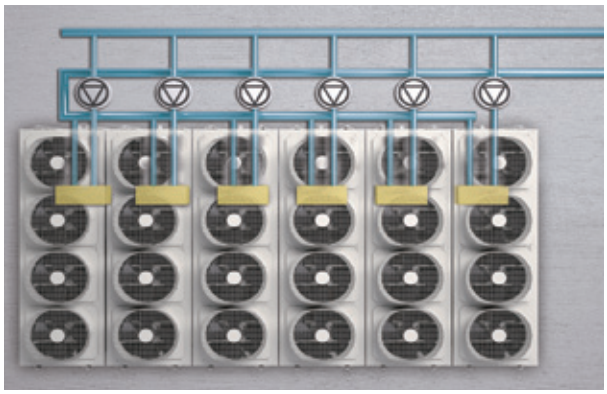
The size of the piping for the built-in header type is large to reduce pressure loss in the piping. It is unnecessary to prepare the piping for reverse return.
This helps to reduce piping space and equipment cost.

Less space and installation work

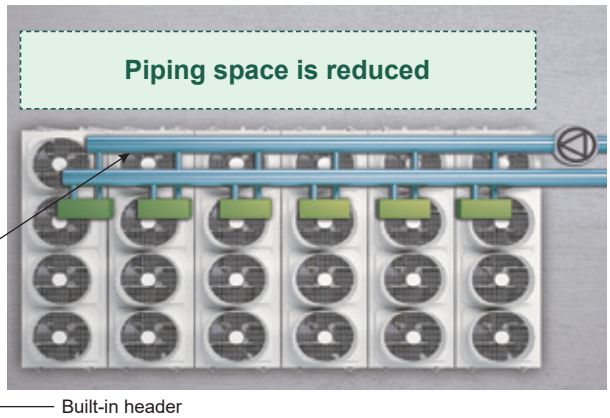
Reduced installation work

The piping to connect to other units is built into each unit. The number of piping connections is reduced by using optional parts (saving construction work and reducing construction time).

Standard piping construction

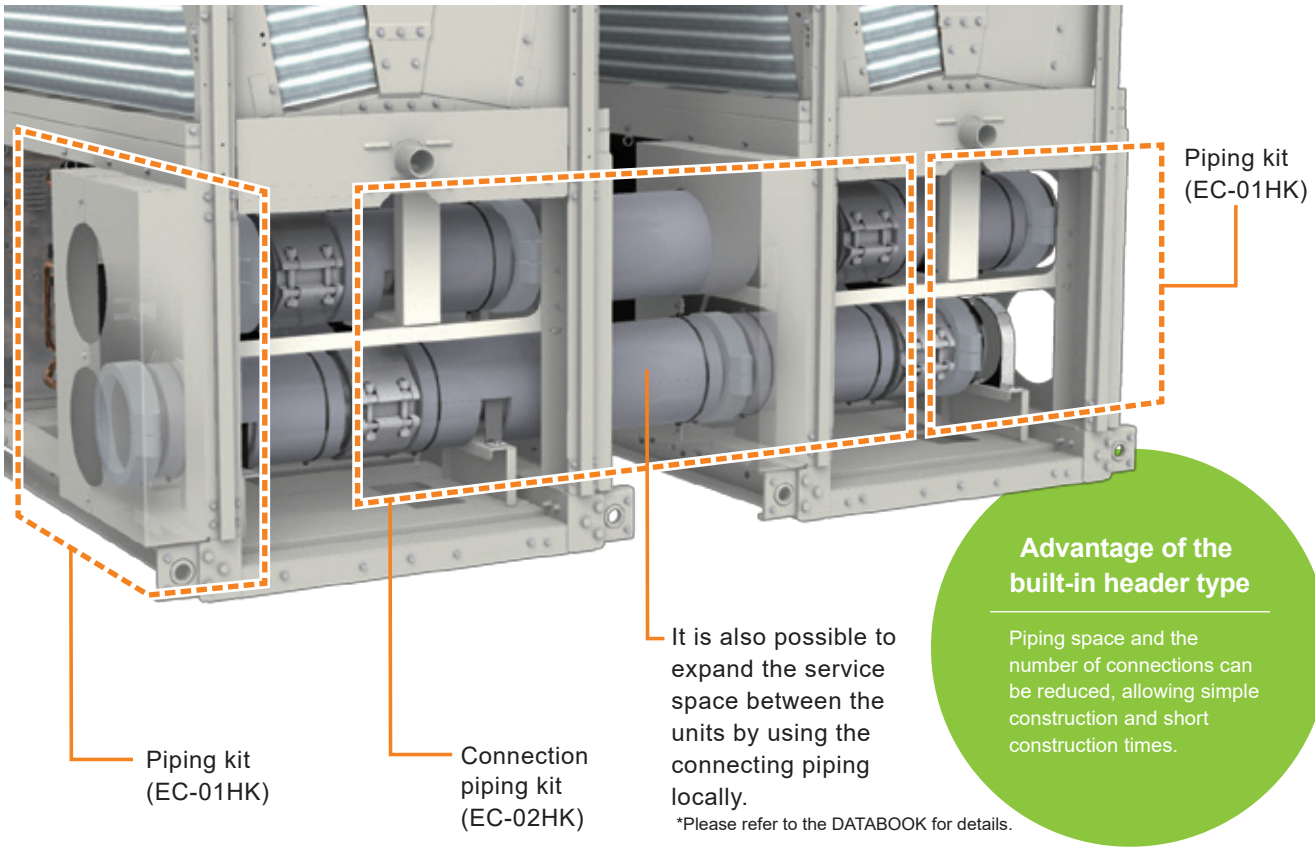


Built-in header type



• Example construction of built-in header type modules

Use the optional connection kit to connect units for easy installation.

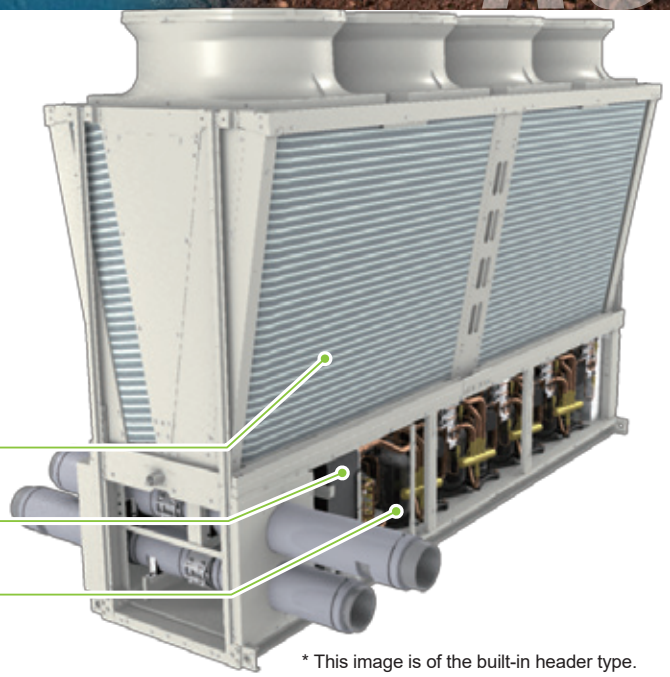


Advantage of the built-in header type

Piping space and the number of connections can be reduced, allowing simple construction and short construction times.

Key technology

The high-grade functionality, energy efficiency, and endurance of the e-series are achieved by Mitsubishi Electric's technology.



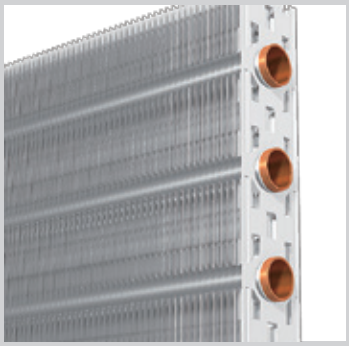
* This image is of the built-in header type.

Flat tube heat exchanger

Flat tubes are sub-divided into smaller fins to increase the contact area with the refrigerant, resulting in greater heat-exchanging efficiency. The cooling only models and the heat pump models have fins that are shaped differently to increase the overall heat-exchange efficiency of each model, resulting in reduced refrigerant volume, greater operating range, and higher operation efficiency.

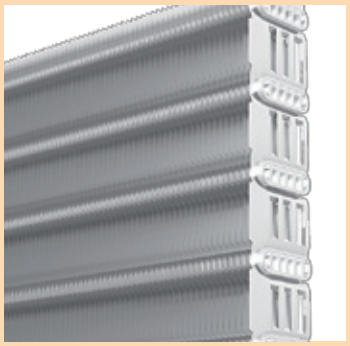
Conventional model (R410A) | **New model** (R32)

Heat pump unit/Cooling only unit



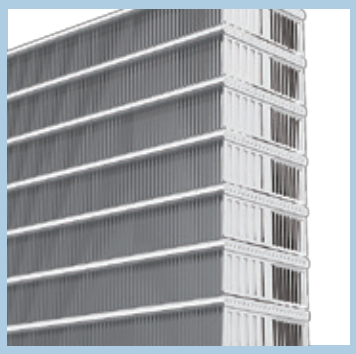
Round copper pipe

Heat pump unit



Flat HFT aluminum tube

Cooling only model



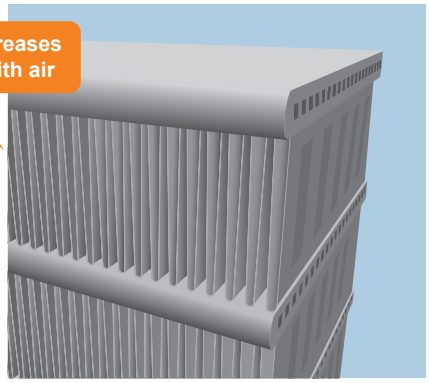
Flat PFC aluminum tube

• **Fin image**

Cooling only

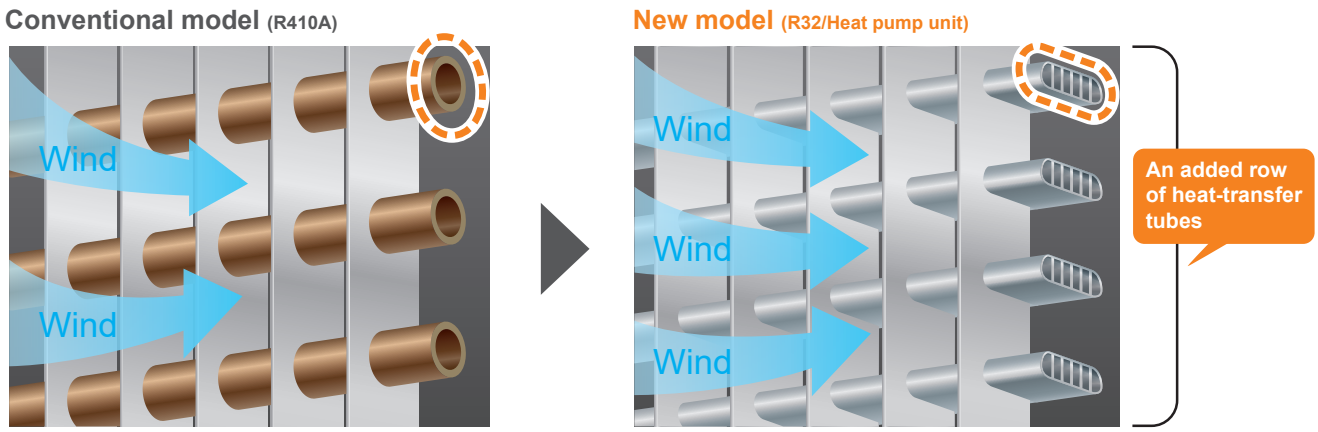
Parallel flow condenser

The heat pump and cooling only models adopt different fins in consideration of the influence of drain water clogging during heating. The heat pump model uses a horizontal flat tube and the cooling only model uses a parallel flow condenser.
The shape of the corrugated fin used in the cooling only model increases the contact area with air and the amount of heat exchange in cooling operation.

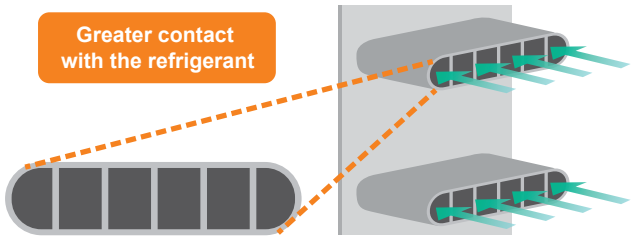


Key technology

• **Image of the flat tube**



• **Cross section of the flat tube**



The fins inside the flat tube divide the flow of refrigerant into multiple paths and improve heat-exchanger effectiveness. Flat tubes reduce wind resistance and increase the number of piping stages, resulting in an overall improvement in heat exchange efficiency.

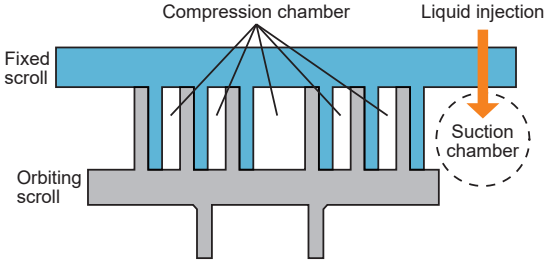
Compressor

R32-compatible high-efficiency inverter compressor

Each unit has four high-efficiency R32-compatible inverter compressors.
Compared to R410A, R32 has low pressure loss, contributing to better operation efficiency.
The inverter compressor automatically controls the compressor frequencies based on various air-conditioning conditions such as outside air temperature and changes in load, helping to achieve higher seasonal efficiency.

Stable operation with a suction chamber injection mechanism

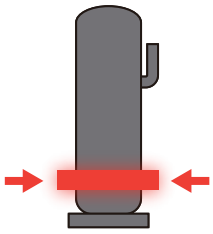
Returning the liquid refrigerant to the suction chamber suppresses a rise in the discharge temperature of R32 while the units are operated at low outside temperatures. The amount of injected refrigerant is adjusted according to the refrigerant state, allowing the units to operate in heating mode at an intake temperature as low as -20°C.



IH (induction heating) warmer

The e-series adopts an IH (induction heating) warmer to prevent refrigerant stagnation while the unit is stopped. The IH warmer suppresses standby power more than the belt case heater, which is wrapped around the compressor shell surface to constantly heat the compressor.

Case heater



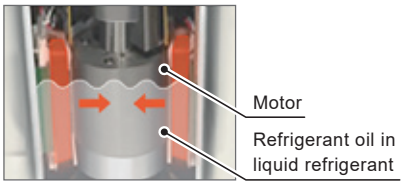
Heated from the outside with a heater

IH warmer

The magnetic property of the iron motor core inside the compressor is used to heat the compressor shell and prevent refrigerant stagnation while the unit is stopped. In addition, compressor heating remains on for 30 minutes after operation is stopped, and subsequently is switched on and off every 30 minutes. Standby power consumption therefore is lower than a case heater.

- Heated by energizing the motor

  * Low voltage at a level that will not start up the compressor



- Operation while the air conditioner is stopped

On/off is repeated every 30 minutes

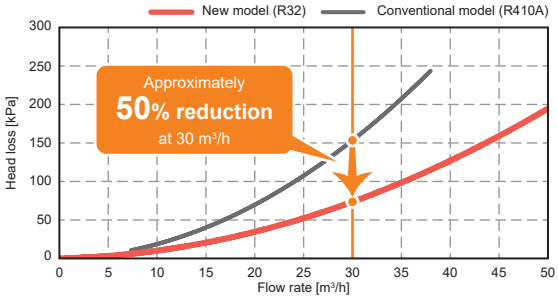
* Normally the compressor is heated while the unit is stopped to prevent liquid refrigerant from remaining in the compressor and to evaporate the liquid refrigerant in the compressor.

Water heat exchanger

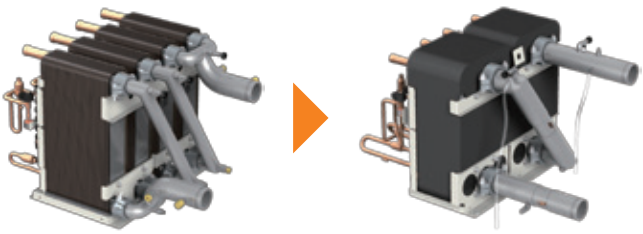
Reduction in head loss

Head loss in the water pipe is reduced by the use of a different water heat exchanger and by reducing the number of water piping routes in the unit.

- Water heat exchanger head loss

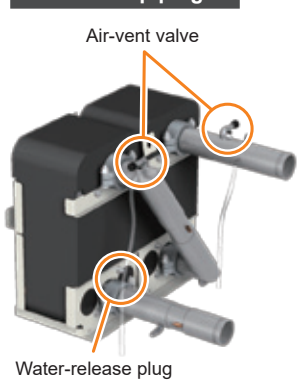


Conventional model **New model**

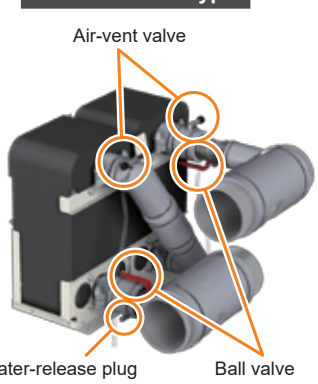


Water piping in the unit

Standard piping



Built-in header type



- A water-release plug prevents water splashing when bleeding air.
- Separate air-vent valves are installed at both the inlet and outlet of the water pipes, allowing for easy water drainage just by plugging in and out the plugs.

Easy control

The water temperature in each module can be controlled by using local remote controller PAR-W31MAA or by using centralized controller AE-200E. The control method can be selected at the request of each customer.

Remote controller PAR-W31MAA

Centralized controller AE-200E

External signal input

Basic operations, such as operation command, mode switching and water temperature setting, can be performed by inputting external signals directly to the unit.

* Optional products, such as remote controllers, are not always required.

• Major functions

Input	ON/OFF Cooling/Heating Snow/Normal Demand Target water temperature
Output	Operation command Operation mode Error
Control function (function of chiller)	Control of number of units Control to prevent simultaneous defrosting

Remote controller

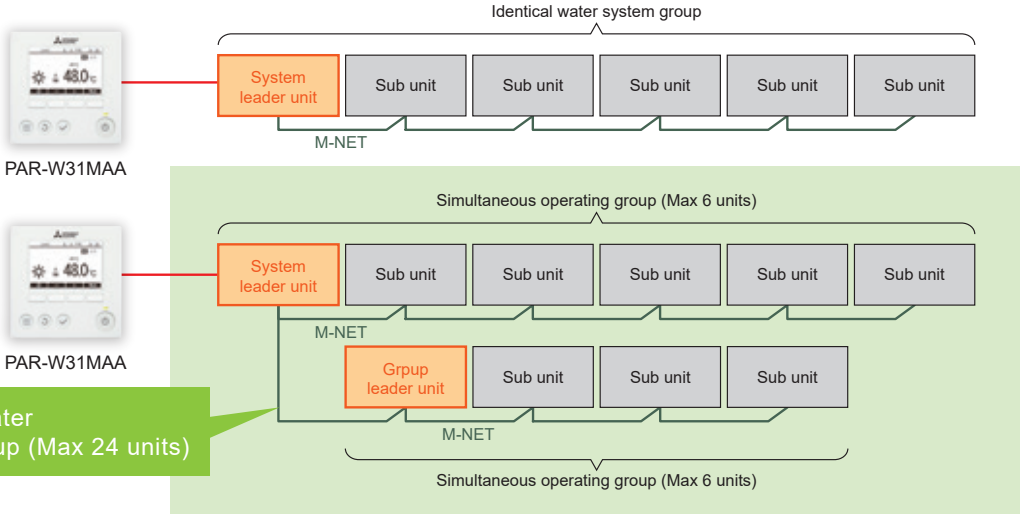
Basic operations, such as ON/OFF, mode switching, water temperature setting and schedule setting, can be performed by connecting a remote controller.

PAR-W31MAA

• Major functions

Operation/setting	ON/OFF Cooling/Heating/HeatingECO/Anti-freeze Snow/Normal Demand Scheduled operation (daily/weekly) Target temperature
Display	Operation mode Current water temperature Target temperature Error code
Control function (function of chiller body)	Control of number of units Control to prevent simultaneous defrosting

System configuration



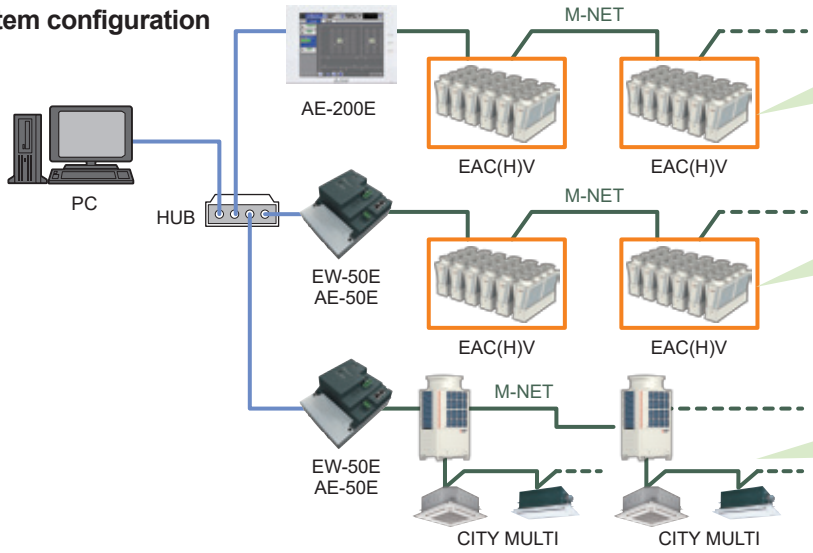
Centralized controller*

The e-series units are connectable to the AE-200E that centrally controls up to 24 units or 24 systems connected via M-NET.
By using EW-50E or AE-50E, the maximum number of connectable units can be further increased.
The use of AE-200E enables various operation settings and integrated control of the e-series and CITY MULTI.

*AE-200E with software Ver.7.80 or later can be connected.

AE-200E

• System configuration



Connectable to a maximum of 24 units or 24 systems

By connecting an EW-50E/ AE-50E to the system, up to another 24 units or 24 systems can be added.

*A maximum of three EW-50E/AE-50E are connectable to each AE-200E.

The e-series units and CITY MULTI can be collectively controlled.

• Major functions

Operation/ setting	ON/OFF Cooling/Heating/Heating ECO/Anti-freeze Snow/Normal Scheduled operation (daily/weekly/annual) Target temperature Local control disabled (ON/OFF, operation mode, target temperature)

Display	WEB browser connected Operation mode Current water temperature Error code Outdoor temperature
Control function (function of chiller body)	Control of number of units Control to prevent simultaneous defrosting

BACnet® connection function NEW

Connectable to a central monitoring device via AE-200E using BACnet®

* BACnet® is a registered trademark of ASHRAE in the United States of America.
* BACnet® can be connected to AE-200E with software Ver.7.90 or later.

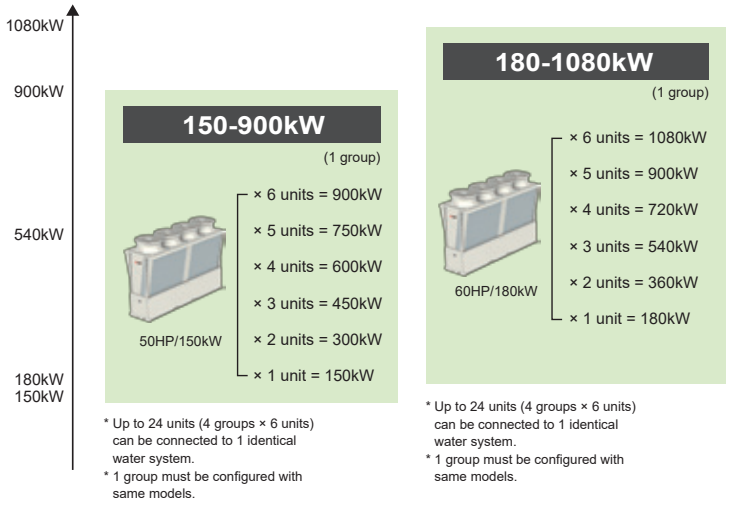
Setting	
ON/OFF	Cooling/Heating/Heating ECO/Anti-freeze
Snow/Normal	Local control disabled (ON/OFF, operation mode, target temperature)
Target water temperature	

Display		
ON/OFF	Cooling/Heating/Heating ECO/Anti-freeze	Communication error
Snow/Normal	Local control disabled (ON/OFF, operation mode, target temperature)	Individual unit error
Inlet/outlet water temperature	Collective error	

	Cooling only	Heat pump
		
50HP (150kW)	EACV-M1500YCL(-N)(-BS)	EAHV-M1500YCL(-N)(-BS)
60HP (180kW)	EACV-M1800YCL(-N)(-BS)	EAHV-M1800YCL(-N)(-BS)

* (-N) indicates built-in header type models. * (-BS) indicates anti-corrosion type models.

Capacity

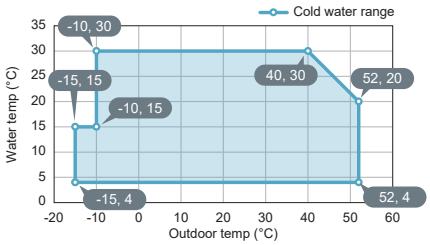


* Up to 24 units (4 groups × 6 units) can be connected to 1 identical water system.
* 1 group must be configured with same models.

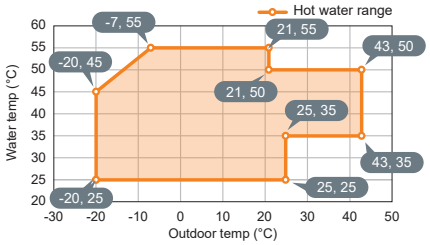
* Up to 24 units (4 groups × 6 units) can be connected to 1 identical water system.
* 1 group must be configured with same models.

Wide operating range

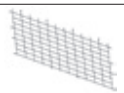
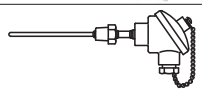
Cooling operation



Heating operation

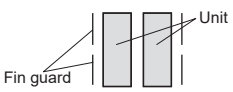


Optional parts

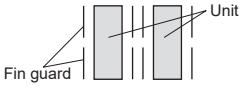
Description	Image	Model name	Remarks
Piping kit		EC-01HK *1	For inside header type modules
Connection piping kit		EC-02HK *1	For inside header type modules
Fin guard		EC-130FG	For standard pipe type and inside header type modules *2
Representative-water temperature sensor		TW-TH16-E	For standard pipe type and inside header type modules

*2 One set contains 4 fin guards. Please refer to the following installation examples.

Installation only on the outside



Installation on the outside and inside



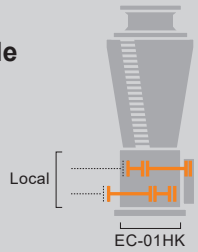
* 2 sets are required.

*1 EC-01HK and EC-02HK contain panels and bolts together with the items shown. (Please refer to the next page for details.)

Details of piping kit

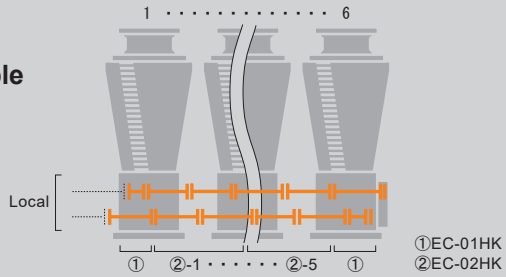
Single unit

1



Multiple units

2



Parts list

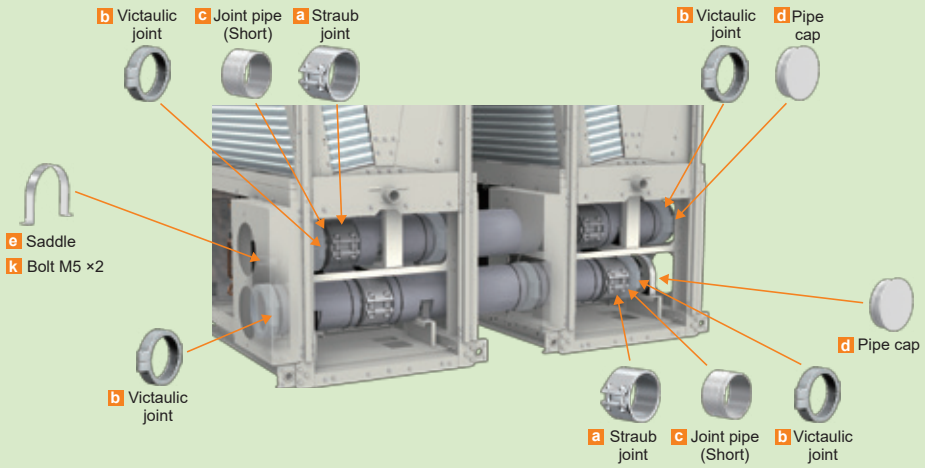
Optional parts ①
(Piping kit)

EC-01HK

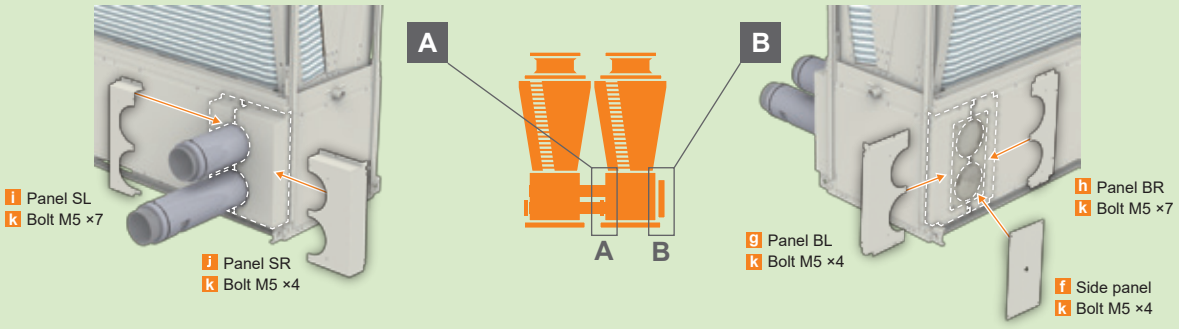
 a Straub joint×2	 b Victaulic joint×4	 c Joint pipe (Short)×2	 d Pipe cap×2	 e Saddle×1
 f Side panel×1	 g Panel BL×1	 h Panel BR×1	 i Panel SL×1	 j Panel SR×1 k Bolt M5

Installing the piping kit (EC-01HK)

Header piping



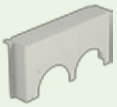
Panel



Parts list

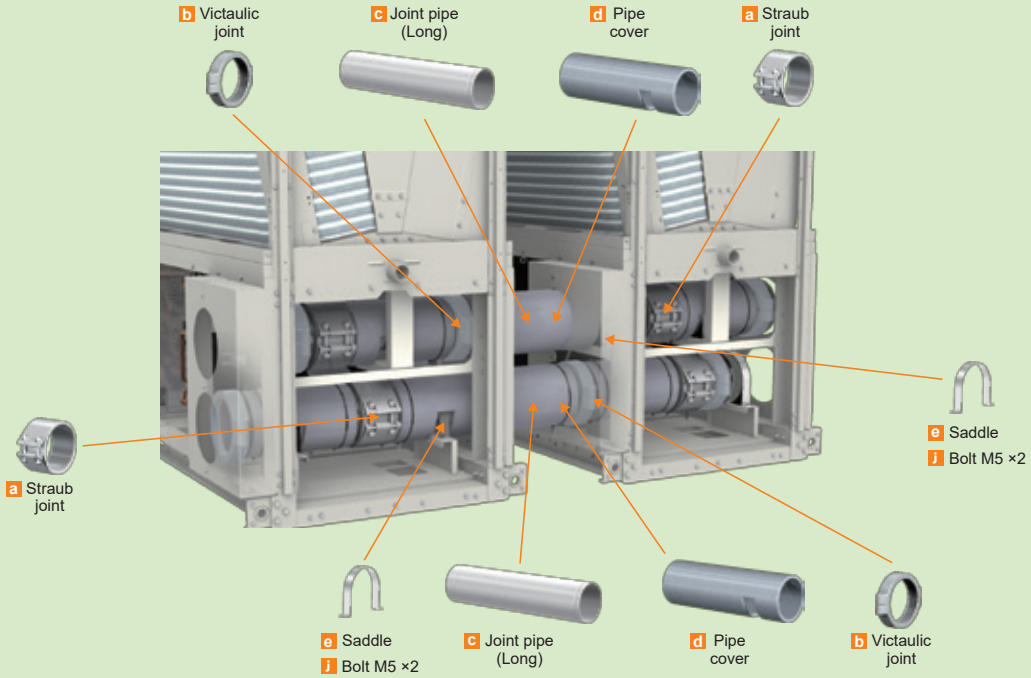
Optional parts ②
(Connection piping kit)

EC-02HK

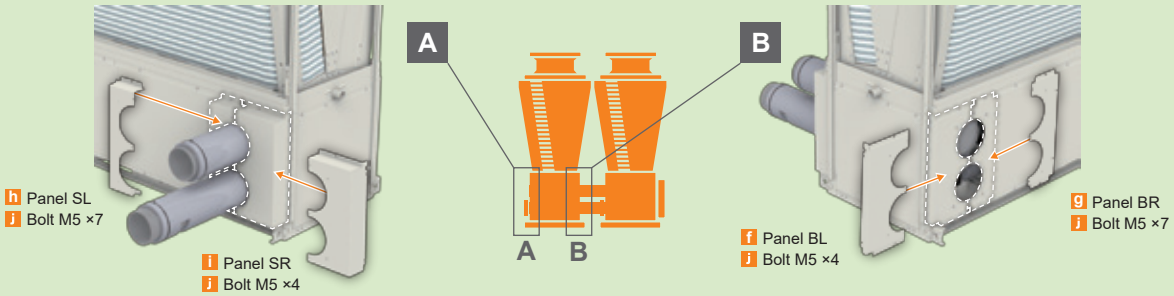
 a Straub joint×2	 b Victaulic joint×2	 c Joint pipe (Long)×2	 d Pipe cover×2	 e Saddle×2
 f Panel BL×1	 g Panel BR×1	 h Panel SL×1	 i Panel SR×1	j Bolt M5

Installing the piping kit (EC-02HK)

Header piping



Panel



*Please refer to the installation manual for details on the installation procedure.

Specifications

Standard	50HP	EACV-M1500YCL	60HP EACV-M1800YCL
Anti-corrosion	50HP	EACV-M1500YCL-BS	60HP EACV-M1800YCL-BS
Built-in header	50HP	EACV-M1500YCL-N	60HP EACV-M1800YCL-N
Anti-corrosion / Built-in header	50HP	EACV-M1500YCL-N-BS	60HP EACV-M1800YCL-N-BS

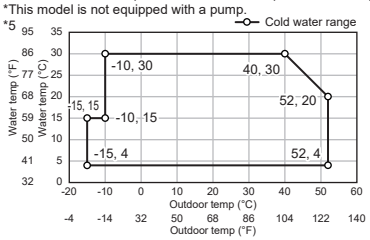
Cooling only

Model			EACV-M1500YCL(-N)(-BS)	EACV-M1800YCL(-N)(-BS)
Power source			3-phase 4-wire 380-400-415V 50/60Hz	
Cooling capacity *1		kW	150.00	180.00
		kcal/h	129,000	154,800
		BTU/h	511,800	614,160
	Power input	kW	44.73	57.02
	EER		3.35	3.16
	IPLV *4		6.42	6.31
	Water flow rate	m^3/h	25.8	31.0
Cooling capacity (EN14511) *2		kW	149.18	178.80
		kcal/h	128,295	153,768
		BTU/h	509,002	610,066
	Power input	kW	45.55	58.22
	EER		3.28	3.07
	Eurovent efficiency class		A	B
	SEER		5.52	5.36
	Water flow rate	m^3/h	25.8	31.0
Current input	Cooling current 380-400-415V *1	A	76 - 72 - 69	96 - 91 - 88
	Maximum current	A	120	
Water pressure drop *1		kPa	55	78
Temp range	Cooling	°C	Outlet water 4~30 *5	
		°F	Outlet water 39.2~86 *5	
	Outdoor	°C	-15~52 *5	
		°F	5~125.6 *5	
Circulating water volume range		m^3/h	12.9~43.0	
Sound pressure level (measured in anechoic room) at 1m *1		dB (A)	65	67
Sound power level (measured in anechoic room) *1		dB (A)	83	85
Diameter of water pipe (Standard piping)	Inlet	mm (in)	65A (2 1/2B) housing type joint	
	Outlet	mm (in)	65A (2 1/2B) housing type joint	
Diameter of water pipe (Inside header piping)	Inlet	mm (in)	150A (6B) housing type joint	
	Outlet	mm (in)	150A (6B) housing type joint	
External finish			Polyester powder coating steel plate	
External dimension HxWxD		mm	2350 x 3400 x 1080	
Net weight	Standard piping	kg (lbs)	1039 (2291)	
	Inside header piping	kg (lbs)	1067 (2352)	
Design pressure	R32	MPa	4.15	
	Water	MPa	1.0	
Heat exchanger	Water side		Stainless steel plate and copper brazing	
	Air side		Salt-resistant corrugated fin & aluminium micro channel	
Compressor	Type		Inverter scroll hermetic compressor	
	Maker		MITSUBISHI ELECTRIC CORPORATION	
	Starting method		Inverter	
	Quantity		4	
	Motor output	kW	11.5 x 4	
	Lubricant		MEL46EH	
Fan	Air flow rate	m^3/min	270 x 4	
		L/s	4500 x 4	
		cfm	9534 x 4	
	Type, Quantity		Propeller fan x 4	
	Starting method		Inverter	
	Motor output	kW	0.92 x 4	
	External static press.	Pa	20	
Protection	High pressure protection		High pres.Sensor & High pres.Switch at 4.15MPa (601psi)	
	Inverter circuit		Over-heat protection, Over current protection	
	Compressor		Over-heat protection	
Refrigerant	Type x charge		R32 x 4.7 (kg) x 4 *3	
	Control		LEV	

*1 Under normal cooling conditions at outdoor temp 35°C DB / 24°C WB (95°F DB / 75.2°F WB) outlet water temp 7°C (44.6°F) inlet water temp 12°C (53.6°F). Pump input is not included in cooling capacity and power input.
*2 Under normal cooling conditions at outdoor temp 35°C DB / 24°C WB (95°F DB / 75.2°F WB) outlet water temp 7°C (44.6°F) inlet water temp 12°C (53.6°F). Pump input is included in cooling capacity and power input based on EN14511.
*3 Amount of factory-charged refrigerant is 3 (kg) x 4. Please add the refrigerant at the field.
*4 IPLV is calculated in accordance with AHRI 550-590.
*Please don't use the steel material for the water piping.
*Please always make water circulate, or pull the circulation water out completely when not in use.
*Please do not use groundwater or well water directly.
*The water circuit must be closed circuit.
*Due to continuous improvement, the above specifications may be subject to change without notice.
*This model is not equipped with a pump.

Unit converter
kcal/h = kW x 860
BTU/h = kW x 3,412
lbs = kg/0.4536
cfm = m^3/min x 35.31

*5



Standard	50HP	EAHV-M1500YCL	60HP EAHV-M1800YCL
Anti-corrosion	50HP	EAHV-M1500YCL-BS	60HP EAHV-M1800YCL-BS
Built-in header	50HP	EAHV-M1500YCL-N	60HP EAHV-M1800YCL-N
Anti-corrosion / Built-in header	50HP	EAHV-M1500YCL-N-BS	60HP EAHV-M1800YCL-N-BS

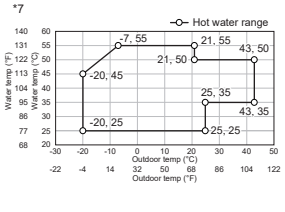
Heat pump

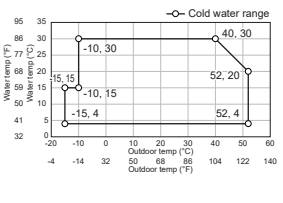
Model			EAHV-M1500YCL(-N)(-BS)	EAHV-M1800YCL(-N)(-BS)
Power source			3-phase 4-wire 380-400-415V 50/60Hz	
Cooling capacity *1		kW	150.00	180.00
		kcal/h	129,000	154,800
		BTU/h	511,800	614,160
	Power input	kW	44.73	57.02
	EER		3.35	3.16
	IPLV *6		6.42	6.31
	Water flow rate	m^3/h	25.8	31.0
Cooling capacity (EN14511) *2		kW	149.18	178.80
		kcal/h	128,295	153,768
		BTU/h	509,002	610,066
	Power input	kW	45.55	58.22
	EER		3.28	3.07
	Eurovent efficiency class		A	B
	SEER		5.52	5.36
	Water flow rate	m^3/h	25.8	31.0
Heating capacity *3		kW	150.00	180.00
		kcal/h	129,000	154,800
		BTU/h	511,800	614,160
	Power input	kW	42.61	53.09
	COP		3.52	3.39
	Water flow rate	m^3/h	25.8	31.0
Heating capacity (EN14511) *4		kW	150.82	181.20
		kcal/h	129,705	155,832
		BTU/h	514,598	618,254
	Power input	kW	43.43	54.29
	COP		3.47	3.34
	SCOP Low temp. application/ Medium temp. application		3.31 / 2.88	
	Water flow rate	m^3/h	25.8	31.0
Current input	Cooling current 380-400-415V *1	A	76 - 72 - 69	96 - 91 - 88
	Heating current 380-400-415V *3	A	72 - 68 - 66	90 - 85 - 82
	Maximum current	A	120	
Water pressure drop *1		kPa	55	78
Temp range	Cooling	°C	Outlet water 4~30 *7	
		°F	Outlet water 39.2~86 *7	
	Heating	°C	Outlet water 25~55 *7	
		°F	Outlet water 77~131 *7	
	Outdoor (Cooling)	°C	-15~52 *7	
		°F	5~125.6 *7	
	Outdoor (Heating)	°C	-20~43 *7	
		°F	-4~109.4 *7	
Circulating water volume range		m^3/h	12.9~43.0	
Sound pressure level (measured in anechoic room) at 1m *1		dB (A)	65	67
Sound power level (measured in anechoic room) *1		dB (A)	83	85
Diameter of water pipe (Standard piping)	Inlet	mm (in)	65A (2 1/2B) housing type joint	
	Outlet	mm (in)	65A (2 1/2B) housing type joint	
Diameter of water pipe (Inside header piping)	Inlet	mm (in)	150A (6B) housing type joint	
	Outlet	mm (in)	150A (6B) housing type joint	
External finish			Polyester powder coating steel plate	
External dimension HxWxD		mm	2350 x 3400 x 1080	
Net weight	Standard piping	kg (lbs)	1280 (2822)	
	Inside header piping	kg (lbs)	1307 (2881)	
Design pressure	R32	MPa	4.15	
	Water	MPa	1.0	
Heat exchanger	Water side		Stainless steel plate and copper brazing	
	Air side		Salt-resistant cross fin & aluminium tube	
Compressor	Type		Inverter scroll hermetic compressor	
	Maker		MITSUBISHI ELECTRIC CORPORATION	
	Starting method		Inverter	
	Quantity		4	
	Motor output	kW	11.5 x 4	
	Lubricant		MEL46EH	
Fan	Air flow rate	m^3/min	270 x 4	
		L/s	4500 x 4	
		cfm	9534 x 4	
	Type, Quantity		Propeller fan x 4	
	Starting method		Inverter	
	Motor output	kW	0.92 x 4	
	External static press.	Pa	20	
Protection	High pressure protection		High pres.Sensor & High pres.Switch at 4.15MPa (601psi)	
	Inverter circuit		Over-heat protection, Over current protection	
	Compressor		Over-heat protection	
Refrigerant	Type x charge		R32 x 11.5 (kg) x 4 *5	
	Control		LEV	

*1 Under normal cooling conditions at outdoor temp 35°C DB / 24°C WB (95°F DB / 75.2°F WB) outlet water temp 7°C (44.6°F) inlet water temp 12°C (53.6°F). Pump input is not included in cooling capacity and power input.
*2 Under normal cooling conditions at outdoor temp 35°C DB / 24°C WB (95°F DB / 75.2°F WB) outlet water temp 7°C (44.6°F) inlet water temp 12°C (53.6°F). Pump input is included in cooling capacity and power input based on EN14511.
*3 Under normal heating conditions at outdoor temp 7°C DB / 6°C WB (44.6°F DB / 42.8°F WB) outlet water temp 45°C (113°F) inlet water temp 40°C (104°F). Pump input is not included in heating capacity and power input.
*4 Under normal heating conditions at outdoor temp 7°C DB / 6°C WB (44.6°F DB / 42.8°F WB) outlet water temp 45°C (113°F) inlet water temp 40°C (104°F). Pump input is included in heating capacity and power input based on EN14511.
*5 Amount of factory-charged refrigerant is 3 (kg) x 4. Please add the refrigerant at the field.
*6 IPLV is calculated in accordance with AHRI 550-590.
*Please don't use the steel material for the water piping.
*Please always make water circulate, or pull the circulation water out completely when not in use.
*Please do not use groundwater or well water directly.
*The water circuit must be closed circuit.
*Due to continuous improvement, the above specifications may be subject to change without notice.
*This model is not equipped with a pump.

Unit converter	
kcal/h = kW x 860	BTU/h = kW x 3,412
lbs = kg/0.4536	cfm = m^3/min x 35.31

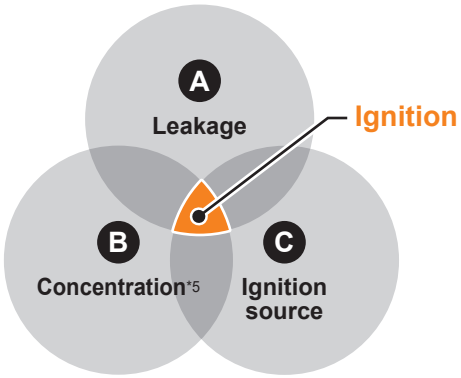
*7





R32 refrigerant properties

Under the conditions shown below, there is a possibility that R32 could burn.



	R32	R410A	R22
Chemical formula	CH_2F_2	CH_2F_2/CHF_2CF_3	$CHClF_2$
Composition (blend ratio wt. %)	Single composition	R32/R125 (50/50 wt %)	Single composition
Ozone depletion potential (ODP)	0	0	0.055
Global warming potential (GWP) *1	675	2088	1810
LFL(vol.%) *2	13.3	–	–
UFL(vol.%) *3	29.3	–	–
Flammability *4	Lower flammability (2L)	No flame propagation (1)	No flame propagation (1)

*1 IPCC 4th assessment report
*2 LFL: Lower flammable limit
*3 UFL: Upper flammable limit
*4 ISO 817:2014
*5 R32 consistency is higher than LFL*2 and lower than UFL*3.

Be sure to observe the following three points to use R32 safely.

⚠ WARNING

A **Do not leak refrigerant.**
<Installation> • Vacuum drying should be done. Do not release refrigerant into the atmosphere unnecessarily.
• Follow "Installation points of charging refrigerant."
<Repair/Removal> • Refrigerant should be recovered.

B **Prevent concentration.**
• Follow “Installation restrictions”.

C **Keep ignition sources away from the unit.**
• Do not braze pipes that contain refrigerant. Before brazing, refrigerant should be recovered.
• Do not install the unit while electricity is on. Turn off electricity and check using a tester.
• Do not smoke during work and transportation.

Note: Both R32 / R410A emit toxic gas when exposed to naked flame.

Tools

Tools	Gauge manifold	Charge hose	Electronic weight scales	Charge valve	Electric leak tester (Gas leak detector)	Vacuum pump	Vacuum pump adapter	Refrigerant recovery equipment	Refrigerant recovery cylinder
R32	*3 Shareable	*3 Shareable	*3 Shareable	*3 Shareable	*3 Shareable	*3 Shareable	*3 Shareable	*3 Shareable	Exclusive
R410A									Exclusive

*1
*2

Note: Be sure to confirm with the manufacturers that the electric leak tester, vacuum pump and refrigerant recovery equipment are compliant with R32.

*1 Refer to catalogs provided by the manufacturers of the tools above to ensure that the tools are usable with R32.
*2 Do not use R32 and R410A in combination in the same refrigerant recovery cylinder.
*3 The types of tools required for R32 units and R410A units are the same. Each tool must be used only with either R32 units or R410A units.

Procedure for charging refrigerant

Before work	Confirmation of refrigerant type	Confirm the spec label.
	Confirmation of installation restrictions	Be sure to follow "Installation restrictions".
Work	Charging of additional refrigerant	Use a gauge manifold, charge hose and charge valve compliant with R32.
	Gas leak inspection	Use a leak tester compliant with R32.

Installation restrictions

General restrictions

⚠ WARNING

Do not install the unit where combustible gas may leak.

- If combustible gas accumulates around the unit, fire or explosion may result.

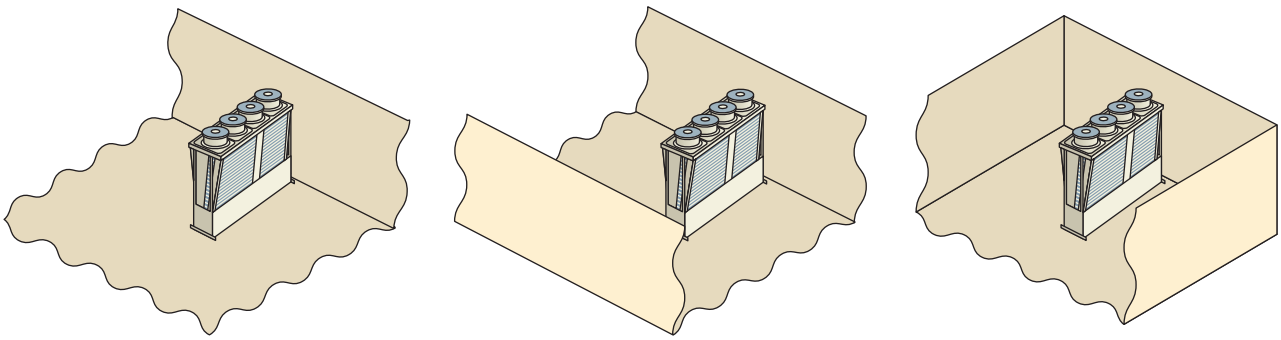
- Provide sufficient space around the unit for effective operation, efficient air movement, and ease of access for maintenance.
- All restrictions mentioned in this manual apply not only to new installations but also to relocations and layout changes.
- Refer to the Installation manual for other precautions on installation.

Installation space requirement

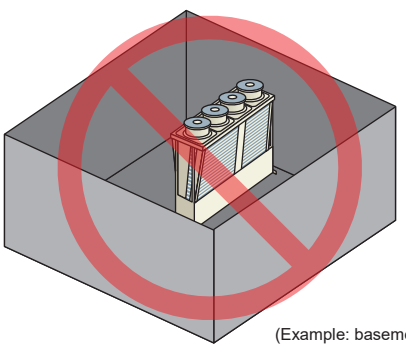
- Do not install the unit inside a building such as the basement or machine room, where the refrigerant may stagnate.
- Install the unit in a place where at least one of four sides is open.

Figure 1

Correct installation



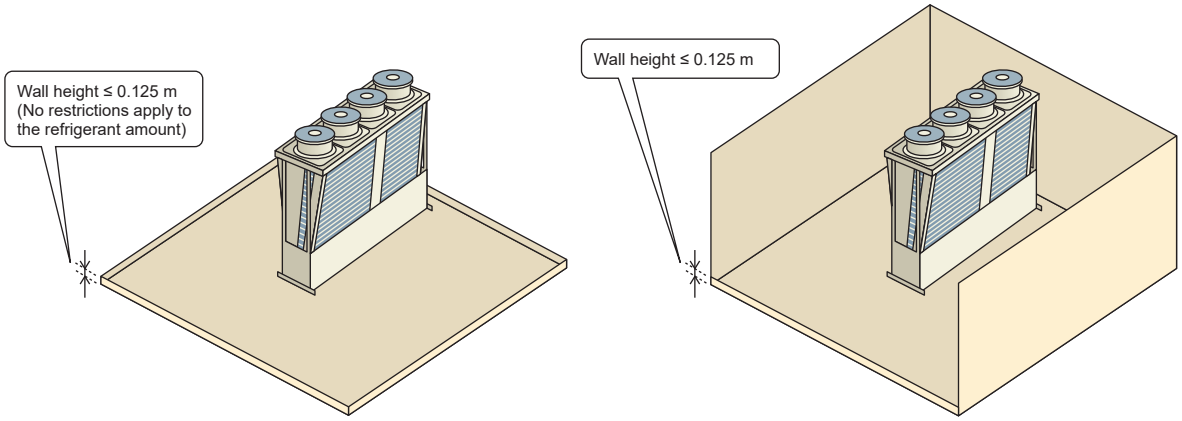
Incorrect installation



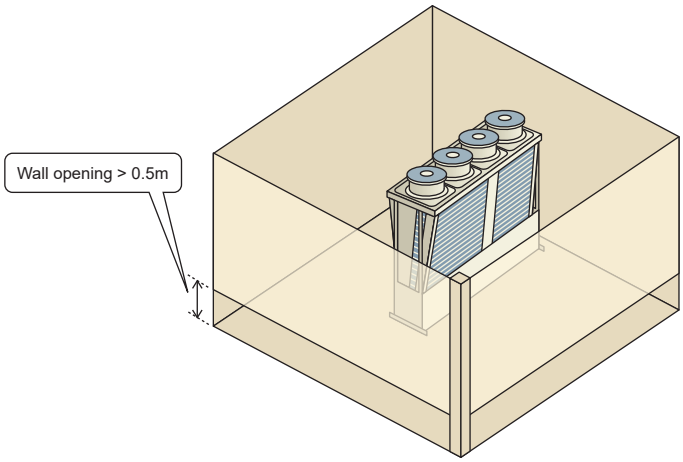
(Example: basement)

If the unit needs to be installed in a space where all four sides are blocked, confirm that one of the following situations (A or B) is satisfied.

A Install the unit in a space with a wall height of ≤ 0.125 m.



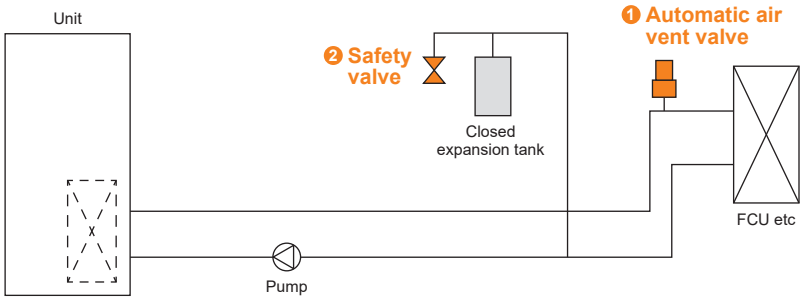
B Create an appropriate ventilation opening.



Regulatory requirements for safety

See below for information on installing a safety device on the air cooled chilling unit system.

* Safety devices shall be regularly inspected, maintained, and replaced in accordance with relevant laws, regulations, and the instructions of the manufacturers.
* The requirements listed below were established based on IEC60335-2-40 (Edition 5.0) G.G.6. See the original standards for further information on selecting a safety device.



Required items	Note
❶ Automatic air vent valve	* In the event of a failure of the waterside heat exchanger in the unit, the refrigerant may leak from the automatic air vent valve, so install it in a place where the refrigerant will not accumulate, such as outdoors.
❷ Safety valve	* In the event of a failure of the waterside heat exchanger in the unit, the refrigerant may leak from the safety valve, so install it in a place where the refrigerant will not accumulate, such as outdoors.

for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

⚠Warning

■Do not use refrigerant other than the type indicated in the manuals provided with the unit and on the nameplate.
- Doing so may cause the unit or pipes to burst, or result in explosion or fire during use, repair, or at the time of disposal of the unit.
- It may also be in violation of applicable laws.
- MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.

■Our air-cooled chilling units contain a fluorinated greenhouse gas, R32 (GWP:675).
This GWP value is based on Regulation (EU) No. 517/2014 from IPCC 4th edition. In case of Regulation (EU) No. 626/2011 from IPCC 3rd edition, this is R32 (GWP:550).

MITSUBISHI ELECTRIC CORPORATION

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