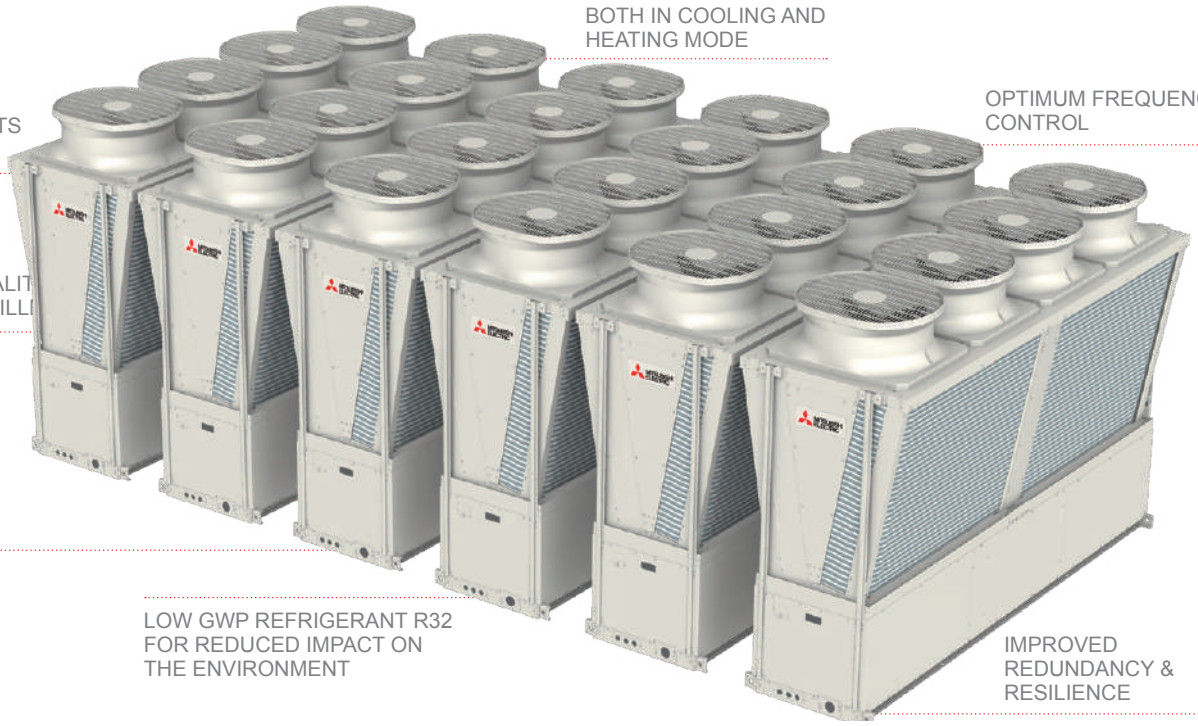
M1500/M1800 NEW

R32 | e-series



High energy-saving performance thanks to high-performance inverter compressor and proprietary Y-shaped construction.

Best in class efficiency for energy saving performance

The rated and seasonal energy efficiency ratios have been increased to achieve high energy saving performance.

Rated efficiency

The use of the high-efficiency inverter compressors achieves high energy saving performance. The 50 HP model has cooling EER and heating COP rating corresponding to energy saving class A.

Model **M1500**	Eurovent efficiency class Rank A achieved	Model **M1500**
EER 3.28[*1]		**COP 3.47**[*2]

[*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.

Seasonal efficiency

The use of the high-efficiency inverter compressors ensures optimum operation according to the operation load. The compressors can operate efficiently even during nighttime and intermediate seasons with low load, thereby saving energy throughout the year.

Model **M1500**	SEERavg. +18% vs R410 version	Model **M1800**
SEER 5.52[*1]		**SEER 5.36**[*1]
SCOP 3.31[*1]		**SCOP 3.31**[*1]

[*1] Compliant with EN14511

Key Components and Technologies

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

Compressor

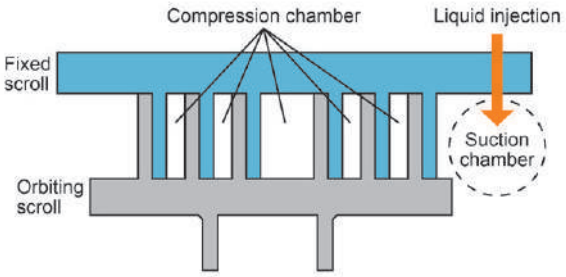
R32-compatible high-efficiency inverter compressor

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

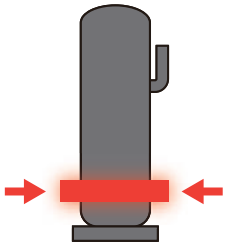
Returning the liquid refrigerant to the suction chamber suppresses a rise in the discharge temperature of R32 while the units are operated at low outside temperatures. The amount of injected refrigerant is adjusted according to the refrigerant state, allowing the units to operate in heating mode at an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



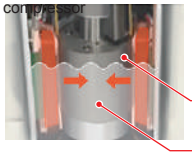
Heated from the outside with a heater

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

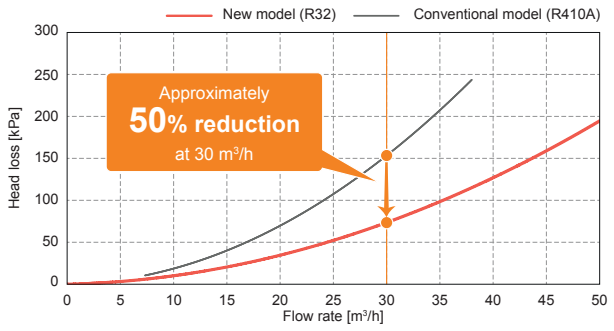
* Normally the compressor is heated while the unit is stopped to prevent liquid refrigerant from remaining in the compressor and to evaporate the liquid refrigerant in the compressor.

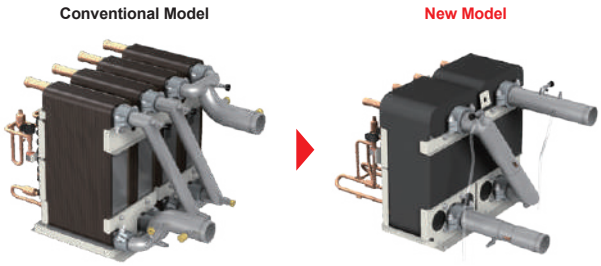
Water heat exchanger

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.

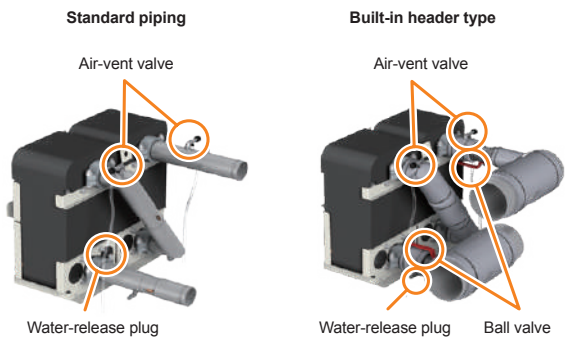
WATER HEAT EXCHANGER HEAD LOSS





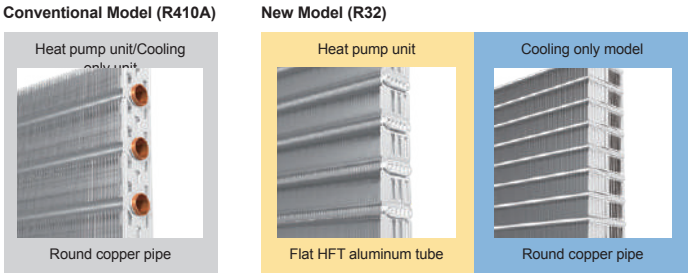
Water piping in the unit

• 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.



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.



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.

FIN IMAGE

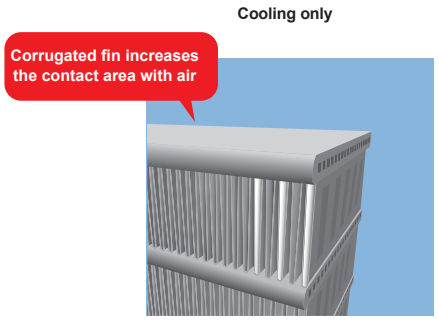
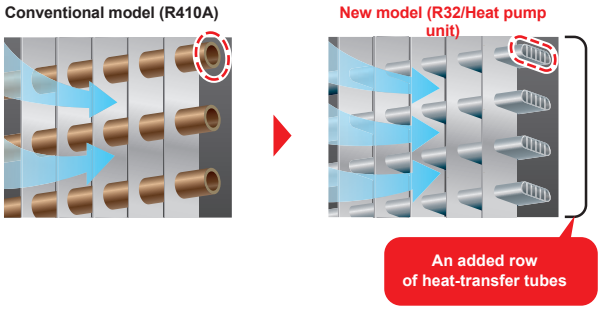
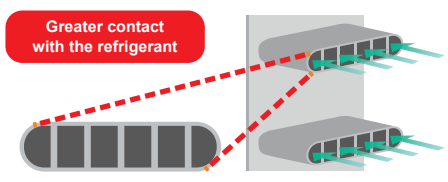


IMAGE OF THE FLAT TUBE



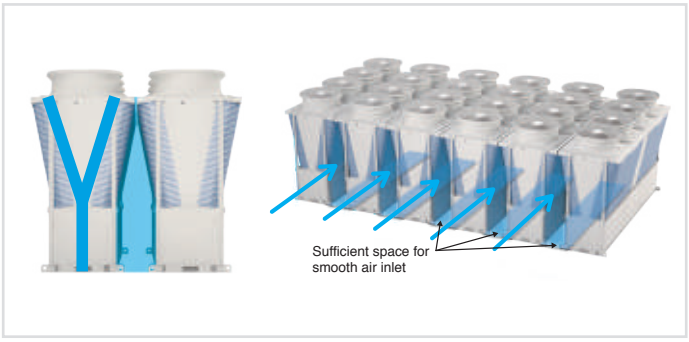
CROSS SECTION OF THE FLAT TUBE



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.

Use of Y-shape structure for effective operation

When the modules are connected, the intake air passages can be ensured on the floor and sides. This structure contributes to effective operation.



High functionality of modular chiller

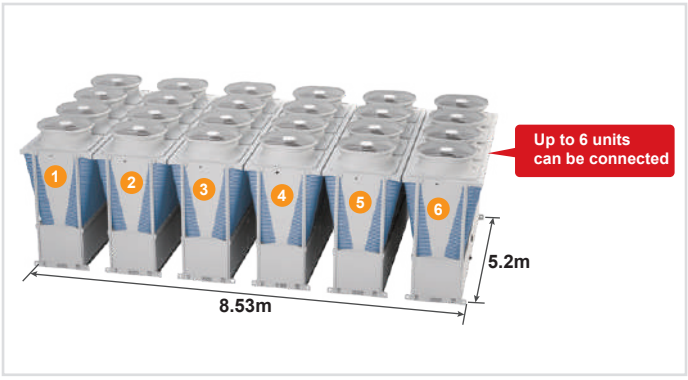
The capacity among 1 group can be increased to up to 360 HP by combining units.

Large-capacity 50 HP and 60 HP units are available. Even a 360 HP system using six 60 HP units can be installed in a floor area of 8.53 m × 5.2 m including the service space

* Only modules with the same capacity can be combined.

Heat Pump	EAHV-M1500YCL(-N)
Cooling Only	EACV-M1500YCL(-N)

Heat Pump	EAHV-M1800YCL(-N)
Cooling Only	EACV-M1800YCL(-N)

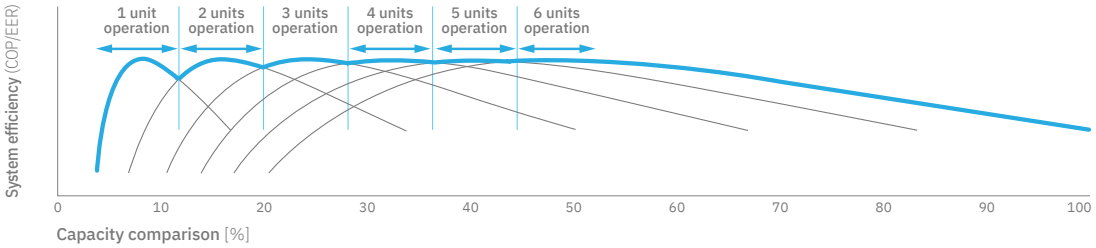


Optimum frequency control

When multiple modules are connected, the frequency of each inverter compressor is controlled during operation to increase the efficiency of each module, achieving a high energy saving performance.

This control can be implemented by simply using our unique M-NET control, without the need for any other on-site design.

HIGH EFFICIENCY IS MAINTAINED

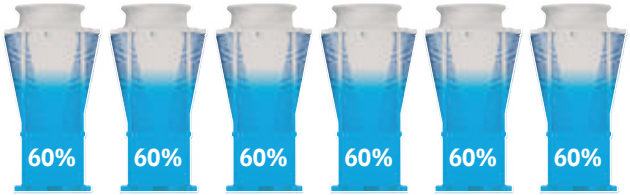


WHEN THE OVERALL SYSTEM LOAD IS 60%

Without optimum frequency control

With non-inverter compressors, it is only possible to turn the unit on or off, and the compressor frequency cannot be adjusted according to the required capacity.

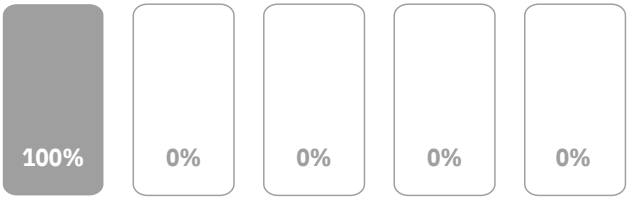
With optimum frequency control



Our modules are equipped with inverter compressors, so the system can be operated in frequency ranges in which the efficiency of each module is at its peak. Optimum frequency control of each unit increases the efficiency of the whole system.

WHEN THE OVERALL SYSTEM LOAD IS 20%

Without optimum frequency control



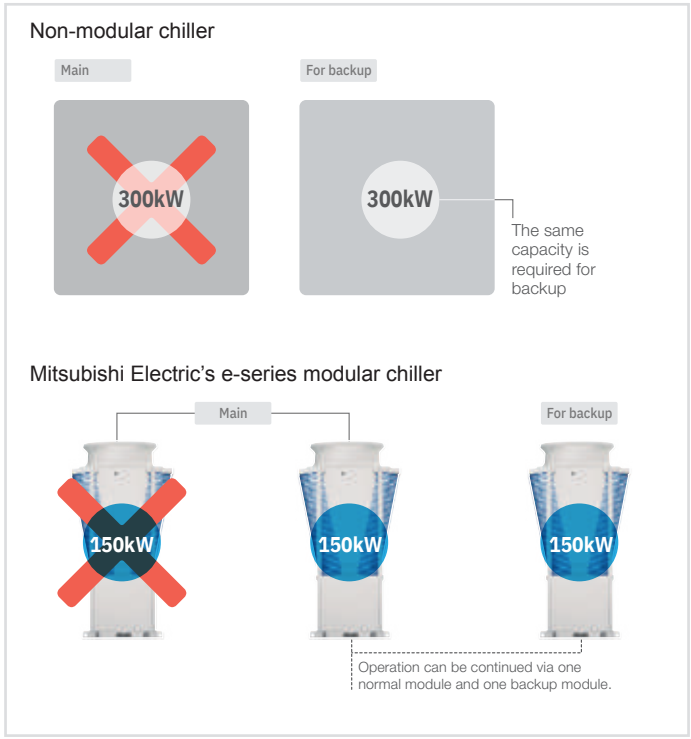
Since the compressors are running at inefficient frequencies, the efficiency of the whole system is lower.

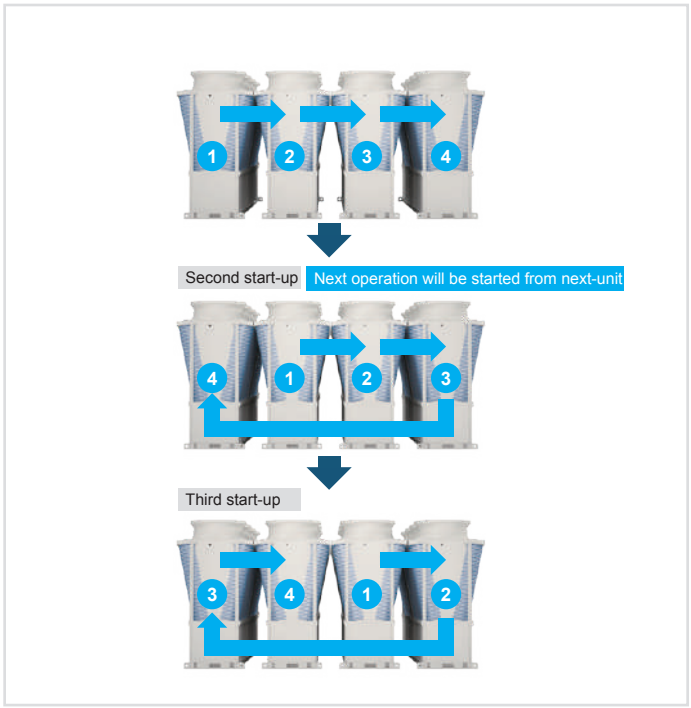
With optimum frequency control

Peak efficiency is between 40 and 60%. In low load conditions, modules can be switched off to **keep remaining modules at optimum efficiency.**
The output of the pumps connected to the remaining group can be decreased, and the efficiency of the whole system is then increased. This control is achieved by connecting to M-NET. There is no need to prepare sensors, and the instrumentation is simple.

Improved redundancy & resilience

When a non-modular chiller is used as the main 300kW unit, as in this example, the same capacity would also be required as a backup. However, when a Mitsubishi Electric e-series modular chiller is used, two modules can still operate even if one module goes down, continuing normal operation. This reduces the backup capacity requirement.

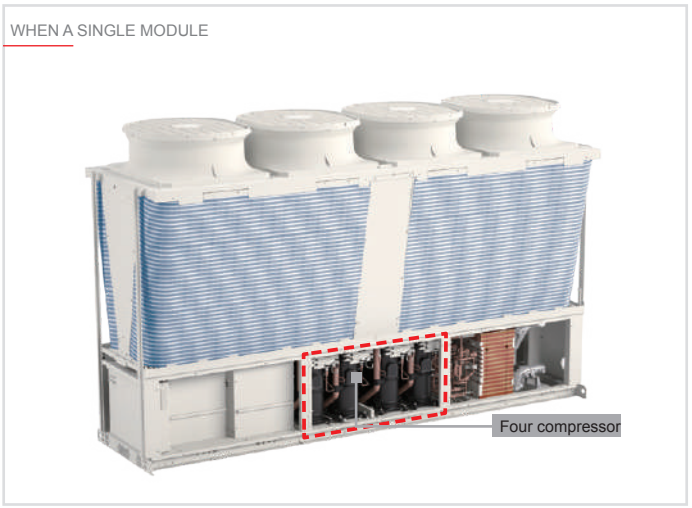




Emergency operation mode

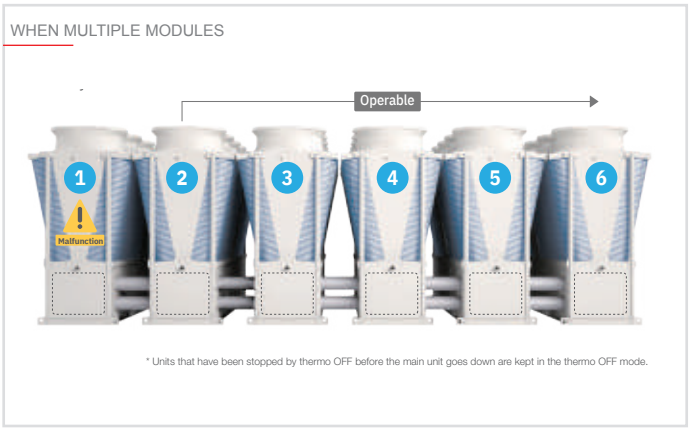
When a single module

The e-series module contains four compressors (two for the 90kW module) developed by Mitsubishi Electric. The four compressors operate as two pairs. If something is wrong with one of the two pairs, the other pair can temporarily continue to operate. The 90kW module achieves this by operating its two compressors independently.



When multiple modules

If one of the e-series modules goes down, the remaining modules can continue to operate. Each module can independently control the outlet water temperature. Even if the main module goes down, operation can be continued.



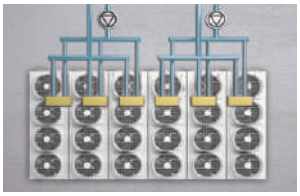
Procedure for installing the connection kit

Selectable piping system

Standard piping and built-in header types are available. The optimum type can be selected according to the design and construction needs of the building.

STANDARD PIPING TYPE

Type without built-in pump or header



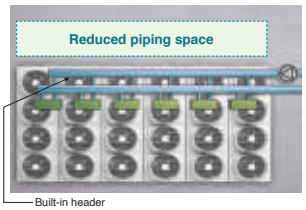
Advantages

The flexibility of design is high, and it is possible to select the most suitable number of pumps and water circuit for the on-site system.

BUILT-IN HEADER TYPE

(models with "-N" in the name only)

Type of built-in header piping for connection between modules



Advantages

The piping space and number of connections are reduced, allowing simple construction and short construction times.
Advantages

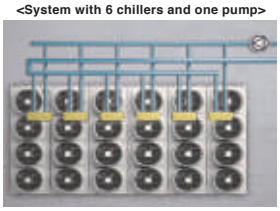
* It is not possible to build both the pump and the header in each unit.

Standard piping type

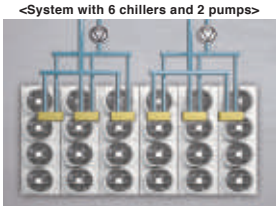
The flexibility of design is high, and the system can be designed according to the on-site system and load pattern. Up to 24 units (4 groups × 6 units) can be connected to one system. The number of pumps and the piping structure can be designed according to the on-site.

STANDARD PIPING TYPE

<System with 6 chillers and one pump>



<System with 6 chillers and 2 pumps>

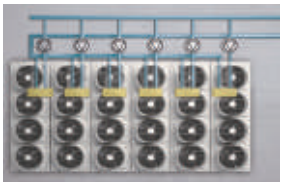


Built-in header type

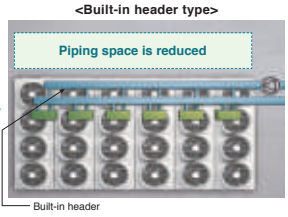
The piping to connect to other units is built into each unit. The number of piping connections is reduced (saving construction work and reducing the construction time), and the installation space can be also reduced.

BUILT-IN HEADER TYPE

<Standard piping construction>



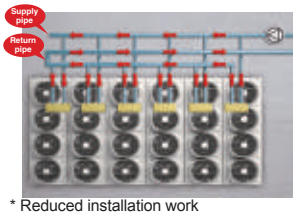
<Built-in header type>



* Less space and equipment cost

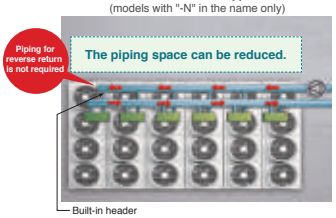
SPACE FOR RETURN PIPING IS NOT REQUIRED

<Standard piping construction>



<Built-in header type>

(models with "-N" in the name only)



* Reduced installation work

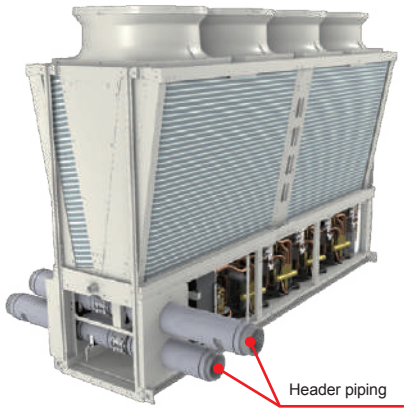
Details of built-in header type modules

Up to six units with built-in headers can be connected. (Piping size: 150A)
When 6 units or a less are connected, flow adjustment and reverse return piping for each unit are unnecessary.

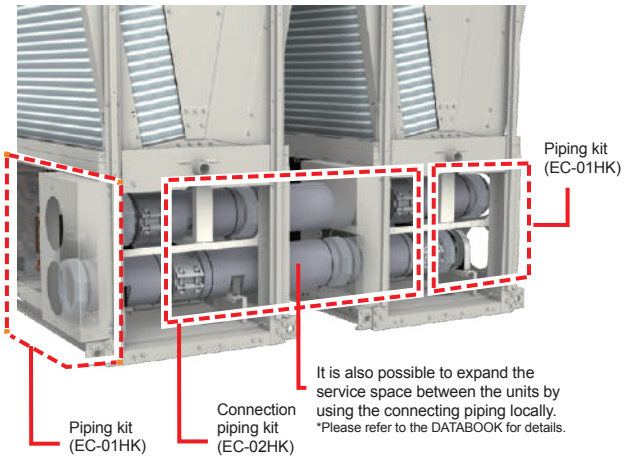
Built-in header type

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.

BUILT-IN HEADER TYPE

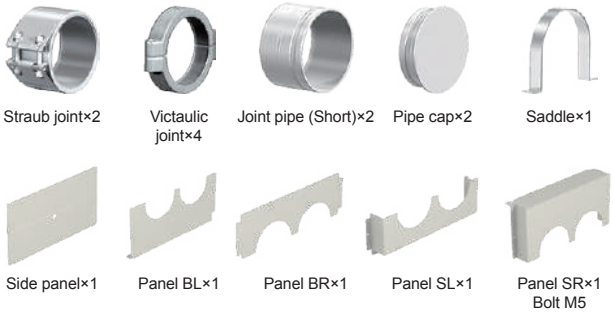


* This photo shows the angle from the piping side.



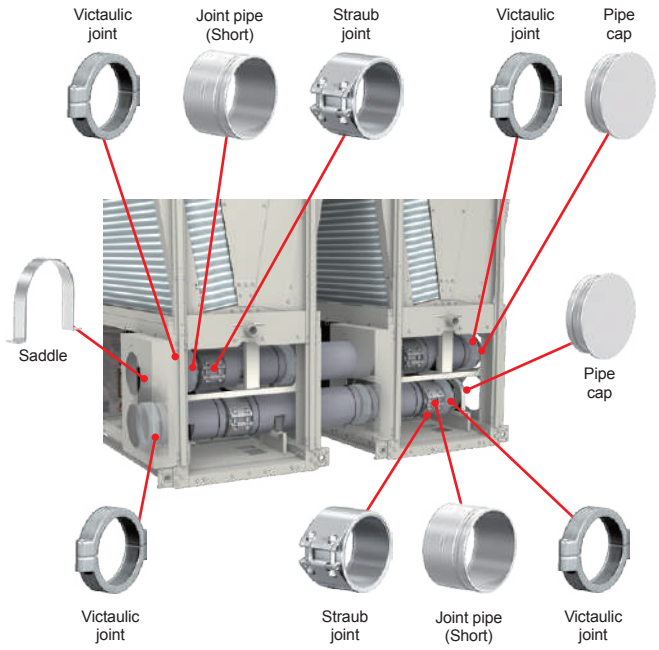
PARTS LIST

EC-01HK
Optional parts
(Piping kit)



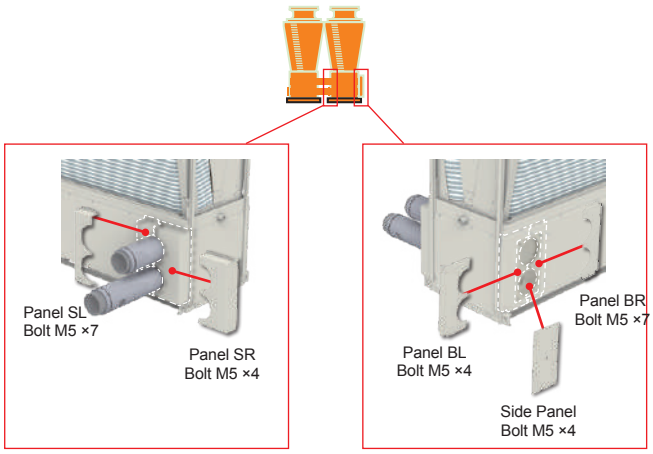
INSTALLING THE PIPING KIT (EC-01HK)

Header piping



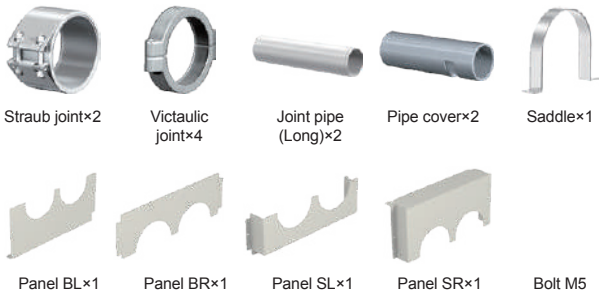
INSTALLING THE PIPING KIT (EC-01HK)

Panel



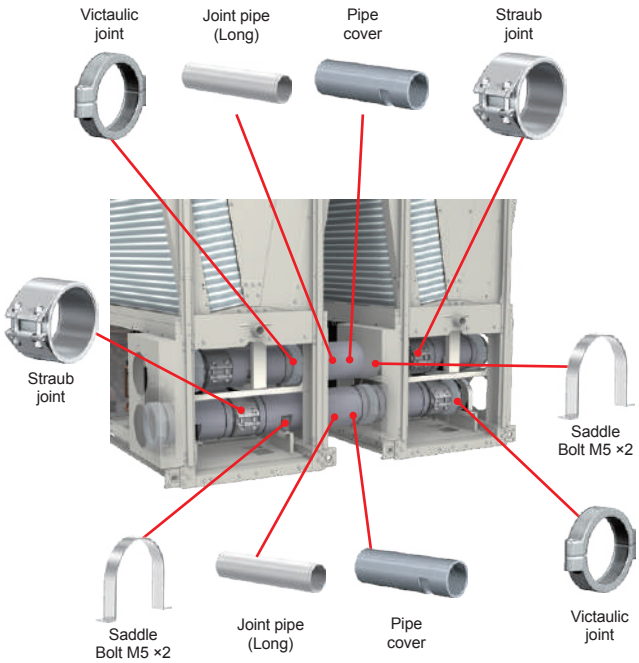
PARTS LIST

EC-02HK
(Connection piping kit)



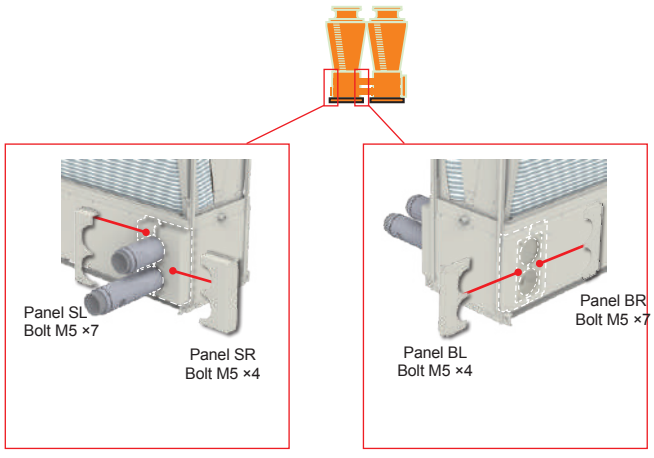
INSTALLING THE PIPING KIT (EC-02HK)

Header piping



INSTALLING THE PIPING KIT (EC-02HK)

Panel



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.

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

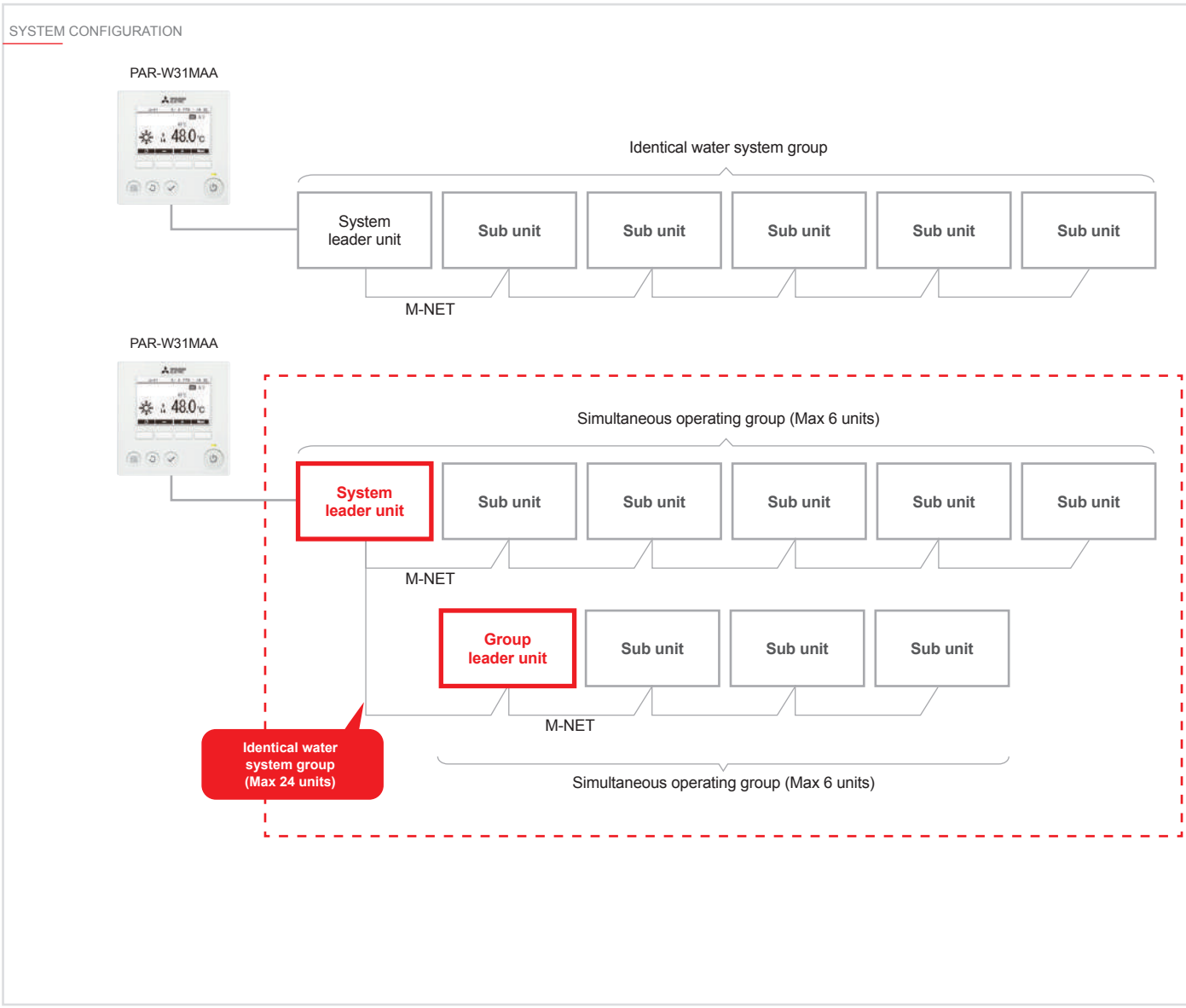
Remote controller

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

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

PAR-W31MAA

SYSTEM CONFIGURATION



Centralized controller*

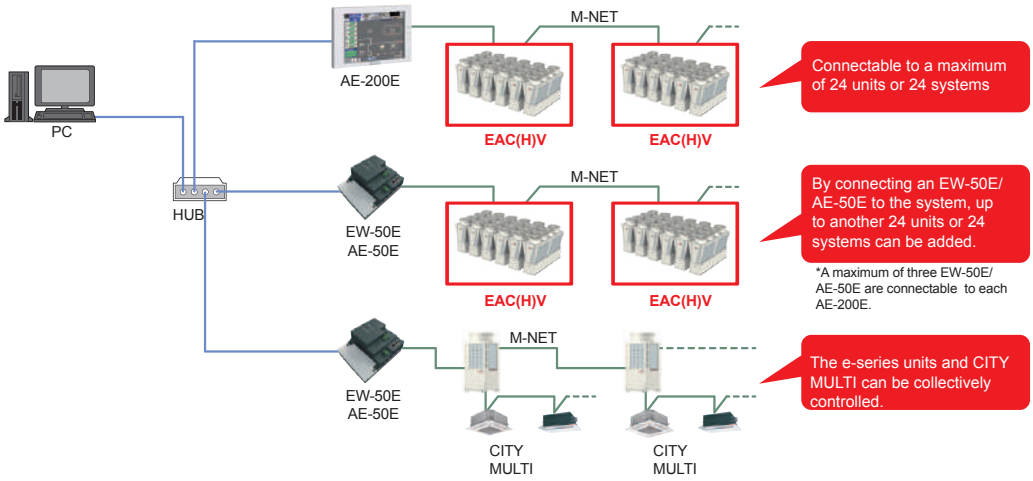
The e-series units are connectable to the AE-200E that centrally controls up to 24 units or 24 systems connected via M-NET.
By using EW-50E or AE-50E, the maximum number of connectable units can be further increased.
The use of AE-200E enables various operation settings and integrated control of the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

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

Operation/setting	ON/OFF
	Cooling/Heating/HeatingECO/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

Centralized controller
AE-200E

SYSTEM CONFIGURATION



BACnet® connection function

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.

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

Technical specifications COOLING ONLY MODEL

MODEL		SET	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 5~30 *5	
		°F	Outlet water 41~86 *5	
	Outdoor	°C	-15~52 *5	
		°F	5~125.6 *5	
Circulating water volume range		m^3/h	12.9~34.0	
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	R410A	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	11.7 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	
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 *3	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.

Technical specifications HEATPUMP MODEL

MODEL		SET	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. applic.		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	12.9~34.0	
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	R410A	MPa	4.15	
	Water	MPa	1.0	
Heat exchanger	Water side		Stainless steel plate and copper brazing	
	Air side		Plate fin and copper 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 *5	Type x charge		R32 x 11.5 (kg) x 4 *5	
	Control		LEV	

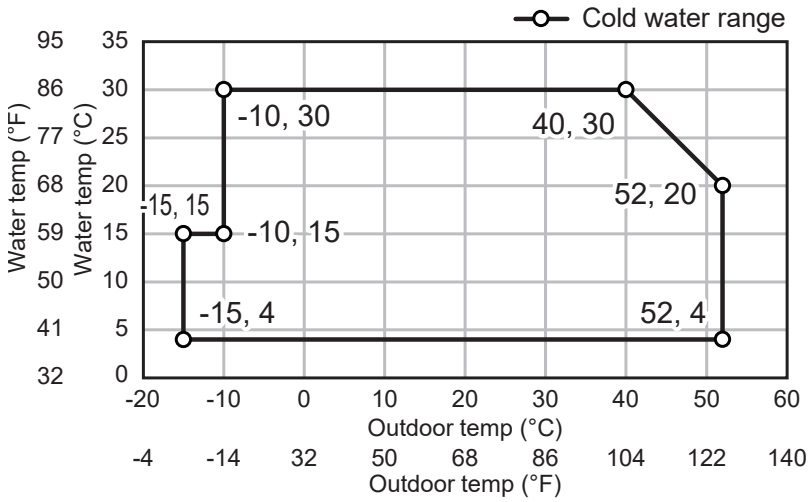
*1 Under normal cooling conditions at outdoor temp 35°C DB / 24°C WB (95°F DB / 75.2°F WB) outlet water temp 7°C (44.6°F) inlet water temp 12°C (53.6°F). Pump input is not included in cooling capacity and power input.
*2 Under normal cooling conditions at outdoor temp 35°C DB / 24°C WB (95°F DB / 75.2°F 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.

Operating limits

COOLING ONLY

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

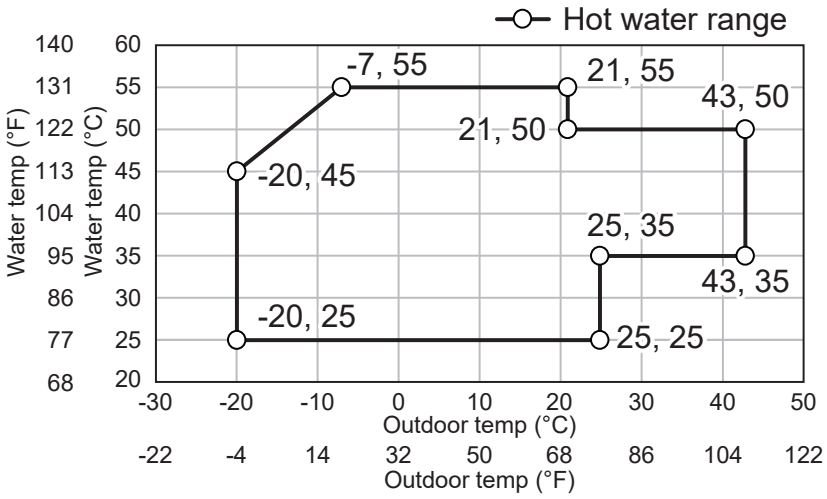
The use of the flat tube heat exchanger has made it possible to increase the maximum intake air temperature from 43°C to 52°C in cooling mode, extending the cooling performance of the units in intense heat and in collective installation.

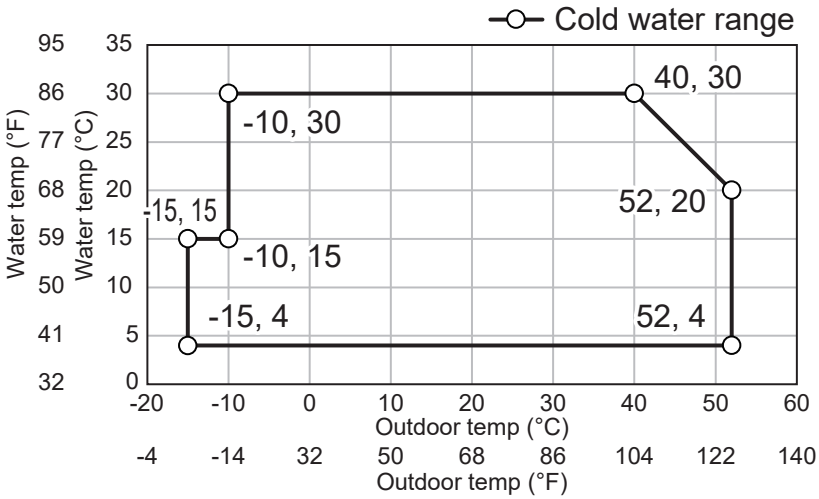


REVERSIBLE HEAT PUMP

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

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.



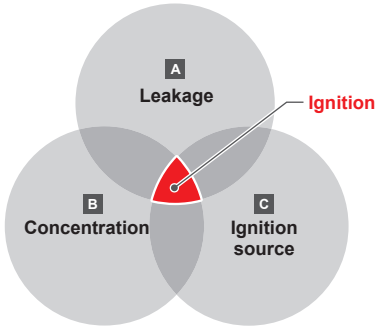


R32 refrigerant properties

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

	R32	R410	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.

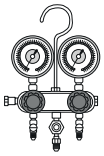
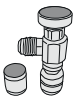
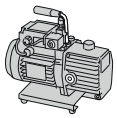
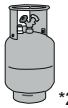


A **Do not leak refrigerant.**
<Installation> • Vacuum drying should be done.
Do not release refrigerant into the atmosphere unnecessarily.
• Follow "Installation points of charging refrigerant."
<Repair/Removal> • Refrigerant should be recovered.

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	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
R32	Shareable *3	Shareable *3	Shareable *3	Shareable *3	Shareable *3	Shareable *3	Shareable *3	Shareable *3	EXCLUSIVE
R410									EXCLUSIVE

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.
Work	Confirmation of installation restrictions	Be sure to follow "Installation restrictions".
	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

Do not install the unit where combustible gas may leak
- If combustible gas accumulates around the unit, fire or explosion may result.

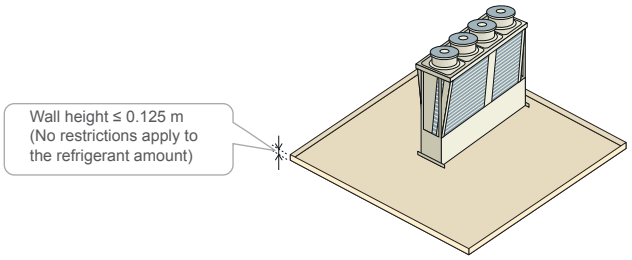
- Provide sufficient space around the unit for effective operation, efficient air movement, and ease of access for maintenance.
- All restrictions mentioned in this manual apply not only to new installations but also to relocations and layout changes.
- Refer to the Installation manual for other precautions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

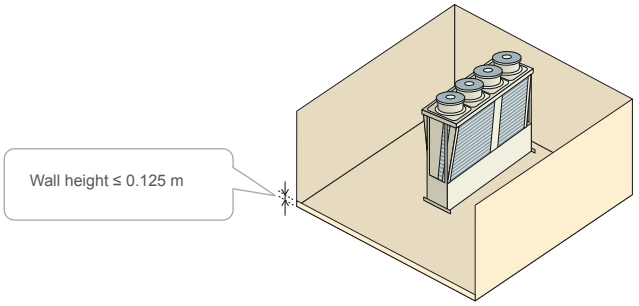
Installation space requirement
- Do not install the unit inside a building such as the basement or machine room, where the refrigerant may stagnate.
- Install the unit in a place where at least one of four sides is open.

CORRECT INSTALLATION

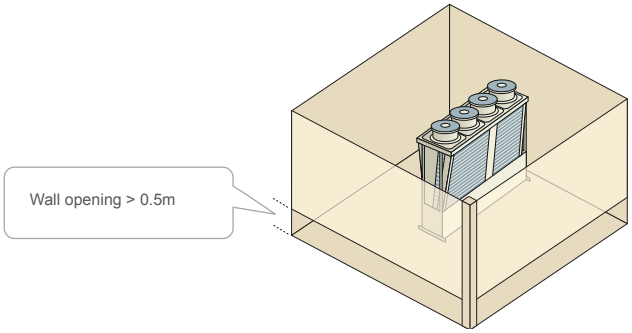
If the unit needs to be installed in a space where all four sides are blocked, confirm that one of the following situations (A or B) is satisfied.

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

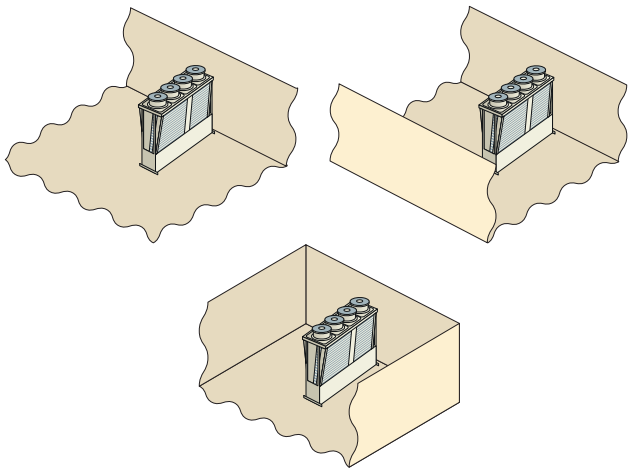




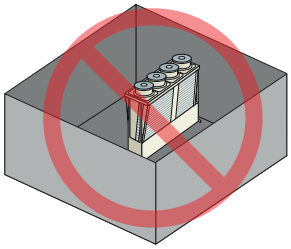
B Create an appropriate ventilation opening.



CORRECT INSTALLATION



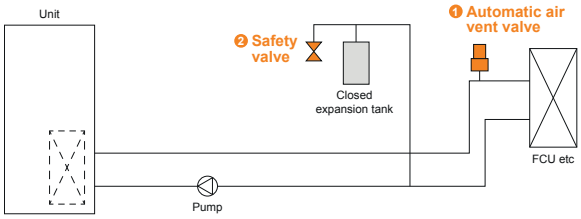
INCORRECT INSTALLATION



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 IEC60 335-2-40 (Edition 5.0) G.G.6. See the original standards for fu rther information on selecting a safety device.



Required items	Note
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.
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.

IT Cooling

s-MEXT split system

MULTIDENSITY modular system


MEMORY
STATUS
BACKUP
TIME
19:52
LAN1 ONLINE
LAN2 ONLINE
LAN3 ONLINE
LAN4 ONLINE

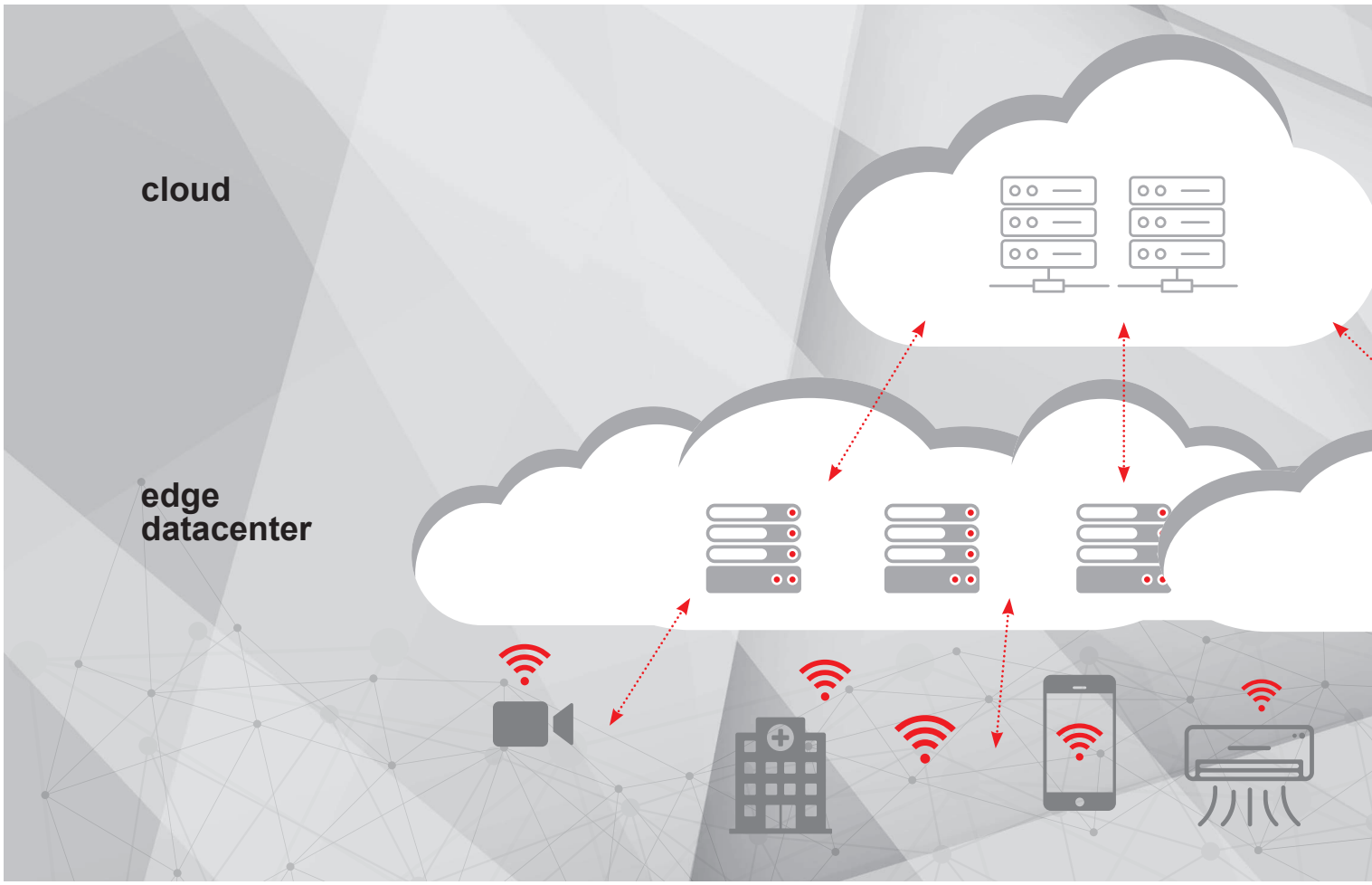
s-MEXT split system

Close Control Unit for IT Cooling applications.
Direct expansion system, full inverter for Edge Data Center.

Edge computing: the new trend for cloud decentralization

A new concept that places it self side by side to cloud computing is appearing on the market, thanks to the unstoppable digital transformation we are experiencing. It's the Edge computing.
In 2018, into the top ten strategic technological trends for companies and organizations, Gartner, a leading company in research and consulting, reported the "Cloud to the Edge" trend in fifth position.
This technology imposes the cloud decentralization, which translate into a new reference model for designing data centers. Concepts like IoT, 5G will inevitably lead a resources fragmentation in data centers management. In fact, we speak of granularity, investments in smaller and widespread data centers, developed to respond to the growing demand for web connections with low latency and high performances.
As result, data processing times will have to be faster, and the only way to comply with both the connections' growing number and consumers' needs in terms of performances will have to be, according to the experts, to data processing closer to the users themselves.
Then we start to talk about Edge Data Centers, little data centers or server rooms, scattered on territory and used to host cloud services and local data processing.


cloud
users


cloud
edge
datacenter

Cloud Computing

Traditional cloud model

The traditional model is facing some latency problems, limited brandwidth, dependability that cause traffic congestions, not suitable for future IoT implementations.
Advantages: large data processing capacity for complex analysis.
Products and applications: chillers, precision conditioners, infrastructures, control systems and accessories with RC brand.

Edge Computing

Distributed intellingence model

Edge computing, by distributing intelligence, will bring down the reduction of the amount of datas to be processed, prioritizing management of critical datas, latency sensitive, next to the users, filtering and passing to the cloud less impacting datas. It will manage big data processing.
Advantages: low latency, high elaboration performances with less investments in infrastructures.
Products and applications: precision air conditioners, infrastructures, control systems and accesories branded Mitsubishi Electric an RC.

s-MEXT G00 system NEW

R410A | R32

HIGH EFFICIENCY LEVEL,
REDUCED OCCUPATION

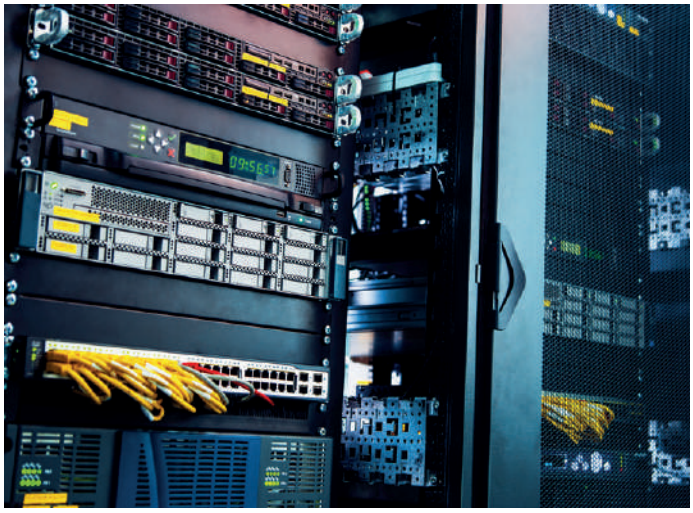
S-MEXT COMBINES MORE THAN 50 YEARS OF EXPERIENCE OF RC BRAND IN THE IT COOLING MARKET, WITH THE MITSUBISHI ELECTRIC EXCELLENCE QUALITY.

S-MEXT AND MR. SLIM
PERFECT SYNERGY

Under

Over

MITSUBISHI ELECTRIC QUALITY
READY TO SERVE YOUR EDGE
DATA CENTER

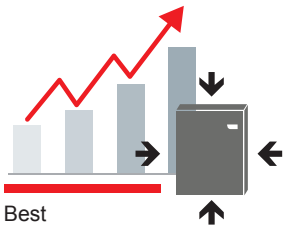


Mitsubishi Electric present s-MEXT, developed with the RC experience and notoriety in the IT Cooling market: the brand new combined system that combines all the experience of a specialized brand in precision air conditioning with the tecnological excellence and reliability of Mitsubishi Electric.

The innovative system dedicated to Edge Data Center combines a precision air conditioner (indoor unit) with the commercial outdoor unit of Mr.Slim series.

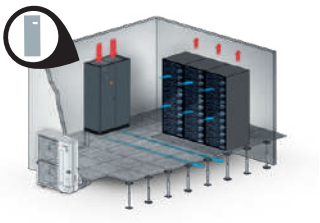
Best kW/m² Ratio

Thanks to the innovative system, s-MEXT guarantees high level performances while occupying very small floor space.
It's compact layout allows to easily integrate the unit in existing data centers, without sacrificing any kW per square meter.



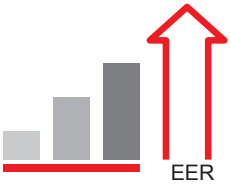
Beyond the traditional Operational limits

The continuous increase of the thermal load in the IT environments has led to an increasing temperature inside the server rooms (up to 27°C) s-MEXT system has been developed to operate with return air temperature up to 35°C.



Efficiency beyond expectations

A data center's air conditioning system accounts for over 40% of total data center energy consumption. An efficient approach to air conditioning can generate an enormous advantage in efficiency and reduction of operating costs.
s-MEXT system is characterized by high quality components and control logics aimed at managing the system in the most efficiency mode.
• DC inverter scroll for linear and continuous modulation of cooling capacity based on the load.
• DC fans for best modulation of the air flow.



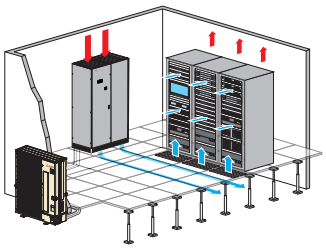
Flexibility in the air flows' choice

Flexible installation of the unit, thanks to the possibility of choosing between two air requirements: Under and Over.

UNDER

With air delivery down, and air intake on the top.

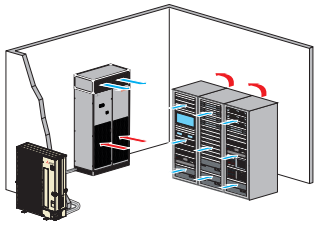
Ideal for environments with raised floor.



OVER

With air delivery from the top and fron air intake.

Ideal for environments with standard floors.



s-MEXT G00 Indoor Unit NEW

R410A R32

PRECISION CONDITIONER (INDOOR UNIT)

ABLE TO MANAGE TEMPERATURE AND HUMIDITY VARIABLES, WITH EXTREME PRECISION, EVEN IN THE EVENTS OF LARGE LOADS VARIATIONS

DESIGNED TO PERFECT COMBINE EFFICIENCY AND RELIABILITY IN ALL OPERATIONG CONDITIONS, THESE INDOOR UNIT USES ONLY CERTIFIED AND HIGH QUALITY COMPONENTS: EC FAN, DX COIL WITH HYDROLYSIS TREATMENT AND ADVANCED CONTROL SYSTEM.

A WIDE RANGE OF ACCESORIES COMPLETES THE SERIE AND MAKES S-MEXT SUITABLE FOR THE MOST CRITICAL ENVIRONMENTAL'S CONDITIONS

Quick and easy installation

The construction features and the unit layout have been designed to ensure quick installation and facilitate front access for easy maintenance activity.

New EC inverter fan

High performance EC fan ensures a perfect modulation of air flow for partial loads. Made of ultra-light polymeric material, this fan is distinguished by:
- Sound level reduction by 4-5 dB(A);
- Reduction of 25% of power consumption, compared to traditional solutions.

Advanced Control System

Control System is the heart of the unit. Designed for monitoring and to operate the fuctional and environmetnal single unit's parameters. The Control System allows:
- Automatic reset after power failures;
- Serial interconnection with most modern BMS systems;
- up to 100 events recording;
- "Non-volatile" data storage for saving files;

Via simple and intuitive graphic display.

INVERTER EEV EC FAN R HFC R410A R HFC R32

Technical specifications

MODEL			006	009	013	022	038	044
	Outdoor unit	n°	1	1	1	1	2	2
	Model	PUHZ-ZRP	60 VHA2	100 VKA3	125 YKA3	250 YKA3	200 YKA3	250 YKA3
		PUHZ-ZM	60 VHA	100 VKA	125 YKA	250 YKA	200 YKA	250 YKA
Cooling (1)	Cooling capacity	kW	6,79	10,1	11,9	22,5	38,8	42,4
	Sensible	kW	6,28	9,0	10,3	19,5	34,0	37,5
	SHR (2)		0,92	0,89	0,87	0,87	0,88	0,88
	System EER (nominal) 27°C - 47% RH		3,92	3,98	2,97	2,87	3,15	2,59
	SUPPLY FAN	n°	1	1	1	2	1	1
	Air flow	m³/h	2000	2500	2800	5000	8800	10000
	Nominal external static pressure	Pa	20	20	20	20	20	20
	Maximum external static pressure	Pa	200	25	45	25	125	25
	Power input (3)	kW	0,21	0,37	0,52	0,74	1,43	2,10
	Absorbed current (3)	A	0,93	1,64	3,23	3,28	2,20	3,22
	Starting current	A	0,5	0,5	0,5	0,5	0,5	0,5
	Plate current	A	2,3	2,3	3,15	4,6	4,2	4,2
Electrical panel	Power input	kW	0,14	0,14	0,14	0,14	0,14	0,14
Sound level (ISO 3744) (4)	Pressure level	dB(A)	53	57	61	60	63	67
	Power level	dB(A)	69	73	77	76	79	83
	AIR FILTERS	n°	1	1	1	2	4	4
	Extended filtering surface	m²	0,68	0,68	0,68	1,05	1,76	1,76
	Efficiency (ISO EN 16890)	COARSE	60%	60%	60%	60%	60%	60%
	REFRIGERANT CIRCUITS	n°	1	1	1	1	2	2
	POWER SUPPLY	V/Ph/Hz	230/1/50	230/1/50	230/1/50	230/1/50	400/3+N/50	400/3+N/50
Dimensions	Length	mm	600	600	600	1000	1000	1000
	Depth	mm	500	500	500	500	890	890
	Height	mm	1980	1980	1980	1980	1980	1980
	NET WEIGHT Over	kg	103	115	115	185	297	297
	NET WEIGHT Under	kg	103	115	115	185	297	297
Connections	Refrigerant pipes: Gas - Liquid	Ø Inch	5/8" - 3/8"	5/8" - 3/8"	5/8" - 3/8"	1" - 1/2"	1" - 3/8"	1" - 1/2"
	Condensate (5)	Ø mm	19	19	19	19	19	19
	Power supply wiring cable (6)	n° x mm²	3G1.5	3G1.5	3G1.5	3G1.5	4G1.5	4G1.5

Notes:
THE COOLINC CAPACITY DOES NOT CONSIDER THE SUPPLY FAN MOTOR THERMAL LOAD
(1) Gross value. Characteristics referred to entering air at 27°C-47% RH; Ambient temperature 35°C; ESP=20Pa; Connection pipes length 5m;
(2) SHR= Sensible cooling capacity / Total cooling capacity.
(3) Corresponding to the nominal ESP=20Pa.
(4) Sound pressure level on air return at 1m .
(5) Rubber pipe-referred to internal diameter.
(6) Minimum section.
These units contain <HFC R410A [GWP_{100} 2088]> fluorinated greenhouse gas.
These units contain <HFC R32 [GWP_{100} 675]> fluorinated greenhouse gas.

Mr. SLIM NEW

OUTDOOR UNIT

OUTDOOR UNIT EQUIPPED WITH DC SCROLL INVERTER COMPRESSOR AND AXIAL FANS WITH DC ELECTRIC MOTOR

THE HEAT EXCHANGER IS THUS EXPLOITED ENTIRELY IN ITS EXCHANGE SURFACE.

OUTDOOR UNIT THAT BENEFIT FROM SCROLL COMPRESSOR, IS ALSO EQUIPPED WITH A DEVICE CALLED "POWER RECEIVER", A REFRIGERANT ACCUMULATOR ACCOMPAINED BY A PAIR OF LEV VALVES, WITH THE DUAL FUNCTION (SUBCOOLING/OVERHEATING THE REFRIGERANT).

Technologies and Functions

Mr.Slim presents excellent performances in all loading conditions thanks to the sophisticated power inverter technology with advanced features:
- "Rotation and Backup" function for automatic switching on a second unit in case of first unit block.
- "Easy and fast maintenance" function and authomatic monitoring of the refrigerant status.

Linear Expansion Valve (LEV)

The Mr.Slim linear expansion valve (LEV) allows precise regulation of the refrigerant flow, optimizing the compressor's performances.
- Fast achievement of system stability.
- Quick adaptation to load fluctuations.

Scroll Inverter compressor

Full inverter technology applied to the compressor allows continuous modulation of the cooling capacity according to the real needs of the servers.
In this way the rotation speed is continuously modulated helping to significantly increase the efficiency for partial loads.
- Elimination of inrush currents;
- Energy consumption reduction for 25%, compared to traditional ON/OFF technology;
- Maximum reliability thanks to continuous modulation without annoying ON/OFF cycles.

Technical specifications

OUTDOOR UNIT			PUHZ-ZM 60VHA	PUHZ-ZM 100VKA	PUHZ-ZM 125YKA	PUHZ-ZM 250YKA	PUHZ-ZM 200YKA	PUHZ-ZM 250YKA
	Indoor unit model		006	009	013	022	038	044
	Outdoor unit to be coupled to the indoor	n°	1	1	1	1	2	2
	COMPRESSOR	n°	1	1	1	1	1	1
	Power INPUT	kW	1,19	1,88	2,82	6,01	4,33	6,01
	Refrigerant charge	kg	2,8	4	4	7,7	7,1	7,7
	CONDENSER FAN	n°	1	2	2	2	2	2
	Air flow	m³/h	3300	6600	7200	8400	8400	8400
	Power input	kW	0,06	0,06	0,06	0,2	0,2	0,2
Dimensions	Lenght	mm	950	1050	1050	1050	1050	1050
	Depth	mm	355	370	370	370	370	370
	Height	mm	943	1338	1338	1338	1338	1338
	NET WEIGHT	kg	70	116	125	135	135	135

Notes:
(1) Characteristics referred to ambient temperature 35°C – indoor air condition 27°C-47% UR - Connection pipes length 5m;
(2) Sound pressure level on unit front at 1m.
(3) Minimum section.
(4) For standard refrigerent charge.
(5) With additional refrigerant charge.
(*) Data are referred to single outdoor unit.
(+) from 71 to 100 m please refer to Mr Slim O&M Manual.
These units contain <HFC R32 [GWP_{100} 675]> fluorinated greenhouse gas.

MULTIDENSITY modular system

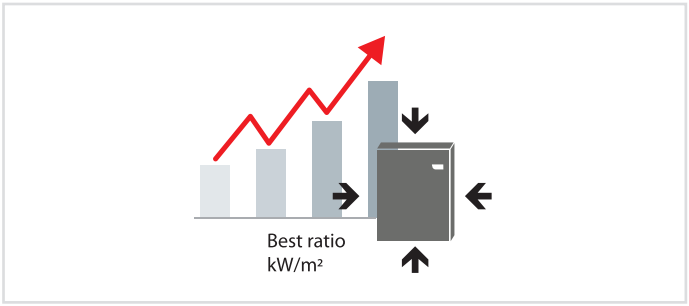
Efficient, rational, plug & play solution for high density data rooms.
Full inverter VRF system for small & medium size it environments
with hot spots up to 50 kW.

Up to 8 indoor units connected to one OUTDOOR unit

High density hot spots are managed by indoor units connected to condensing units working together as a unique system.

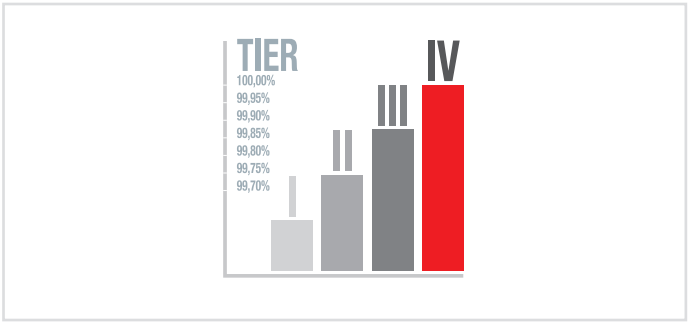
Highest capacity per footprint

Thanks to the possibility to minimise the number of outdoor units, the overall footprint of the whole system is drastically reduced.



Choose your system's reliability

A multitude of configurations are available to provide customers with their desired level of reliability (configuration N, N+1, 2N). The Multidensity system is in line with TIER III and IV design topologies, based on the configuration chosen.

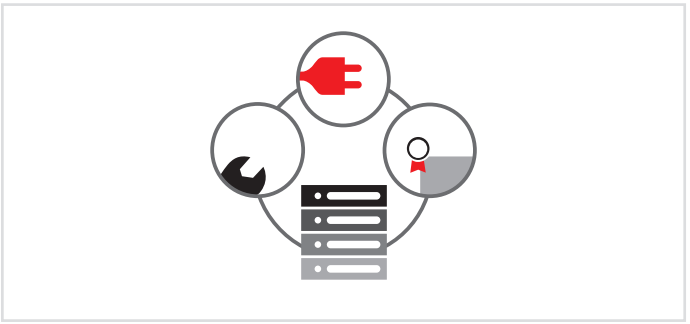


Adaptable flexibility

Match any kind of cooling requirement, from localised cooling to hot and cold aisle cooling management.

Rational design for optimised CAPEX

The rational design of the VRF system is combined with the experience and reliability of the Mitsubishi Electric brand, which guarantees the best quality for your IT infrastructure.



Plug and Play Installation

No additional elements such as pumps, tanks, and valves are required. This installation simplicity results in a quicker start-up and more reliable maintenance, which are key factors for reducing installation and maintance costs.

Active Redundancy

Advanced load sharing logics of the Active Redundancy function ensure that the heat loads are balanced among the units (including those units that usually remain in stand-by) according to the actual requirements of the IT infrastructure, leveraging on the multi-unit configuration of redundant systems.

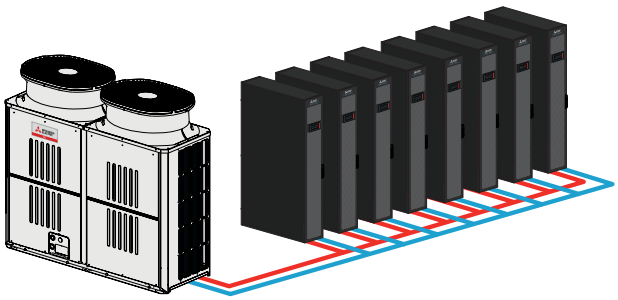
The modular approach of MULTIDENSITY SYSTEM

Indoor units are connected in master-slave configuration, if the master unit fails for any reason, the Dynamic Master logic automatically elects a new master from the other units.

Thanks to the flexible and modular approach of the MULTIDENSITY SYSTEM, it represents a tailored solution for any data center layout.

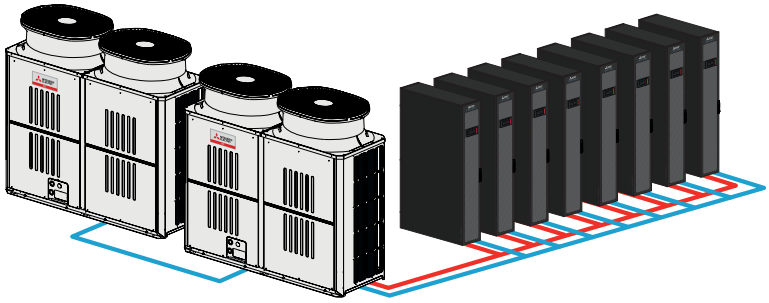
CONFIGURATION WITHOUT REDUNDANCY (N)

Ideal for small to medium IT rooms
- 1 external unit paired with up to 8 indoor units
- Average system EER is around 3.00
- Cooling capacity up to 50 kW



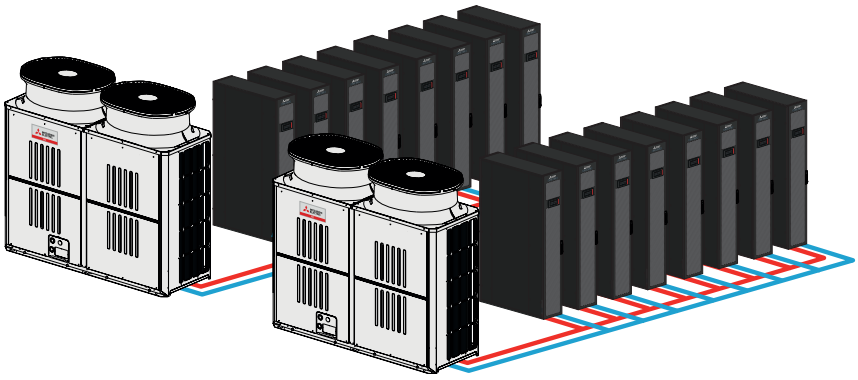
CONFIGURATION WITH REDUNDANCY (N+1)

Ideal for TIER II IT rooms
- 2 external units paired with up to 8 indoor units
- The external units operate in load sharing at partial loads for higher efficiency
- In case of failure of one of the condensing units, the second one operates at full load
- Average system EER is around 3.25
- Cooling capacity up to 50 kW



CONFIGURATION (2N)

Ideal for TIER III and TIER IV data centers
In accordance with the Uptime's Institute's classification, this configuration offers:
- A fully redundant and mirrored system with two independent distribution systems
- 1+1 external units paired with up to 8+8 indoor units

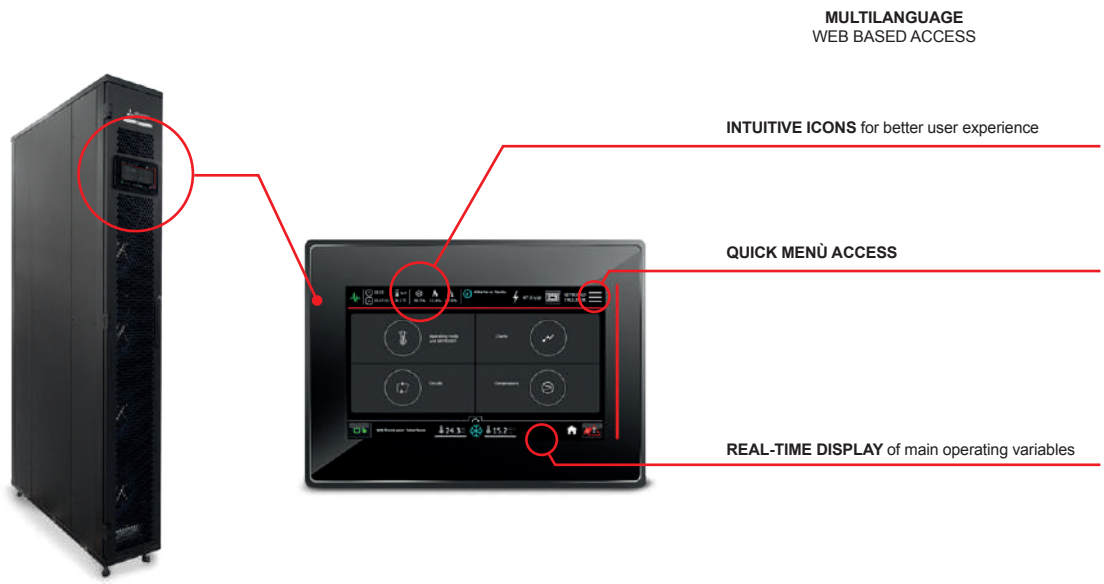


New evolution touch display

The evolution touch display is available for the room units m-MROW and m-MRAC.
Through simple, easy-to-read colour graphics, the innovative touch screen display (available as an option) shows the real performance of key components.

A completely redesigned interface improves the user experience.
The 7" touch screen display ensures the immediate visualization of the indoor units' status thanks to dedicated screens for main operating parameter control: temperature, humidity, ventilation and then, alarms and event management.

NEW EVOLUTION TOUCH DISPLAY



KIPlink innovative interface

Multidensity system is also available, as option, with KIPlink interface.
Based on WI-FI technology, KIPlink gets rid of the standard keyboard and allows one to operate on the unit directly from a mobile devices (smartphone, tablet, notebook).

KIPLINK INNOVATIVE INTERFACE

Dimensioning and design

Thanks to the sizing and design tool typical of Mitsubishi Electric direct expansion systems - New Design Tool – it's possible to simplify the design phases by minimizing the learning curve.

KIPLINK INNOVATIVE INTERFACE

Easier on-site operation
View and change all parameters with easy-to-understand screenshot and dedicated tooltips.
Get devoted "help" messages for alarm reset and trouble shooting.

Real-time graphs and trends
Monitor the immediate labour status of main components.
View the real-time graphs of the key operating variable trends.

Data logger function
View history of events and use the filter for a simple search.
Enhance diagnostics with data and graphs of 10 minutes before and after each alarm.
Download all the data for detailed analysis.

m-MOCU NEW

AIR-COOLED OUTDOOR UNIT FOR OUTDOOR INSTALLATION
TO BE COUPLED WITH IT COOLING INDOOR UNITS

MITSUBISHI ELECTRIC'S EXPERIENCE IN VRF APPLIED TO IT COOLING INFRASTRACTURES

BELL-MOUTH SHAPE DESIGNED PROPELLER FANS WITH INVERTER CONTROL BRUSHLESS DC MOTORS

BLDC SCROLL COMPRESSORS WITH INVERTER TECHNOLOGY TO PRODUCE THE EXACT OUTPUT NEEDED BY THE SYSTEM

MODULAR DESIGN AND REDUCED FOOTPRINT FOR ANY INSTALLATION REQUIREMENT

INCREASED PERFORMANCE

EXTREME RELIABILITY

LOW NOISE OPERATION

SUITABLE FOR LONG REFRIGERANT PIPE DISTANCE

Technical specifications CONDENSING UNITS

Outdoor Unit			1x m-MOCU-G02-050	2x m-MOCU-G02-050
Cooling Capacity	Total (1)	kW	50	50
	System EER (1)	kW/kW	2.96	3.24
Unit Electrical Data	Power input (1)	kW	15.2	13.7
Compressor		Nr.	1	2x 1
	Power input (1)	kW	14.3	2x 14.3
Condenser Fans		Nr.	2	2x 2
	Total air flow	m3/h	19.200	2x 19.200
	Power input	kW	2x 0.92	4x 0.92
	External static pressure	Pa	0	0
Sound Level Iso 3744	Pressure level (2)	dB(A)	65	68
Refrigerant Circuits		Nr.	**1**	**2x 1**
	Refrigerant type		R410A	R410A
	Pre-charged refrigerant	kg	11.8	2x 11.8
	F-GAS - CO_2 equivalent	t	24.63	2x 24.63
Refrigerant Piping	Max pipe length (from the outdoor unit to the farthest indoor unit)	m	165	165
	Max height difference (outdoor unit higher than indoor units)	m	50	50
	Max height difference (outdoor unit lower than indoor units)	m	40	40
Power Supply		V/Ph/Hz	**380-400-415 / 3+N / 50-60**	**380-400-415 / 3+N / 50-60**
Dimensions	Length	mm	1750	2x 1750
	Depth	mm	740	2x 740
	Height	mm	1650	2x 1650
Net Weight		kg	**304**	**2x 304**

1. Gross Value. Characteristics referred to room air temperature 35°C with 27%RH and external ambient air temperature 35°C. ESP=20Pa.
2. Gross Value. Characteristics referred to room air temperature 46°C with 16%RH and external ambient air temperature 35°C. ESP=20Pa.
3. Sound pressure level on air return at 1m.

m-MROW
m-MRAC

NEW

**THESE INDOOR RACK COOLING UNITS, FROM 10 TO 28 KW,
ARE DESIGNED TO BE CLOSE-COUPLED TO BLADE SERVERS AND MANAGE HOT SPOTS**

OPTIMIZED FOR MULTIDENSITY SYSTEM

REDUCED SPACE OCCUPANCY (UP TO 0,36 M²)

COOLING ONLY WHERE NEEDED

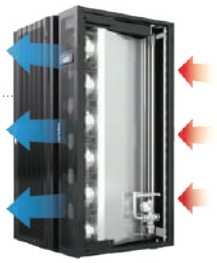
EC PLUG FANS FOR REDUCING ENERGY CONSUMPTION AND NOISE LEVELS

ELECTRONIC EXPANSION VALVE TO ACHIEVE A MUCH WIDER MODULATION CAPACITY

BOTH IN-ROW AND ENCLOSURE VERSIONS AVAILABLE

ENCLOSURE
IDEAL FOR REMOVING HOT SPOTS IN STAND ALONE SYSTEMS

IN ROW
IDEAL FOR HOT/COLD AISLE CONFIGURATIONS



Technical specifications INDOOR UNITS

Indoor unit			m-MROW-G02-009 m-MRAC-G02-009	m-MROW-G02-015 m-MRAC-G02-015	m-MROW-G02-025 m-MRAC-G02-025
Unit size			9	15	25
Cooling capacity m-MROW	Total (1)	kW	10.6	16.6	28.6
	Sensible (1)	kW	9.6	15.7	27.4
	SHR (1)		0.91	0.94	0.96
	Indoor unit EER (1)	kW/kW	58.9	50.3	32.5
Cooling capacity m-MROW	Total (2)	kW	10.9	22.9	32.8
	Sensible (2)	kW	10.9	22.9	32.8
	SHR (2)		1	1	1
	Indoor unit EER (2)	kW/kW	60.5	69.3	37.2
Supply fan		Nr.	2	4	5
	Air flow	m³/h	1500	2700	4200
	Power input	kW	0.18	0.34	0.85
	Nominal external static pressure	Pa	20	20	20
	Maximum external static pressure	Pa	60	60	60
Sound level ISO 3744	Pressure level (3)	dB(A)	63.5	64.5	70.5
	Power level	dB(A)	79.0	80.0	86.0
Air filters		Nr.	2	2	2
	Extended filtering surface	m2	0.35	0.35	0.35
	Efficiency (ISO EN 16890)	COARSE	40%	40%	40%
Refrigerant circuits		Nr.	1	1	1
	POWER SUPPLY	V/Ph/Hz	230/1/50-60	230/1/50-60	230/1/50-60
Dimensions	Width	mm	300	300	300
	Length	mm	1000 / 1200	1000 / 1200	1000 / 1200
	Height	mm	2085	2085	2085
Net weight	m-MROW	kg	175	190	193
	m-MRAC	kg	185	200	203


MITSUBISHI
ELECTRIC
LIVING ENVIRONMENTAL SYSTEMS

MITSUBISHI ELECTRIC

LIVING ENVIRONMENTAL SYSTEMS

Centro Direzionale Colleoni
Viale Colleoni, 7 - Palazzo Sirio
20864 Agrate Brianza (MB)
tel. 039.60531 - fax 039.6053223
e-mail: clima@it.mee.com

The equipment described in this catalogue contain fluorinated gasses such as HFC-32 (GWP 675), HFC-410A (GWP 2088). Installation of those equipment must be executed by professional installer based on EU reg. 303/2008 and 517/2014

COMFORT & IT COOLING SYSTEMS
FULL PRODUCT CATALOGUE
E-2112250(17170) sostituisce E-2009250(16620)

Specifications are subject to change without notice

E-2112250

les.mitsubishielectric.it/en/products/