MITSUBISHI ELECTRIC

Air to Water

Why Choose Mitsubishi Electric?

In recent years, the need to be more energy conscious and environmentally responsible has become increasingly important to us all.

As a leading manufacturer of air conditioning systems, Mitsubishi Electric constantly strives to meet and exceed the increasing demands placed on the industry.

Through research and development for the future, we proudly introduce our new Air to Water system which uses water as a heating and cooling medium for space heating/ cooling and hot water supply applying the heat pump and heat recovery technology.

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Key Technologies of Air to Water Series

Air to Water Series making the most of Heat Pump and Heat Recovery Technology

Heat pump and heat recovery technologies are already well known in the air conditioning market and proved to be efficient for cooling and heating. Mitsubishi Electric has now designed Air to Water (ATW) Series utilising the technologies to provide hot water.

Here is an overview of the technology that is used in the ATW system:

Heat Pump Technology

- Remarkable energy consumption efficiency
- Generating much larger heat energy than the input energy
- Heating or cooling operation

Heat Recovery Technology

- Effective use of waste heat
- Heating and cooling simultaneous operation

Both technologies, compared to conventional systems of boilers, not only have incredible design flexibility, excellent use of energy and reduce CO_2 emissions, there is a further reduction in capital costs. Negating the need for the installation of gas supply entirely, the ATW Series can provide hot water by means of electricity.

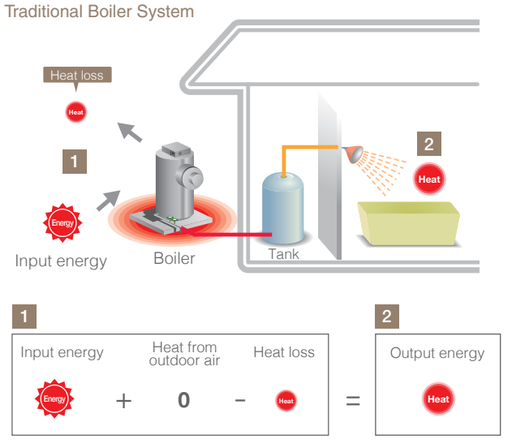
BASICS OF AIR CONDITIONING

Heat Pump

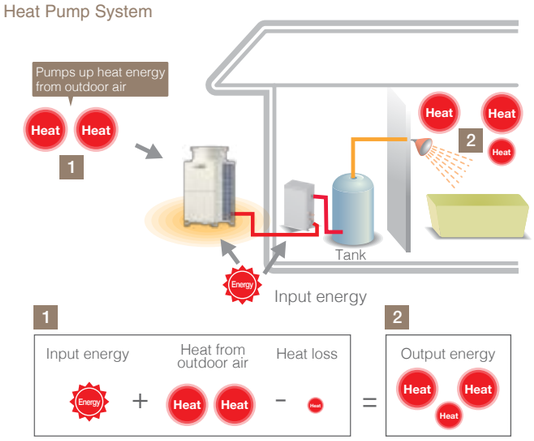
- Remarkable energy consumption efficiency
- Generating much larger heat energy than the input energy
- Heating or cooling operation

From the energy output side, the operation characteristics of a heat pump are different to conventional systems (such as electric/gas/oil boilers or electric heaters). With conventional systems, 1kW of input energy provides less than 1kW of output energy or heat. With a heat pump system, every 1kW of input energy is converted into an average of 2~5 times of output energy or heat by absorbing heat from outdoor air. Also, a heat pump, as its name shows, “pumps up” heat from a low temperature source, outdoor air, for example, and transfers it at a higher temperature in a building, making it more efficient than conventional boilers and a natural choice for low cost heating and hot water.

Traditional Boiler System



Heat Pump System

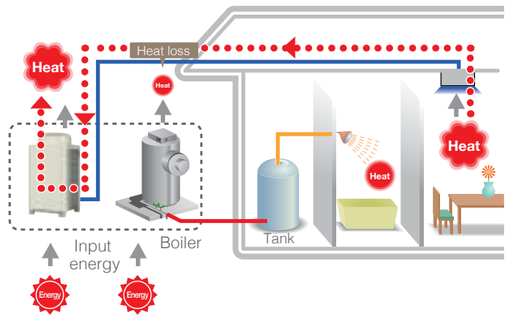


Heat Recovery

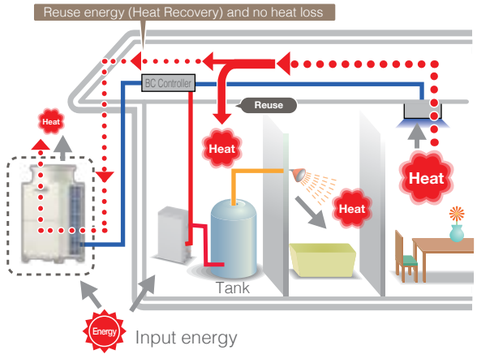
- Effective use of waste heat
- Heating and cooling simultaneous operation

Heat recovery system can provide an ideal solution when taking a look at the system from an energy exhaust point of view. This is because air conditioning and hot water are used throughout the year and with a heat recovery system, exhausted heat from the indoor unit is diverted to be reused in a different purpose. For example, the wasted heat from cooling operation is reused for heating or hot water supply, and wasted heat from the heating operation or hot water supply is reused for cooling operation or cold water supply. The more frequently heating and cooling simultaneous operation is carried out, the higher the energy saving effect becomes.

Traditional Boiler System + Cooling Only Air Conditioner



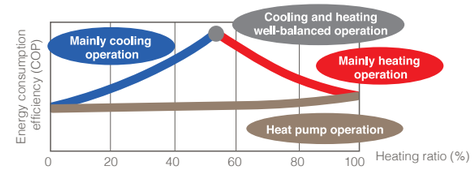
Heat Recovery System



Heat Recovery System

1. Hot water supply and cooling operation can be carried out within a system.
2. Savings in installation space can be achieved.
3. Savings in power consumption can be achieved by utilising waste heat from cooling operation to provide hot water.

COP in the heat recovery system

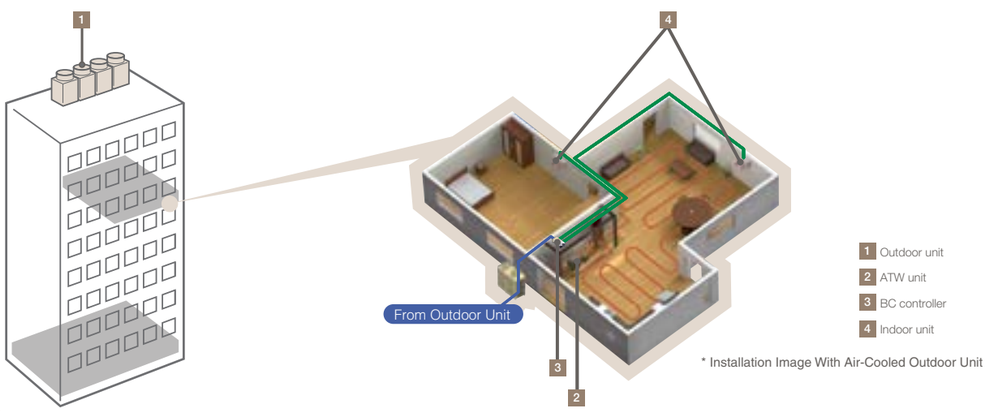


Mitsubishi Electric's Solution

Air to Water Advanced System Explained

Air To Water (ATW) series offers the choice between two types of units; a Booster unit and a HEX (Heat Exchanger) unit. A Booster unit offers hot water to a maximum of 70°C and a HEX unit offers 45°C in heating and down to 8°C in cooling. Applying heat pump and heat recovery technology to provide hot water, the units are suitable for residences, office buildings, restaurants or hotels, providing an optimal environment while benefiting from reduced running costs and less impact on the environment.

ATW system consists of an outdoor unit, a BC controller when connected with R2 series, ATW unit, indoor unit and a controller.



* Installation Image With Air-Cooled Outdoor Unit

Outdoor Unit

CITY MULTI outdoor units, both air cooled heat pump/heat recovery or water-cooled heat pump/heat recovery can be connected to the ATW system depending on the system structure.

AIR COOLED OUTDOOR UNIT

Lineup

Heat Pump

Y Series	22.4kW~150.0kW
EP High COP Series	22.4kW~150.0kW

Heat Recovery

R2 Series	22.4kW~101.0kW
EP High COP Series	22.4kW~101.0kW

CITY MULTI

Features

CITY MULTI units are designed to be an efficient, a fully customisable solution for providing a comfortable environment inside a building. Broader model line up is prepared from standard Y/R2 Series and High COP Series to diverse requirements.

WATER COOLED OUTDOOR UNIT

Lineup

Heat Pump

WY Series	22.4kW~101.0kW

Heat Recovery

WR2 Series	22.4kW~101.0kW

CITY MULTI

Features

CITY MULTI water cooled systems use water as a heat exchange medium and can be installed inside, rather than outside a building. The water can be delivered at optimized temperature and volumes, which allows flexibility and energy efficiency. They are ideally suited for use in temperate and cooler climates since heat exchange with the outside air is not required.

R410A Refrigerant

R410A refrigerants are safe with zero ODP (Ozone Depletion Potential). Accordingly, our systems require less energy to run, and have a significantly lower indirect global warming potential.

*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, during 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.

Inverter Driven Compressor

The compressor varies its speed to match the indoor cooling or heating demand and only consumes the energy that is required.

When an inverter driven system is operating at partial load, the energy efficiency of the system is significantly higher than that of a standard fixed speed, non inverter system.

Air to Water Unit

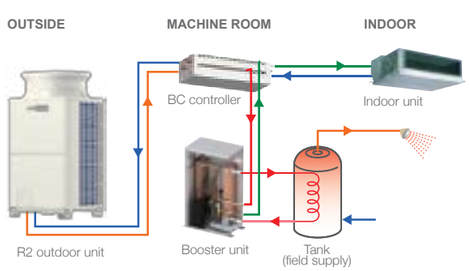
BOOSTER UNIT

Benefiting from the heat recovery operation of the CITY MULTI R2 system, the Booster unit converts energy from the air to higher temperatures suitable for supplying hot water and results in virtually no energy waste.

Connectable to	Applications	Operation
CITY MULTI R2/WR2 Series	Best for sanitary water, shower, etc.	Up to 70˚C

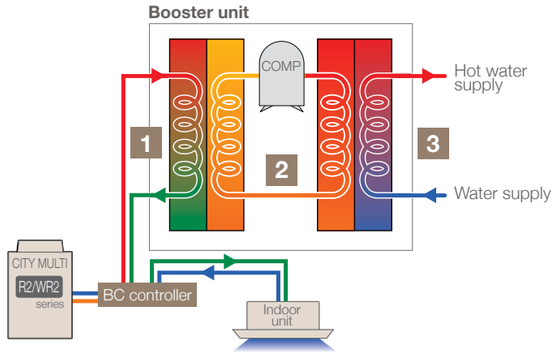
System Outline

The Booster unit is connected to a BC controller with refrigerant pipes, and to the water tank with water pipes. The waste heat from cooling operation is utilised for heating operation which provides hot water.



Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

What Makes the Booster Unit Unique?



Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

Refrigerant Flow

1 From the BC controller, high pressure R410A gas refrigerant is delivered to the Booster unit to exchange heat with the low pressure R134a liquid refrigerant circulating through 2 and returns to the BC controller as a high pressure liquid refrigerant.

2 Refrigerant R134a circulates inside the two plate heat exchangers inside the unit.

Temperature rises as low-pressure R134a gas refrigerant is compressed by the compressor and becomes high-pressure gas refrigerant.

Water Supply

3 Water entering the Booster unit exchanges heat with high-pressure R134a gas refrigerant. The hot water circulates to heat the water inside the tank which will be used for showers, sanitary water, etc.

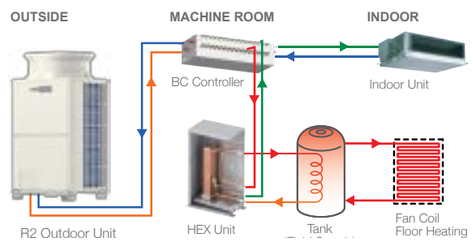
HEX UNIT

By utilising waste heat from the R2 outdoor unit for heating operation in HEX unit, it is possible to supply hot water with high efficiency. Also, even when connected with the Y series, it provides efficient operation compared to a conventional system.

Connectable to	Applications	Operation
CITY MULTI R2/WR2 Series Y/WY Series	Best for floor heating, panel heater, fan-coil unit (AHU) etc.	Hot Water up to 45°C Cold Water up to 8°C

System Outline - HEX Unit with R2 Series

HEX unit is connected to BC controller with refrigerant pipes, and to the water tank with water pipes.
The HEX unit is not equipped with a compressor.

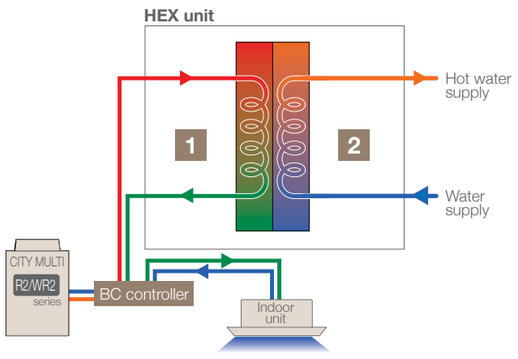


* The image is a system example in case of heating mode.
* The necessity of the tank depends on the system configuration.

Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrige
Green — High Pressure Liquid Refrigera
Blue — Low Pressure Gas Refrigerant

What Makes the HEX Unit Unique with R2/WR2 Series?

Hot Water Supply



Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

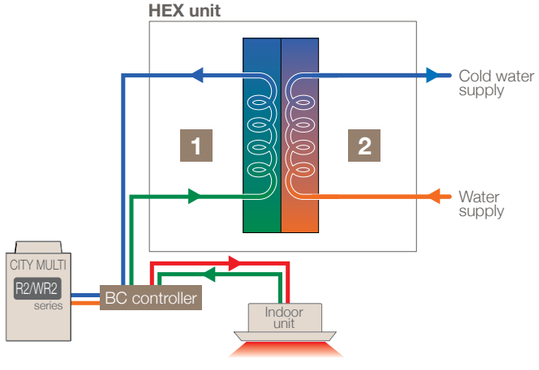
Refrigerant Flow

1 From the BC controller, high pressure R410A gas refrigerant is delivered to the HEX unit and returns to the unit as high pressure liquid refrigerant.

Water Supply

2 Water entering the HEX unit exchanges heat with the R410A refrigerant and water circulates to heat the water inside the tank.

Cold Water Supply



Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

Refrigerant Flow

1 From the BC controller, high pressure R410A liquid refrigerant is delivered to the HEX unit and returns to the unit as low pressure gas refrigerant.

Water Supply

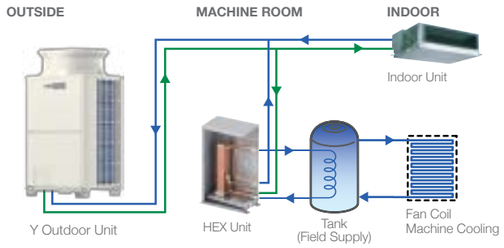
2 Water entering the HEX unit exchanges heat with the R410A refrigerant and water circulates to cool the water inside the tank.

Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

HEX UNIT

System Outline - HEX Unit with Y Series

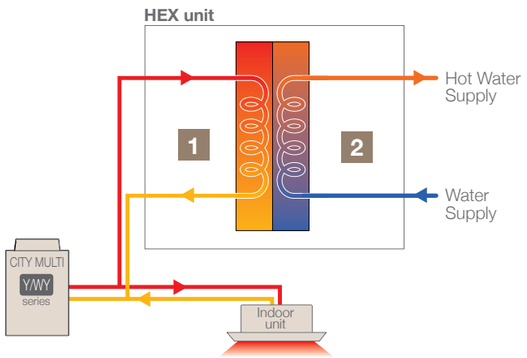
The HEX Unit is connected to the Y outdoor unit with refrigerant pipes, and to the water tank with water pipes.
The HEX Unit is not equipped with a compressor.



Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

What Makes the HEX Unit Unique with Y/WY Series?

Hot Water Supply



Refrigerant Flow

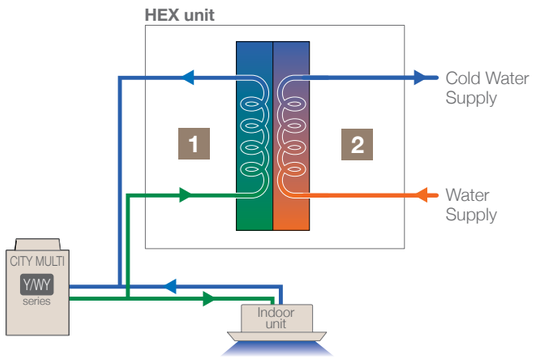
1 From the outdoor unit, high pressure R410A gas refrigerant is delivered to the HEX unit and returns to the unit as low pressure 2-phase refrigerant.

Water Supply

2 Water entering the HEX unit exchanges heat with the R410A refrigerant and water circulates to heat the water inside the tank.

Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Yellow — Low Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

Cold Water Supply



Refrigerant Flow

1 From the outdoor unit, high pressure R410A liquid refrigerant is delivered to the HEX unit and returns to the unit as low pressure gas refrigerant.

Water Supply

2 Water entering the HEX unit exchanges heat with the R410A refrigerant and water circulates to cool the water inside the tank.

Red — High Pressure Gas Refrigerant
Orange — High Pressure 2-phase Refrigerant
Green — High Pressure Liquid Refrigerant
Blue — Low Pressure Gas Refrigerant

BC Controller

To connect R2/WR2 series outdoor units and ATW indoor units, a BC controller can be used.

		BC Controller
Connectable ATW System		Booster/HEX
Outdoor Unit	Connectable Series	R2/WR2
	Connectable Capacity	P200-P900
ATW/ Indoor Unit	Connectable Qty	1-50
	Connection Method	With BC's Port
	Operation Mode	Cooling and Heating
Product Image		

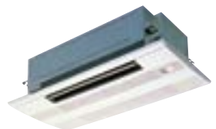
Indoor Unit

In an ATW system, standard CITY MULTI indoor units can also be connected.

CITY MULTI selection of indoor units provide a wide range of indoor units to meet the requirements of all room types.
Units are available in Ceiling Cassette, Ceiling Concealed Ducted, Ceiling Suspended, Wall Mounted and Floor Mounted versions.

Ceiling Cassette
4-way Airflow
PLFY-VBM,VCM

Ceiling Cassette
2-way Airflow
PLFY-VLMD



Ceiling Cassette
1-way Airflow
PMFY

Ceiling Concealed
Middle Static Pressure
PEFY-VMA(L)

Ceiling Concealed
Low Static Pressure
PEFY-VMR

Ceiling Concealed
Low Static Pressure
PEFY-VMS1(L)

Ceiling Concealed
High Static Pressure
PEFY-VMH(S)

Ceiling Suspended
PCFY

Wall Mounted
PKFY

Floor Standing Exposed
PFFY-VKM

Floor Standing Concealed
PFFY-VLRM, PFFY-VLRMM

Control

REMOTE CONTROLLER

The PAR-W21MAA remote controller is specially designed for the Air to Water system.

Basic Functions

- Operation Mode Setting
- Water Temperature Setting
- Temperature Range Setting
- Local Operation Setting
- Weekly Schedule Setting
- Error Code Display

PAR-W21MAA

CENTRALISED CONTROLLER

With a newly designed colour liquid crystal display and touch panel, AE-200E can centrally control up to 200 units via new expansion controllers (AE-50E, EW-50E).

Basic Functions

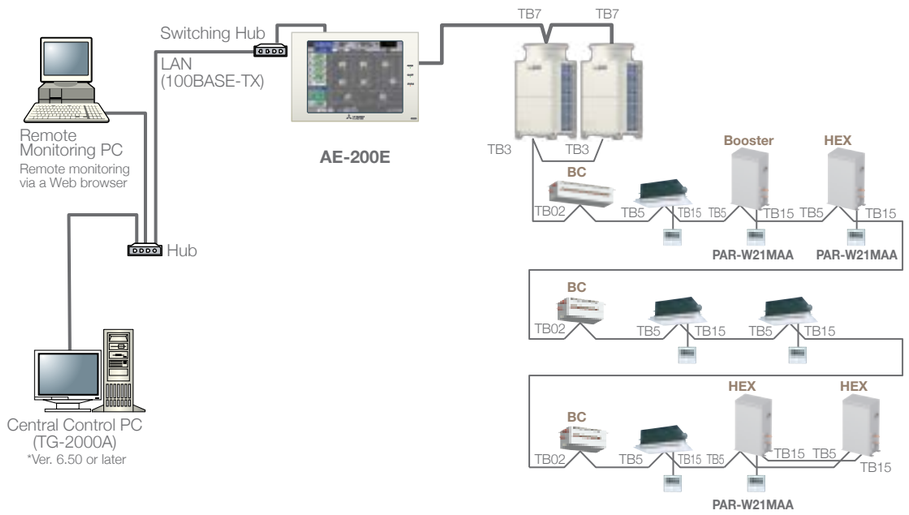
- Operation Setting
- Water Temperature Setting
- Local Operation Setting
- Error Code Display

Booster/HEX unit display icon shown on AE-200E screen

AE-200E

System Structure (Remote Controller + Centralised Controller)

Centralised controller AE-200E can centrally control up to 200 units via expansion controllers (AE-50E, EW-50E).



ADVANCED TOUCH CONTROLLER

With backlit 5-inch colour liquid crystal display, AT-50B can centrally control up to 50 units. It also provides easy operation with touch panel.

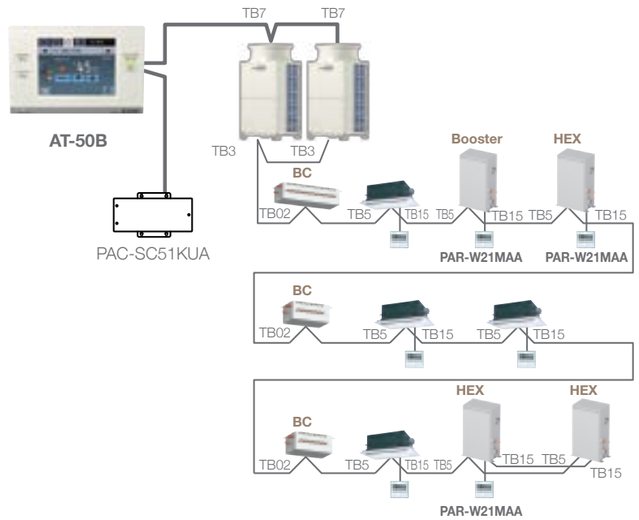
Basic Functions

- Operation Mode Switching
- Water Temperature Setting
- Weekly and Daily Schedule Setting
- Error Code Display

AT-50B

System Structure (Remote Controller + Advanced Touch Controller)

Advanced touch controller AT-50B can control up to 50 units from one location.



Mitsubishi Electric's Proposal

How Air to Water systems can actually apply to applications to satisfy the expectations

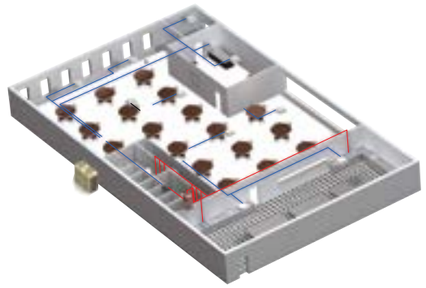
The Air to Water system; Mitsubishi Electric's solution to cooling, heating and hot water supply, is an attractive solution utilising the heat pump and heat recovery technology.

The fact that the Air to Water advanced technology can greatly reduce CO_2 emissions is appealing amid the global and national pressures to be more environmentally responsible.

With both innovative technology and high environmental concerns, Air to Water systems are ideal for use in various applications to provide air conditioning or hot water depending on requirement.

Application Examples

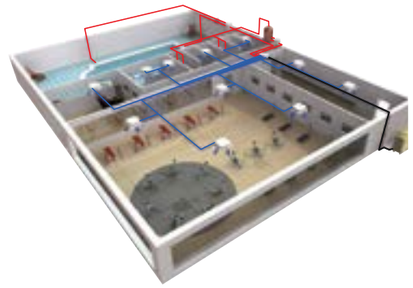
The application examples here indicate why ATW systems are chosen and how the great potential offered by using ATW systems can be best utilised



Restaurant

Reason for ATW

- Hot water is almost always required in the kitchen.
- Waste heat from the kitchen can be used to cool the dining hall in the summer, increasing efficiency of the system.



Health Club

Reason for ATW

- Gym space requires year-round cooling.
- Swimming pools and shower rooms require hot water.

Office

Reason for ATW

- Different requirements for different tenants/rooms.
  Meaning cooling/heating/hot water is expected throughout the year.
- In the winter, hot water for small kitchens using the waste heat from cooling operation in rooms with a number of computers.
- In the summer, cooling operation performed in all rooms while hot water is available in small kitchens.

Residence

Reason for ATW

- Hot water requirement throughout the year. For shower and kitchen.
- Can be used for under floor heating in winter seasons and cooling in summer seasons.

Case Studies

These actual case studies reveal the background of why the ATW system was proposed and chosen as a solution to match the different needs of the people and the building

Case Study 1

Application
Medical & Dental Centre

Location
Port Macquarie, NSW

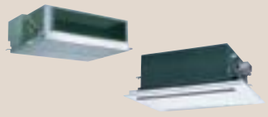
The Challenge
The specially designed $6.5 million Port Macquarie Medical and Dental Centre, at the corner of Hastings River Drive and Park Streets, incorporating health professionals, medical specialists, pathology and radiology as well as a dental clinic, all in one location gave the mechanical consultant an enormous challenge. There was a requirement for heating and cooling as well as hot water for medical and sanitary use, but at the same time making it as efficient as possible.

The Solution
SECON consulting engineers came up with the idea of using Mitsubishi Electric's Air to Water system so that waste heat from the building could be transferred into the hot water system, thus making the combination of Air-conditioning and hot-water increasingly economical and efficient. The consultant's solution was to have VRF Heat Recovery units providing air-conditioning to the common areas, as well as two booster units connected to the VRF systems to provide hot-water.

The Air to Water system provides hot water to a continuous circulation loop within the building so that there is no delay in receiving hot water when required. In addition, to achieve the required off-site monitoring, Mitsubishi Electric Australia supplied an AG-150A System controller with the Maintenance Tool function enabled. This was patched to the server within the building which already had remote access, thus allowing Primary Health developer to monitor all the equipment controlled by the AG-150A.

UNIT INFORMATION

Outdoor Units
PURY-P750YSJM-A x 1
PURY-P700YSJM-A x 1
PURY-P600YSJM-A x 1



Indoor Units
PEFY-P40VMH-E x 3
PEFY-P50VMH-E x 1
PEFY-P200VMH-E x 2
PEFY-P250VMH-E x 4
PLFY-P20VCM-E x 6
PLFY-P25VCM-E x 1
PLFY-P125VBM-E x 2

Controllers
AG-150A x 1
AG-150A Web Browser x 1
PAR-30MAA x 1

Air to Water
PWFY-P100VM-E-BU x 3

Case Study 2

Application
Residential

Location
Mornington Peninsula, VIC

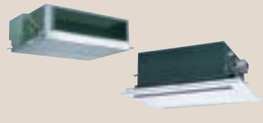
The Challenge
This large residential property is located on the Mornington Peninsula, south of Melbourne, in an area where natural gas is unavailable. There was a requirement for Heating and Cooling and also to provide for Hot Water for the home and in addition, to assist in the heating of the Pool and Spa. There was a requirement for Outdoor Units to be hidden from view rather than be dotted around the perimeter of the house. In addition, there was a desire to explore GEO THERMAL as there was sufficient land available for either bore holes or for a slinky type ground loop.

The Solution
A closed loop ground source slinky coil was linked to a Water Cooled Heat Recovery (WR2) VRF system, which allows the house to use the geothermal energy of the earth as a heating or cooling energy store. WR2 also transfers heat between the indoor units (including Air to Water units) to offer double heat recovery potential. System internally comprises City Multi ducted indoor units to provide space heating/cooling and Air to Water system to provide hot water.

The tank water is heated by 1 x 12.5kw Air to Water Booster unit and also by Evacuated tubes (solar). This water is for home use. Spa gains additional heating from 2 x 25kw Air to Water Hex unit and a heat exchanger. Centralised controller AG-150A with Web Browser is installed which allows Remote access and operation.

UNIT INFORMATION

Outdoor Units
PQRY-P550YSHM-A x 1
PQRY-P300YHM-A x 1



Indoor Units
PEFY-P40VMH-E x 5
PEFY-P50VMH-E x 1
PEFY-P63VMH-E x 1
PEFY-P140VMH-E x 3

Controllers
AG-150A x 1
AG-150A Web Browser x 1
PAR-30MAA x 10
PAR-W21MAA x 3

Air to Water
PWFY-P100VM-E-BU x 1
PWFY-P200VM-E-AU x 2

Frequently Asked Questions

ENVIRONMENT

Q1. How can air source heat pumps alleviate fuel poverty?

Because of the energy conversion efficiencies within an air source heat pump and heat recovery, the running costs against the other main gas, oil or direct electric heating systems are significantly reduced.

Q2. How does the ATW system help reduce carbon emissions?

Comparing COP of systems that can produce hot water, the boiler has a COP of approximately 1.0 and the ATW system 3.0. This means that boilers consume triple the amount of electrical energy. Taking this into account, the ATW system emits far less CO_2 than even the highest efficiency gas boilers.

INSTALLATION

Q3. How easy is it to install the ATW system?

Consider ATW units as one type of indoor unit in a VRF system. For example, the Booster unit can be installed by connecting the unit to a BC controller. The unit can even be added to an existing VRF system.

Q4. How much space is required for the ATW unit?

ATW units (Booster/HEX unit) must be installed inside a building. The units are approximately 800mm tall by 450mm wide and have a depth of 300mm. Sufficient service space 600mm x 925mm is required at the front of the unit.

Q5. Where does the gas boiler go in the installation?

There is no need to have a gas or oil fired boiler in an ATW installation.

Q6. What kind of protection is required for sanitary hot water?

We do not recommend hot water for drinking. The hot water is circulating and not supplied for drinking purposes.

It is also recommended that hot water be stored above 60°C to prevent microbial growth (Legionella).

Using an optional controller PAR-W21MAA weekly schedule function (up to 6 settings/day in 1 minute increments) can set hot water above 60°C regularly to sanitize the system.

Q7. Are there any special requirements during Winter?

Commonly, an inhibitor is put in the system to prevent it from freezing but with the ATW system, an Anti-freeze function is available.
The Anti-freeze mode can set the heating temperature range between 10°C~45°C enabling the unit to maintain low water temperature to prevent water pipes from freezing.

OPERATION

Q8. What difference will the users experience if they use an ATW system instead of a traditional boiler?

One of the differences users are likely to experience is that it saves their time and cut costs. This is because the ATW system works with CITY MULTI outdoor units operated on electricity and not requiring liquid or gas fuels to be supplied regularly as in traditional boilers.

Q9. Will the ATW system work when it's cold outside?

The ATW system works with CITY MULTI outdoor units which heating operation ranges down to as low as -20°C (Y/R2 series).

Q10. Are the ATW units noisy?

Even though ATW units will be installed inside the building, the units have a sound pressure level of 44dB with Booster unit and 29dB with HEX unit which is unlikely to be disturbing.

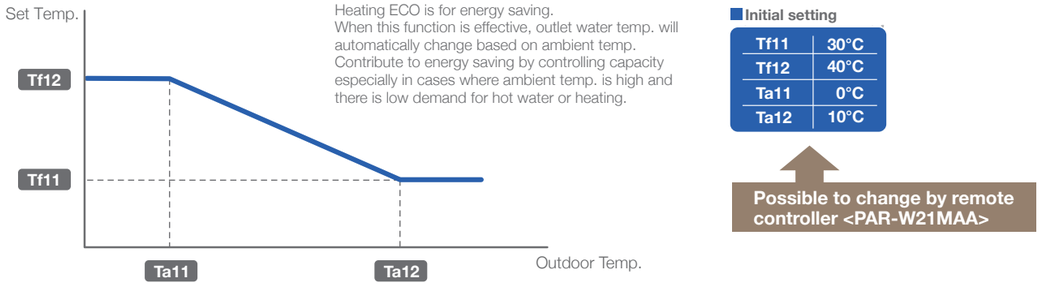
Q11. Will installing the ATW system be cost saving?

The running costs are lower because of the highly efficient heat pump and heat recovery technology. They are both refrigerant based systems, (like a refrigerator) when compared with the boiler system, fuel costs can be cut fundamentally.

The heat pump system can absorb low grade heat from the air (air source) or water (water source), and raise its temperature efficiently to be suitable for space heating and/or hot water.

The heat recovery system reuses wasted heat from cooling operation for heating or hot water supply, and wasted heat from heating operation or hot water supply is reused for cooling operation or cold water supply. The cost saving effect is higher the more frequently heating and cooling simultaneous operation is carried out.

Furthermore, with a "Heating ECO mode" available by setting Dip Switch, outlet water temperature can automatically change based on outdoor temperature to provide only the required heating and supply hot water.



Specifications

ATW UNIT

BOOSTER UNIT

Model				PWFY-P100VM-E-BU
Power Source				1- phase 220 - 230 -240V 50/60-Hz
Heating Capacity (nominal)			*1 kW	12.5
			*1 Kcal/h	10,800
			*1 Btu/h	42,700
	Power Input		kW	2.48
	Current Input		A	11.63 -11.12 - 10.66
Temp. Range of Heating	Outdoor Unit/Heat Source Unit Condition		W.B.	-20 ~ 32°C R2-Series
			-	10 ~ 45°C WR2-Series
	Booster Unit Inlet Water Temp		-	10 ~ 70°C
Connectable Outdoor Unit / Heat Source Unit	Total Capacity			50 ~ 100% of outdoor unit/heat source unit capacity
	Model / Quantity			R2 (Standard, Hi-COP), WR2 Series only
Sound Pressure Level (measured in anechoic room)			Db <a>	44
Diameter of Refrigerant Pipe	Liquid		mm	ø9.52 (ø3/8") Brazed
	Gas		mm	ø15.88 (ø5/8") Brazed
Diameter of Water Pipe	Inlet		mm	PT3/4 Screw
	Outlet		mm	PT3/4 Screw
Field Drain Pipe Size			mm	ø32 (1-1/4")
External Finish				NO
External Dimension H x W x D			mm	800 (785 without legs) x 450 x 300
Net Weight			kg	59
Compressor	Type			Inverter rotary hermetic compressor
	Maker			MITSUBISHI ELECTRIC CORPORATION
	Starting Method			Inverter
	Motor Output		kW	1.0
	Lubricant			NEO22
Circulating Water	Operation Volume Range		m^3/ h	0.6 ~ 2.15
Protection on Internal Circuit (R134A)	High Pressure Protection			High pressure sensor, High pressure switch at 3.60 MPa (601 psi)
	Inverter Circuit (comp)			Over - heat protection, Over - current protection
	Compressor			Discharge thermo protection, Over - current protection
Refrigerant	Type x Original Charge		*2	R134a x 1.1kg
	Control			IEV
Design Pressure	R410a		Mpa	4.15
	R134a		Mpa	3.60
	Water		Mpa	1.00
Drawing	External			WKB94L762
	Wiring			WKE94C229
Standard Attachment	Document			Installation Manual, Instruction Book
	Accessory			Strainer, Heat insulation material
Optional Parts				NONE
Remark				Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual.

Notes:

* 1. Nominal heating conditions

R2-Series
Outdoor Temp.: 7°CDB/6°CWB
Pipe length: 7.5m
Level difference: 0m
Inlet water Temp 65°C
Water flow rate 2.15m^3/h

WR2-Series
Circulating water Temp.: 20°C
Pipe length: 7.5m
Level difference : 0m
Inlet water Temp (for PWFY side) 65°C
Water flow rate 2.15m^3/h

Unit Converter

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

*The specification data is subject to rounding variation.

* 2. 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, during 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.

* Due to continuing improvement, the above specifications may be subject to change without notice.
* The unit is not designed for outside installations.
* Please don't use steel fittings for the water piping.
* Please always make water circulate or add the brine to the circulation water when the ambient temperature becomes 0°C or less.
* Please always make sure that water circulates or pull out the circulation water completely when not using it.
* Please do not use groundwater and well water.
* Install the Outdoor unit (R2-series) in an environment where the wet bulb Temp. will not exceed 32°C.
* The water circuit must use the closed circuit.
* Please do not use it as a drinking water.

ATW UNIT

HEX UNIT

Model				PWFY-EP100VM-E1-AU
Power Source				1 -Phase 220 -230 240v 50 / 60hz
Heating Capacity (nominal)			*1 kW	12.5
			*1 Kcal/h	10,800
			*1 Btu/h	42,700
	Power Input		Kw	0.015
	Current Input		A	0.068 - 0.065 - 0.063
Temp. Range of Heating	Outdoor Temp. for Outdoor Unit		W.B	-20 ~ 32°C R2 - Series
			W.B	-20 ~ 15.5°C Y - Series
	Circulating Water Temp. for Heat Source Unit		-	10 ~ 45.5°C WR2 - Series
			-	10 ~ 45.5°C WY - Series
	Inlet Water Temp. for PWFY		-	10 ~ 40°C R2/Y/WR2/WY - Series
Cooling Capacity (nominal)			*2 kW	11.2
			*2 Kcal / h	9, 600
			*2 Btu / h	38, 200
	Power Input		kW	0.015
	Current Input		A	0.068 - 0.065 - 0.063
Temp. Range of Cooling	Outdoor Temp. For Outdoor Unit		D.B.	-5 ~ 46°C R2 - Series
			D.B.	-5 ~ 46°C Y - Series
	Circulating Water Temp. for Heat Source Unit		-	10 ~ 45°C WR2 - Series
			-	10 ~ 45°C WY - Series
	Inlet Water Temp. for PWFY		-	10 ~ 35°C
Connectable Outdoor Unit / Heat Source Unit	Total Capacity			50 ~ 100% Of outdoor / heat source unit capacity
	Model / Quantity			PUHY-P·Y(S)KB-A1(-BS), PUHY-EP·Y(S)LM-A(-BS), PQHY-P·, PURY-(E)P·Y(S)LM-A(1)(-BS), PQRY-P·Y(S)LM-A
Sound Pressure Level (measured in anechoic room)			Db <a>	29
Diameter of Refrigerant Pipe	Liquid		mm	Ø9.52 brazed
	Gas		mm	Ø15.88 brazed
Diameter of Water Pipe	Inlet		mm	Pt1 screw (pt3/4 screw without expansion joint)
	Outlet		mm	Pt1 screw (pt3/4 screw without expansion joint)
Field Drain Pipe Size			mm	Ø32 (1-1/4")
External Finish				No
External Dimension H x W x D			mm	800 (785 Without legs) x 450 x 300
Net Weight			kg	33
Circulating Water	Operation Volume Range		m^3 / h	1.8 ~ 4.30
Design Pressure	R410a		Mpa	4.15
	Water		Mpa	1.00
Drawing	External			WKJ94T340
	Wiring			WKE94C951
Standard Attachment	Document			Installation manual, instruction book
	Accessory			Strainer, heat insulation material, expansion joint, flow switch x 1 set, buffer material
Optional Parts				Solenoid valve kit: PAC-SV01PW-E
Remark				Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to in the installation manual

Notes:

* 1. Nominal heating conditions (PWFY conditions are indicated in the parentheses)

Y/R2-Series
Outdoor Temp.: 7°CDB/6°CWB
Pipe length: 7.5m
Level difference: 0m
(Inlet water Temp. 30°C, Water flow rate 4.30m^3/h)

WY/WR2-Series
Circulating water Temp. : 20°C
Pipe length: 7.5m
Level difference: 0m
(Inlet water Temp. for PWFY side 30°C,
Water flow rate 4.30m^3/h)

Unit Converter

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

*The specification data is subject to rounding variation.

* 2. Nominal cooling conditions (PWFY conditions are indicated in the parentheses)

Y/R2-Series
Outdoor Temp.: 35°CDB
Pipe length: 7.5m
Level difference: 0m
(Inlet water Temp. 23°C, Water flow rate 3.86m^3/h)

WY/WR2-Series
Circulating water Temp.: 30°C
Pipe length: 7.5m
Level difference: 0m
(Inlet water Temp. for PWFY side 23°C,
Water flow rate 3.86m^3/h)

* Due to continuing improvement, the above specifications may be subject to change without notice.
* The unit is not designed for outside installations.
* Please don't use steel fittings for the water piping.
* Please always make sure that water circulates or add the brine to the circulation water when the ambient temperature becomes 0°C or less.
* Please always make water circulate or pull out the circulation water completely when not using it.
* Please do not use ground water and well water.
* Install the outdoor unit (R2-Series) in an environment where the wet bulb Temp. will not exceed 32°C.
* The water circuit must use the closed circuit.
* Please do not use it as a drinking water.

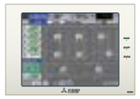
Specifications

CONTROLLER

REMOTE CONTROLLER PAR-W21MAA

Item	Description	Operations	Display
ON / OFF	ON and OFF the operation of a group of units	○	○
Operation Mode Switching	Switches between Hot Water / Heating / Heating ECO / Anti - freeze / Cooling * Available operation modes vary depending on the unit to be connected. * Switching limit setting can be made via a remote controller.	○	○
Water Temperature Setting	Temperature can be set within the ranges below. (in increments of 1°C) Heating 30°C ~ 50°C Anti-freeze 10°C ~ 45°C Heating ECO 30°C ~ 45°C Cooling 10°C ~ 30°C Hot Water 30°C ~ 70°C * The settable range varies depending on the unit to be connected.	○	○
Preset Temperature Range Limit	Preset temperature range setting can be limited via a remote controller.	○	○
Water Temperature Display	10°C ~ 90°C (in increments of 1°C) * The settable range varies depending on the unit to be connected.	×	○
Permit / Prohibit Local Operation	Individually prohibits operations of each local remote control function: ON / OFF, Operation modes, Water temperature setting, Circulating water replacement warning reset. * Upper level controller may not be connected depending on the unit to be connected.	×	○
Schedule Operation	ON / OFF / Water temperature setting can be done up to 6 times one day in the week. (in increments of a minute)	○	○
Error Display	When an error is currently occurring on a unit, the afflicted unit and the error code are displayed.	×	○
Self Check (error history)	Searches the latest error history by pressing the CHECK button twice.	○	○
Test Run	Enables the Test run mode by pressing the TEST button twice. * Test run mode is not available depending on the unit to be connected.	○	○
Circulating Water Replacement Warning	Displays the circulating water replacement warning via the unit message. Clears the display by pressing the CIR.WATER button twice. * Circulating water replacement warning is not available depending on the unit to be connected.	○	○
Operation Locking Function	Remote controller operation can be locked or unlocked. ·All-switch locking ·Locking except ON / OFF switch	○	○

○ = Each Group × = Not Available



CENTRALISED CONTROLLER AE-200E

Item	Description	Operations	Display
Controllable Unit	Up to 50 units / 50 groups (200 units with AE-50E or EW-50E)		
ON / OFF	ON and OFF the operation of a group of units	○ ◎ △ ●	○ ◎
Operation Mode Switching	Switches between Hot Water / Heating / Heating ECO / Anti - freeze / Cooling * Available operation modes vary depending on the unit to be connected. * Switching limit setting can be made via a remote controller.	○ ◎ △ ●	○
Water Temperature Setting	Temperature can be set within the ranges below (in increments of 1°C) [Booster unit]** [Water HEX unit]** Heating: 30°C ~ 50°C Heating: 30°C ~ 45°C Heating ECO***: Invalid Heating ECO***: Invalid Hot Water: 30°C ~ 70°C Hot Water: Invalid Anti-freeze: 10°C ~ 45°C Anti-freeze: 10°C ~ 45°C Cooling: Invalid Cooling: 10°C ~ 30°C * The settable range varies depending on the unit to be connected.** "Air To Water" on the AE-200E screen indicates Booster unit group and Water HEX unit group.*** The temperature is controlled automatically in the Heating ECO. The user cannot change the temperature settings.	○ ◎ △ ●	○
Water Temperature Display	10°C ~ 90°C (in increments of 1°C). * The settable range varies depending on the unit to be connected.	×	○
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (ON / OFF, Change operation mode, Set temperature).	○ ◎ △ ●	○
Schedule Operation	Group is the smallest unit to which a weekly schedule can be assigned. The same schedule can be applied collectively, or to each group, groups in a block, or groups on a floor. • Up to 24 events can be scheduled for each day. • "ON/OFF", "Operation mode", "Temperature Setting", and "Permit / Prohibit local operation" can be scheduled. • Five types of weekly schedule patterns (summer and winter) are available. • Five operation patterns (A-E) can be set for each year, up to 50 days can be allocated to each pattern.	○ ◎ △ ●	○
Error Display	When an error is currently occurring on a unit, the afflicted unit and the error code is displayed.	×	□ ◎
Test Run	This operates air conditioner units in test run mode.	○ ◎ △ ●	○
External Input / Output	By using optional external input / output adaptor (PAC-YG10HA) you can set and monitor the following. Input: By level signal : "Batch ON / OFF", "Batch emergency stop" By pulse signal: "Batch ON / OFF", "Enable / disable local remote controller" Output: "ON / OFF", "Error / Normal"	◎	◎

□ = Each Unit ○ = Each Group ● = Each Block △ = Each Floor ◎ = Collective × = Not Available

Note: Operation and displayed content vary depending on the indoor unit model. Refer to the CITY MULTI catalog for the air conditioning control systems.

CONTROLLER

ADVANCED TOUCH CONTROLLER AT-50B

Item	Description	Operations	Display
Controllable Unit	50 units / groups of units		
ON / OFF	ON and OFF operation of a group of units. Even when only a single ATW unit or indoor unit is operated in the system, the advanced touch controller will operate and collective ON/OFF lamp will light up.	◎ ○	◎ ○
Operation Mode Switching	Switches between Hot Water / Heating / Heating ECO / Anti - freeze / Cooling * Available operation modes vary depending on the unit to be connected.	◎ ○	◎ ○
Water Temperature Setting	Temperature can be set within the ranges below. (in increments of 1°C) [Booster unit] [Water HEX unit] Heating: 30°C ~ 50°C Heating: 30°C ~ 45°C Heating ECO**: 30°C ~ 45°C Heating ECO**: 30°C ~ 45°C Hot Water: 30°C ~ 70°C Hot Water: Invalid Anti-freeze: 10°C ~ 45°C Anti-freeze: 10°C ~ 45°C Cooling: Invalid Cooling: 10°C ~ 30°C * The settable range varies depending on the unit to be connected. ** The temperature is controlled automatically in the Heating ECO mode. The user cannot change the temperature settings.	◎ ○	◎ ○
Water Temperature Display	10°C ~ 90°C (in increments of 1°C)	×	○
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start / Stop, Change operation mode, Set temperature, Circulating water replacement warming reset).	◎ ○	◎ ○
Schedule Operation	Weekly schedule setting up to 12 patterns is available. In one pattern, up to 16 settings of "ON / OFF", "Operation mode", "Temperature Setting", and "Permit / Prohibit local operation" can be scheduled. Two types of weekly schedule patterns (summer and winter) are available. Today's schedule setting up to 5 patterns in available * Time setting unit: 5 minutes / unit	○	○
Error Display	When an error is currently occurring on a unit, the afflicted unit and the error code are displayed. * When an error occurs, the "ON / OFF" LED flashes. The operation monitor screen show abnormal icon over the unit. The error monitor screen shows the abnormal unit address and error code. The error log monitor screen shows the time and date, the abnormal unit address, error code, and source of detection.	×	□ ◎

□ = Each Unit ○ = Each Group ● = Each Block △ = Each Floor ◎ = Collective × = Not Available

OPTIONAL PARTS

SOLENOID VALVE KIT

Note:
When you intend to adpot PWFY-EP100VM-E1-AU with below system configuration, you may need to use optional part (PAC-SV01PW-E).
Please contact your Mitsubishi Electric sales office for details.

Applicable System

System Configuration
Y, or WY* + PWFY-EP100VM-E1-AU + Indoor Unit

*Solenoid valve kit will be used only when operating the WY at the water temperature below 10°C.

PAC-SV01PW-E

Item			Description
Power Source			1 - phase 220 - 230 -240V 50 / 60Hz
Diameter of Refrigerant Pipe	Applicable Models		PWFY-EP100VM-E1-AU
	Liquid	mm	ø15.88
	Gas	mm	ø9.52
External Dimension H x W x D		mm	462 x 320 x 207
Net Weight		kg	8.5
Drawing	External		WKD94T532
Standard Attachment	Document		Installation Manual
	Accessory		Specification Label, Refrigerant conn.pipe

NOTES

FM33568 / ISO 9001:2008

The Air Conditioning & Refrigeration Systems Works acquired ISO 9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of Quality management for the production of refrigeration and air conditioning equipment.

ISO Authorization System
The ISO 9000 series is a plant authorization system relating to quality management as stipulated by the ISO. ISO 9001 certifies quality management based on the "design, development, production, installation and auxiliary services" for products built at an authorized plant.

EC97J1227 051

The Air Conditioning & Refrigeration Systems Works acquired environmental management system standard ISO 14001 certification.

The ISO 14000 series is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
Registered on March 10, 1998.

⚠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, during repair, or at the time of disposal of the unit.
- It may also be in violation of applicable laws.
- MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.

■Our air-conditioning equipments and heat pumps contain a fluorinated greenhouse gas, R134a or R410A depending on the product.

MITSUBISHI ELECTRIC

For more information contact
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