MITSUBISHI ELECTRIC

Changes for the Better

Water-cooled Chilling Units

The new e-series Water-cooled

Chilling Units

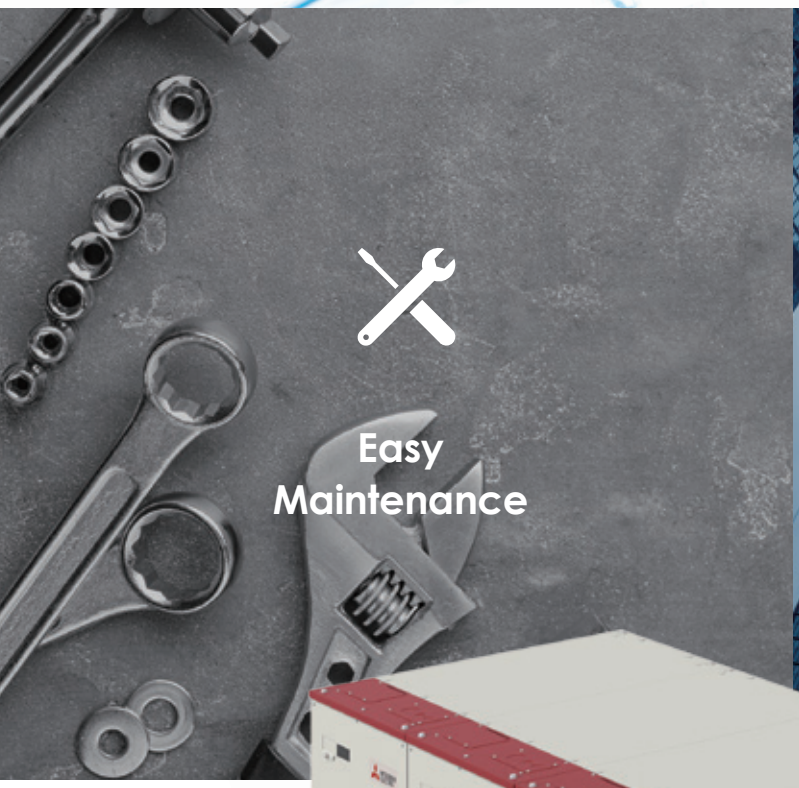
Refrigerants
R32

The new e-series Water-cooled Chilling Units

This new e-series provides a comfortable and energy-conservative air-conditioning system through daily operations.

With growing concerns about global warming, building owners are expected to choose more energy-efficient equipment.

Mitsubishi Electric's chillers have been used widely in various applications from commercial buildings to industrial use.
Besides air-cooled chillers, we have now developed new water-cooled e-series, which is an inverter-driven and uniquely designed modular compact chiller.



Easy
Maintenance

Energy
Efficiency

High functionality of modular compact chillers

Easy Installation and Highly Efficient Operation

- **Its compactness contributes to easy carry-in with an elevator.**
- **The use of low GWP refrigerant R32 achieves reduced impact on the environment.**
- **The internal elements can be pulled out improving the ease of maintenance.**
- **The unit can accomplish highly efficient operations (EER: 5.05/SEER: 7.66).**

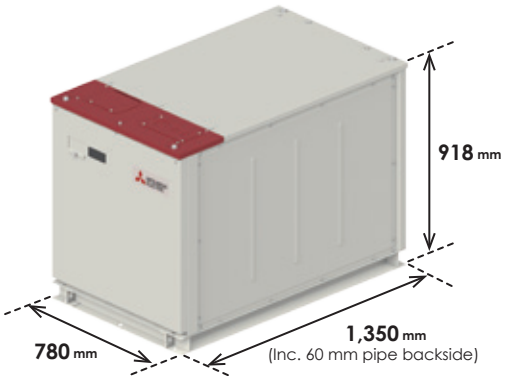
Compactness & Easy Installation

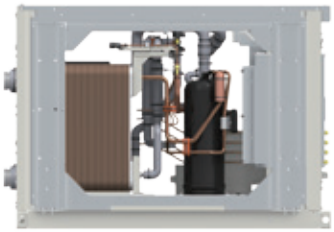
Thanks to its compact chassis, elevator carry-in is achievable, resulting in an easy installation and shorter construction period.

*Use an elevator that fulfills at least 800 mm for its door and 1,350 mm for its depth.
*A unit can be carried in through a 800 mm wide machine room door.

Compact Chassis

ERCV-M900YA
30HP 90kW

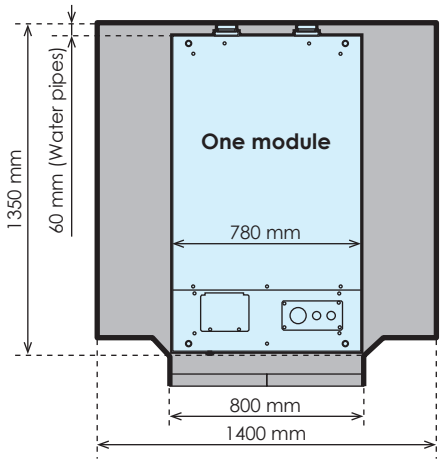


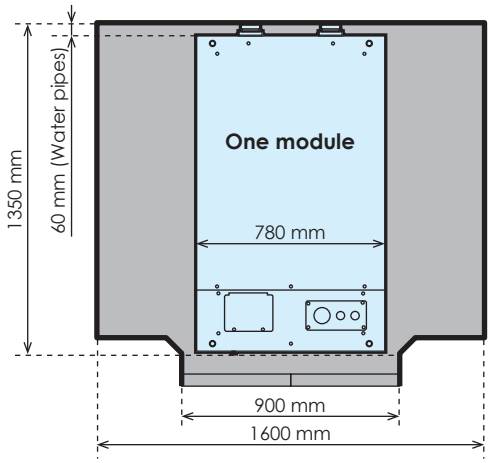


▲ Side view of the structure

▲ Carried in easily with an elevator*
*By an elevator for more than 11 people

Elevator size examples



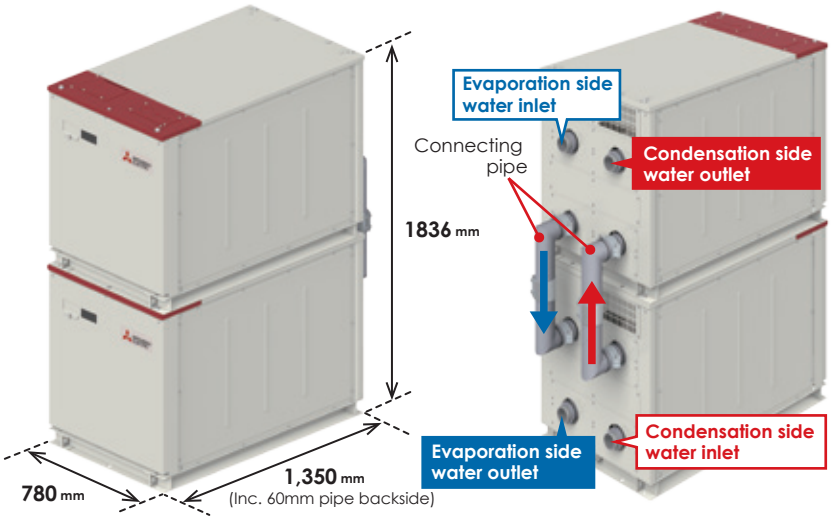


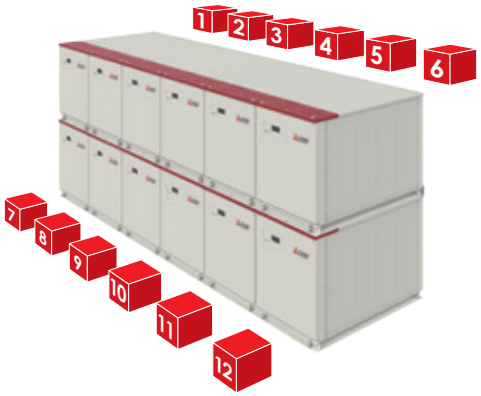
Double stack style

ERCV-M900YA x 2
60HP 180kW

With the top-bottom unit joining kit (ER-01RK)*, two units can be combined vertically and achieve 60 HP/180 kW. Moreover, a maximum of 1,080 kW is possible since up to 6 double-stack units (12 units) are connectable in one group.

* Please refer to the installation manual.



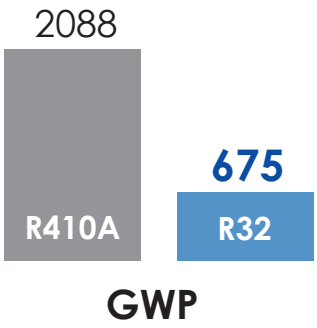


▲ Up to 24 double-stack units can be connected to 1 identical water system.

Low GWP Refrigerant R32

Compared to R410A, the refrigerant that has been generally used for chilling units, R32 has a one-third lower GWP of 675*. Moreover, since R32 is a high-density refrigerant, the refrigerant volume required for a unit is smaller than R410A. The amount of CO_2 emission is calculated based on GWP x refrigerant volume, so the use of R32 has a reduced impact on the environment.

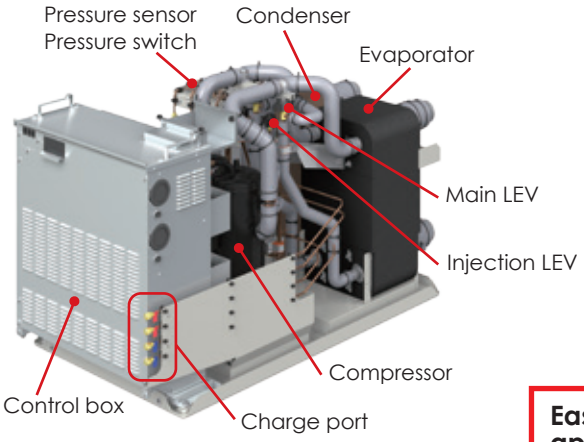
* Source: IPCC 4th Assessment Report, global warming potential (GWP) 100-year value.



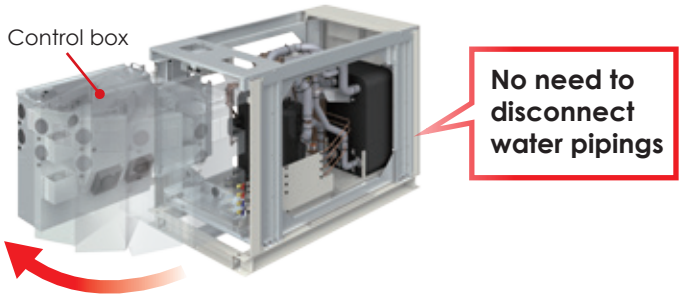
Easy Maintenance

Thanks to the openable and drawable internal structure, this unit provides easy access to each component. When you only want to access the control box, drawing all the components out is unnecessary because it is openable to the front.

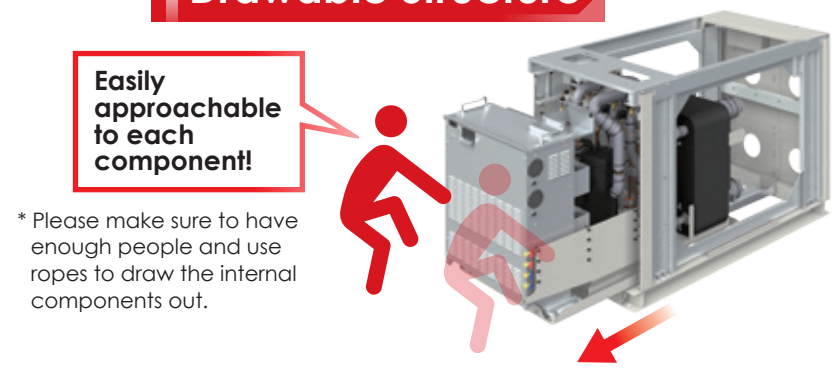
Internal Components



Openable Structure

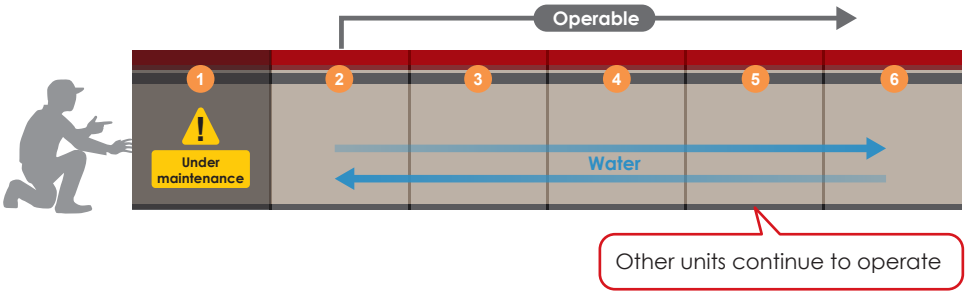


Drawable Structure



* Please make sure to have enough people and use ropes to draw the internal components out.

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



High Efficiency

Both rated and seasonal efficiency are high thanks to our original configuration. Moreover, since this inverter-driven chiller is able to operate at a partial load, higher efficiency is achievable which a fixed-speed system cannot reach.

Rated Efficiency

EER 5.05

*Under normal cooling conditions at the evaporation side water inlet temp 12°C (53.6°F) outlet temp 7°C (44.6°F) and at the condensation side water inlet temp 30°C (86°F) outlet temp 35°C (95°F). Pump input is included in cooling capacity and power input.

COP 4.61

*Under normal heating conditions at the condensation side water inlet temp 40°C (104°F) outlet temp 45°C (113°F) and at the evaporation side water inlet temp 10°C (50°F) outlet temp 7°C (44.6°F). Pump input is included in heating capacity and power input.

Seasonal Efficiency

SEER 7.66

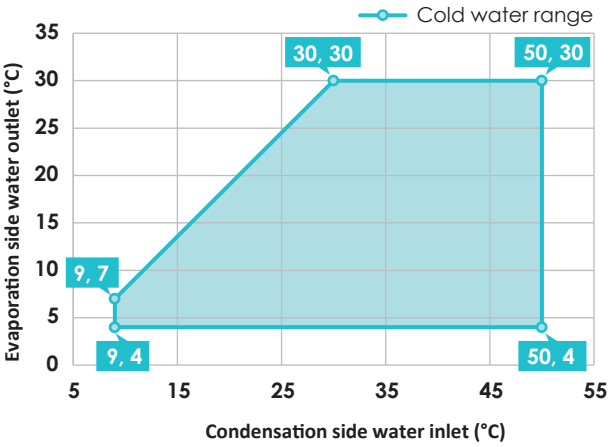
*Under normal cooling conditions at the evaporation side water inlet temp 12°C (53.6°F) outlet temp 7°C (44.6°F) and at the condensation side water inlet temp 30°C (86°F) outlet temp 35°C (95°F). Pump input is included in cooling capacity and power input based on EN14511.

SCOP (low) 7.10

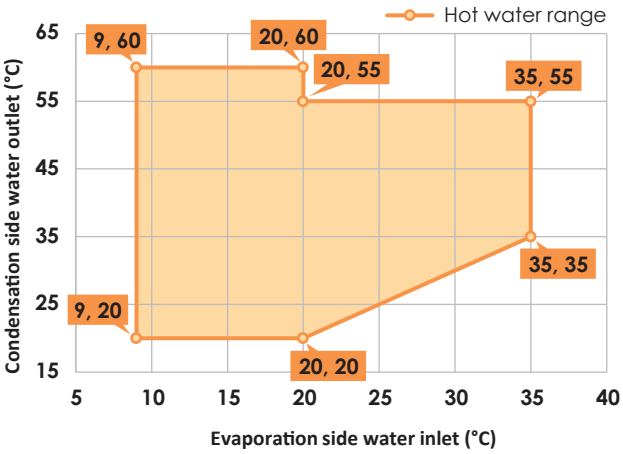
*Under normal heating conditions at the condensation side water inlet temp 40°C (104°F) outlet temp 45°C (113°F) and at the evaporation side water inlet temp 10°C (50°F) outlet temp 7°C (44.6°F). Pump input is included in heating capacity and power input based on EN14511.

Water Temperature Range

Cooling Operation



Heating Operation



* Please refer to p.19 for the water temperature range of the double stack style in the heating operation.
* Please set the DipSW when switching the cooling/heating mode accordingly (the default factory setting is the cooling mode).

Optimum Frequency Control

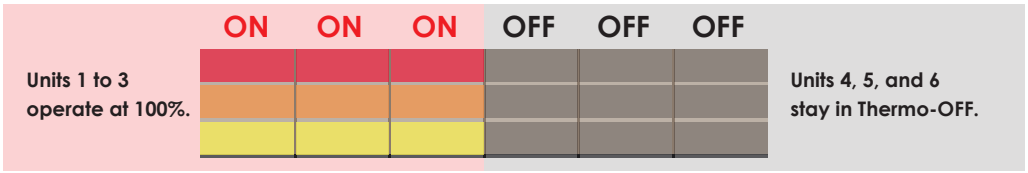
Each group can have a maximum of 6 units to increase the capacity of the system. When multiple units are connected, the optimum frequency control function is available, achieving higher efficiency.

*Pumps are necessary to be installed on-site.

In low-load operation

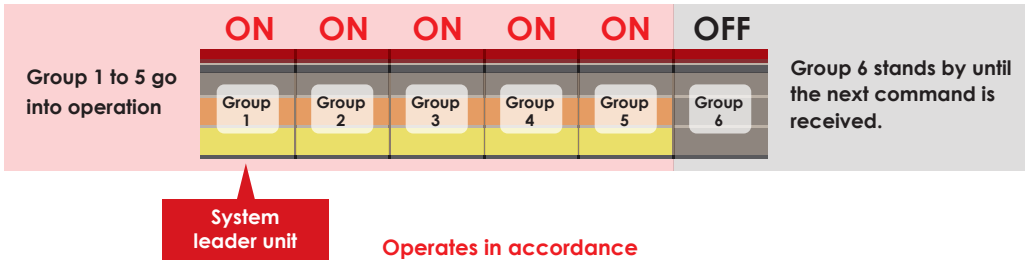
Control of general fixed-speed chillers

Normal system efficiency



Optimum frequency control of our e-series

High system efficiency



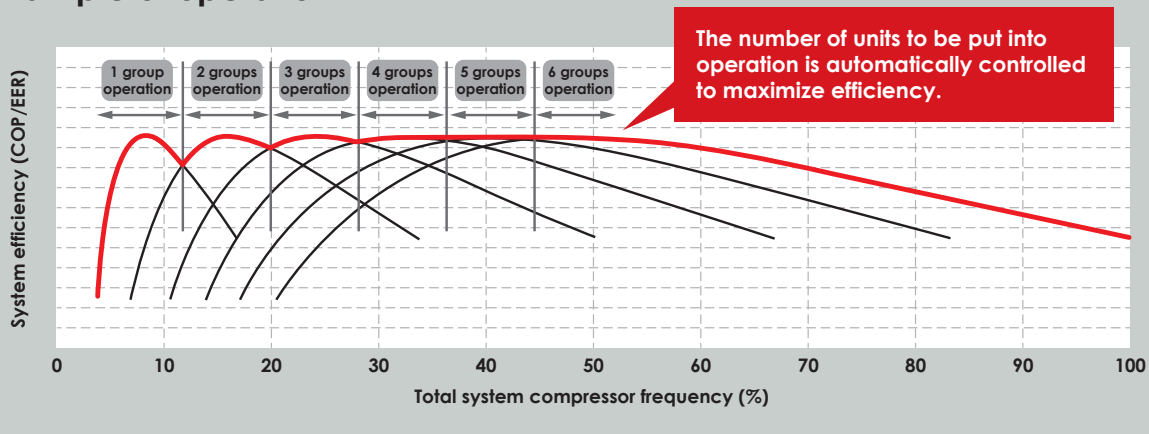
Operates in accordance with the command sent from the system leader unit.

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

No need for metering devices to perform optimum frequency control.

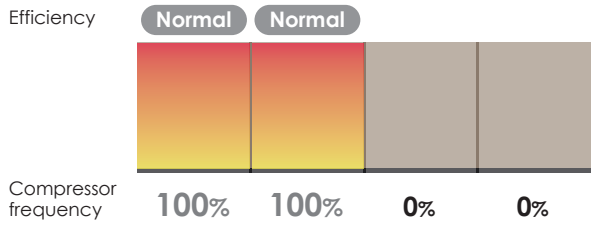
1. Based on the operating load on-site, the system leader unit calculates the number of groups need to be operated to maximize efficiency.
2. The system leader unit sends a command to each unit to go into operation or remain stopped.
3. Each unit controls the water temperature according to the command from the system leader unit.

Example of operation

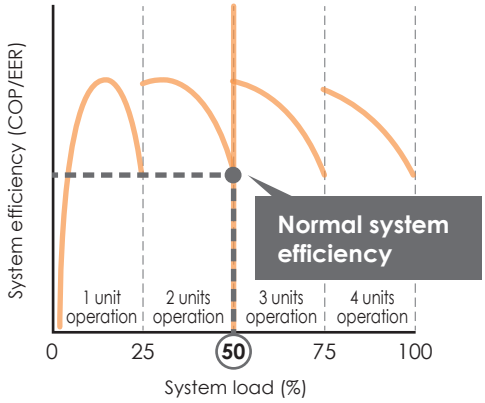


In the case of overall system load of 50%

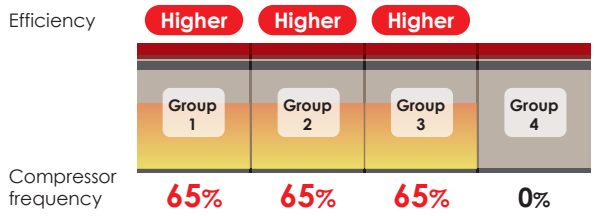
Control of general fixed-speed chillers



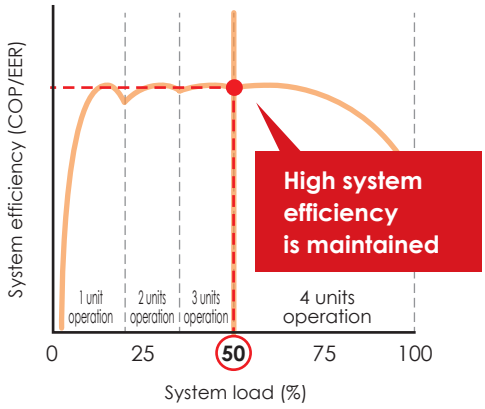
Only turning the unit on or off is possible without optimum frequency control, and compressor frequency cannot be adjusted according to the required capacity.



Optimum frequency control of our e-series

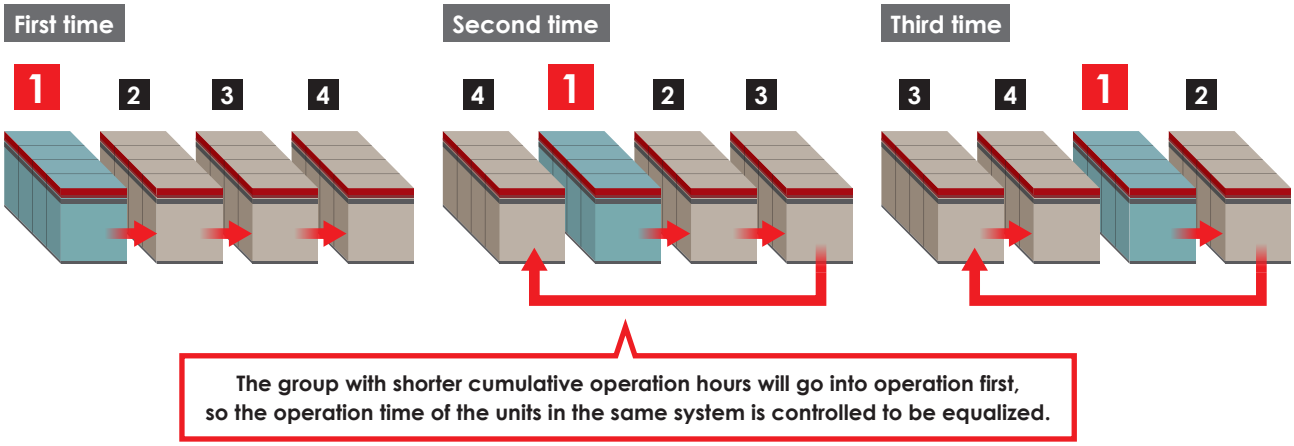


Each unit has inverter compressors, and the operating frequency and the number of units to be operated are controlled to maximize the operational efficiency of each unit based on the total system compressor frequency for the entire group.



Rotation Operation

When multiple units are installed, the group of units runs alternately, ensuring an optimum product lifecycle for component units.



Key Technology

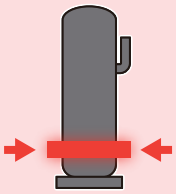
Compressor

Inverter-driven

Each unit has two high-efficiency R32-compatible inverter compressors developed by Mitsubishi Electric. The inverter compressor automatically controls the compressor frequency based on the fluctuating load, helping to achieve higher seasonal efficiency compared to a standard fixed-speed system.

IH (induction heating) warmer

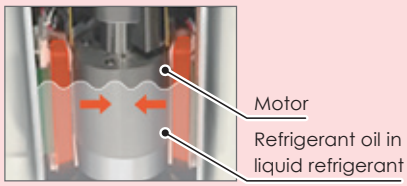
Case heater



Heated from the outside with a heater

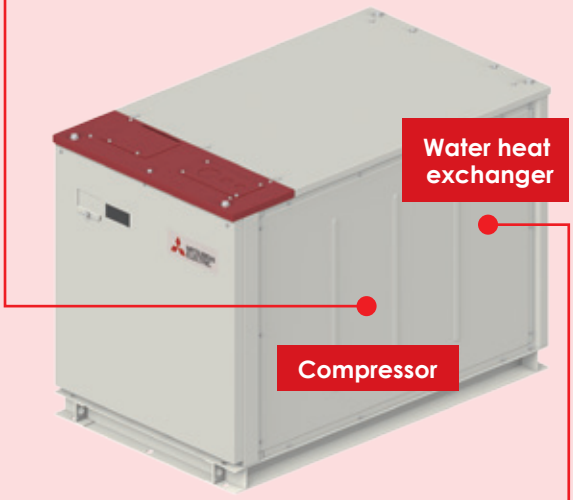
IH warmer

Heated by energizing the motor



Operation while the air conditioner is stopped

On/off is repeated every 30 minutes



As same as the conventional air-cooled e-series, IH (induction heating) warmer is adopted to prevent refrigerant stagnation while the unit is stopped. The IH warmer suppresses standby power more than a belt case heater, which is wrapped around the compressor shell surface to heat the compressor constantly.

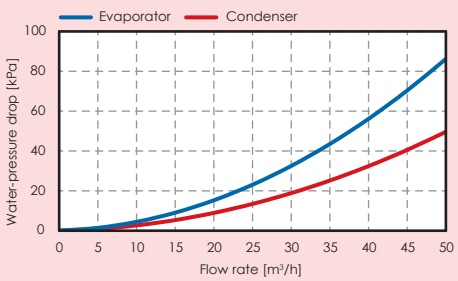
Utilizing the magnetic property of the iron motor core, the motor is energized for 30 minutes after the operation is stopped at the low voltage level. Since this energization repeats every 30 minutes, standby power consumption, therefore, is lower than a belt case heater that heats the compressor constantly.

Water heat exchanger

Water heat exchanger head loss

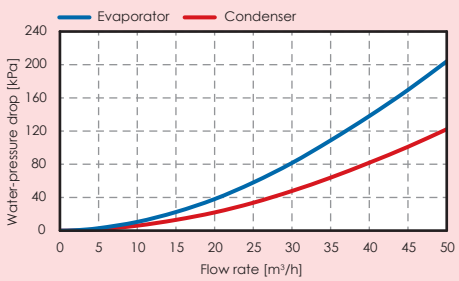
ERCV-M900YA

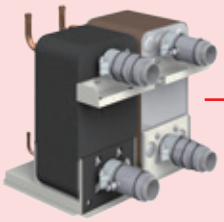
Evaporation/Condensation heat exchanger head loss



ERCV-M900YA×2

Evaporation/Condensation heat exchanger head loss





The water circuits increase the efficiency of heat exchange, which contributes to higher system efficiency.

Easy Control

Remote controller PAR-W31MAA

The water temperature in each module is easily controllable by connecting to the local remote controller PAR-W31MAA or to the centralized controller, depending on the customers' requests.

External signal output

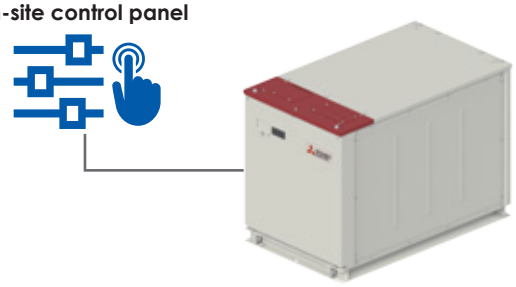
The external signal input from the on-site control panel can control basic operations, such as operation command and the water temperature settings.

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

Major functions

Input	ON/OFF Cooling/Heating/Cooling ECO/Heating ECO/ Anti-freeze Demand Target water temperature
Output	Operation command Operation mode Error
Control function	Control of the number of units

On-site control panel



Remote controller

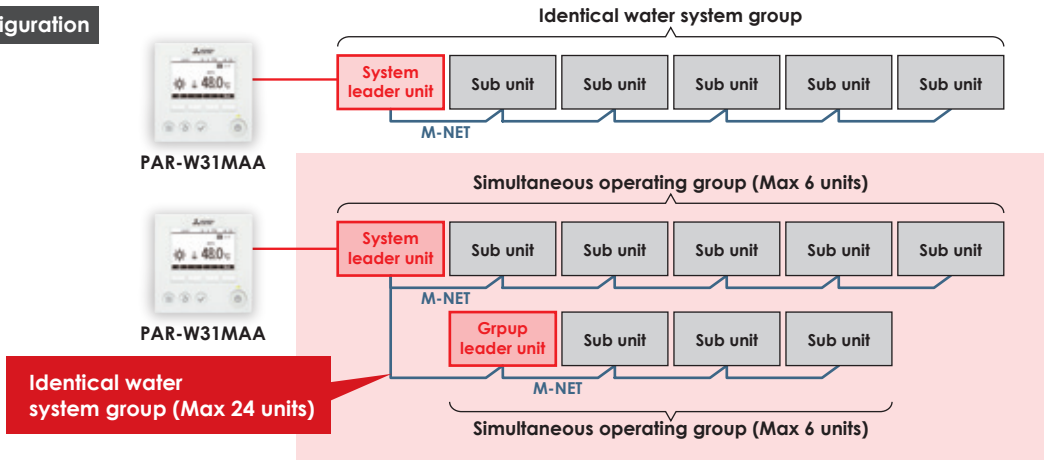
The remote controller can control basic operations, such as ON/OFF, water temperature settings, and schedule settings.

Major functions

Input	ON/OFF Cooling/Heating/HeatingECO/Anti-freeze Demand Scheduled operation (daily/weekly) Target water temperature
Output	Operation mode Current water temperature Target temperature Error code
Control function	Control of the number of units

PAR-W31MAA

System configuration



Parts list

Optional parts

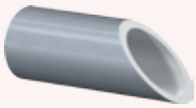
ER-01RK

A Straub joint×2

B Coupling water pipe×4

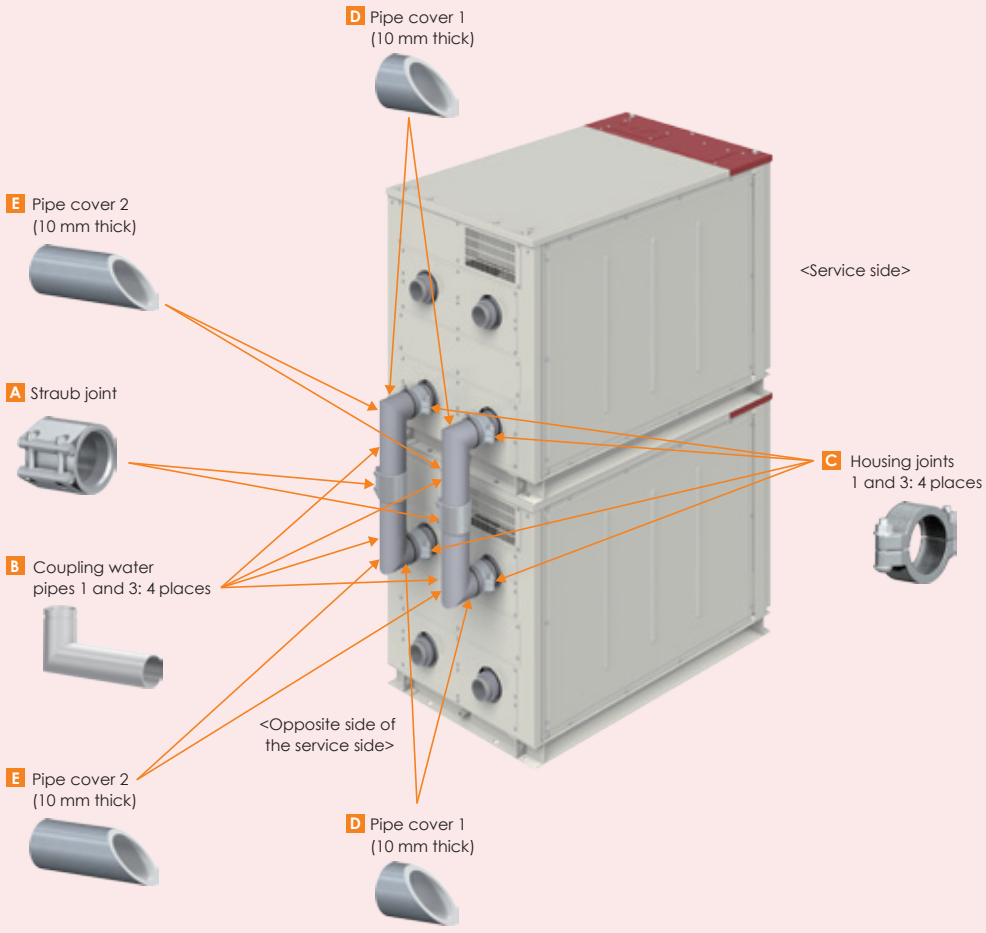
C Housing joint×4

D Pipe cover 1×4
(10 mm thick)



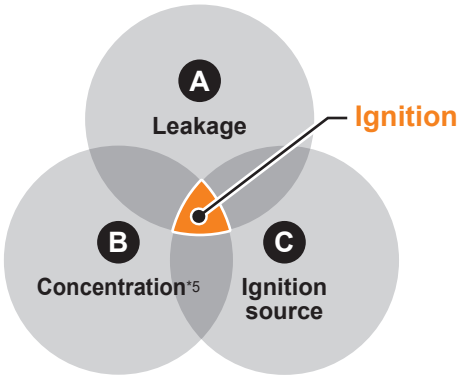
E Pipe cover 2×4
(10 mm thick)

Installing the piping kit (ER-01RK)



R32 refrigerant properties

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



	R32	R410A
Chemical formula	CH_2F_2	CH_2F_2/CHF_2CF_3
Composition (blend ratio wt. %)	Single composition	R32/R125 (50/50 wt %)
Ozone depletion potential (ODP)	0	0
Global warming potential (GWP) *1	675	2088
LFL(vol.%) *2	13.3	–
UFL(vol.%) *3	29.3	–
Flammability *4	Lower flammability (2L)	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

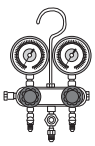
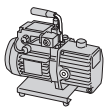
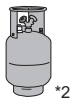
A **Do not leak refrigerant.**
<Installation> • Vacuum drying should be done. Do not release refrigerant into the atmosphere unnecessarily.
• Follow "Installation points of charging refrigerant."
<Repair/Removal> • Refrigerant should be recovered.

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
								 *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.

Installation restrictions

General restrictions

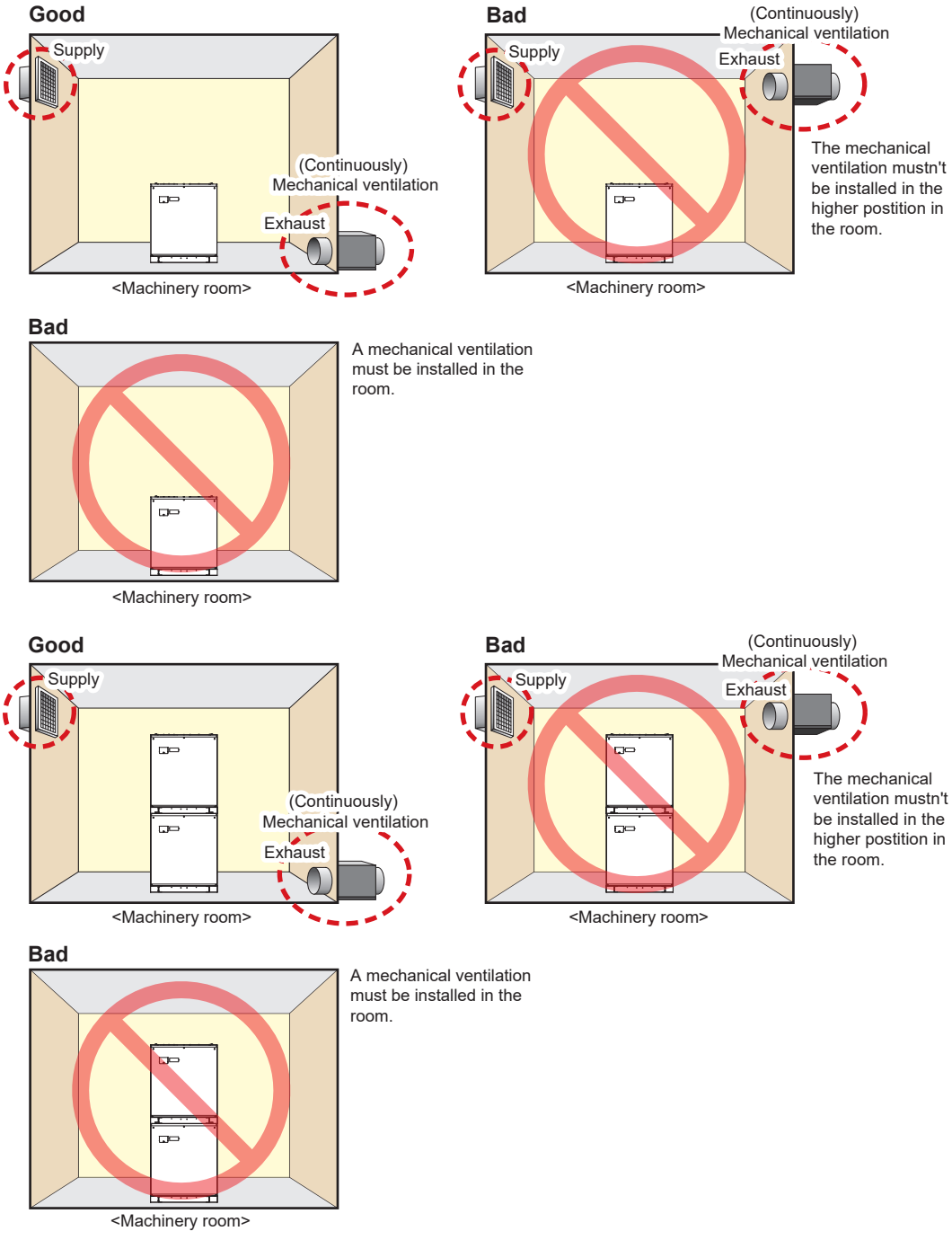
⚠ WARNING

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

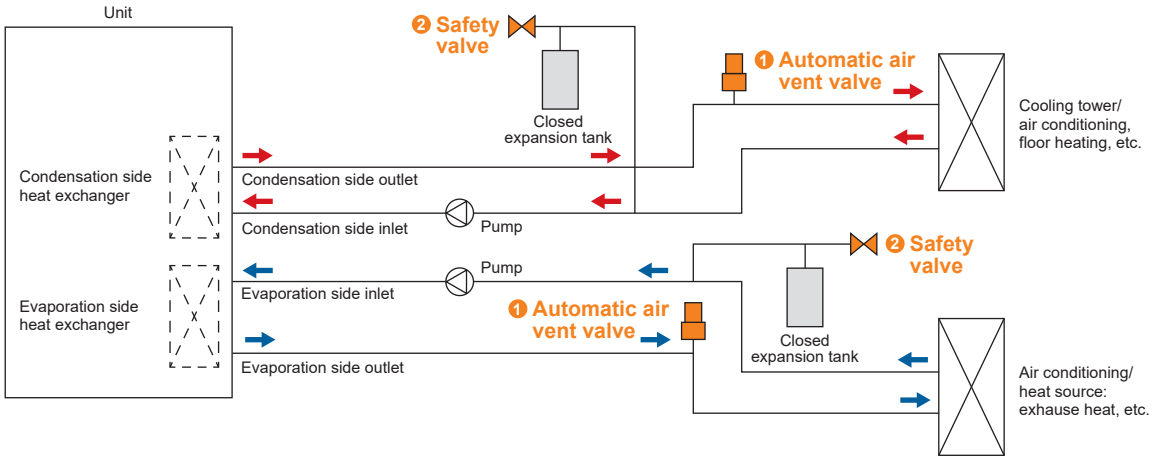
This unit is for exclusive use in a machine room with ventilation equipment.
As shown in the figure below, install the unit in a machine room with ventilation equipment.
*The requirements listed below were established based on IEC60335-2-40 (ver.6) and ISO5149 (2014).



Regulatory requirements for safety

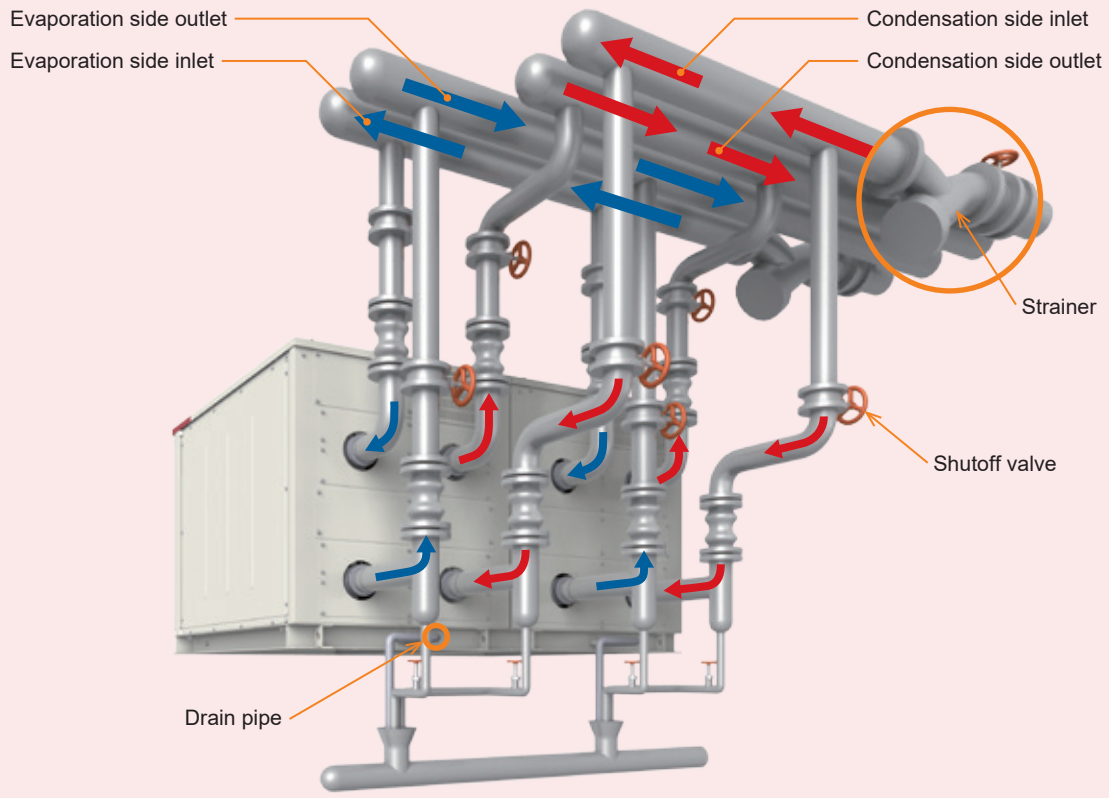
See below for information on installing a safety device on the water-cooled chilling unit system.

* 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 (ver.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.

On-site water piping connection example

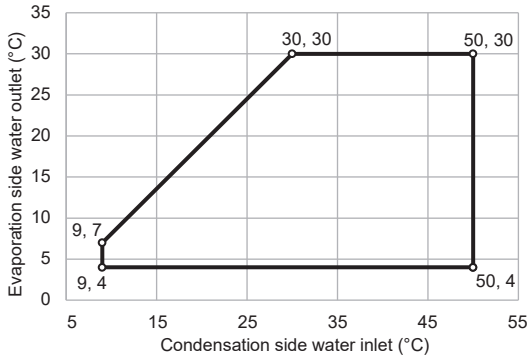


Specifications

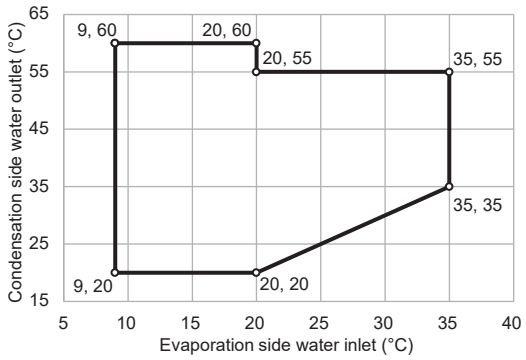
Model			ERCV-M900YA	
Capacity change mode			Capacity priority	Efficiency priority
Power source			3-phase 4-wire 380-400-415V 50/60Hz	
Cooling capacity *1		kW	90.00	45.00
		kcal/h	77,400	38,700
		BTU/h	307,080	153,540
	Power input	kW	17.47	8.22
	EER		5.15	5.47
	IPLV *5		8.18	–
	Evaporation side water flow rate	m^3/h	15.5	7.7
	Condensation side water flow rate	m^3/h	17.9	8.9
Cooling capacity (EN14511) *2		kW	89.83	44.95
		kcal/h	77,254	38,657
		BTU/h	306,500	153,369
	Power input	kW	17.80	8.31
	EER		5.05	5.41
	SEER		7.66	–
	ηsc	%	303.4	–
	Evaporation side water flow rate	m^3/h	15.5	7.7
	Condensation side water flow rate	m^3/h	17.9	8.9
Heating capacity *3		kW	90.00	45.00
		kcal/h	77,400	38,700
		BTU/h	307,080	153,540
	Power input	kW	19.07	9.40
	COP		4.72	4.79
	Condensation side water flow rate	m^3/h	15.5	7.7
	Evaporation side water flow rate	m^3/h	21.5	10.7
Heating capacity (EN14511) *4		kW	90.12	45.03
		kcal/h	77,503	38,726
		BTU/h	307,489	153,642
	Power input	kW	19.53	9.52
	COP		4.61	4.73
	SCOP Low/Medium		7.10/4.86	–
	ηsh Low/Medium	%	281.0/191.0	–
	Condensation side water flow rate	m^3/h	15.5	7.7
	Evaporation side water flow rate	m^3/h	21.5	10.7
Current input	Cooling current 380-400-415V *1	A	29 - 27 - 26	13 - 13 - 12
	Heating current 380-400-415V *3	A	31 - 30 - 29	15 - 15 - 14
	Maximum current	A	60	
Water pressure drop *1	Evaporation side	kPa	10	3
	Condensation side	kPa	7	2
Temperarure range (Cooling) *7	Evaporation side water outlet	°C	4~30	
	Condensation side water inlet	°C	9~50	
Temperarure range (Heating) *8,*9	Condensation side water outlet	°C	20~60 *6	20~55
	Evaporation side water inlet	°C	9~35	
Circulating water volume range	Evaporation side	m^3/h	7.7~25.8	
	Condensation side	m^3/h	4.5~30.0 *10	
Sound pressure level (measured in anechoic room) at 1m *1		dB (A)	53	48
Sound power level (measured in anechoic room) *1		dB (A)	72	66
Diameter of water pipe (Cooling exchanger side)	Inlet	mm (in)	65A (2 1/2B) housing type joint	
	Outlet	mm (in)	65A (2 1/2B) housing type joint	
Diameter of water pipe (Heating exchanger side)	Inlet	mm (in)	65A (2 1/2B) housing type joint	
	Outlet	mm (in)	65A (2 1/2B) housing type joint	
External finish			Polyester powder coating steel plate	
External dimension HxWxD		mm	918 x 780 x 1350	
Net weight		kg (lbs)	430 (948)	
Design pressure	R32	MPa	4.15	
	Water	MPa	1.0	
Heat exchanger	Evaporation side		Stainless steel plate and copper brazing	
	Condensation side		Stainless steel plate and copper brazing	
Compressor	Type		Inverter scroll hermetic compressor	
	Maker		MITSUBISHI ELECTRIC CORPORATION	
	Starting method		Inverter	
	Quantity		2	
	Motor output	kW	8.3 x 2	
	Lubricant		MEL46EH	
Protection	High pressure protection		High pressure Switch at 4.15MPa (601psi)	
	Inverter circuit		Over-heat protection, Over current protection	
	Compressor		Over-heat protection	
Refrigerant	Type x charge		R32 x 5.2 (kg) x 2	
	Control		LEV	

*1 Under normal cooling conditions at evaporation side water inlet temp 12°C outlet temp 7°C
codensation side water inlet temp 30°C outlet temp 35°C. Pump input is not included in cooling capacity and power input.
*2 Under normal cooling conditions at evaporation side water inlet temp 12°C outlet temp 7°C
condensation side water inlet temp 30°C outlet temp 35°C. Pump input is included in cooling capacity and power input based on EN14511.
*3 Under normal heating conditions at condensation side water inlet temp 40°C outlet temp 45°C
evaporation side water inlet temp 10°C outlet temp 7°C. Pump input is not included in cooling capacity and power input.
*4 Under normal heating conditions at condensation side water inlet temp 40°C outlet temp 45°C
evaporation side water inlet temp 10°C outlet temp 7°C. Pump input is included in cooling capacity and power input based on EN14511.
*5 IPLV is calculated in accordance with AHRI 551-591.
*6 When using in condensation side water outlet is more than 55°C, please adjust the condensation inlet water temperature to 50°C or less.
- 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 in direct.
- The water circuit must be closed circuit.
- Due to continuous improvement, the above specifications may be subject to change without notice.
- This model doesn't equip with a pump.

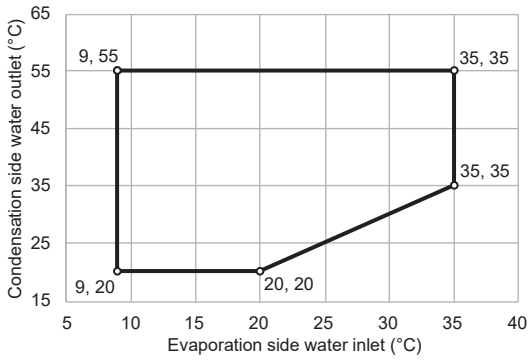
*7 Capacity priority/Efficiency priority



*8 Capacity priority



*9 Efficiency priority



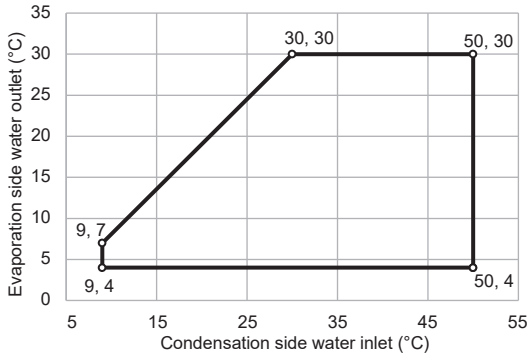
*10 Set the minimum water flow rate on the condensation side water to 8.0m^3/h when the evaporation side water inlet temperature during operation is 15°C or higher.

Model			ERCV-M900YA×2	
Capacity change mode			Capacity priority	Efficiency priority
Power source			3-phase 4-wire 380-400-415V 50/60Hz	
Cooling capacity *1		kW	180.00	90.00
		kcal/h	154,800	77,400
		BTU/h	614,160	307,080
	Power input	kW	33.07	15.24
	EER		5.44	5.91
	Evaporation side water flow rate	m^3/h	31.0	15.5
	Condensation side water flow rate	m^3/h	35.9	17.5
Cooling capacity (EN14511) *2		kW	178.71	89.66
		kcal/h	153,691	77,108
		BTU/h	609,759	305,920
	Power input	kW	35.54	15.87
	EER		5.03	5.65
	Evaporation side water flow rate	m^3/h	31.0	15.5
	Condensation side water flow rate	m^3/h	35.9	17.5
Heating capacity *3		kW	180.00	90.00
		kcal/h	154,800	77,400
		BTU/h	614,160	307,080
	Power input	kW	37.22	18.39
	COP		4.84	4.89
	Condensation side water flow rate	m^3/h	31.0	15.5
	Evaporation side water flow rate	m^3/h	42.7	21.7
Heating capacity (EN14511) *4		kW	180.87	90.23
		kcal/h	155,548	77,598
		BTU/h	617,128	307,865
	Power input	kW	40.90	19.26
	COP		4.42	4.68
	Condensation side water flow rate	m^3/h	31.0	15.5
	Evaporation side water flow rate	m^3/h	42.7	21.7
Current input	Cooling current 380-400-415V *1	A	54 - 51 - 49	25 - 24 - 23
	Heating current 380-400-415V *3	A	61 - 58 - 56	30 - 29 - 28
	Maximum current	A	120	
Water pressure drop *1	Evaporation side	kPa	85	25
	Condensation side	kPa	66	18
Temperature range (Cooling) *5	Evaporation side water outlet	°C	4~30	
	Condensation side water inlet	°C	9~50	
Temperature range (Heating) *6	Condensation side water outlet	°C	20~55	
	Evaporation side water inlet	°C	9~35	
Circulating water volume range	Evaporation side	m^3/h	15.4~50.0	
	Condensation side	m^3/h	9.04~50.0 *7	
Sound pressure level (measured in anechoic room) at 1m *1		dB (A)	56	51
Sound power level (measured in anechoic room) *1		dB (A)	75	69
Diameter of water pipe (Cooling exchanger side)	Inlet	mm (in)	65A (2 1/2B) housing type joint	
	Outlet	mm (in)	65A (2 1/2B) housing type joint	
Diameter of water pipe (Heating exchanger side)	Inlet	mm (in)	65A (2 1/2B) housing type joint	
	Outlet	mm (in)	65A (2 1/2B) housing type joint	
External finish			Polyester powder coating steel plate	
External dimension HxWxD		mm	1836 x 780 x 1350	
Net weight		kg (lbs)	863 (1903)	
Design pressure	R32	MPa	4.15	
	Water	MPa	1.0	
Heat exchanger	Evaporation side		Stainless steel plate and copper brazing	
	Condensation side		Stainless steel plate and copper brazing	
Compressor	Type		Inverter scroll hermetic compressor	
	Maker		MITSUBISHI ELECTRIC CORPORATION	
	Starting method		Inverter	
	Quantity		4	
	Motor output	kW	8.3 x 4	
	Lubricant		MEL46EH	
Protection	High pressure protection		High pressure Switch at 4.15MPa (601psi)	
	Inverter circuit		Over-heat protection, Over current protection	
	Compressor		Over-heat protection	
Refrigerant	Type x charge		R32 x 5.2 (kg) x 4	
	Control		LEV	

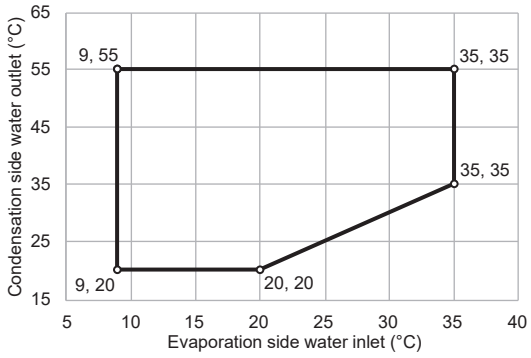
*1 Under normal cooling conditions at evaporation side water inlet temp 12°C outlet temp 7°C
codensation side water inlet temp 30°C outlet temp 35°C. Pump input is not included in cooling capacity and power input.
*2 Under normal cooling conditions at evaporation side water inlet temp 12°C outlet temp 7°C
condensation side water inlet temp 30°C outlet temp 35°C. Pump input is included in cooling capacity and power input based on EN14511.
*3 Under normal heating conditions at condensation side water inlet temp 40°C outlet temp 45°C
evaporation side water inlet temp 10°C outlet temp 7°C. Pump input is not included in cooling capacity and power input.
*4 Under normal heating conditions at condensation side water inlet temp 40°C outlet temp 45°C
evaporation side water inlet temp 10°C outlet temp 7°C. Pump input is included in cooling capacity and power input based on EN14511.

- 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 in direct.
- The water circuit must be closed circuit.
- Due to continuous improvement, the above specifications may be subject to change without notice.
- This model doesn't equip with a pump.

*5



*6



*7 Set the minimum water flow rate on the condensation side water to 16.0m^3/h when the evaporation side water inlet temperature during operation is 15°C or higher.

⚠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 water-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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VEGETABLE OIL INK

MEES23K001

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