MITSUBISHI ELECTRIC

FLOW TEMP. CONTROLLER [MAIN] (Cased)
PAC-IF081B-E
PAC-IF082B-E
PAC-IF083B-E

INSTALLATION MANUAL

FOR INSTALLER

For safe and correct use, read this manual thoroughly before installing the FTC unit.

English

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"FTC (Main)" is the abbreviation of "Flow Temperature Controller [Main]", which is described as "FTC (Main)" in this manual.
"FTC (Sub)" is the abbreviation of "Flow Temperature Controller [Sub]", which is described as "FTC (Sub)" in this manual.
In this manual, "FTC" that is not followed by "(Main)" or "(Sub)" means "FTC (Main and Sub)".
Mitsubishi Electric is not responsible for the failure of locally supplied parts.

https://wwwl2.mitsubishielectric.com/

Should you need more information, please access above website to download detailed manuals, select your region, select model name, then choose your language.

1. Safety precautions FOR INSTALLER

- **Before installing the FTC unit, make sure you read all the "Safety precautions".**
- **Please report to your electrical supply authority or obtain their consent before connecting this equipment to the power supply system.**

⚠ WARNING:
Precautions that must be observed to prevent injuries or death.

⚠ CAUTION:
Precautions that must be observed to prevent damage to the unit.

After installation, perform the test run to ensure normal operation. Then explain to your customer the "Safety Precautions"*1, use, and maintenance of the unit based on the information in this manual. This manual must be given to the user. This manual must always be kept by the actual users.
*1 "Safety Precautions" for user is indicated on page 33.
⏚ : This indicates a part which must be grounded.

⚠ WARNING:
Carefully read the labels attached to the unit.

⚠ WARNING:
- **The unit must not be installed by the user. Ask an installer or an authorized technician to install the unit. If the unit is installed improperly, electric shock, or fire may occur.**
- **For installation work, follow the instructions in the Installation Manual and use tools and pipe components specifically made for use with the specified refrigerant in the outdoor unit installation manual.**
- **The unit must be installed according to the instructions in order to minimize the risk of damage by earthquakes, typhoons, or strong winds. Improperly installed units may fall down and cause damage or injuries.**
- **The unit must be securely installed on a structure that can sustain its weight. If the unit is mounted on an unstable structure, it may fall down and cause damage or injuries.**
- **All electric work must be performed by a qualified technician according to local regulations and the instructions given in this manual. The unit must be powered by dedicated power lines and the correct voltage and circuit breakers must be used. Power lines with insufficient capacity or incorrect electrical work may result in electric shock or fire.**
- **Only the specified cables can be used for wiring. Connections must be made securely without tension on the terminals. If cables are connected or installed improperly, it may result in overheating or fire.**
- **Terminal block cover panel of the unit must be firmly fixed. If the cover panel is mounted improperly, dust and moisture may enter the unit, and it may cause electric shock or fire.**
- **Make sure to use accessories authorized by Mitsubishi Electric and ask an installer or an authorized technician to install them. If accessories are improperly installed, it may cause electric shock, or fire.**
- **Do not remodel the unit. Consult an installer for repairs. If alterations or repairs are not performed correctly, it may cause electric shock or fire.**
- **The user should never attempt to repair the unit or transfer it to another location. If the unit is installed improperly, it may cause electric shock or fire. If the FTC unit needs to be repaired or moved, ask an installer or an authorized technician.**
- **During the installation of a heat pump system, keep water from splashing on the FTC unit.**
- **When installing sensors and parts, do not expose the terminals.**

1.1 Before installation (Environment)

⚠ WARNING:
- **Do not install the FTC unit in an outdoor location as it is designed for indoor installation only. Otherwise electric shock or breakdown may be caused by water, wind or dust.**
- **Do not install the unit where combustible gas may leak, be produced, flow, or accumulate. If combustible gas accumulates around the unit, it may cause fire or explosion.**

⚠ CAUTION:
- **Do not use the unit in an corrosive environment. If the FTC unit is installed or exposed to steam, volatile oil (including machine oil), or sulfuric gas, or exposed to briny air, the internal parts can be damaged.**
- **When installing the unit in a hospital or in a building where communications equipment are installed, you may need to take measures to prevent noise and electronic interference. Inverters, home appliances, high-frequency medical equipment, and radio communications equipment can cause malfunction or breakdown of the FTC unit. At the same time, the noise and electric interference from the FTC unit may disturb the proper operation of nearby medical equipment, and communications equipment.**

1.2 Before installation or relocation

⚠ WARNING:
- **Do not wash the FTC unit, it can cause an electric shock.**

⚠ CAUTION:
- **Be very careful when moving the units. Do not hold the packaging bands. Wear protective gloves to unpack and to move the units, in order to avoid injury to your hands.**
- **Be sure to safely dispose of the packaging materials. Packaging materials, such as nails and other metal or wooden parts may cause injuries.**

1.3 Before electric work

⚠ WARNING:
- **Be sure to install a circuit breaker. If it is not installed, there may be a risk to get an electric shock.**
- **For the power lines, use standard cables of sufficient capacity. Otherwise, it may cause a short circuit, overheating, or fire.**
- **When installing the power lines, do not apply tension to the cables. The cables may be cut or overheated resulting in a fire.**
- **Make sure to ground the unit. Do not connect the ground wire to gas or water pipes, lightning rods, or telephone grounding lines. If the unit is not properly grounded, there may be a risk to get an electric shock.**
- **Make sure to use circuit breakers (ground fault interrupter, isolating switch (+B fuse), and molded case circuit breaker) with the specified capacity. If the circuit breaker capacity is larger than the specified capacity, breakdown or fire may occur.**

1. Safety precautions

1.4 Before starting the test run

⚠WARNING:

- **Before starting operation, check that all protective parts are correctly installed. Make sure not to get injured by touching high voltage parts.**
- **Do not touch any switch with wet hands. There may be a risk of electrocution.**

⚠ CAUTION:

- **Turn on the main power switch of the outdoor unit more than 12 hours before starting operation. Starting operation immediately after turning on the power switch can severely damage the internal parts. Keep the main power switch turned on during the operation period.**
- **In heating mode, to avoid the heat emitters being damaged by excessively hot water, set the target flow temperature to a minimum of 2ºC below the maximum allowable temperature of all the heat emitters. For Zone 2, set the target flow temperature to a minimum of 5ºC below the maximum allowable flow temperature of all the heat emitters.**
- **After stopping operation, make sure to wait at least 5 minutes before turning off the main power. Otherwise, it may cause breakdown.**

1.5 Electric booster and immersion heaters

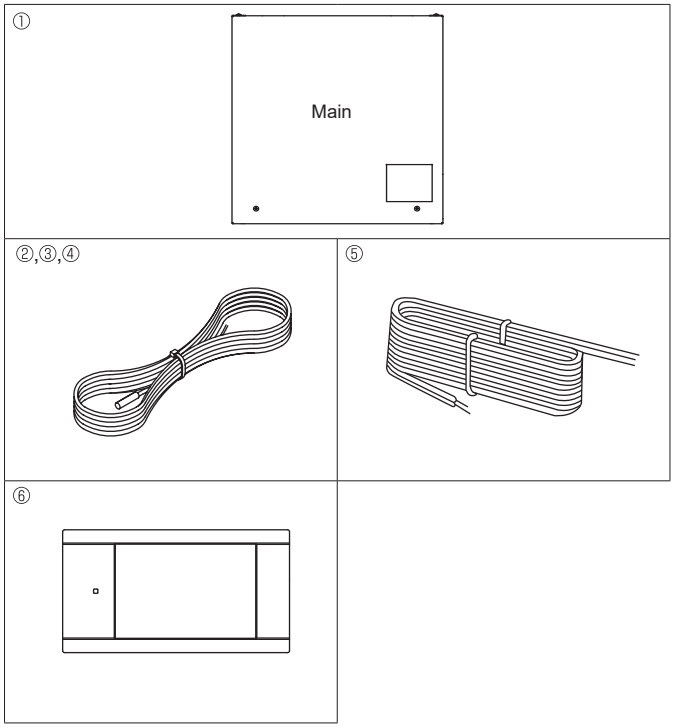
- **FTC has signal outputs for heaters however it can not isolate power to them in the event of overheating. All electrical heaters used on the water circuit must have:**

  a) A thermostat to prevent overheating.
  b) A non-self resetting thermal mechanism to prevent overheating.

Abbreviations and glossary

Abbreviations/Word	Description
Ambient temperature	The outdoor temperature
Freeze stat. function	Heating control routine to prevent water pipes freezing
Cylinder unit	Indoor unvented DHW tank and component plumbing parts
Hydrobox	Indoor unit housing the component plumbing parts (NO DHW tank)
DeltaT	Difference in temperature between two system locations.
DHW mode	Domestic Hot Water heating mode for showers, sinks, etc.
Flow temperature	Temperature at which water is delivered to the primary circuit
FTC (Main)	Flow temperature controller, the circuit board in charge of controlling the system, main board for multiple outdoor units control
FTC (Sub)	Sub board for multiple outdoor units control
Compensation curve mode	Space heating incorporating outdoor ambient temperature compensation
Heating mode	Space heating through radiators or underfloor heating
Cooling mode	Space cooling through radiators or underfloor cooling
Legionella	Bacteria potentially found in plumbing, showers and water tanks that may cause Legionnaires disease
LP mode	Legionella prevention mode – available function for systems with water tanks to prevent the growth of legionella bacteria
Packaged model	Plate heat exchanger (Refrigerant - Water) in the outdoor heat pump unit
Split model	Plate heat exchanger (Refrigerant - Water) in the indoor unit
TRV	Thermostatic Radiator Valve – a valve on the entrance or exit of the radiator panel to control the heat output

2. Installing the FTC unit



<Fig. 2.1.1>

2.1. Check the parts (Fig. 2.1.1)

The FTC unit should be supplied with the following parts.

	Part name	Wiring diagram symbol	Q'ty		
			PAC-IF081	PAC-IF082	PAC-IF083
①	FTC (Main) unit/FTC (Sub) unit		1	1	1
②	Thermistor (Ref. liquid temp.) (Lead wire: 5 m/Red, Connector: 3p)	TH2	1	–	–
③	Thermistors (Flow water temp. and Return water temp.) (Lead wire: Gray (Flow water temp.), Black(Return water temp.), Connector: 4p)	THW1/2	1 (5 m/5 m)	1 (5 m/5 m)	1 (1.1 m/ 1.2 m)
④	Thermistors (DHW tank upper water temp. and DHW tank lower water temp.) (Lead wire: Blue (DHW tank upper water temp.), Gray (DHW tank lower water temp.), Connector: 4p)	THW5A/5B	–	–	1
⑤	Main remote controller cable (10 m)		1	1	1
⑥	Main remote controller		1	1	1
⑦	microSD memory card *1		1	1	1

*1 A microSD memory card is installed in the unit at the factory.

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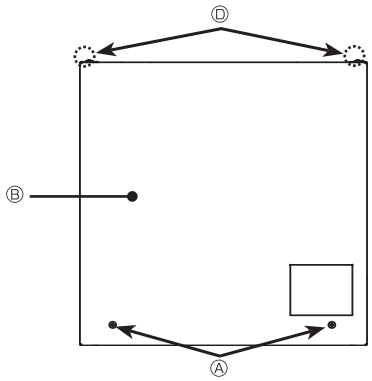
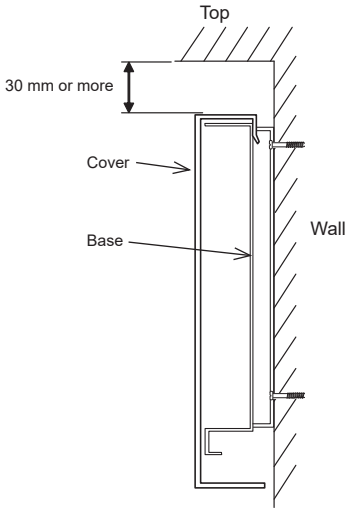
2. Installing the FTC unit



<Fig. 2.3.1>



<Fig. 2.3.2>
Service space

2.2. Choosing the FTC unit installation location

- Do not install the FTC unit outdoors as it is designed for indoor installation only. (The FTC circuit board and casing are not waterproof.)
- Avoid locations where the unit is exposed to direct sunlight or other sources of heat.
- Select a location where easy wiring access to the power source is available.
- Avoid locations where combustible gases may leak, be produced, flow, or accumulate.
- Select a level location that can bear the weight and vibration of the unit.
- Avoid locations where the unit is exposed to oil, steam, or sulfuric gas.
- Do not install in a location that is hot or humid for long periods of time.

2.3. Installing the FTC unit (Fig. 2.3.1, 2.3.2, 2.3.3, 2.3.4)

1. Remove 2 screws (Screw Ⓐ) from FTC unit and remove the cover. (See Fig. 2.3.4)
2. Install the 4 screws (locally supplied) in the 4 holes (Hole Ⓒ).
   Note: To prevent the unit from falling off the wall, select the appropriate screws (locally supplied) and secure the base horizontally to the appropriate wall location. (See Fig. 2.3.2)

Screw Ⓐ Cover Ⓑ
Hole for installation Ⓒ Screw Ⓓ

Note: Do not remove the screws Ⓓ as the screws are component parts of the cover and are not used for the installation of cover.

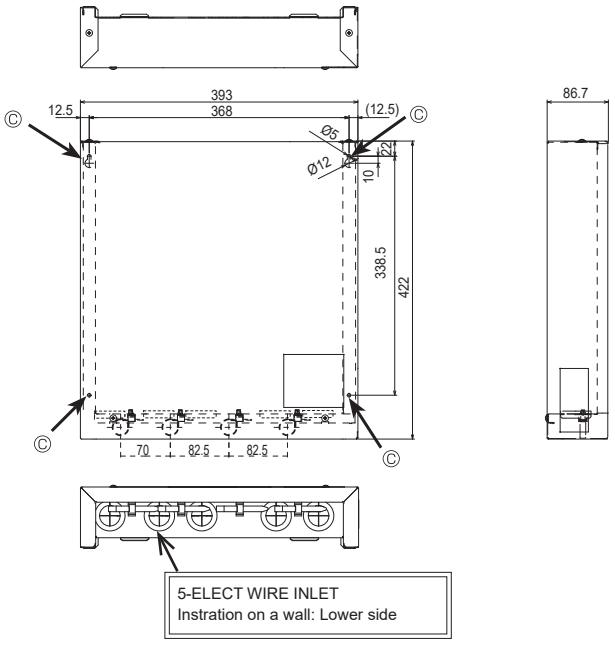
Weight	PAC-IF081B-E	3.9 kg
	PAC-IF082/083B-E	4.2 kg
Allowable ambient temperature		0 to 35°C
Allowable ambient humidity		80% RH or less

Optional extras

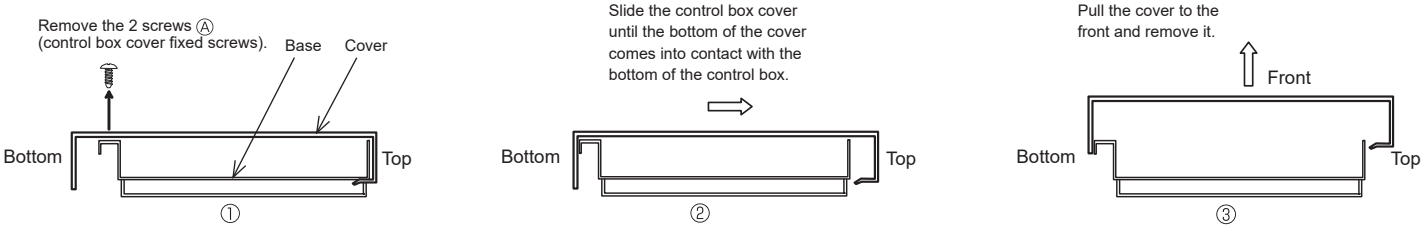
- Wireless Remote Controller PAR-WT60R-E
- Wireless Receiver PAR-WR61R-E
- Remote sensor PAC-SE41TS-E

<FTC (Main) unit>

<Unit: mm>



<Fig. 2.3.3>

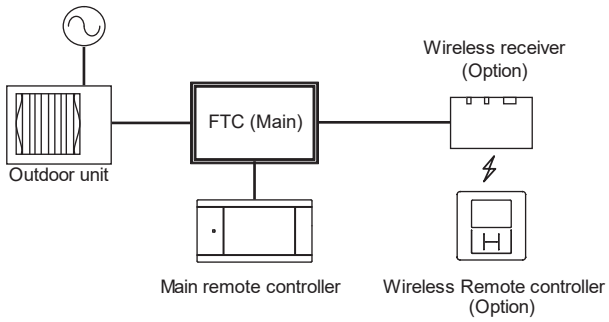
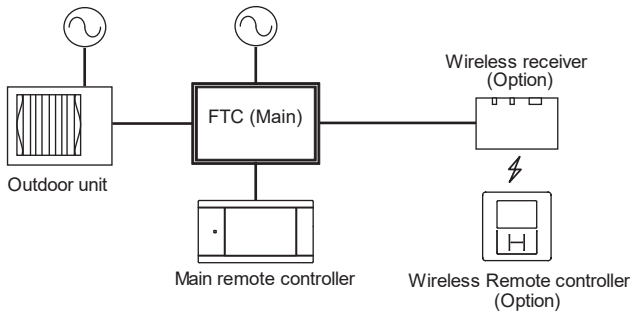


<Fig. 2.3.4>

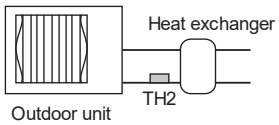
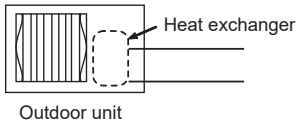
3. System

The FTC (Main) is designed for use with a number of heat pump systems. Please refer to the following table to find the relevant installation information for your system. For multiple outdoor units control with FTC (Sub), see section 9.

3.1 First step (Electrical work)

Power supply	System diagram	Reference section
FTC (Main) powered via outdoor unit		4.1 4.2
FTC (Main) powered by independent source		4.1 4.2

3.2 Second step (Outdoor unit connection)

Outdoor unit type	System diagram	Thermistor	Reference section
Split		TH2: Ref. liquid temp.	4.4 5.2
Packaged		—	4.4 5.2

* PAC-IF082/083B-E is not available for Split-type system.

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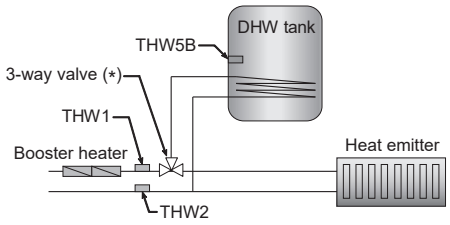
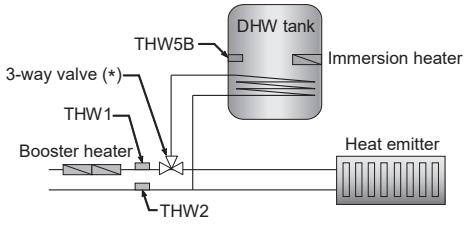
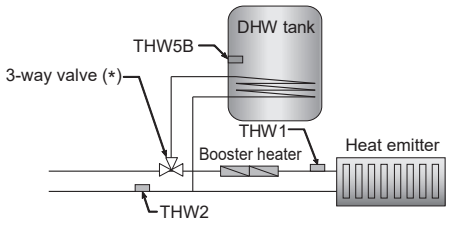
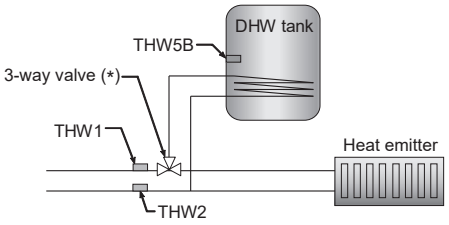
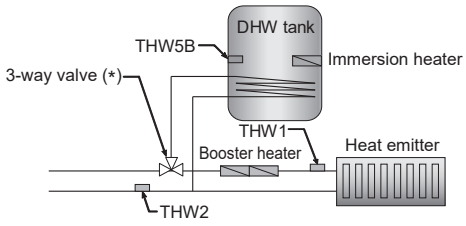
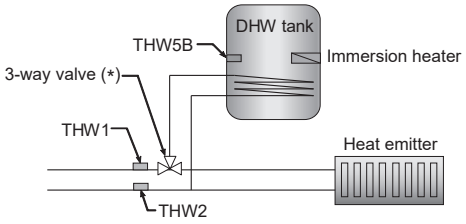
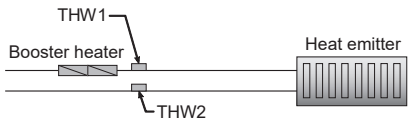
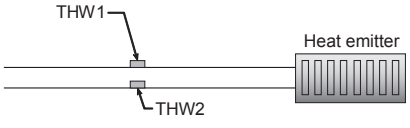
3.3 Third step (Functions setting)

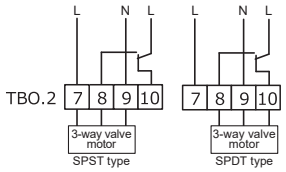
DHW tank	Immersion heater	Booster heater	BH function	System diagram	Thermistor	Reference section	Remarks
Present	Absent	Present	For heating and DHW		THW1: Flow water temp. THW2: Return water temp. THW5B: DHW tank lower water temp.	4.4 4.5 5.3	
Present	Present	Present	For heating and DHW		THW1: Flow water temp. THW2: Return water temp. THW5B: DHW tank lower water temp.	4.4 4.5 5.3	
Present	Absent	Present	For heating only		THW1: Flow water temp. THW2: Return water temp. THW5B: DHW tank lower water temp.	4.4 4.5 5.3	1. ‘Legionella prevention mode’ cannot be selected in this system.
Present	Absent	Absent	—		THW1: Flow water temp. THW2: Return water temp. THW5B: DHW tank lower water temp.	4.4 4.5 5.3	1. ‘Legionella prevention mode’ cannot be selected in this system. 2. Please make sure water circuit not to get frozen during defrost.
Present	Present	Present	For heating only		THW1: Flow water temp. THW2: Return water temp. THW5B: DHW tank lower water temp.	4.4 4.5 5.3	
Present	Present	Absent	—		THW1: Flow water temp. THW2: Return water temp. THW5B: DHW tank lower water temp.	4.4 4.5 5.3	
Absent	Absent	Present	—		THW1: Flow water temp. THW2: Return water temp.	4.4 4.5 5.3	
Absent	Absent	Absent	—		THW1: Flow water temp. THW2: Return water temp.	4.4 4.5 5.3	1. Please make sure water circuit not to get frozen during defrost.

* The use of two 2-way valves can perform same function as a 3-way valve.

3. System

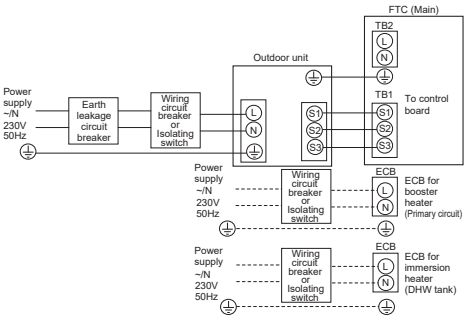
3.4 Fourth step (Functions setting)

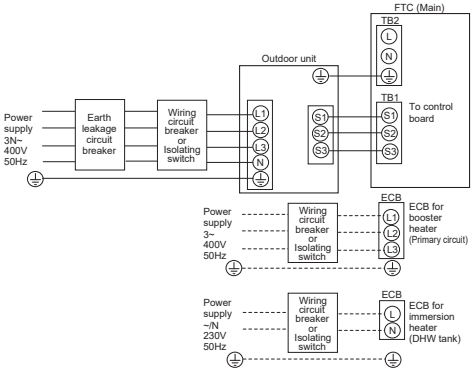
* Make sure to check the followings for your safety when designing a system. These are the minimum requirements for the safe use of FTC unit.

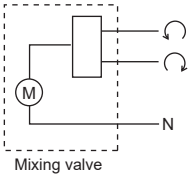
<table>
<tr><th>Parts name</th><th>Requirement</th></tr>
<tr><td>Flow switch</td><td>It is required to protect system from the effects of insufficient flow.</td></tr>
<tr><td>Flow sensor</td><td>It is required to detect an error in flow rate.
(The operation is validated with SIKA VVX20.)
It is required for Energy monitor function.</td></tr>
<tr><td>Strainer /Magnetic filter (water circuit)</td><td>Provide it as required to protect parts from damages caused by iron particles/water/contamination (e.g. The position before pump and return part from emitters).</td></tr>
<tr><td>Pressure relief valve (Primary circuit side) (Sanitary water side)</td><td>It is required to protect system from reaching high pressure.
Select the operating pressure depending on water pressure in the circuit in normal use.
Note: Follow the national regulations.</td></tr>
<tr><td>3-way valve</td><td>Power supply: 230 V AC
Current: 0.1 A max. (You must use a relay if over 0.1 A.)
Connect earth cable, if there is one.
Type: SPST or SPDT
 
</td></tr>
<tr><td>2-way valve</td><td>Power supply: 230 V AC
Current: 0.1 A max. (You must use a relay if over 0.1 A.)
Connect earth cable, if there is one.
Type: Normally closed
Select the 2-way valve that slowly opens and shuts off to prevent water hammer.
A bypass valve or circuit should be installed between pump and 2-way valve for safety (to release pressure when the both 2-way valves are closed).
Select a 2-way valve equipped with manual override, which is necessary for topping up or draining of water.</td></tr>
<tr><td>Water circulation pump</td><td>Power supply: 230 V AC
Current: 0.1 A max.
When connecting a pump with an electric current of ≥ 1 A or multiple pumps, please note the following.
1. Use (a) relay(s).
2. When power is supplied from outdoor unit, total current (including the other parts) requirement must be ≤ 3 A. (Otherwise, the fuse on the outdoor unit PCB will blow.)
3. When independent power supplies (i.e. from the FTC unit itself), total current for the pump(s) is ≤ 4 A. (Otherwise, the fuse on the FTC PCB will blow.)
Connect earth cable, if there is one.
Adjust the pump speed setting so that the flow rate in the primary circuit is appropriate for the outdoor unit installed. See the table and figures below.
<table>
<tr><th colspan="2">Outdoor heat pump unit</th><th>Water flow rate range [L/min]</th></tr>
<tr><td rowspan="8">Packaged model</td><td>PUZ-WM50</td><td>6.5 - 14.3</td></tr>
<tr><td>PUZ-WM60</td><td>8.6 - 17.2</td></tr>
<tr><td>PUZ-WM85</td><td>10.8 - 24.4</td></tr>
<tr><td>PUZ-WM112</td><td>14.4 - 32.1</td></tr>
<tr><td>PUZ-HWM140</td><td>17.9 - 36.9</td></tr>
<tr><td>PUZ-WZ50</td><td>6.5 - 14.3</td></tr>
<tr><td>PUZ-WZ60</td><td>6.5 - 17.2</td></tr>
<tr><td>PUZ-WZ80</td><td>6.5 - 22.9</td></tr>
<tr><td rowspan="3">Split model</td><td>PUHZ-SW160</td><td>23.0 - 63.1</td></tr>
<tr><td>PUHZ-SW200</td><td>28.7 - 71.7</td></tr>
<tr><td>PUHZ-SHW230</td><td>28.7 - 65.9</td></tr>
</table>
<Table 3.4.1>
Notes: 1. The water velocity in pipes should be kept within certain limits of material to avoid erosion corrosion and excessive noise generation. (e.g. Copper pipe: 2.0 m/s)
2. If the water flow rate is less than the minimum flow rate setting of the flow sensor (default 5.0 L/min), the flow rate error will be activated.</td></tr>
</table>

Continue to the next page.

3. System

<table>
<tr><th>Parts name</th><th colspan="2">Requirement</th></tr>
<tr><td rowspan="3">Booster heater</td><td>General</td><td>* Consider necessity and capacity of booster heater to meet the following points.
(1) Heating capacity and flow water temperature should always be sufficient.
(2) System can increase the temperature of the stored water in tank to inhibit legionella bacteria growth.
(Note) For systems without booster heater or immersion heater, ‘legionella prevention mode’ is NOT available.
(3) Water circuit should not be frozen during defrost operation.</td></tr>
<tr><td>Control power for contactor</td><td>Power supply: 230 V AC / Current: 0.5 A max.
* Use a relay.</td></tr>
<tr><td>Separate power for heater</td><td>Install an earth leakage circuit breaker (ECB) for heater, separate from control power (See Fig. 1 and Fig. 2).
* When using two booster heaters, booster heater 1 capacity must be less than that of booster heater 2.
When using a single booster heater, connect to BH1 (TBO.5 5-6 (OUT6)) , and turn the DIP SW2-3 to ON. (Booster heater capacity restriction)
 

<Fig. 1 (1 phase)>
 

<Fig. 2 (3 phase)>
Heater capacity/Breaker/wiring (recommended)
<1 Phase>
<table>
<tr><th>Description</th><th>Power supply</th><th>Total capacity (BH1 + BH2)</th><th>Breaker</th><th>Wiring</th></tr>
<tr><td>Booster heater (Primary circuit)</td><td>~/N 230V 50Hz</td><td>2 kW (2 kW + 0 kW)
6 kW (2 kW + 4 kW)</td><td>16 A
32 A</td><td>2.5 mm²
6.0 mm²</td></tr>
</table>
<3 Phase>
<table>
<tr><th>Description</th><th>Power supply</th><th>Total capacity (BH1 + BH2)</th><th>Breaker</th><th>Wiring</th></tr>
<tr><td>Booster heater (Primary circuit)</td><td>3~ 400V 50Hz</td><td>9 kW (3 kW + 6 kW)</td><td>16 A</td><td>2.5 mm²</td></tr>
</table>
* When installing a booster heater with the capacity of bigger than shown above, select an appropriate size breaker and cable (diameter) based on the maximum possible electric current.</td></tr>
<tr><td>Safety device</td><td>(1) Use an overheat protection thermostat (manual reset type) (to detect unusual temperature increase/heating up without water).
Protection device operating temperature must be above 80°C. Protection device should not operate quickly, but water circuit must not boil even when heater(s) overshoot.
(Reference value) Thermostat operation temperature used in our Cylinder unit and Hydrobox : 90°C ± 4°C
(2) Connect a pressure relief valve on the primary circuit side.</td></tr>
<tr><td rowspan="4">Immersion heater</td><td>General</td><td>* Consider necessity and capacity of immersion heater to meet the following points.
(1) Heating capacity and flow water temperature should always be sufficient.
(2) System can increase the temperature of the stored water in tank to inhibit legionella bacteria growth.
(Note) For systems without booster heater or immersion heater, ‘legionella prevention mode’ is NOT available.</td></tr>
<tr><td>Control power for contactor</td><td>Power supply: 230 V AC / Current: 0.5 A max.
* Use a relay.</td></tr>
<tr><td>Separate power for heater</td><td>Install an earth leakage circuit breaker (ECB) for heater, separate from control power (See Fig. 1 and Fig. 2).
*ECB is built-in in PAC-IF082/083B-E.
Heater capacity/Breaker/wiring (recommended)
<1 Phase>
<table>
<tr><th>Description</th><th>Power supply</th><th>Capacity</th><th>Breaker</th><th>Wiring</th></tr>
<tr><td>Immersion heater (DHW tank)</td><td>~/N 230V 50Hz</td><td>3 kW</td><td>16 A</td><td>2.5 mm²</td></tr>
</table>
* When installing an immersion heater with a capacity bigger than the one shown above, select an appropriate size breaker and cable (diameter) based on the maximum possible electric current.</td></tr>
<tr><td>Safety device</td><td>(1) Install the thermistor THW5B (optional parts PAC-TH011TK2-E (5 m) or PAC-TH011TKL2-E (30 m)) on the DHW tank.
Note that PAC-IF083B-E comes with THW5B. (Microcomputer detecting temperature for protection: 80°C)
(2) Use a built-in direct cut-off thermostat (manual reset type).
Protection device operating temperature must be above 80°C. A fast reaction from the protection device is not required, but water circuit must not boil even when a heater overshoots.
(Reference value) Thermostat operation temperature used in our Cylinder unit : 85°C ± 5°C
(3) Connect a pressure relief valve on the sanitary water side.</td></tr>
<tr><td colspan="2">Mixing valve</td><td>Power supply: 230 V AC
Current: 0.1 A max. (You must use a relay if over 0.1 A.)
Connect earth cable, if there is one.
Type: Refer to the right figure.
 

Mixing valve</td></tr>
<tr><td colspan="2">Expansion Vessel (Primary circuit side)
Expansion Vessel (Sanitary circuit side)</td><td>When the water circuit is closed, select the expansion vessel according to water quantity of the water circuit.
* Follow the national regulations.</td></tr>
<tr><td colspan="2">Limits of total electric current when connecting local supply parts</td><td>Option 1. (Power supply from outdoor unit)
Total current requirement must be ≤ 3 A. (Otherwise, the fuse on the outdoor unit PCB will blow up.)
Option 2. (Independent power supply (i.e. from the FTC unit itself))
Total current of the pump(s) must be ≤ 4 A.
The total current allowed for parts except pumps is ≤ 3 A. (Otherwise, the fuse on the FTC PCB will blow up.)</td></tr>
</table>

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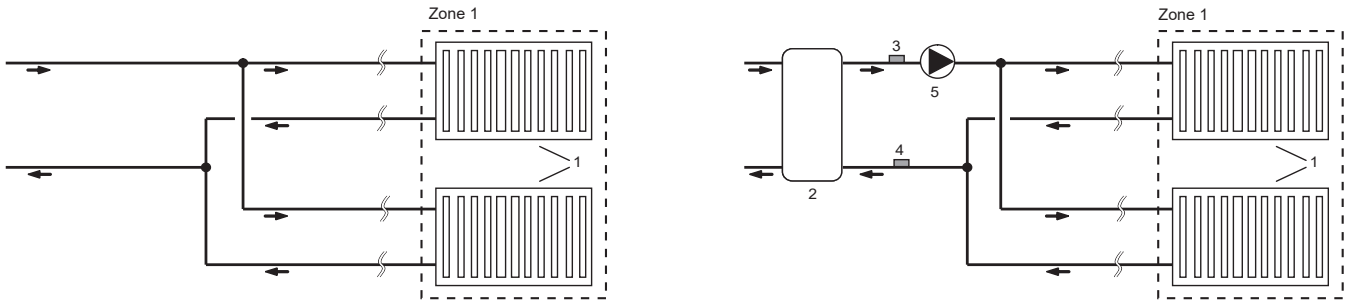
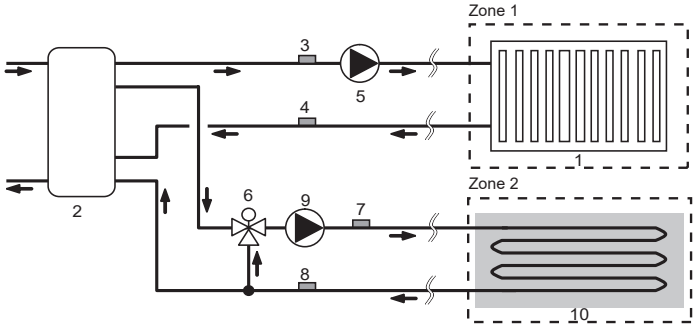
3. System

3.5 Local system

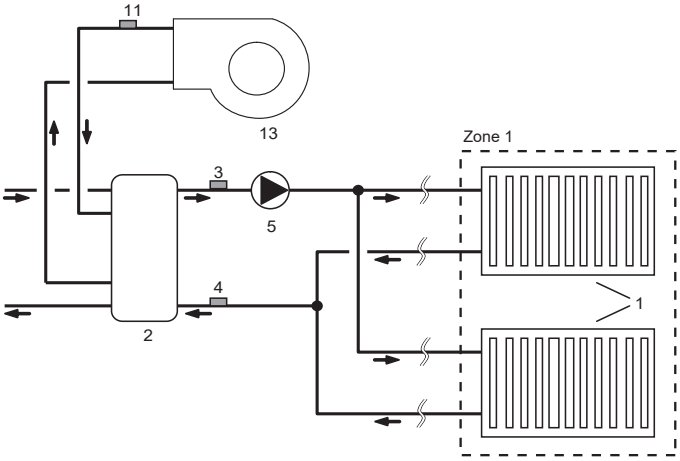
1-zone temperature control



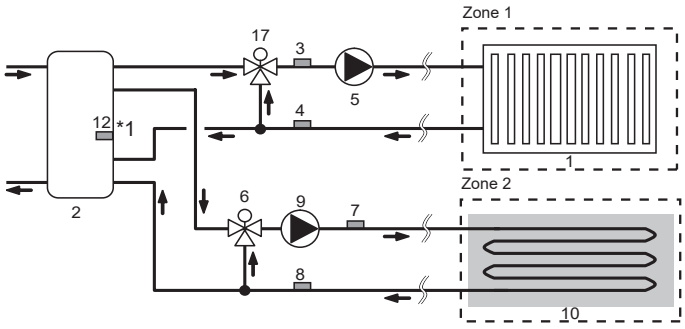
2-zone temperature control



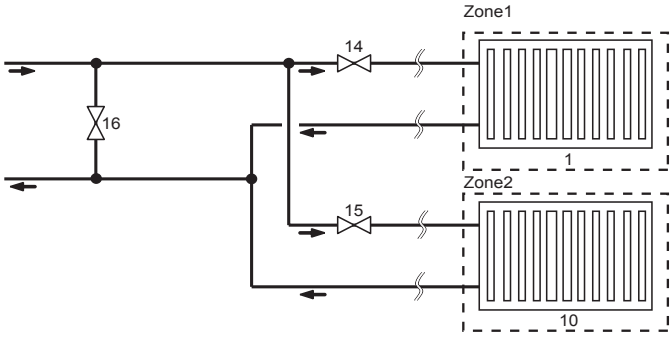
1-zone temperature control with boiler



2-zone temperature control & Buffer tank control



1-zone temperature control (2-zone valve ON/OFF control)



1. Zone 1 heat emitters (e.g. radiator, fan coil unit) (local supply)
2. Mixing tank (local supply)
3. Thermistor (Zone 1 flow water temp.) (THW6) } Optional part : PAC-TH011-E
4. Thermistor (Zone 1 return water temp.) (THW7) }
5. Zone 1 water circulation pump (local supply)
6. Zone 2 motorized mixing valve (local supply)
7. Thermistor (Zone 2 flow water temp.) (THW8) } Optional part : PAC-TH011-E
8. Thermistor (Zone 2 return water temp.) (THW9) }
9. Zone 2 water circulation pump (local supply)
10. Zone 2 heat emitters (e.g. underfloor heating) (local supply)
11. Thermistor (Boiler flow water temp.) (THWB1) } Optional part : PAC-TH012HT(L)-E
12. Thermistor (Mixing tank water temp.) (THW10) *1 }
13. Boiler (local supply)
14. Zone 1 2-way valve (local supply)
15. Zone 2 2-way valve (local supply)
16. Bypass valve (local supply)
17. Zone 1 motorized mixing valve (local supply)

*1 ONLY Buffer tank control (heating/cooling) applies to [Smart grid ready].

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3.6 Minimum amount of water required in the space heating/cooling circuit

Outdoor heat pump unit		Indoor unit containing water amount [L]	Additional required water amount [L]*1	
			Average / Warmer climate*2	Colder climate*2
Packaged model	PUZ-WM50	5	2	24
	PUZ-WM60		4	29
	PUZ-WM85		7	32
	PUZ-WM112		11	43
	PUZ-HWM140		15	55
	PUZ-WZ50		2	24
	PUZ-WZ60		4	21
	PUZ-WZ80		6	29
Split model	PUHZ-SW160	5	18	64
	PUHZ-SW200		24	81
	PUHZ-SHW230		28	94

<Table 3.6.1>

*1 Water amount: If there is a bypass circuit, above table means minimum water amount in case of bypass.
*2 Climate: Please refer to 2009/125/EC: Energy-related Products Directive and Regulation (EU) No 813/2013 to confirm your climate zone.
*3 SUZ series: Flow temperature should never drop below 32 °C when outdoor temperature drops below -15 °C.
There are potential risks of plate heat exchanger getting frozen and damaged, and also outdoor heat exchanger would frequently frost because of insufficient defrosting.

Case 1. No division between primary and secondary circuit
• Please ensure the required water amount according to the table 3.6.1 by water pipe and radiator or underfloor heating.
Case 2. Separate primary and secondary circuit
• If the interlock operation of primary and secondary pump is not available, please ensure required additional water in only primary circuit according to the table 3.6.1.
• If the interlock operation of primary and secondary pump is not available, please ensure required additional water in only primary circuit according to Table 3.6.1.
In case of the shortage of required water amount, please install buffer tank.

3.7 Energy monitor *3

End user can monitor accumulated*1 consumption and production energy in each operation mode*2 on the main remote controller.
*1 Monthly and Year to date
*2 - DHW operation
- Space heating
- Space cooling
*3 Not available during multiple outdoor unit control.

Refer to “7. Remote controller” for how to check the energy, and “5.1 DIP switch functions” for the details on DIP-SW setting.
Either one of the following two methods is used for monitoring.
Note: The method 1 should be used as a guide. If a certain accuracy is required, the method 2 should be used.

Booster heater1	Booster heater2	Immersion heater	Pump1	Pump2	Pump3
2kW*1	4kW*1	0kW*1	*** *1	0W*1	0W*1

<Table 3.7>

Method 1. Calculation internally
Electricity consumption is calculated internally based on the energy consumption of outdoor unit, electric heater, water pump(s) and other auxiliaries.
Delivered heat is calculated internally by multiplying delta T (Flow and Return temp.) and flow rate measured by the locally supplied sensors.
Set the electric heater capacity and water pump(s) input according to indoor unit model and specs of additional pump(s) supplied locally. (Refer to the menu tree in “7. Remote controller”.)

*1 Be sure to change the setting corresponding to the specification of locally supplied auxiliaries such as electric heater and pump.

When anti-freeze solution (propylene glycol) is used for primary water circuit, set the delivered energy adjustment if necessary.
Should you need more details, refer to “7. Remote controller”.

Method 2. Actual measurement by external meter (locally supplied)
FTC has external input terminals for 2 ‘Electric energy meters’ and a ‘Heat meter’.
If two ‘Electric energy meters’ are connected, the 2 recorded values will be combined at the FTC and shown on the main remote controller.
(e.g. Meter 1 for H/P power line, Meter 2 for heater power line)
Refer to the “Signal inputs” section in “4.5 Connecting inputs/outputs” for more information on connectable electric energy meter and heat meter.

4. Electrical work

4.1 Electrical connection

All electrical work should be carried out by a suitably qualified technician. Failure to comply with this could lead to electrocution, fire, and death. It will also invalidate product warranty. All wiring should be according to national wiring regulations.
For multiple outdoor units control with FTC (Sub), see section 9.

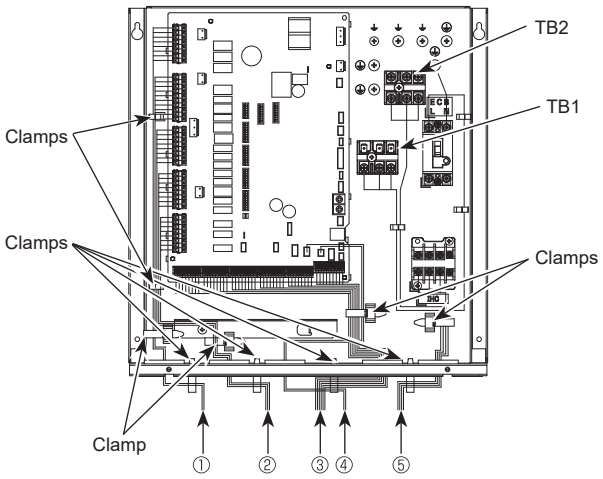
FTC (Main) can be powered in two ways.
1. Power cable is run from the outdoor unit to FTC (Main).
2. FTC (Main) has independent power source.

Connections should be made to the terminals indicated in the following figures depending on the phase.

Breaker abbreviation	Meaning
ECB	Earth leakage circuit breaker for immersion heater
TB1	Terminal block 1
TB2	Terminal block 2

Immersion heater should be connected independently from one another to dedicated power supplies.

Notes: 1. Do not run the low voltage cables through a slot that the high voltage cables go through.
2. Do not run other cables except low voltage cables through a slot that the wireless receiver's cable goes through.
3. Do not bundle power cables together with other cables.
4. Bundle cables as figure above by using clamps.

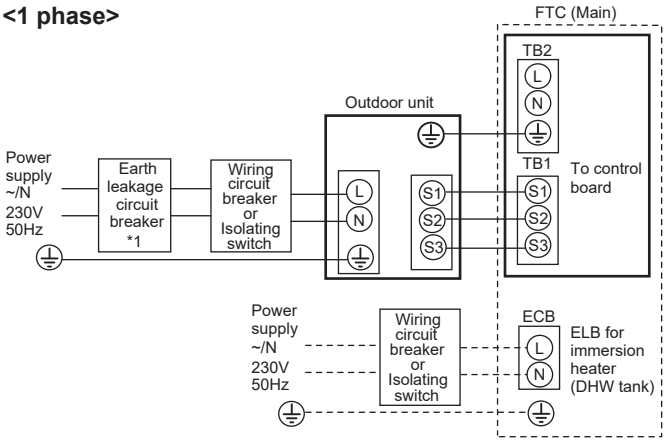


① High voltage cables (OUTPUT)
② High voltage cables (OUTPUT)
③ Low voltage cables (INPUT) and wireless receiver's cable
④ Thermistor cables
⑤ Power cables

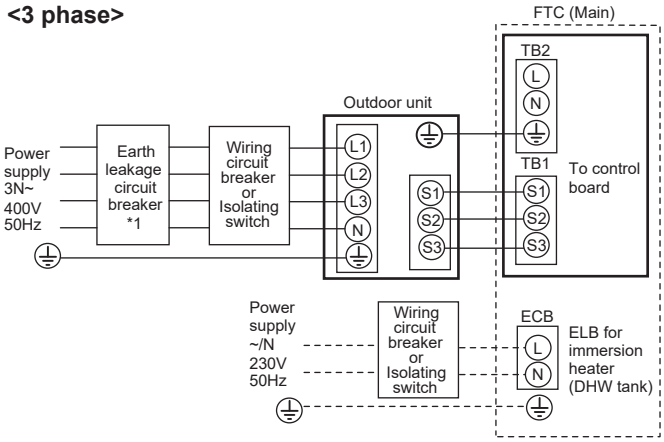
<Fig. 4.1.1> Wiring for PAC-IF08*B-E

Option 1: FTC (Main) powered via outdoor unit

<1 phase>



<3 phase>



: PAC-IF081B-E
: PAC-IF082/083B-E

<Fig. 4.1.2>
Electrical connections 1 phase/3 phase

*1. If the installed earth leakage circuit breaker does not have an over-current protection function, install a breaker with that function along the same power line.
A breaker with at least 3.0 mm contact separation in each pole shall be provided. Use earth leakage breaker (NV).
The breaker shall be provided to ensure disconnection of all active phase conductors of the supply.

Note: In accordance with IEE regulations the circuit breaker/isolating switch located on the outdoor unit should be installed with lockable devices (health and safety).

Wiring Wiring No. × size (mm²)	FTC (Main) - Outdoor unit	*2	3 × 1.5 (polar)
	FTC (Main) - Outdoor unit earth	*2	1 × Min. 1.5
Circuit rating	FTC (Main) - Outdoor unit S1 - S2	*3	230V AC
	FTC (Main) - Outdoor unit S2 - S3	*3	24V DC

*2. 45 m max.
If 2.5 mm² is used, the maximum length is 50 m.
If 2.5 mm² is used and S3 is separated, the maximum length is 80 m.
*3. The values given in the table above are not always measured against the ground value.

Notes: 1. Wiring size must comply with the applicable local and national codes.
2. FTC (Main)/outdoor unit connecting cords shall not be lighter than polychloroprene sheathed flexible cord. (Design 60245 IEC 57)
FTC (Main) power supply cords shall not be lighter than polychloroprene sheathed flexible cord. (Design 60227 IEC 53)
3. Install an earth longer than other cables.
4. Please keep enough output capacity of power supply for each individual heater. Insufficient power supply capacity might cause chattering.

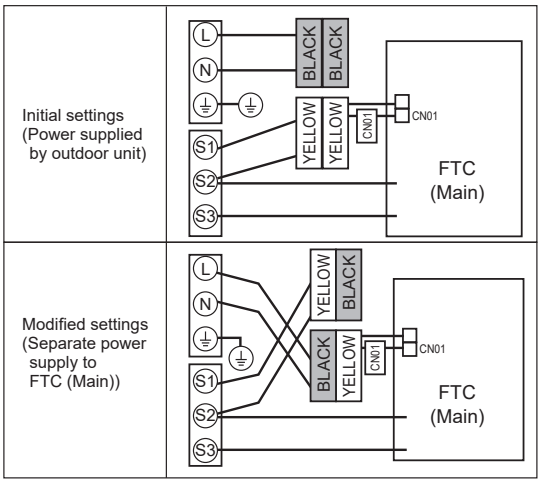
en

4. Electrical work

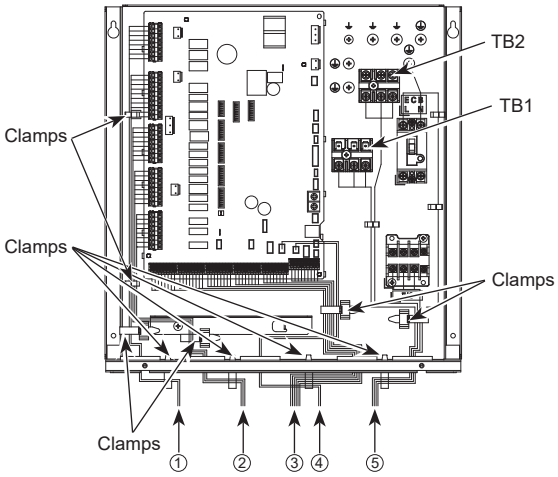
Option 2: FTC (Main) powered by independent source

If FTC (Main) and outdoor units have separate power supplies, the following requirements must be carried out:

- **FTC (Main) unit electrical box connector connections changed. (see Fig. 4.1.3)**
- **Outdoor unit DIP switch settings changed to SW8-3 ON.**
- **Turn on the outdoor unit before the FTC (Main).**
- **Power by independent source is not available for particular models of outdoor unit model.**
  For more detail, refer to the connecting outdoor unit installation manual.



<Fig. 4.1.3>

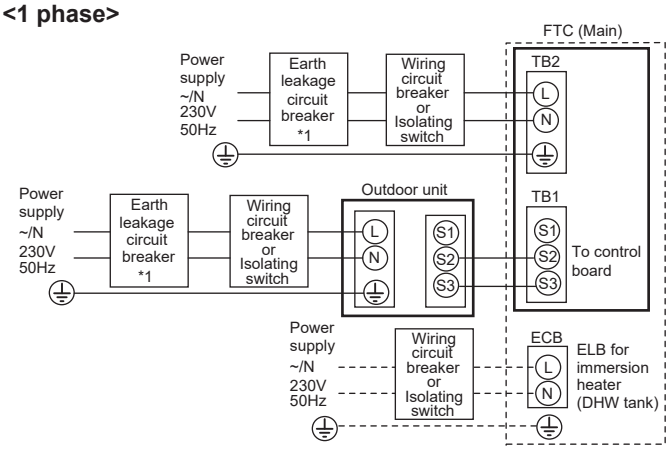


① High voltage cables (OUTPUT)
② High voltage cables (OUTPUT)
③ Low voltage cables (INPUT) and wireless receiver's cable
④ Thermistor cables
⑤ Power cables

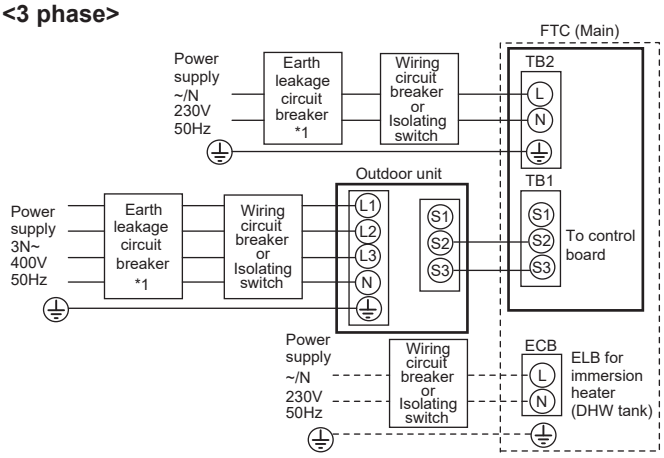
<Fig. 4.1.4> Wiring for PAC-IF08*B-E

Notes: 1. Do not run the low voltage cables through a slot that the high voltage cables go through.
2. Do not run other cables except low voltage cables through a slot that the wireless receiver's cable goes through.
3. Do not bundle power cables together with other cables.
4. Bundle cables as figure above by using clamps.

<1 phase>



<3 phase>



: PAC-IF081B-E
: PAC-IF082/083B-E

<Fig. 4.1.5>
Electrical connections 1 phase/3 phase

*1. If the installed earth leakage circuit breaker does not have an over-current protection function, install a breaker with that function along the same power line.
A breaker with at least 3.0 mm contact separation in each pole shall be provided. Use earth leakage circuit breaker (NV).
The breaker shall be provided to ensure disconnection of all active phase conductors of the supply.

Note: In accordance with IEE regulations the circuit breaker/isolating switch located on the outdoor unit should be installed with lockable devices (health and safety).

FTC (Main) power supply			~/N 230 V 50 Hz
FTC (Main) input capacity Main switch (Breaker)		*1	16 A
Wiring Wiring No. × size (mm²)	FTC (Main) power supply		2 × Min. 1.5
	FTC (Main) power supply earth		1 × Min. 1.5
	FTC (Main) - Outdoor unit	*2	2 × Min. 0.3
	FTC (Main) - Outdoor unit earth		—
Circuit rating	FTC (Main) L - N	*3	230V AC
	FTC (Main) - Outdoor unit S1 - S2	*3	—
	FTC (Main) - Outdoor unit S2 - S3	*3	24V DC

*2. 120 m max.
*3. The values given in the table above are not always measured against the ground value.

Notes: 1. Wiring size must comply with the applicable local and national codes.
2. FTC (Main) unit/outdoor unit connecting cords shall not be lighter than polychloroprene sheathed flexible cord. (Design 60245 IEC 57) FTC (Main) unit power supply cords shall not be lighter than polychloroprene sheathed flexible cord. (Design 60227 IEC 53)
3. Install an earth longer than other cables.
4. Please keep enough output capacity of power supply for each individual heater. Insufficient power supply capacity might cause chattering.

4.2 Connecting the main remote controller

4.2.1 Connect the main remote controller cable to FTC (Main)

Connect the main remote controller cable to 1 and 2 on the terminal block (TB5) on the FTC (Main) controller. <Fig. 4.2.1>

Wiring wire No. × size (mm²): 2 × 0.3 (non polar)

The 10 m wire is attached as an accessory. (150 m max.)

Wiring size must comply with the applicable local and national codes.

Circuit rating: 12V DC

Circuit rating is NOT always against the ground.

Location to place the main remote controller

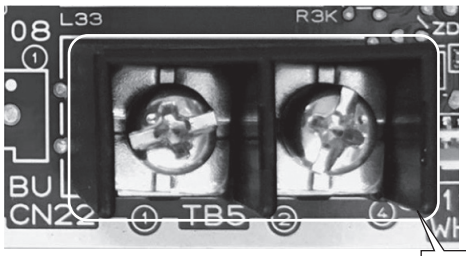
When using the remote controller options (refer to section 4.3), place the main remote controller on appropriate location that meets the following points to detect room temperature.

- Do not place the main remote controller in the periphery of a door or a window.
- Do not place the main remote controller near heat or cold sources, such as a radiator or the like.

Notes:

Wiring for main remote controller cable shall be (5 cm or more) apart from power source wiring so that it is not influenced by electric noise from power source wiring. (Do not insert main remote controller cable and power source wiring in the same conduit.) (Refer to Fig. 4.1.1)

Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).



<Fig. 4.2.1>

4.2.2 Installing the main remote controller

1. The main remote controller can be installed either in the switch box or directly on the wall. Perform the installation properly according to the method.
   (1) Secure clearances shown in Fig. 4.2.2 regardless of whether installing the main remote controller either directly on the wall or in the switch box.
   (2) Prepare the following items in the field.
   Double switch box
   Thin metal conduit
   Locknut and bushing
   Cable cover
   Wall plug

2. Drill an installation hole in the wall.
   ■ Installation using a switch box
   • Drill a hole in the wall for the switch box, and install the switch box in the hole.
   • Fit the conduit tube into the switch box.

   ■ Direct wall installation
   • Drill a cable access hole and thread the main remote controller cable through it.

⚠ **CAUTION:**

To prevent entry of dew, water, and insects, seal the gap between the cable and the hole through which the cable is threaded with putty. Otherwise, electric shock, fire, or failure may result.

3. Have the main remote controller ready.
   Remove the bottom case from the main remote controller.

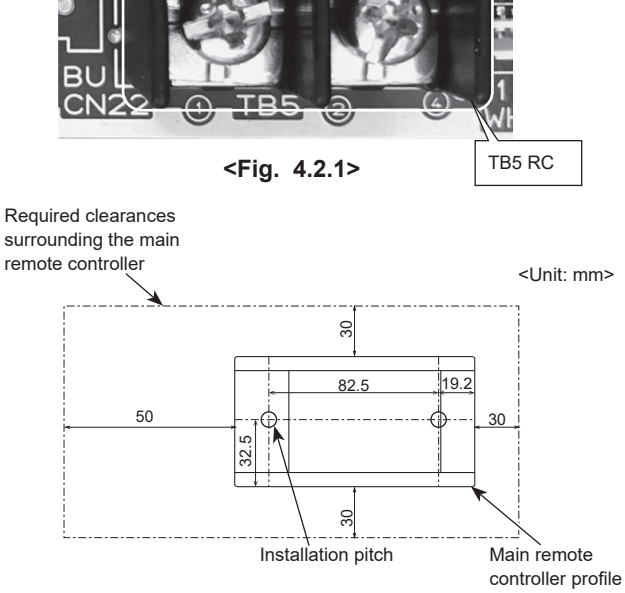
4. Connect the main remote controller cable to the terminal block on the bottom case.
   Modify the main remote controller cable as shown in Fig. 4.2.5, and thread the cable from behind the bottom case.
   Completely thread the cable to the front so that the unsheathed part of the cable cannot be seen behind the bottom case.
   Connect the main remote controller cable to the terminal block on the bottom case.

   ■ Direct wall installation
   • Seal the gap between the cable and the hole through which the cable is threaded.

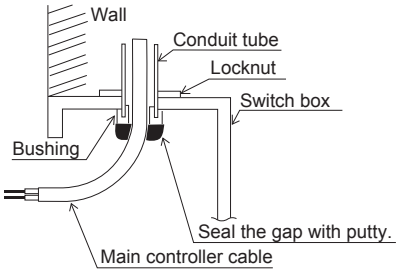
⚠ **CAUTION**

To prevent electric shock or failure, keep the sheath ends or any other foreign objects out of the terminal block.

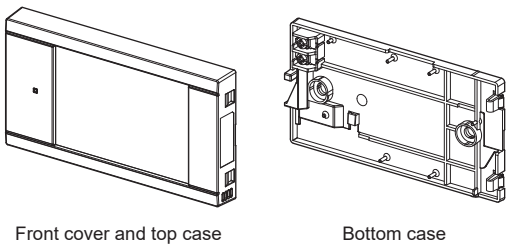
Do not use ring terminals to connect the wires to the terminal block on the bottom case. The terminals will come in contact with the control board and the front cover, which will result in failure.



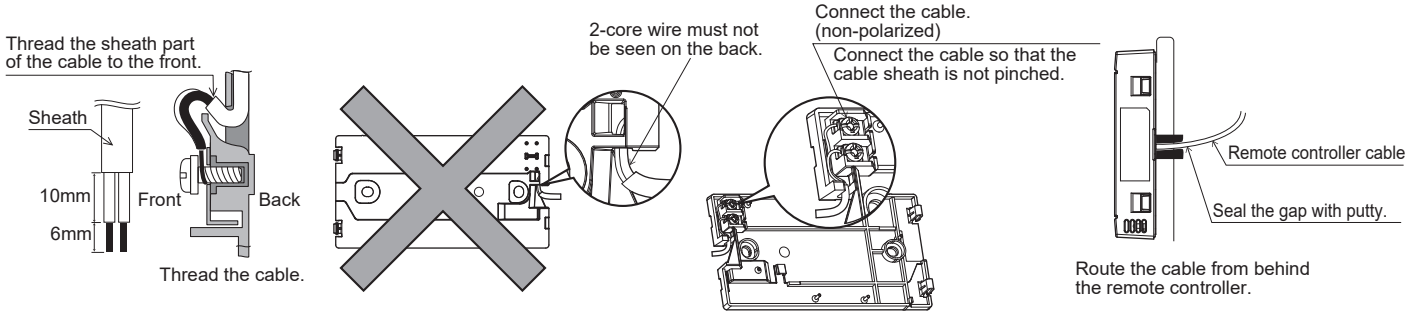
<Fig. 4.2.2>



<Fig. 4.2.3>



<Fig. 4.2.4>



<Fig. 4.2.5>

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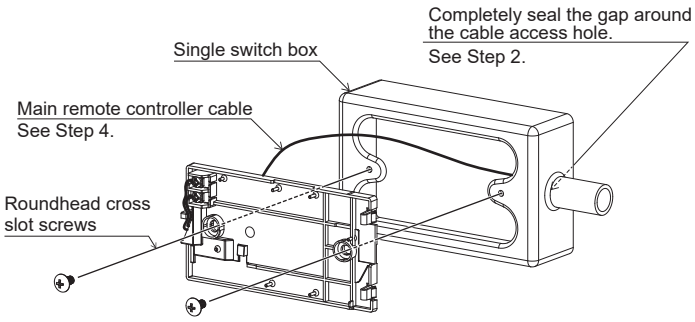
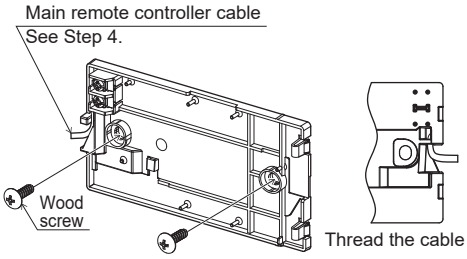
5. Install the bottom case.
■ Installation using a switch box
• When installing the bottom case on the switch box, secure it to the switch box with screws.
• Install the bottom case in the direction shown in Fig 4.2.6.



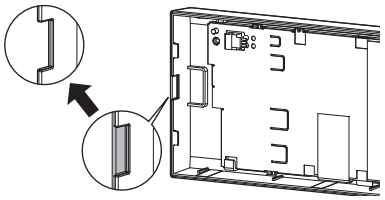
■ Direct wall installation
• Thread the cable through the slot provided.
• When mounting the bottom case on the wall, secure at least two corners of the main remote controller with screws.
• To prevent the bottom case from lifting, use top-left bottom-right corners of the main remote controller (viewed from the front) to secure the bottom case to the wall with wall plugs or the like.
• Install the bottom case in the direction shown in Fig 4.2.6.



<Fig. 4.2.6>

⚠ CAUTION:
To avoid causing deformation or cracks to the main remote controller, do not overtighten the screws and do not make an additional installation hole(s).

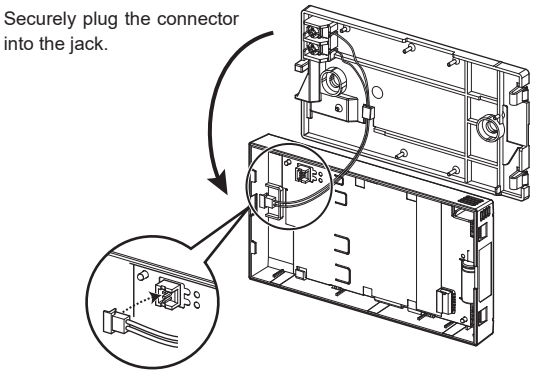
6. Cut out the cable access hole.
■ Direct wall installation
• Cut out the knockout hole (indicated with grey in Fig. 4.2.7) in the front cover by nipper.
• Thread the main remote controller cable from the slot behind the bottom case through this access hole.



<Fig. 4.2.7>

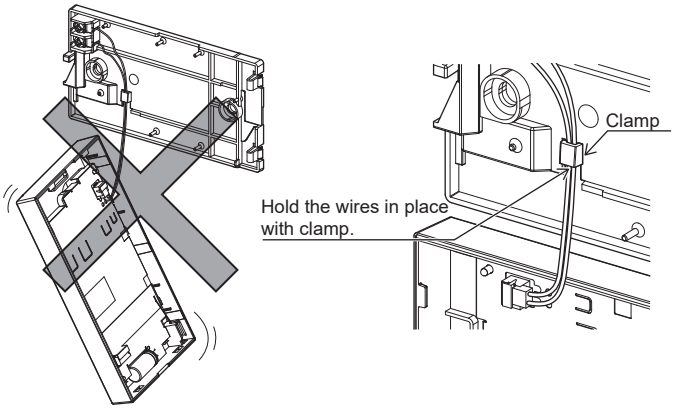
7. Plug the lead wire cable into the top case.
Plug the lead wire cable coming from the bottom case into the top case.

⚠ CAUTION:
To avoid failures, do not remove the controller board protective sheet and the controller board from the top case.
After the cable is plugged into the top case, do not hang the top case as shown in Fig. 4.2.8. Otherwise, the main remote controller cable could sever, which could cause malfunction to the main remote controller.



8. Fit the lead wires into the clamps.

⚠ CAUTION:
Hold the wires in place with clamps to prevent excessive strain from being applied on the terminal block and causing cable breakage.

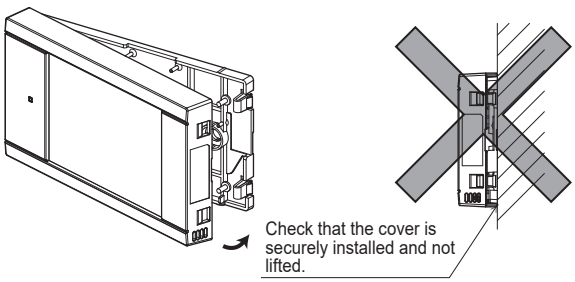


<Fig. 4.2.8> **<Fig. 4.2.9>**

4. Electrical work

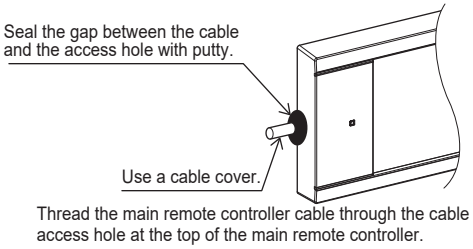
9. Fit the top case and the front cover onto the bottom case.
   The top case assembly (fitted with the front cover at factory shipment) has two tabs on top. Hook the tabs onto the bottom case and snap the top case onto the bottom case into place. Check that the cover is securely installed.

⚠ **CAUTION:**
When the top case is correctly attached to the bottom case, a click is heard. If the front cover is not clicked into place, it may fall off.



<Fig. 4.2.10>

■ Direct wall installation (when routing the main remote controller cable along the wall surface)
- Thread the main remote controller cable through the cable access hole at the top of the main remote controller.
- Seal the gap between the cable and the access hole with putty.
- Use a cable cover.



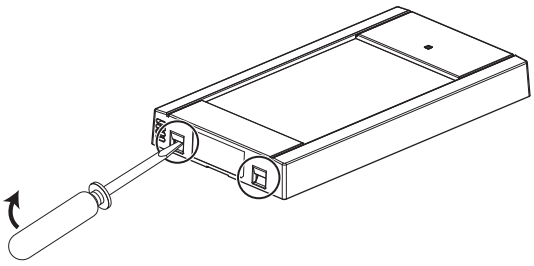
<Fig. 4.2.11>

■ Disassembling the top case and the front cover

(1) Remove the front cover.
   Insert a flat head screwdriver into either of two open slots at the bottom of the main remote controller and move the screwdriver handle downward as shown. The engagement of the tabs will be released. Then pull the front cover toward the front to remove the front cover.

(2) Remove the top case.
   Insert a flat head screwdriver into either of two open slots at the bottom of the main remote controller. The subsequent procedure is the same as that of the front cover.

⚠ **CAUTION:**
Use a 5 mm-flat head screwdriver. Do not turn the screwdriver forcibly while placing the blade in the slots. Doing so could break the covers.



<Fig. 4.2.12>

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4.3 Main remote controller options

The FTC (cased) comes factory fitted with a main remote controller. This incorporates a thermistor for temperature monitoring and a graphical user interface to enable set-up, view current status and input scheduling functions. The main remote controller is also used for servicing purposes. This facility is accessed via password protected service menus.

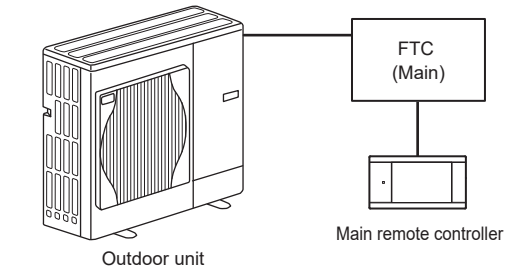
To provide the best efficiency, Mitsubishi Electric recommends using Auto Adaptation function based on room temperature for heating purposes only. To use this function a room thermistor needs to be present in a main living area. This can be done in a number of ways. The most convenient are detailed below.

Refer to heating section of this manual for instructions on how to set the weather compensation curve, flow temperature or room temperature (Auto Adaptation).
For instructions on how to set the thermistor input for the FTC (Main) please refer to Initial settings section.

The factory setting for space heating mode is set to room temperature (Auto Adaptation). If there is no room sensor present in the system or if cooling is required, this setting must be changed to either weather compensation curve mode or flow temperature mode.

Note: Auto Adaptation is not available in cooling mode.

Factory supplied standard



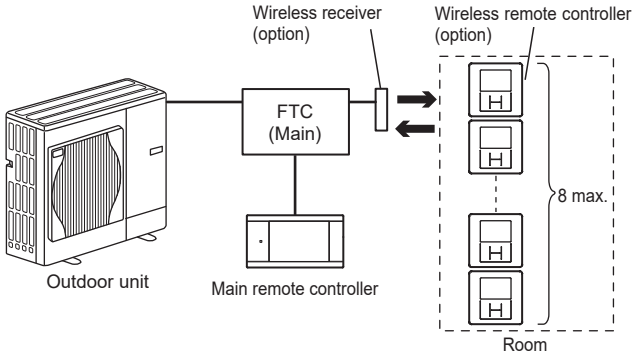
■ 1-zone temperature control

Control option A

This option features the main remote controller and the Mitsubishi Electric wireless remote controller. The wireless remote controller is used to monitor room temperature and can be used to make changes to the space heating settings, boost DHW *1 and switch to holiday mode without directly using the main remote controller.

If more than one wireless remote controller is used, the most recently requested temperature setting will commonly be applied to all rooms by the central control system regardless of which wireless remote controller was used. No hierarchy exists across these remote controllers.

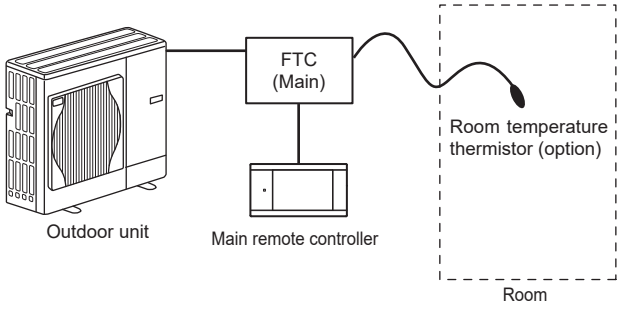
Wire the wireless receiver to FTC (Main) referring to the wireless remote controller instruction manual. **Turn DIP SW1-8 to ON.** Before operation, configure the wireless remote controller to transmit and receive data referring to the wireless remote controller installation manual.



Control option B

This option features the main remote controller and the Mitsubishi Electric thermistor wired to FTC (Main). The thermistor is used to monitor room temperature but can not make any changes in control operation. Any changes to DHW *1 must be made using the main remote controller mounted on the FTC (Main).

Wire the thermistor to the CN20 connector on FTC (Main).
The number of room temperature thermistors that can be connected to FTC (Main) is always one.

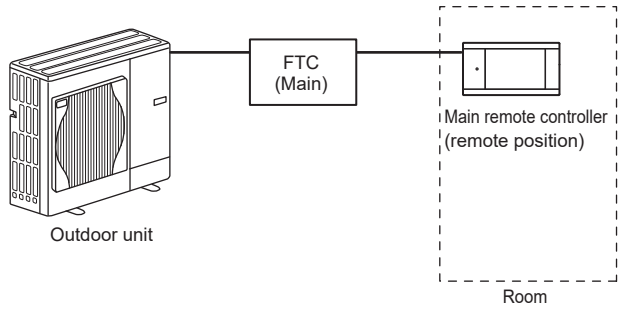


Control option C

This option features the main remote controller being removed from the FTC (Main) and situated in a different room. A thermistor built in the main remote controller can be used for monitoring the room temperature for Auto Adaptation function whilst keeping all its features of the main remote controller available.

The main remote controller and FTC (Main) are connected by a 2-core, 0.3 mm², non-polar cable (local supply) with a maximum length of 150 m.

To use the sensor in the main remote controller, the main remote controller should be detached from the FTC (Main). Otherwise it will detect the temperature of the FTC (Main) instead of room temperature. This will affect the output of the space heating.

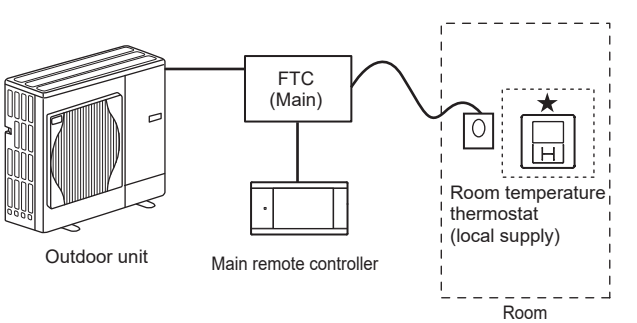


Control option D (Flow temperature or weather compensation curve only)

This option features the main remote controller and a locally supplied thermostat wired to FTC (Main). The thermostat is used to set the maximum temperature for heating room. Any changes to DHW *1 must be made using main remote controller mounted on the FTC (Main).

The thermostat is wired to IN1 in TBI.1 on FTC (Main). A single thermostat can be connected to FTC (Main).

The wireless remote controller can be also used as a thermostat.



*1 If applicable

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4. Electrical work

■ 2-zone temperature control

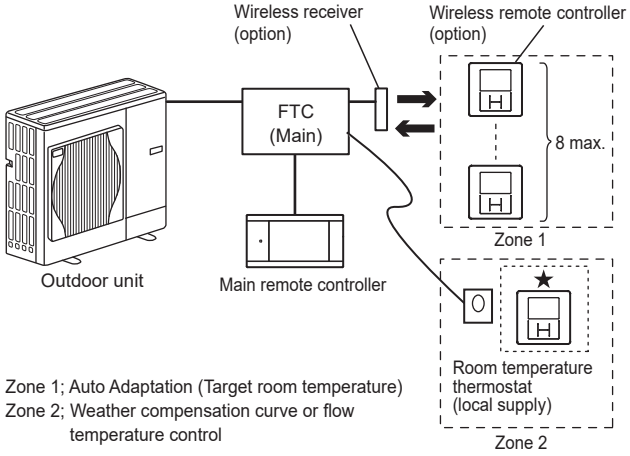
Control option A

This option features the main remote controller, the Mitsubishi Electric wireless remote controller and a locally supplied thermostat.
The wireless remote controller is used to monitor the Zone 1 room temperature and the thermostat is used to monitor the Zone 2 room temperature.
The thermostat can be also assigned to Zone 1 and the wireless remote controller to Zone 2.

The wireless remote controller can be also used to make changes to the space heating settings, boost DHW *1 and switch to holiday mode without having to use the main remote controller.

If more than one wireless remote controller is used, the last temperature setting adjustment/demand will be applied to all rooms in same zone.

Wire the wireless receiver to FTC (Main) referring to the wireless remote controller instruction manual. Turn DIP SW1-8 to ON. Before operation, configure the wireless remote controller to transmit and receive data referring to the wireless remote controller installation manual.
The thermostat is used to set the maximum temperature for heating Zone 2 room.
The thermostat is wired to IN6 on FTC (Main). (If the thermostat is assigned to Zone 1, it is wired to IN1 on TBI.1.) (Refer to 4.5.)

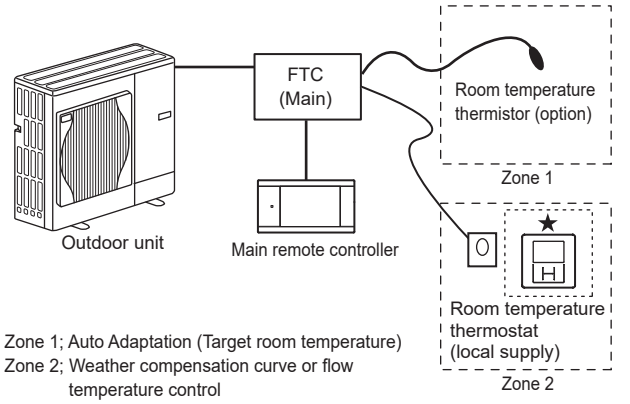


Zone 1; Auto Adaptation (Target room temperature)
Zone 2; Weather compensation curve or flow temperature control

Control option B

This option features the main remote controller, the Mitsubishi Electric thermistor and a locally supplied thermostat that are wired to FTC (Main).
The thermistor is used to monitor the Zone 1 room temperature and the thermostat is used to control the Zone 2 room temperature.

The thermostat can be also assigned to Zone 1 and the thermistor to Zone 2.
The thermistor can not make any changes in control operation. Any changes to DHW *1 must be made using the main remote controller mounted on the FTC (Main).
Wire the thermistor to the CN20 connector on FTC (Main).
The number of room temperature thermistors that can be connected to FTC (Main) is always one.
The thermostat is used to set the maximum temperature for heating Zone 2 room.
The thermostat is wired to IN6 on FTC (Main). (If the thermostat is assigned to Zone 1, wire it to IN1 on TBI.1.) (Refer to 4.5.)



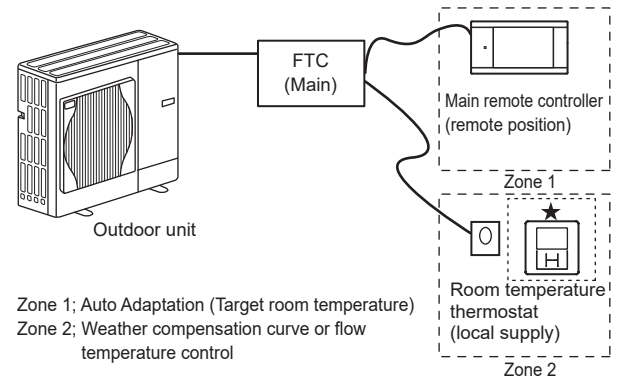
Zone 1; Auto Adaptation (Target room temperature)
Zone 2; Weather compensation curve or flow temperature control

Control option C

This option features the main remote controller (with in-built thermistor) that is removed from the FTC (Main) to monitor the Zone 1 room temperature and a locally supplied thermostat to monitor the Zone 2 room temperature.
The thermostat can be also assigned to Zone 1 and the thermistor to Zone 2.

A thermistor built into the main remote controller can be used for monitoring the room temperature for Auto Adaptation function whilst keeping all its features of the main remote controller available.
The main remote controller and FTC (Main) are connected by a 2-core, 0.3 mm², non-polar cable (local supply) with a maximum length of 150 m.
To use the sensor in the main remote controller, the main remote controller should be detached from the FTC (Main). Otherwise it will detect the temperature of the FTC (Main) instead of room temperature. This will affect the output of the space heating.

The thermostat is used to set the maximum temperature for heating Zone 2 room.
The thermostat is wired to IN6 on FTC (Main). (If the thermostat is assigned to Zone 1, wire it to IN1 on TBI.1.) (Refer to 4.5.)

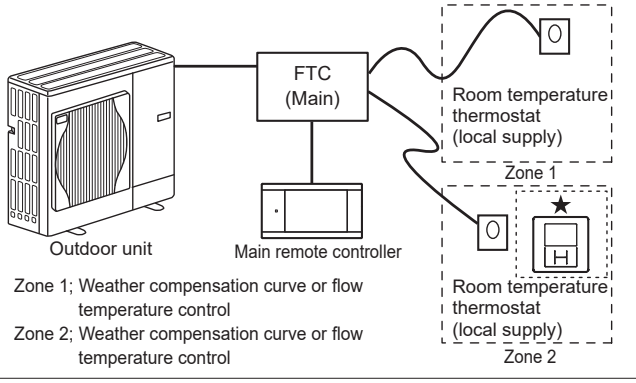


Zone 1; Auto Adaptation (Target room temperature)
Zone 2; Weather compensation curve or flow temperature control

Control option D

This option features the locally supplied thermostats wired to FTC (Main). The thermostats are individually assigned to Zone 1 and Zone 2. The thermostats are used to set each maximum temperature for heating Zone 1 and Zone 2 rooms. Any changes to DHW *1 must be made using the main remote controller mounted on the FTC (Main).

The thermostat for Zone 1 is wired to IN1 in TBI.1 on FTC (Main).
The thermostat for Zone 2 is wired to IN6 in TBI.1 on FTC (Main).



Zone 1; Weather compensation curve or flow temperature control
Zone 2; Weather compensation curve or flow temperature control

Note: For the options above, the sensor types can be exchanged between Zone 1 and Zone 2. (e.g. Wireless remote controller in Zone 1 and room temperature thermostat in Zone 2 can be changed to room temperature thermostat and wireless remote controller, respectively.)
*1 If applicable
★ **The wireless remote controller can be also used as a thermostat.**

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4.4. Connecting the thermistor cables

Connect the thermistor for the FTC (Main) controller.
For multiple outdoor units control with FTC (Sub), see section 9.

4.4.1 Connecting the cable of the thermistor (Room temp.) (TH1)

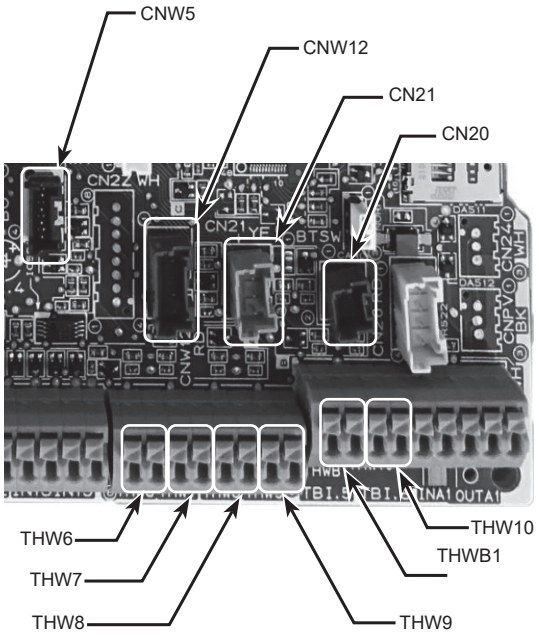
TH1 is an optional part (PAC-SE41TS-E).
TH1 is required to use the Auto Adaptation function. However, when room temperature detection is conducted by the main remote controller or the wireless remote controller (optional), this part is not required.
Connect the TH1 cable to the CN20 connector on FTC (Main).
When the TH1 cable is too long, bundle the excess cable outside the FTC (Main) unit.
For more details, refer to Section 4.3 in this manual or the installation manual that comes with PAC-SE41TS-E.
When using TH1, place this sensor on appropriate location to detect room temperature.

4.4.2. Connecting the cable of the thermistor (Ref. liquid temp.) (TH2)

Connect the TH2 cable to the CN21 connector on FTC (Main).
For split outdoor unit : Connect TH2.
For packaged outdoor unit : It is NOT necessary to connect TH2.

When the TH2 cable is too long, bundle the excess cable outside the FTC (Main) unit.
Do not bind the wires in the FTC (Main) unit.

<Thermistor position>
Place TH2 on **refrigerant** piping (**liquid** side).
It is recommended to protect the thermistor with heat insulating materials so as not to be affected by ambient temperature.
Note: Be sure to place TH2 where it correctly detects refrigerant piping temp. (liquid side).
Because;
(1) TH2 is required to detect heating subcool correctly.
(2) Refrigerant temperature of water-to-refrigerant heat exchanger also needs to be detected for protection purpose.



<Fig. 4.4.1>

4.4.3. Connecting the cables of the thermistor (Flow water temp.) (THW1) and the thermistor (Return water temp.) (THW2)

The THW1 and the THW2 cables share a connector, and the connector connects to CNW12 connector on FTC (Main).

When the THW1 and THW2 cables are too long, bundle the excess cables outside the FTC (Main) unit.
Do not bind the wires in the FTC (Main) unit.

<Thermistor position>
Place THW1 on **water** piping (water **outlet** side) after booster heater, and THW2 on the water inlet side.
It is recommended to protect the thermistor with heat insulating materials so as not to be affected by ambient temperature.
Note: Be sure to attach THW1 where it correctly detects flow temperature (water outlet side). For more details, see Page 5.

4.4.4. Connecting the cable of the thermistor (DHW tank lower water temp.) (THW5B)

THW5B is an optional part (PAC-TH011TK2-E (5 m) or PAC-TH011TKL2-E (30 m)). However, PAC-IF083B-E comes with THW5B.
Connect the THW5B cable to the CNW5 connector on FTC (Main) if the DHW tank is available.
When the THW5B cable supplied with FTC (Main) is too long, bundle the excess cable outside the FTC (Main) unit.
Do not bind the wires in the FTC (Main) unit.

<Thermistor position>
Place THW5 on the position where tank water temperature can be detected correctly.
It is recommended to position the thermistor at the mid height of the DHW tank (to control DHW heating with this sensor).
It is recommended to protect the thermistor with heat insulating materials so as not to be affected by ambient temperature.
Especially for double (insulated) tank, thermistor should be attached to the inner side (to detect the water temperature).

Note:
Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).
For 2-zone temperature control, refer to "4.7 Wiring for 2-zone temperature control" where the necessary thermistor (THW6, THW7, THW8, THW9) connection is explained.

For back-up operation of boiler, refer to the installation manual of PAC-TH012HT-E where the necessary thermistor (THWB1, THW6, THW7) connection is explained.

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⚠ **CAUTION:**
Do not route the thermistor cables together with power cables.
The sensor part of the thermistor should be installed where user can not access.

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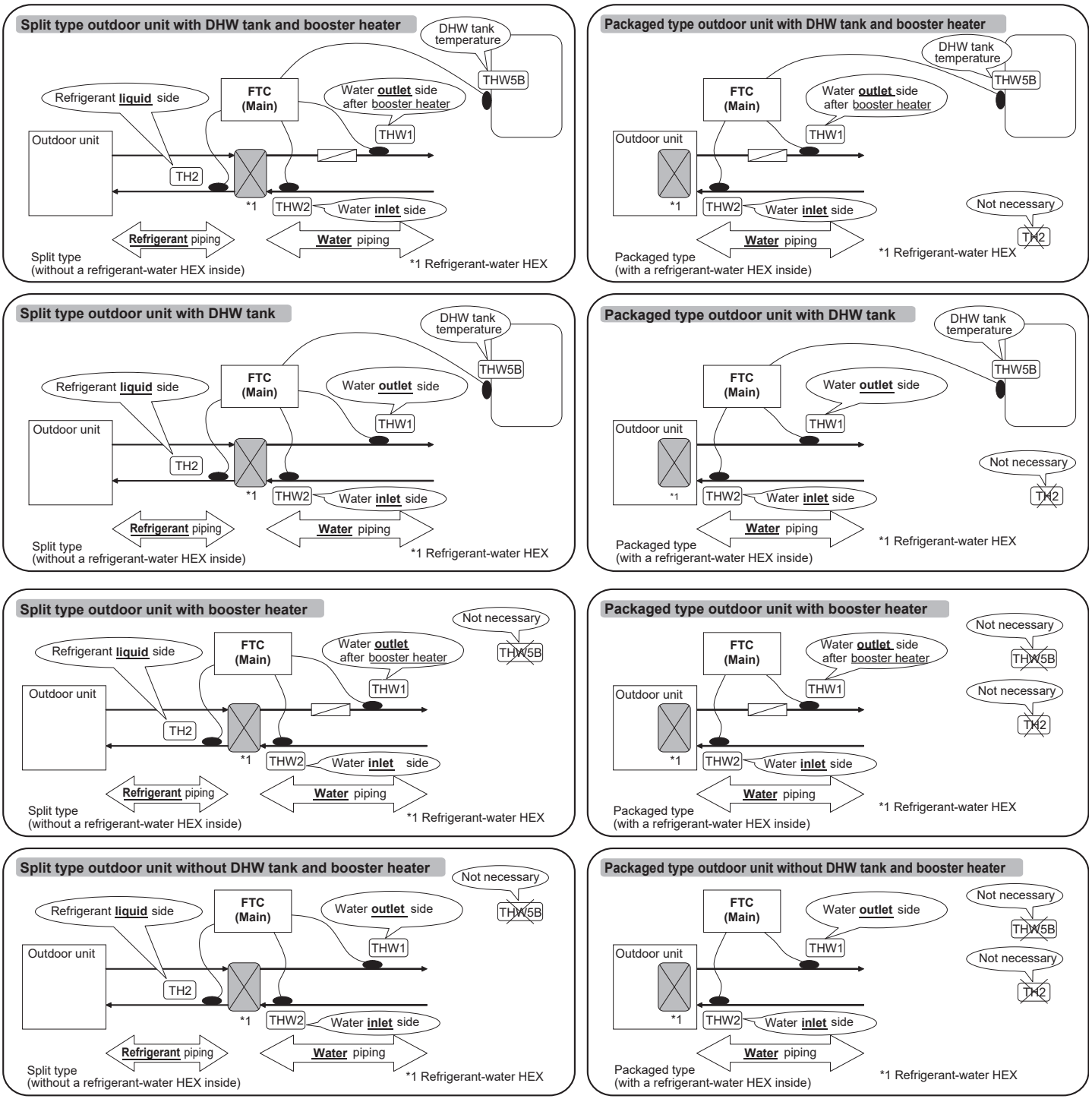
4.4.5. Thermistor position and necessity

<Thermistor position and necessity>

Outdoor unit type	DHW tank	TH2	THW1	THW2	THW5B
Split	Present	✔	✔	✔	✔
	Absent	✔	✔	✔	—
Packaged	Present	—	✔	✔	✔
	Absent	—	✔	✔	—

✔: Necessary. Connect the thermistor.
—: Not necessary. Do not connect the thermistor.



<Fig. 4.4.2>

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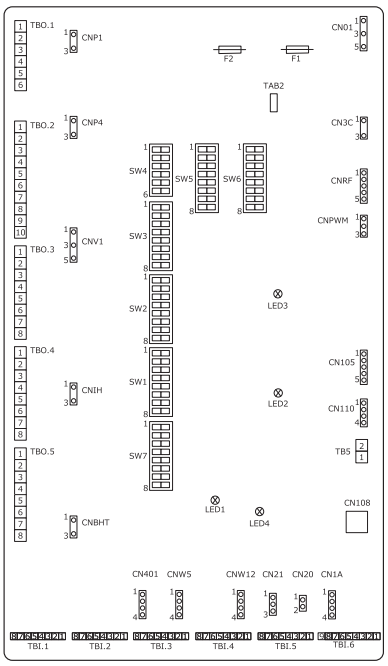
4.5 Connecting inputs/outputs

For multiple outdoor units control with FTC (Sub), see section 9.

■ Signal inputs

Name	Terminal block	Con-nector	Item	OFF (Open)	ON (Short)
IN1	TBI.1 7-8	—	Room thermostat 1 input *1	Refer to SW2-1 in <5.1 DIP switch functions>.	
IN2	TBI.1 5-6	—	Flow switch 1 input	Refer to SW2-2 in <5.1 DIP switch functions>.	
IN3	TBI.1 3-4	—	Flow switch 2 input (Zone 1)	Refer to SW3-2 in <5.1 DIP switch functions>.	
IN4	TBI.1 1-2	—	Demand control input	Normal	Heat source OFF/ Boiler operation *3
IN5	TBI.2 7-8	—	Outdoor thermostat input *2	Standard operation	Heater operation/ Boiler operation *3
IN6	TBI.2 5-6	—	Room thermostat 2 input *1	Refer to SW3-1 in <5.1 DIP switch functions>.	
IN7	TBI.2 3-4	—	Flow switch 3 input (Zone 2)	Refer to SW3-2 in <5.1 DIP switch functions>.	
IN8	TBI.3 7-8	—	Electric energy meter 1	*4	
IN9	TBI.3 5-6	—	Electric energy meter 2		
IN10	TBI.2 1-2	—	Heat meter		
IN11	TBI.3 3-4	—	Smart grid ready input	*5	
IN12	TBI.3 1-2	—			
IN13	TBI.4 3-4	—	Forced cooling mode	Refer to SW7-2 in <5.1 DIP switch functions>.	
IN15	TBI.4 1-2	—	Cooling limit temp.	Refer to SW7-3 in <5.1 DIP switch functions>.	
INA1	TBI.6 3-5	CN1A	Flow sensor input	*6	



<Fig. 4.5.1>

*1. Set the ON/OFF cycle time of the room thermostat for 10 minutes or more; otherwise the compressor may be damaged.
*2. If using outdoor thermostat for controlling operation of heaters, the lifetime of the heaters and related parts may be reduced.
*3. To turn on the boiler operation, use the main remote controller to select [Boiler settings] in [Operation settings] from [Service].
*4. Connectable electric energy meter and heat meter

- Pulse type: Voltage free contact for 12 VDC detection by FTC (TBI.2 1 pin, TBI.3 5 and 7 pins have a positive voltage.)
- Pulse duration: Minimum ON time: 40ms; Minimum OFF time: 100ms
- Possible unit of pulse: 0.1 pulse/kWh, 1 pulse/kWh, 10 pulse/kWh, 100 pulse/kWh, 1000 pulse/kWh

Those values can be set by the main remote controller. (Refer to the menu tree in "7.2 Main remote controller".)

*5. As for the smart grid ready, refer to "4.9 Smart grid ready".
*6. Connectable flow sensor

- Power supply: 5 V DC
- Measuring range: 5 to 100 L/min. Those values can be set by the main remote controller. (Refer to [Auxiliary settings] on this page.)
- Flow signal: 0.5 V (at minimum flow rate) to 3.5 V (at maximum flow rate)

Wiring specification and local supply parts

Item	Name	Model and specifications
Signal input function	Signal input wire	Use sheathed vinyl coated cord or cable: 30 m max. Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.21 mm² to 0.52 mm² Solid wire: ø0.51 mm to ø0.8 mm
	Switch	Non-voltage “a” contact signals Remote switch: minimum applicable load 12 V DC, 1 mA

Note:
Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).

[Auxiliary settings]

This function is used to set the parameters for any auxiliary parts used in the system

Menu subtitle		Function/ Description
[Economy settings for pump]		Water pump stops automatically in certain period of time from when operation is finished.
	[Delay]	Time before pump switched off*1
[Electric heater (Heating)]		To select “WITH booster heater (ON)” or “WITHOUT booster heater (OFF)” in heating mode.
	[Delay]	The minimum time required for the booster heater to turn ON from after heating mode has started.
[Electric heater (DHW)]		To select "WITH (ON)" or "WITHOUT (OFF)" booster heater or immersion heater individually in DHW mode.
	[Delay]	The minimum time required for the booster heater or immersion heater to turn ON from after DHW mode has started. (This setting is applied for both booster and immersion heater.)
Mixing valve 1/2 control *2	[Running]	Period from valve fully open (at a hot water mixing ratio of 100%) to valve fully closed (at a cold water mixing ratio of 100%)
	[Interval]	Interval (min.) to control the mixing valve.
[Flow sensor] *3	[Minimum]	The minimum flow rate to be detected at flow sensor.
	[Maximum]	The maximum flow rate to be detected at flow sensor.

*1. Decreasing "time before pump switched off" may increase the duration of stand-by in heating/cooling mode.
*2. Set the running time according to the specifications of the actuator of each mixing valve. It is recommended to set the interval to 2 minutes that is a default value. With the interval set longer, it could take longer to warm up a room.
*3. Do not change the setting since it is set according to the specification of flow sensor attached to the indoor unit.

4. Electrical work

■ Thermistor inputs

Name	Terminal block	Connector	Item	Optional part model
TH1	—	CN20	Thermistor (Room temp.) (Option) *1	PAC-SE41TS-E
TH2	—	CN21	Thermistor (Ref. liquid temp.) *2	—
THW1	—	CNW12 1-2	Thermistor (Flow water temp.) *1	—
THW2	—	CNW12 3-4	Thermistor (Return water temp.) *1	—
THW5A	—	CNW5 1-2	Thermistor (DHW tank upper water temp.)	—
THW5B	—	CNW5 3-4	Thermistor (DHW tank water temp.)	—
THW6	TBI.5 7-8	—	Thermistor (Zone 1 flow water temp.) (Option) *1	PAC-TH011-E
THW7	TBI.5 5-6	—	Thermistor (Zone 1 return water temp.) (Option) *1	
THW8	TBI.5 3-4	—	Thermistor (Zone 2 flow water temp.) (Option) *1	PAC-TH011-E
THW9	TBI.5 1-2	—	Thermistor (Zone 2 return water temp.) (Option) *1	
THW10	TBI.6 6-7	—	Thermistor (Mixing tank water temp.) (Option) *1	PAC-TH012HT-E(5 m)/ PAC-TH012HTL-E(30 m)
THWB1	TBI.6 8-9	—	Thermistor (Boiler flow water temp.) (Option) *1	

Ensure to wire thermistor wirings away from the power line and/or OUT1 to OUT18 wirings.
***1. The maximum length of the thermistor wiring is 30 m.**
The length of the optional thermistors are 5 m. If you need to splice and extend the wirings, following points must be carried out.
1) Connect the wirings by soldering.
2) Insulate each connecting point against dust and water. Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).
***2. Except PAC-IF082/083B-E.**

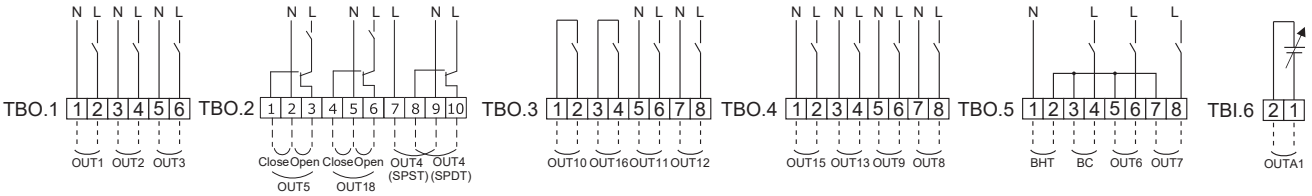
■ Outputs

Name	Terminal block	Connector	Item	OFF	ON	Signal/Max. current	Max. total current
OUT1	TBO.1 1-2	CNP1	Water circulation pump 1 output (Space heating/cooling & DHW)	OFF	ON	230 V AC 1.0 A max. (Inrush current 40 A max.)	4.0 A (a)
OUT2	TBO.1 3-4	—	Water circulation pump 2 output (Space heating/cooling for Zone 1)	OFF	ON	230 V AC 1.0 A max. (Inrush current 40 A max.)	
OUT3	TBO.1 5-6	—	Water circulation pump 3 output (Space heating/cooling for Zone 2) *1	OFF	ON	230 V AC 1.0 A max. (Inrush current 40 A max.)	
			2-way valve 2b output *2				
OUT4	TBO.2 7-9	—	3-way valve SPST (2-way valve 1) output	Heating/Cooling	DHW	230 V AC 0.1 A max.	3.0 A (b)
	TBO.2 8-10	CNV1	3-way valve SPDT output				
OUT5	TBO.2 1-2	—	Zone 2 mixing valve output *1	Stop	Close	230 V AC 0.1 A max.	
	TBO.2 2-3				Open		
OUT6	TBO.5 5-6	—	Booster heater 1 output	OFF	ON	230 V AC 0.5 A max. (Relay)	
OUT7	TBO.5 7-8	—	Booster heater 2 output	OFF	ON	230 V AC 0.5 A max. (Relay)	
OUT8	TBO.4 7-8	—	Cooling signal output	OFF	ON	230 V AC 0.5 A max.	
OUT9	TBO.4 5-6	CNIH	Immersion heater output	OFF	ON	230 V AC 0.5 A max. (Relay)	
OUT10	TBO.3 1-2	—	Boiler output	OFF	ON	non-voltage contact ·220 - 240 V AC (30 V DC) 0.5 A or less ·10 mA 5 V DC or more	—
OUT11	TBO.3 5-6	—	Error output	Normal	Error	230 V AC 0.5 A max.	3.0 A (b)
OUT12	TBO.3 7-8	—	Defrost output	Normal	Defrost	230 V AC 0.5 A max.	
OUT13	TBO.4 3-4	—	2-way valve 2a output *2	OFF	ON	230 V AC 0.1 A max.	
OUT14	—	CNP4	Water circulation pump 4 output (DHW)	OFF	ON	230 V AC 1.0 A max.	4.0 A (a)
OUT15	TBO.4 1-2	—	Comp ON signal	OFF	ON	230 V AC 0.5 A max.	3.0 A (b)
OUT16	TBO.3 3-4	—	Heating/Cooling thermostat ON signal	OFF	ON	non-voltage contact ·220 - 240 V AC (30V DC) 0.5 A or less ·10 mA 5 V DC or more	—
OUT18	TBO.2 4-5	—	Zone 1 mixing valve output *1	Stop	Close	230 V AC 0.1 A max.	3.0 A (b)
	TBO.2 5-6				Open		
OUTA1	TBI.6 1-2	—	Analog output	—	—	0 - 10 V DC 5 mA max.	—
BC	TBO.5 3-4	—	Booster heater protection output	OFF (BHT open)	ON (BHT short)	230 V AC 0.5 A max.	—
BHT	TBO.5 1-2	CNBHT	Thermostat for booster heater	Thermostat Normal: short	High temp. : open	—	—

Do not connect to the terminals that are indicated as "—" in the "Terminal block" field.
***1 For 2-zone temperature control.**
***2 For 2-zone valve ON/OFF control.**

en

4. Electrical work



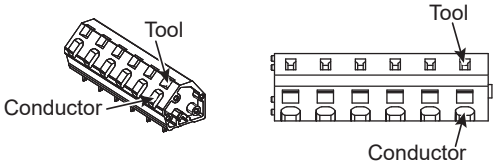
Wiring specification and local supply parts

Item	Name	Model and specifications
External output function	Outputs wire	Use sheathed vinyl coated cord or cable: 30 m max. Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.25 mm² to 1.5 mm² Solid wire: 0.25 mm² to 1.5 mm²

Note:

1. **When the FTC is powered via outdoor unit, the maximum grand total current of (a)+(b) is 3.0 A.**
2. **Do not connect multiple water circulation pumps directly to each output (OUT1, OUT2, and OUT3). In such a case, connect them via (a) relay(s).**
3. **Connect an appropriate surge absorber to OUT10 (TBO.3 1-2) depending on the load at site.**
4. **Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).**

How to use TBO.1 to 5



Outline view **Top view**

Connect them using either way as shown above.
<Fig. 4.5.2>

4.6 Wiring for heater

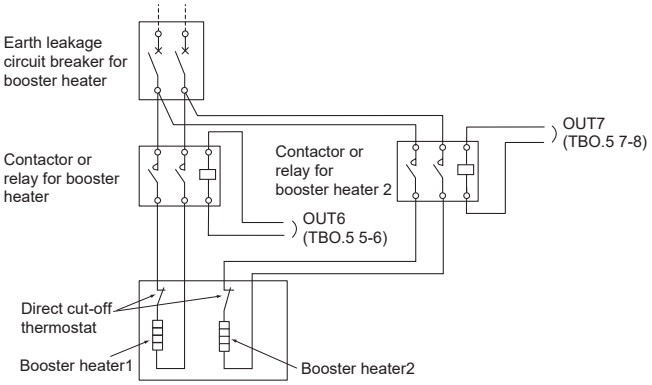
<Be careful when connecting a booster heater(s)>
The initial setting assumes that the connected booster heater(s) has a built-in direct cut-off thermostat. (Fig. 4.6.1)
When the connected booster heater(s) has a built-in indirect cut-off thermostat, perform wiring according to the following items. (Fig. 4.6.2)

- Connect the thermostat signal to BHT (TBO.5 1-2).
- Remove the jumper wire from connector CNBHT.
- Connect a contactor (or relay) for protecting the booster heater.
  (Connect the electromagnetic coil terminals to BC (TBO.5 3-4.))

* Do not remove the jumper wire from connector CNBHT when the connected booster heater(s) has a built-in direct cut-off thermostat. (Fig. 4.6.1)

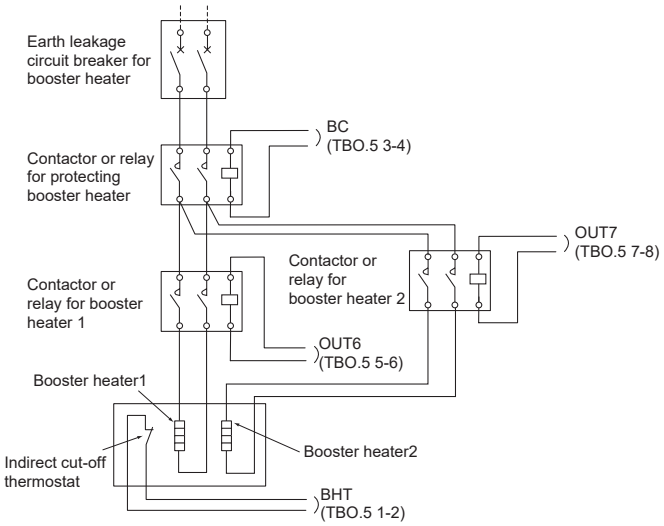
<Care to be taken when connecting an immersion heater>
The initial setting assumes that the connected immersion heater has a built-in direct cut-off thermostat. (Fig. 4.6.3)

<Wiring for booster heater with a built-in direct cut-off thermostat>



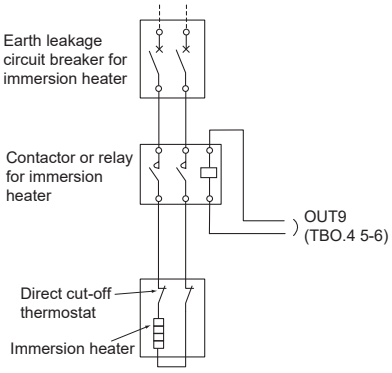
<Fig. 4.6.1>

<Wiring for booster heater with a built-in indirect cut-off thermostat>



<Fig. 4.6.2>

<Wiring for immersion heater with a built-in direct cut-off thermostat>



<Fig. 4.6.3>

4. Electrical work

4.7 Wiring for 2-zone temperature control

Connect the pipe work and locally supplied parts according to the relevant circuit diagram shown “Local system” in Section 3, of this manual.

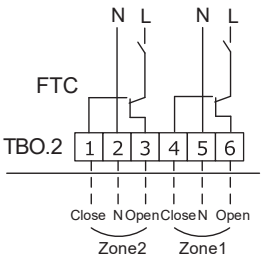
<Mixing valve>

Zone 1

Connect the signal line to open Port A (hot water inlet port) to TBO. 2-6 (Open), the signal line to open Port B (cold water inlet port) to TBO. 2-4 (Close) , and the neutral terminal wire to TBO. 2-5 (N).

Zone 2

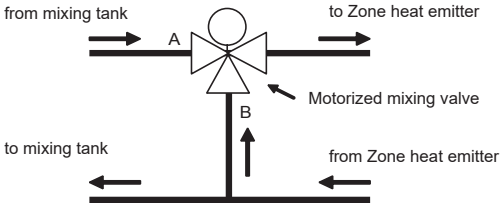
Connect the signal line to open Port A (hot water inlet port) to TBO. 2-3 (Open), the signal line to open Port B (cold water inlet port) to TBO. 2-1 (Close) , and the neutral terminal wire to TBO. 2-2 (N).



<Thermistor>

- Do not install the thermistors on the mixing tank.
- Install the thermistor (Zone 1 flow water temp.) (THW6) near the mixing valve.
- Install the thermistor (Zone 2 flow water temp.) (THW8) near the mixing valve.
- The maximum length of the thermistor wiring is 30 m.
- The length of the optional thermistors are 5 m. If you need to splice and extend the wirings, following points must be carried out.

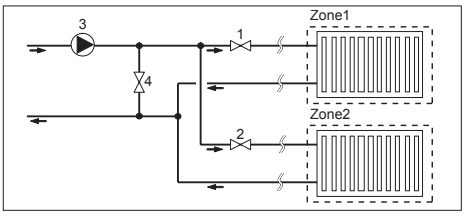
1) Connect the wirings by soldering.
2) Insulate each connecting point against dust and water.



4.8 2-zone valve ON/OFF control

Opening/Closing 2-way valve provides a simple 2-Zone control.
Flow temperature is common for Zone 1 and 2.

1. Pipe work



1. Zone 1 2-way valve 2a (local supply)
2. Zone 2 2-way valve 2b (local supply)
3. Water circulation pump 2 (local supply) *1
4. By-pass valve (local supply) *2

*1 Install according to system in the field.
*2 For safety protection, it is recommended to install a bypass valve.

Note: Freeze stat function is deactivated whilst this control is ON. Use anti-freeze solution to avoid freezing, if necessary.

2. DIP switch
Turn DIP switch 3-6 ON.

3. 2-way valve 2a (for Zone 1) / 2-way valve 2b (for Zone 2)
Electrically wire 2-way valve 2a and 2b to the appropriate external output terminals. (Refer to "External outputs" in 4.5)

4. Room thermostat connection

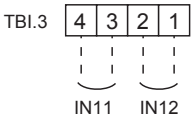
Heating operation mode	Zone 1	Zone 2
Room temperature control (Auto Adaptation) *3	● Wireless remote controller (option) ● Room temperature thermistor (option) ● Main remote controller (remote position)	● Wireless remote controller (option)
Weather compensation curve or flow temperature control	● Wireless remote controller (option) *4 ● Room temperature thermostat (local supply)	● Wireless remote controller (option) *4 ● Room temperature thermostat (local supply)

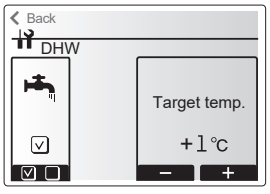
***3 Ensure to install the room thermostat for Zone 1 in main room since the room temperature control for Zone 1 is prioritized.**
***4 The wireless remote controller can be used as a thermostat.**

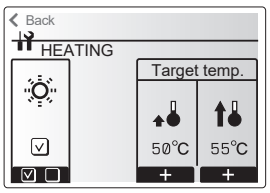
4.9 Smart grid ready

In DHW, heating or cooling operation, the commands in the table below can be used.

IN11	IN12	Meaning
OFF (open)	OFF (open)	Normal operation
ON (short)	OFF (open)	Switch-on recommendation
OFF (open)	ON (short)	Switch-off command
ON (short)	ON (short)	Switch-on command







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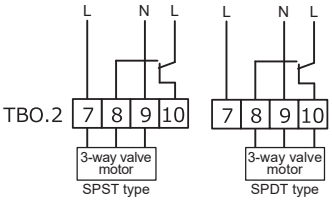
4. Electrical work

4.10 Installation procedure for DHW tank

Note:

- **Be aware that the respective DHW operations are greatly affected by the selections of the components such as tank, immersion heater, or the like.**
- **Comply to your local regulations to perform system configuration.**

1. To enable switching of the water circulation circuit between the DHW mode and the heating mode, install a 3-way valve (local supply). The 3-way valve and the DHW tank should be positioned as shown in the system diagram in section 3. The use of two 2-way valves can perform the same function as a 3-way valve.
2. Install the optional thermistor THW5 (optional part PAC-TH011TK2-E (5 m) or PAC-TH011TKL2-E (30 m)) on the DHW tank. Note that PAC-IF083B-E comes with THW5B.
   It is recommended to position the thermistor at the mid point of the DHW tank capacity. Insulate thermistor from ambient air. Especially for double (insulated) tank, thermistor should be attached to the inner side (to detect the water temperature).
3. Connect the thermistor lead to the CNW5 connector on the FTC (Main).
4. The output terminals for the 3-way valve (SPST) is TBO.2 7-9 (OUT4).
   The output terminals for the 3-way valve (SPDT) is TBO.2 8-10 (OUT4).



When the rated current of the 3-way valve exceeds 0.1 A, be sure to use a relay with maximum voltage and current ratings of 230 V AC / 0.1 A when connecting to the FTC (Main). Do not directly connect the 3-way valve cable to the FTC (Main). Connect the relay cable to the TBO.2 8-9 terminals.
For systems using 2-way valves instead of a 3-way valve please read the following:

Specification of 2-way valve (local supply)

- Power supply: 230 V AC
- Current: 0.1 A max. **(You must use a relay if over 0.1 A.)**
- Type: Normally closed

	Installation position	Electrical connection terminal block	Output signal		
			Heating/ Cooling	DHW	System OFF
2-way valve 1	DHW	TBO.2 8-9	OFF (closed)	ON (open)	OFF (closed)
2-way valve 2	Heating/ Cooling	TBO.4 3-4	ON (open)	OFF (closed)	OFF (closed)

Note: Should the 2-way valve become blocked, the water circulation will stop.
A bypass valve or circuit should be installed between pump and 2-way valve for safety.
The TBO.4 3-4 terminals on the FTC (Main) are shown in the wiring diagram.
The 2-way valve (local supply) should be installed according to the instructions supplied with it. Follow 2-way valve's manufacturer's instructions as to whether to connect an earth cable or not.

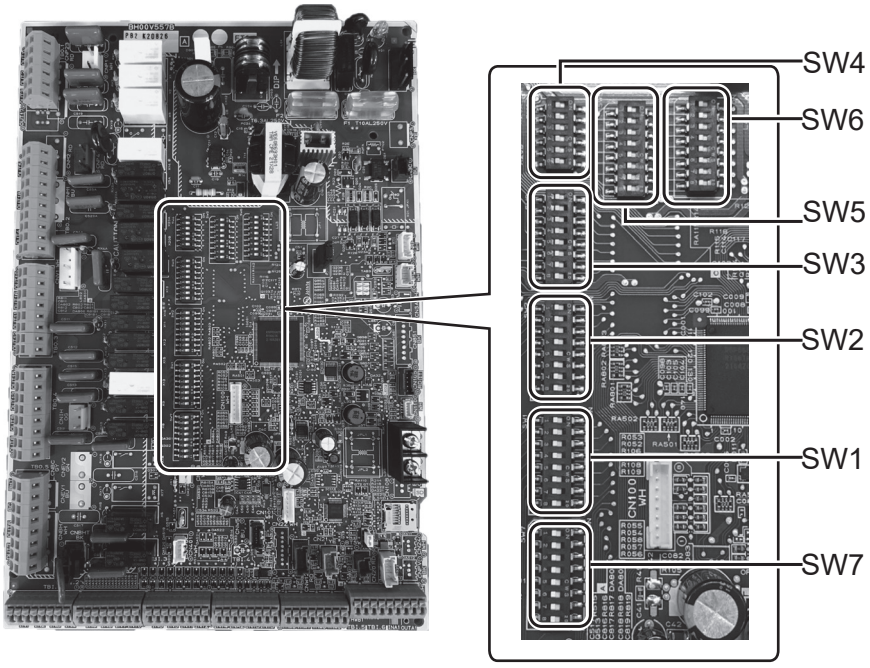
- For the 2-way valve, choose the one that slowly opens and shuts off to prevent water hammer sound.
- Choose the 2-way valve equipped with manual override, which is necessary for topping up or draining of water.

5. Turn the DIP SW1-3 on the FTC (Main) to ON.

6. When using an immersion heater (local supply), connect a contact relay cable for the immersion heater to TBO.4 5-6 (OUT9), and turn the DIP SW1-4 to ON. Do NOT directly connect the power cable to the FTC (Main).

Note:

- When an immersion heater is installed, select appropriate breaker capacity and a cable with appropriate diameter on the basis of heater output.
- When wiring an immersion heater in the field, always install an earth leakage breaker to prevent accidental electric shock.



When connecting DHW tank

(1) Attach the optional thermistor THW5 (PAC-TH011TK2-E (5 m) or PAC-TH011TKL2-E (30 m)). Note that PAC-IF083B-E comes with THW5A/5B.
(2) Always use earth leakage breaker when connecting immersion heater.
(3) When installing an immersion heater, be sure that the immersion heater has a built-in direct cut-off thermostat.
(4) Connect a pressure relief valve on the sanitary water side.

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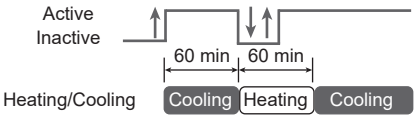
4.11 Forced cooling mode input (IN13)

- When IN13 is active, the mode (heating/cooling) is fixed to cooling.
- SW7-2 changes the logic of IN13.

Name	Terminal block	DIP SW7-2	
		OFF	ON
IN13	TBI.4 3-4	Active at short (Default setting)	Active at open



Notes:
Use non-voltage contact signals for the switch of IN13.
The mode (heating/cooling) does not switch under the condition such as
- within 60 minutes since the mode switched last time,
- during DHW mode or legionella prevention mode,
- during outdoor unit protection control,
- during emergency operation, floor dry up operation, or abnormality.

Check the mode with the main remote controller or the cooling signal output (OUT8 ON: cooling, OFF: heating).

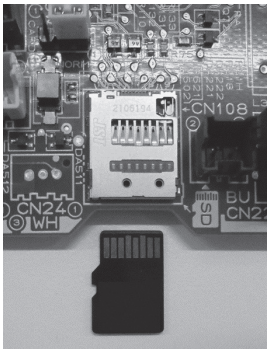
4.12 Using microSD memory card

FTC is equipped with a microSD memory card interface.
Using a microSD memory card can simplify main remote controller settings and can store operating logs. *1

*1 To edit main remote controller settings or to check operating data, an Ecodan service tool (for use with PC) is required.

<Handling precautions>

(1) Use a microSD memory card that complies with the SD standards. Check that the microSD memory card has a logo on it of those shown to the right.
(2) SD memory cards to the SD standards include microSD and microSDHC memory cards. The capacities are available up to 32 GB.
(3) Insert the microSD memory card into the FTC control board in the direction shown below.



(4) Before inserting or ejecting a microSD memory card, make sure to power off the system. If a microSD memory card is inserted or ejected with the system powered on, the stored data could be corrupted or the microSD memory card be damaged.
*A microSD memory card is live for a short duration after the system is powered off. Before insertion or ejection wait until the LED lamps on the FTC control board are all off.
(5) The read and write operations have been verified using the following microSD memory cards, however, these operations are not always guaranteed as the specifications of these microSD memory cards could change.

Manufacturer	Model	Tested in
Vantastek	Vantastek 8GB microSDHC	Sep. 2022
Longsys	NC5MC2008G-52A39	Sep. 2022
Kingston	SDCS2/32GBSP	Sep. 2022

Before using a new microSD memory card (including the card that comes with the unit), always check that the microSD memory card can be safely read and written to by the FTC controller.
<How to check read and write operations>
a) Check for correct wiring of power supply to the system. For more details, refer to section 4.1.
(Do not power on the system at this point.)
b) Insert a microSD memory card.
c) Power on the system.
d) The LED4 lamp lights if the read and write operations are successfully completed. If the LED4 lamp continues blinking or does not light, the microSD memory card cannot be read or written to by the FTC controller.

(6) Make sure to follow the instruction and the requirement of the microSD memory card's manufacturer.
(7) Format the microSD memory card if determined unreadable in step (5). This could make it readable.
Download an SD card formatter from the following site.
SD Association homepage: https://www.sdcard.org/home/
(8) FTC supports FAT12/FAT16/FAT32 file system but not NTFS/exFAT file system.
(9) Mitsubishi Electric is not liable for any damages, in whole or in part, including failure of writing to a microSD memory card, and corruption and loss of the saved data, or the like. Back up saved data as necessary.
(10) Do not touch any electronic parts on the FTC control board when inserting or ejecting a microSD memory card, or else the control board could fail.

Logos
Capacities
2 GB to 32 GB *2
SD speed classes
All

• The microSD logo is a trademark of SD-3C, LLC.

*2 A 2GB microSD memory card stores up to 30 days of operation logs.

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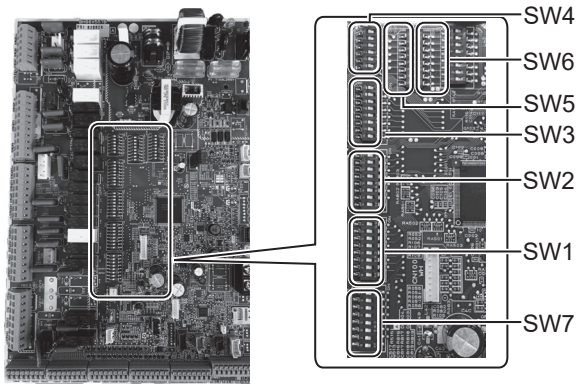
5. DIP switch setting

5.1 DIP switch functions

Located on the FTC printed circuit board are 7 sets of small white switches known as DIP switches. The DIP switch number is printed on the circuit board next to the relevant switches. The word ON is printed on the circuit board and on the DIP switch block itself. To move the switch, you will need to use a pin or the corner of a thin metal ruler or similar.

DIP switch settings are listed below in Table 5.1.1.
Only an authorised installer can change DIP switch setting under one's own responsibility according to the installation condition.
Make sure to turn off both indoor unit and outdoor unit power supplies before changing the switch settings.
For multiple outdoor units control with FTC (sub), see section 10.3.2.



<Fig. 5.1.1>

DIP switch		Function	OFF	ON	Default settings: Indoor unit model
SW1	SW1-1	Boiler	WITHOUT Boiler	WITH Boiler	OFF
	SW1-2	Heat pump maximum outlet water temperature	55ºC	60ºC	ON *1
	SW1-3	DHW tank	WITHOUT DHW tank	WITH DHW tank	OFF: PAC-IF081B-E ON : PAC-IF082/083B-E
	SW1-4	Immersion heater	WITHOUT Immersion heater	WITH Immersion heater	OFF: PAC-IF081B-E ON : PAC-IF082/083B-E
	SW1-5	Booster heater	WITHOUT Booster heater	WITH Booster heater	OFF
	SW1-6	Booster heater function	For heating only	For heating and DHW	OFF
	SW1-7	Outdoor unit type	Split type	Packaged type	OFF: PAC-IF081B-E ON : PAC-IF082/083B-E
	SW1-8	Wireless remote controller	WITHOUT Wireless remote controller	WITH Wireless remote controller	OFF
SW2	SW2-1	Room thermostat1 input (IN1) logic change	Zone 1 operation stop at thermostat short	Zone 1 operation stop at thermostat open	OFF
	SW2-2	Flow switch1 input (IN2) logic change	Failure detection at short	Failure detection at open	OFF
	SW2-3	Booster heater capacity restriction	Inactive	Active	OFF
	SW2-4	Cooling mode function	Inactive	Active	OFF
	SW2-5	Automatic switch to backup heat source operation (When outdoor unit stops by error)	Inactive	Active *2	OFF
	SW2-6	Mixing tank	WITHOUT Mixing tank	WITH Mixing tank	OFF
	SW2-7	2-zone temperature control	Inactive	Active *6	OFF
	SW2-8	Flow sensor	WITHOUT Flow sensor	WITH Flow sensor	OFF
SW3	SW3-1	Room thermostat 2 input (IN6) logic change	Zone 2 operation stop at thermostat short	Zone 2 operation stop at thermostat open	OFF
	SW3-2	Flow switch 2 and 3 input logic change	Failure detection at short	Failure detection at open	OFF
	SW3-3	—	—	—	OFF
	SW3-4	Electric energy meter	WITHOUT Electric energy meter	WITH Electric energy meter	OFF
	SW3-5	Heating mode function *3	Inactive	Active	ON
	SW3-6	2-zone valve ON/OFF control	Inactive	Active	OFF
	SW3-7	—	—	—	OFF
	SW3-8	Heat meter	WITHOUT Heat meter	WITH Heat meter	OFF
SW4	SW4-1	Multiple outdoor unit control	Inactive	Active	OFF
	SW4-2	Position of multiple outdoor unit control *7	Sub	Main	OFF
	SW4-3	—	—	—	OFF
	SW4-4	Indoor unit only operation (during installation work) *4	Inactive	Active	OFF
	SW4-5	Emergency mode (Heater only operation)	Normal	Emergency mode (Heater only operation)	OFF *5
	SW4-6	Emergency mode (Boiler operation)	Normal	Emergency mode (Boiler operation)	OFF *5
SW5	SW5-1	—	—	—	OFF
	SW5-2	Advanced Auto Adaptation	Inactive	Active	ON
	SW5-3	—	—	—	OFF
	SW5-4	—	—	—	OFF
	SW5-5	—	—	—	OFF
	SW5-6	—	—	—	OFF
	SW5-7	—	—	—	OFF
	SW5-8	—	—	—	OFF
SW6	SW6-1	—	—	—	OFF: PAC-IF081/082B-E ON: PAC-IF083B-E
	SW6-2	—	—	—	OFF
	SW6-3	Pressure sensor	Inactive	Active	OFF
	SW6-4	Analog output signal (0-10V)	Inactive	Active	OFF
	SW6-5	—	—	—	OFF
	SW6-6	—	—	—	OFF
	SW6-7	—	—	—	OFF
	SW6-8	—	—	—	OFF

en

5. DIP switch setting

DIP switch		Function	OFF	ON	Default settings: Indoor unit model
SW7	SW7-1	Mixing valve setting	Only Zone 2	Zone 1 and Zone 2	OFF
	SW7-2	Forced cooling mode input (IN13) logic change	Active at short	Active at open	OFF
	SW7-3	Cooling limit temp. input (IN15) logic change	Active at short	Active at open	OFF
	SW7-4	—	—	—	OFF
	SW7-5	—	—	—	OFF
	SW7-6	—	—	—	OFF
	SW7-7	—	—	—	OFF
	SW7-8	—	—	—	OFF

<Table 5.1.1>

Note:
***1. When the FTC unit is connected with an outdoor unit of which maximum outlet water temperature is 55ºC, DIP SW1-2 must be changed to OFF.**
***2. External output (OUT11) will be available. For safety reasons, this function is not available for certain errors. (In that case, system operation must be stopped and only the water circulation pump keeps running.)**
***3. This switches functions only when the cylinder unit is connected with a PUHZ-FRP outdoor unit. When another type of outdoor unit is connected, the heating mode function is active regardless of the fact that this switch is ON or OFF.**
***4. Space heating and DHW can be operated only in indoor unit, like an electric heater. (Refer to "5.7 Indoor unit only operation".)**
***5. If emergency mode is no longer required, return the switch to OFF position.**
***6. Active only when SW3-6 is set to OFF.**
***7. SW4-2 is available only when SW4-1 is ON.**

5. DIP switch setting

5.2 Outdoor unit type

Set DIP SW1-7 to set the outdoor unit type.

DIP SW1-7	Setting	Note
OFF	Split type	Necessary to connect TH2
ON	Packaged type	Not necessary to connect TH2

Set DIP SW1-2 to set the heat pump maximum outlet water temperature.

DIP SW1-2	Setting
OFF	55°C
ON	60°C

Note: When DIP SW1-2 is OFF (55°C) and an electric heater is not installed (*), 'Legionellla Prevention Mode' is NOT available.

* DIP SW settings set when no electric heater is installed.

DIP SW1-2	DIP SW1-4	DIP SW1-5	DIP SW1-6
OFF	OFF	ON	OFF
OFF	OFF	OFF	(ON/OFF)

5.3 Functions setting

Set DIP SW1-1 to set whether the system has a boiler.

DIP SW1-1	Setting
OFF	WITHOUT boiler
ON	WITH boiler

When DIP SW1-1 is OFF, back-up operation of boiler is not available.

Set DIP SW1-3 to set whether the system has a DHW tank.

DIP SW1-3	Setting	Note
OFF	WITHOUT DHW tank	Not necessary to connect THW5
ON	WITH DHW tank	Necessary to connect THW5

When DIP SW1-3 is OFF, DHW mode is not available.

Set DIP SW1-4 to set whether the system has an immersion heater.

DIP SW1-4	Setting
OFF	WITHOUT immersion heater
ON	WITH immersion heater

Set DIP SW1-5 to set whether the system has a booster heater.

DIP SW1-5	Setting
OFF	WITHOUT booster heater
ON	WITH booster heater

Set DIP SW1-6 to set the booster heater function.

DIP SW1-6	Setting
OFF	For heating only
ON	For heating and DHW

Set DIP SW2-6 to set whether the system has a mixing tank.

DIP SW2-6	Setting
OFF	WITHOUT mixing tank
ON	WITH mixing tank

When DIP SW2-6 is OFF, back-up operation of boiler is not available.
When DIP SW2-6 is OFF, 2-zone temperature control is not available.

Set DIP SW2-7 to activate or deactivate 2-zone temperature control.

DIP SW2-7	Setting
OFF	Inactive
ON	Active

Set DIP SW2-8 to set whether the system has a flow sensor.

DIP SW2-8	Setting
OFF	WITHOUT flow sensor
ON	WITH flow sensor

Set DIP SW3-4 to set whether the system has an electric energy meter.

DIP SW3-4	Setting
OFF	WITHOUT electric energy meter
ON	WITH electric energy meter

Set DIP SW3-6 to activate or deactivate 2-zone valve ON/OFF control.

DIP SW3-6	Setting
OFF	Inactive
ON	Active

Set DIP SW3-8 to set whether the system has a heat meter.

DIP SW3-8	Setting
OFF	WITHOUT heat meter
ON	WITH heat meter

Set DIP SW4-1 to activate or deactivate multiple units control.

DIP SW4-1	Setting
OFF	Inactive
ON	Active

When DIP SW4-1 is OFF, 2-zone temperature control and 2-zone valve ON/OFF control is not available.

Set DIP SW4-2 to set main or sub of multiple units control.

DIP SW4-2	Setting
OFF	Sub
ON	Main

When multiple units control is not available, setting of DIP SW4-2 is not necessary.

Set DIP SW5-2 to activate or deactivate advanced Auto Adaptation.

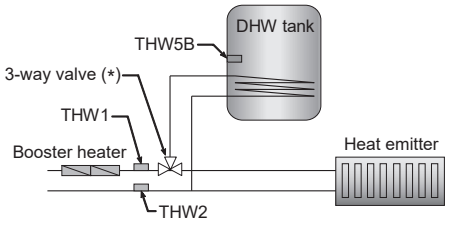
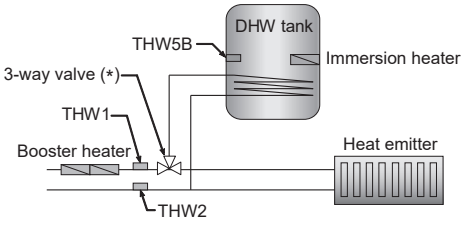
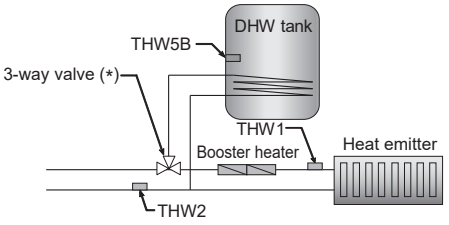
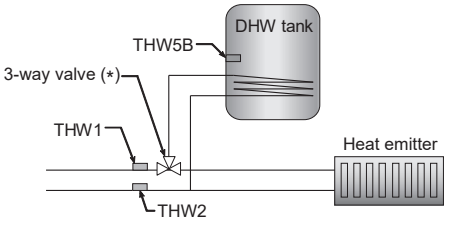
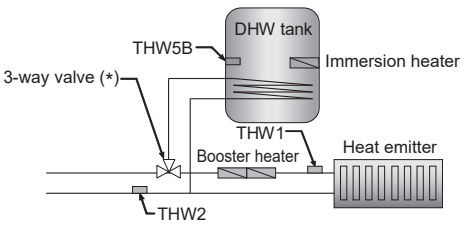
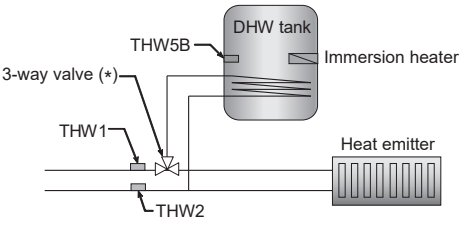
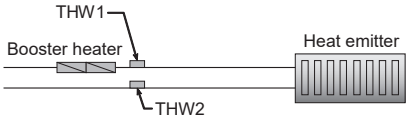
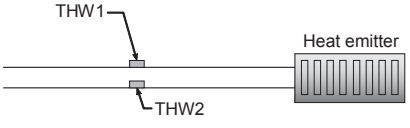
DIP SW5-2	Setting
OFF	Inactive
ON	Active

Set DIP SW7-1 to set the target zone of mixing valve.

DIP SW7-1	Setting
OFF	Only Zone 2
ON	Zone 1 and Zone 2

5. DIP switch setting

<Summary of Function setting>

DIP SW1-3 (DHW tank)	DIP SW1-4 (Immersion heater)	DIP SW1-5 (Booster heater)	DIP SW1-6 (BH function)	System diagram
ON (WITH DHW tank)	OFF (WITHOUT immersion heater)	ON (WITH booster heater)	ON (For heating and DHW)	
ON (WITH DHW tank)	ON (WITH immersion heater)	ON (WITH booster heater)	ON (For heating and DHW)	
ON (WITH DHW tank)	OFF (WITHOUT immersion heater)	ON (WITH booster heater)	OFF (For heating only)	
ON (WITH DHW tank)	OFF (WITHOUT immersion heater)	OFF (WITHOUT booster heater)	—	
ON (WITH DHW tank)	ON (WITH immersion heater)	ON (WITH booster heater)	OFF (For heating only)	
ON (WITH DHW tank)	ON (WITH immersion heater)	OFF (WITHOUT booster heater)	—	
OFF (WITHOUT DHW tank)	OFF (WITHOUT immersion heater)	ON (WITH booster heater)	OFF	
OFF (WITHOUT DHW tank)	OFF (WITHOUT immersion heater)	OFF (WITHOUT booster heater)	—	

* The use of two 2-way valves can perform same function as a 3-way valve.

5. DIP switch setting

5.4 Operation setting

Set DIP SW1-8 to set whether the system has a wireless remote controller.

DIP SW1-8	Setting
OFF	WITHOUT wireless remote controller
ON	WITH wireless remote controller

Set DIP SW2-1 to set the room thermostat 1 input (IN1) logic.

DIP SW2-1	Setting
OFF	Operation stop at thermostat short
ON	Operation stop at thermostat open

Set DIP SW2-2 to set the flow switch 1 input (IN2) logic.

DIP SW2-2	Setting
OFF	Failure detection at short
ON	Failure detection at open

Set DIP SW2-3 to set the restriction on the capacity of booster heater.

DIP SW2-3	Setting
OFF	Inactive
ON	Active

When DIP SW2-3 is ON, booster heater 2 operation is not available. (Only booster heater 1 is available.)

Notes: ① When installing one booster heater, use OUT6 (Booster Heater 1) and switch SW2-3 to ON.
② When installing two booster heaters, use OUT6 (Booster Heater 1) and OUT7 (Booster heater 2). In such cases, use OUT7 (Booster heater 2) to connect the one with higher capacity.

Reference: Summary of booster heater control
The booster heater is controlled in the following three steps.

		Booster heater 1 (OUT6)	Booster heater 2 (OUT7)	
OFF		OFF	OFF	Controlled to this extent when SW2-3 is ON.
ON	STEP 1	ON	OFF	
	STEP 2	OFF	ON	
	STEP 3	ON	ON	

Set DIP SW2-4 to activate or deactivate cooling mode.

DIP SW2-4	Setting
OFF	Inactive
ON	Active

When DIP SW2-4 is OFF, cooling mode is not available.

Set DIP SW2-5 to set the automatic switch to backup heater only operation. (When outdoor unit stops by error.)

DIP SW2-5	Setting
OFF	Inactive
ON	Active

Set DIP SW3-1 to set the room thermostat 2 input (IN6) logic.

DIP SW3-1	Setting
OFF	Operation stop at thermostat short
ON	Operation stop at thermostat open

Set DIP SW3-2 to set the flow switch 2 and 3 input logic.

DIP SW3-2	Setting
OFF	Operation stop at thermostat short
ON	Operation stop at thermostat open

Set DIP SW3-5 to activate or deactivate heating mode.

DIP SW3-5	Setting
OFF	Inactive
ON	Active

When the connected outdoor unit is not of PUHZ-FRP model, heating mode is always active regardless of DIP SW3-5 setting.

Set DIP SW4-4 to activate or deactivate indoor unit only operation.

DIP SW4-4	Setting
OFF	Inactive
ON	Active

5.5 Emergency mode (Heater only operation)

The emergency mode is available when a failure on the outdoor unit of the heat pump or a communication error occurs.
This mode uses booster heater or immersion heater as a heat source and automatically controls between the DHW mode and the heating mode. When the system is not incorporated with heater, the emergency mode is not available.
Before starting the emergency mode, turn off the outdoor unit and FTC (Main), and then turn DIP SW4-5 to ON. Then, turn on FTC (Main) to start the emergency mode. FTC (Main) can be power-supplied by the outdoor unit or directly by power source.
If emergency mode is no longer required, please turn off both outdoor and indoor unit power supply before returning DIP SW4-5 to OFF position.

5.6 Emergency mode (Boiler operation)

The emergency mode is available when a failure on the outdoor unit of the heat pump or a communication error occurs.
This mode uses boiler as a heat source and automatically controls the heating mode. When the system is not incorporated with boiler, the emergency mode is not available.
Before starting the emergency mode, turn off the outdoor unit and FTC (Main), and then turn DIP SW4-6 to ON. Then, turn on FTC (Main) to start the emergency mode. FTC (Main) can be power-supplied by the outdoor unit or directly by power source.
If emergency mode is no longer required, please turn off both outdoor and indoor unit power supply before returning DIP SW4-6 to OFF position.

5.7 Indoor unit only operation (during installation work)

In the case when DHW or heating operation is required prior to connection of the outdoor unit; i.e. during installation work, an electric heater in indoor unit (*1) can be used.
Not available during multiple outdoor unit control.
*1 Model with electric heater only.

1. To start operation
● Check if the indoor unit power supply is OFF, and turn DIP SW4-4 and 4-5 ON.
● Turn ON the indoor unit power supply.

2. To end operation*
● Turn OFF the indoor unit power supply.
● Turn DIP SW4-4 and 4-5 OFF.
*When the indoor unit only operation is ended, ensure to check over the settings after outdoor unit is connected.

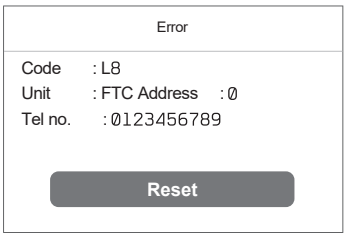
Note:
Prolonged running of this operation may affect the life of the electric heater.

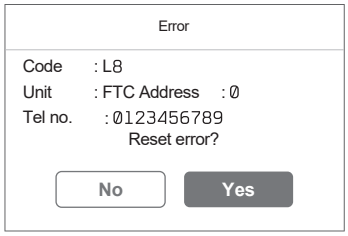
6. Before test run

6.1. Check

After completing installation and the wiring and piping of the local application and outdoor units, check for refrigerant leakage, looseness in the power supply or control wiring, wrong polarity, and power cable is securely connected.
Use a 500-volt megohmmeter to check that the resistance between the power supply terminals and ground is at least 1.0 MΩ.

⚠ **WARNING:**
Do not use the system if the insulation resistance is less than 1.0MΩ.
⚠ **CAUTION:**
Do not carry out this test on the control wiring (low voltage circuit) terminals.





6.2. Self-check

When an error occurs when power is applied or during operation
■ Indication of error details
The code, unit, address, and telephone number are displayed.
The telephone number is displayed if registered.
■ Resetting the error
Press the F4 (RESET) button, and the F3 (Yes) button to reset the current error.

Code	Error	Action
L3	Circulation water temperature overheat protection	Flow rate may be reduced. Check for; • Water leakage • Magnetic filter / Strainer blockage • Water circulation pump function (Error code may display during filling of primary circuit, complete filling and reset error code.)
L4	DHW tank water temperature overheat protection	Check the immersion heater and it's contactor.
L5	Indoor unit temperature thermistor (THW1, THW2, THW5A, THW5B, THW6, THW7, THW8, THW9) failure	Check resistance across the thermistor.
L6	Circulation water freeze protection	See Action for L3.
L8	Heating operation error	Check and re-attach any thermistors that have become dislodged.
L9	Low primary circuit flow rate detected by flow sensor or flow switch (flow switches 1, 2, 3)	See Action for L3. If the flow sensor or flow switch itself does not work, replace it. **Caution: The pump valves may be hot, please take care.**
LA	Pressure sensor failure	Check pressure sensor cable for damage or loose connections.
LB	High pressure protection	• Flow rate of the heating circuit may be reduced. Check water circuit. • Plate heat exchanger may be clogged. Check the plate heat exchanger. • Outdoor unit failure. Check refrigerant volume, valve, LEV coil and pipe crushing of outdoor unit.
LC	Boiler circulation water temperature overheat protection	Check if the setting temperature of the Boiler for heating exceeds the restriction. (See the manual of the thermistors "PAC-TH012HT(L)-E".)
		Flow rate of the heating circuit from the boiler may be reduced. Check for • Water leakage • Magnetic filter / Strainer blockage • Water circulation pump function
LD	Thermistor (Boiler flow water temp.) (THWB1) failure	Check resistance across the thermistor.
LE	Boiler operation error	See Action for L8. Check the status of the boiler.
LF	Flow sensor failure	Check flow sensor cable for damage or loose connections.
LH	Boiler circulation water freeze protection	Flow rate of the heating circuit from the boiler may be reduced. Check for • Water leakage • Magnetic filter / Strainer blockage • Water circulation pump function
LJ	DHW operation error (type of external plate HEX)	• Check for disconnection of thermistor (DHW tank lower water temp.) (THW5B). • Flow rate may be reduced. • Check for water circulation pump function. (primary / sanitary)
LL	Setting errors of DIP switches on FTC control board	For boiler operation, check that DIP SW1-1 is set to ON (With Boiler) and DIP SW2-6 is set to ON (With Mixing Tank). For 2-zone temperature control, check DIP SW2-7 is set to ON (2-zone) and DIP SW2-6 is set to ON (With Mixing Tank).
LP	Out of water flow rate range for outdoor heat pump unit	Check the Table 3.4.1 Check remote controller settings ([Service]→[Heat pump settings]→[Heat pump flow rate range]) See Action for L3.
P1	Thermistor (Room temp.) (TH1) failure	Check resistance across the thermistor.
P2	Thermistor (Ref. liquid temp.) (TH2) failure	Check resistance across the thermistor.
P6	Anti-freeze protection of plate heat exchanger	See Action for L3. Check for correct amount of refrigerant.
J0	Communication failure between FTC and wireless receiver	Check connection cable for damage or loose connections.
J1 - J8	Communication failure between wireless receiver and wireless remote controller	Check wireless remote controller's battery is not flat. Check the pairing between wireless receiver to wireless remote controller. Test the wireless communication. (See the manual of wireless system.)
J9	Communication failure between FTC (Main) and FTC (Sub).	Check connection cable for damage or loose connections.
E0 - E5	Communication failure between main remote controller and FTC	Check connection cable for damage or loose connections.
E6 - EF	Communication failure between FTC and outdoor unit	Check that the outdoor unit has not been turned off. Check connection cable for damage or loose connections. Refer to outdoor unit service manual.
E9	Outdoor unit receives no signal from indoor unit.	Check both units are switched on. Check connection cable for damage or loose connections. Refer to outdoor unit service manual.
EE	Combination error between FTC and outdoor unit	Check combination of FTC and outdoor unit.
U*, F*	Outdoor unit failure	Refer to outdoor unit service manual.
A*	M-NET communication error	Refer to outdoor unit service manual.

Note: To cancel error codes, please switch system off (Touch [Reset] on main remote controller).

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7. Remote controller

For description of each LED (LED1 to 3) provided on the FTC, refer to the following table.

LED 1 (Power for microcomputer)	Indicates whether control power is supplied. Make sure that this LED is always lit.
LED 2 (Power for main remote controller)	Indicates whether power is supplied to the main remote controller. This LED lights only in the case of the FTC (Main) unit which is connected to the outdoor unit refrigerant address “0“.
LED 3 (Communication between FTC and outdoor unit)	Indicates state of communication between the FTC and outdoor unit. Make sure that this LED is always blinking.

Note
(Marking for WEEE)

This symbol mark is for EU countries only.
This symbol mark is according to the directive 2012/19/EU Article 14 Information for users and Annex IX.

Your Mitsubishi Electric products have been manufactured with high quality materials and components which can be recycled and/or reused. This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from your household waste.
Please, dispose of this equipment at your local community waste collection/recycling centre.
In the European Union, there are separate collection systems for used electrical and electronic product.
Please, help us to conserve the environment we live in!

7.1. Safety precautions

FOR USER

► Before installing the unit, make sure you read all the “Safety Precautions”.
► The “Safety Precautions” provide very important points regarding safety. Make sure you follow them.
► Please report to or take consent by the supply authority before connection to the system.

Symbols used in the text
⚠ WARNING:
Describes precautions that should be observed to prevent danger of injury or death to the user.
⚠ CAUTION:
Describes precautions that should be observed to prevent damage to the unit.

Symbols used in the illustrations
⏚ : Indicates a part which must be grounded.

⚠ WARNING:

- **For appliances not accessible to the general public.**
- **The unit must not be installed by the user. Ask the dealer or an authorized company to install the unit. If the unit is installed improperly, water leakage, electric shock or fire may result.**
- **Do not stand on, or place any items on the unit.**
- **Do not splash water over the unit and do not touch the unit with wet hands. An electric shock may result.**
- **Do not spray combustible gas close to the unit. Fire may result.**
- **Do not place a gas heater or any other open-flame appliance where it will be exposed to the air discharged from the unit. Incomplete combustion may result.**
- **Do not remove the front panel or the fan guard from the outdoor unit when it is running.**
- **When you notice exceptionally abnormal noise or vibration, stop operation, turn off the power switch, and contact your dealer.**
- **Never insert fingers, sticks, etc. into the intakes or outlets.**
- **If you detect odd smells, stop using the unit, turn off the power switch and consult your dealer. Otherwise, a breakdown, electric shock, or fire may result.**
- **If the supply cable is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.**
- **This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.**
- **Children should be supervised to ensure that they do not play with the appliance.**
- **If the refrigeration gas blows out or leaks, stop the operation of the air conditioner, thoroughly ventilate the room, and contact your dealer.**
- **Do not install in location that is hot or humid for long periods of time.**

⚠ CAUTION:

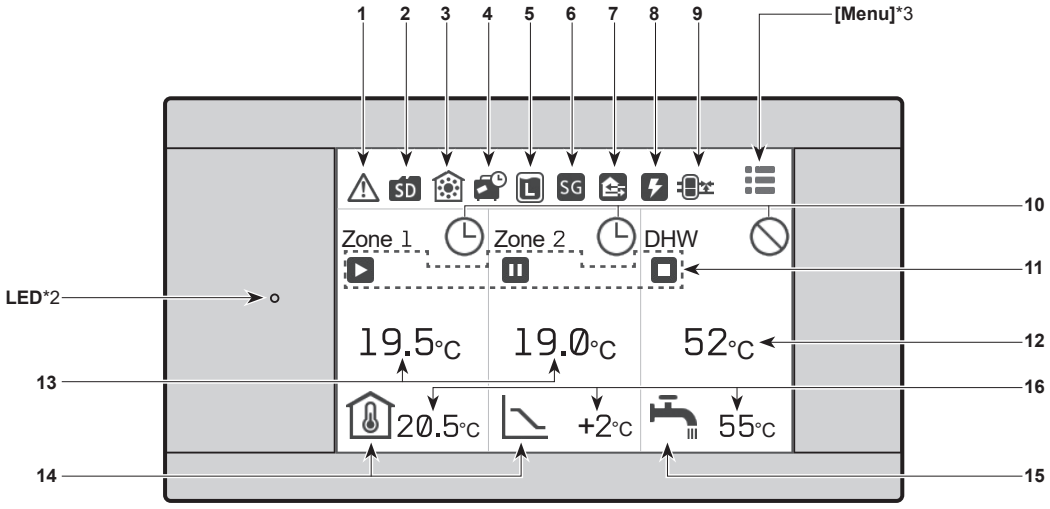
- **Do not use any sharp object to push the buttons, as this may damage the main remote controller.**
- **Never block or cover the indoor or outdoor unit’s intakes or outlets.**

Disposing of the unit
When you need to dispose of the unit, consult your dealer.

7. Remote controller

■ Main remote controller

To change the settings of your heating/cooling system, please use the main remote controller located on the wall or the front panel of the cylinder unit or hydrobox. The following is a guide to viewing the main settings. Should you require more information, please contact your installer or local Mitsubishi Electric dealer. Some functions are not available depending on the system configuration. These functions are grayed out or not shown.
Note: The terms displayed on the remote controller are enclosed in square brackets.



[Home screen] (Full screen*1)

Home screen icons

No.	Icons	Description
1	⚠	Alert (for multiple outdoor units control) Touching the menu icon displays error codes.
	J1	Alert Error codes are displayed.
2	SD	SD card is inserted. Normal operation
	SD	SD card is inserted. Abnormal operation
3		Heating mode
		Cooling mode
4		Holiday schedule is activated.
5	L	Legionella prevention mode is running.
6	SG	Smart grid ready is running.
7		Compressor is running.
		Compressor is running and defrosting.
		Compressor is running and in quiet mode. The sound level is shown at left side of the icon.
	⚠	Emergency heating
8		Electric heater is running.

No.	Icons	Description
9		Boiler is running.
		Buffer tank control is running.
10		Schedule
		Prohibited
		Cloud control
11		Operation
		Standby
		This unit is in standby whilst other indoor unit(s) is in operation by priority.
		Stop
12	Actual DHW tank temperature values	
13	Actual room temperature values [-- °C] appears when the unit is not connected to the room RC (Remote Controller) and it is under control other than Auto Adaptation.	

No.	Icons	Description
14		Weather compensation curve When the operation stops: Black During heating operation: Orange During cooling operation: Blue
	*4	Auto Adaptation (Target room temperature) When the operation stops: Black During heating operation: Orange
		Flow temperature (Target flow temperature) When the operation stops: Black During heating operation: Orange During cooling operation: Blue
15		DHW icon is displayed when DHW is enabled. When the operation stops: Black During operation: Orange
16	Target temperature values The settable temperature differs depending on the control logic.	

- The screen will turn off when the main remote controller is not operated for a while. Touching any part of the screen turns it on again.
- From [Touch screen] in [Setting], the brightness can be adjusted.
- By selecting [Always on] for [Backlight time] from [Touch screen] in [Setting], the backlight stays lit for 30 seconds and after it dims down.

***1 From [Setting], the screen can be switched to the full screen or the base screen.**
The base screen does not display the operation icons and the target temperature values.
***2 From [Display] in [Setting], the LED lamp can be turned on/off.**
***3 Pressing and holding the menu icon ☰ for 3 seconds switches the lock menu to on/off.**
Some functions cannot be edited when the lock menu is on.
(The icon changes to ☰ when the lock menu is on.)
***4 Auto Adaptation cannot be selected during the cooling mode.**

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7. Remote controller

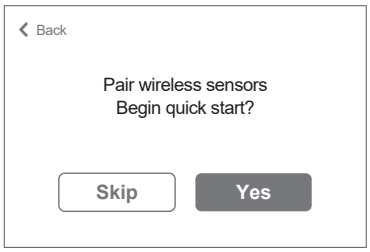
■ Quick start

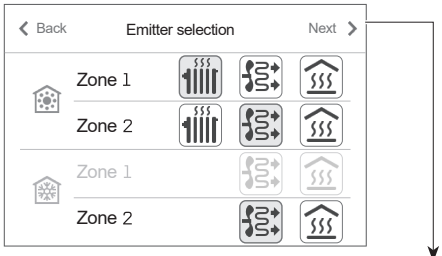
When the main remote controller is switched on for the first time, the screen automatically goes to the [Language], [Date/Time], [System configuration], and quick start setting screen in order. On the quick start setting screen, the following items can be set.

Note:
[Electric booster heater use]
This setting restricts the booster heater capacity. It is NOT possible to change the setting after starting up.
If you do not have any special requirements (such as building regulations) in your country, skip this setting (select [Next]).

Quick start
- [Zone sensor selection]*1
- [Emitter selection]
- [Control logic]
- [Outdoor design temperature]
- [Zone sensor selection]*2
- [DHW]
- [Flow rate & pump speed]
- [Electric booster heater use]*3

*1 Selection of zone to assign each wireless remote controller
*2 Selection of room sensors for monitoring the room temperature
*3 It cannot be reset, so be careful when you set it.





[Emitter selection]

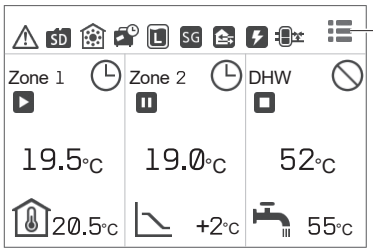
Next setting

■ Lock menu

Pressing and holding the menu icon for 3 seconds switches the lock menu to on.
(The icon changes to when the lock menu is on.)
Some functions cannot be edited in this state.

Note: You need a password to edit [Service] even when the lock menu is off.

Refer to the main controller menu tree for details of the items which cannot be edited when the lock menu is on.



[Home screen]

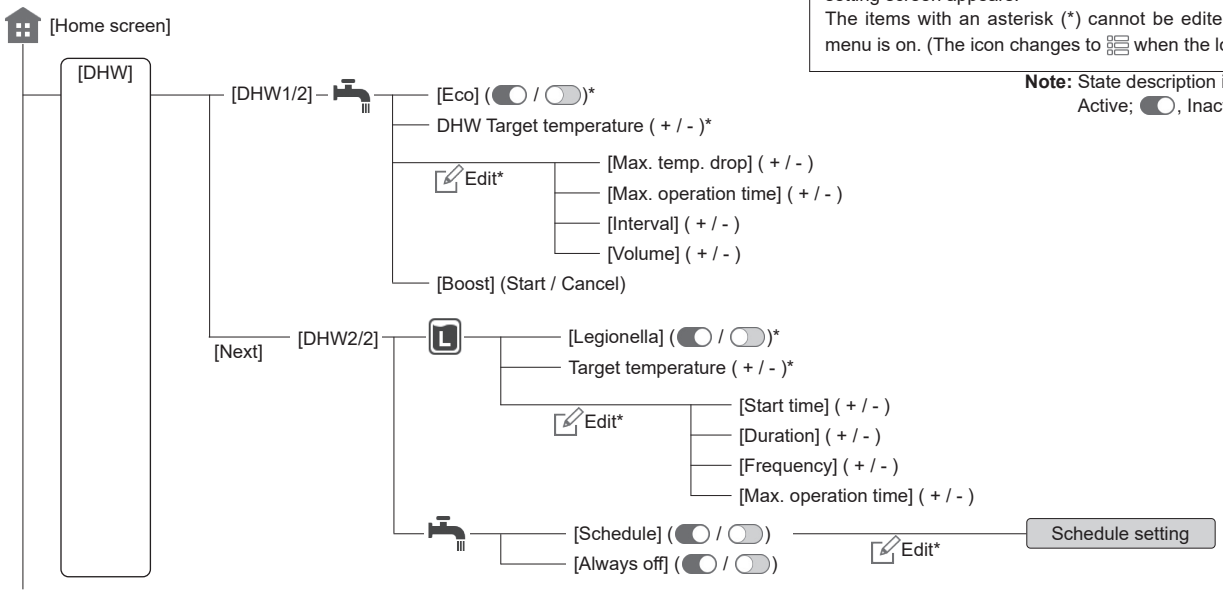
Press and hold the icon for 3 seconds.

Lock

<Main Controller Menu Tree>

When the system is started up for the first time, the quick start setting screen appears.
The items with an asterisk (*) cannot be edited when the lock menu is on. (The icon changes to when the lock menu is on.)

Note: State description indicated by toggle
Active; , Inactive;

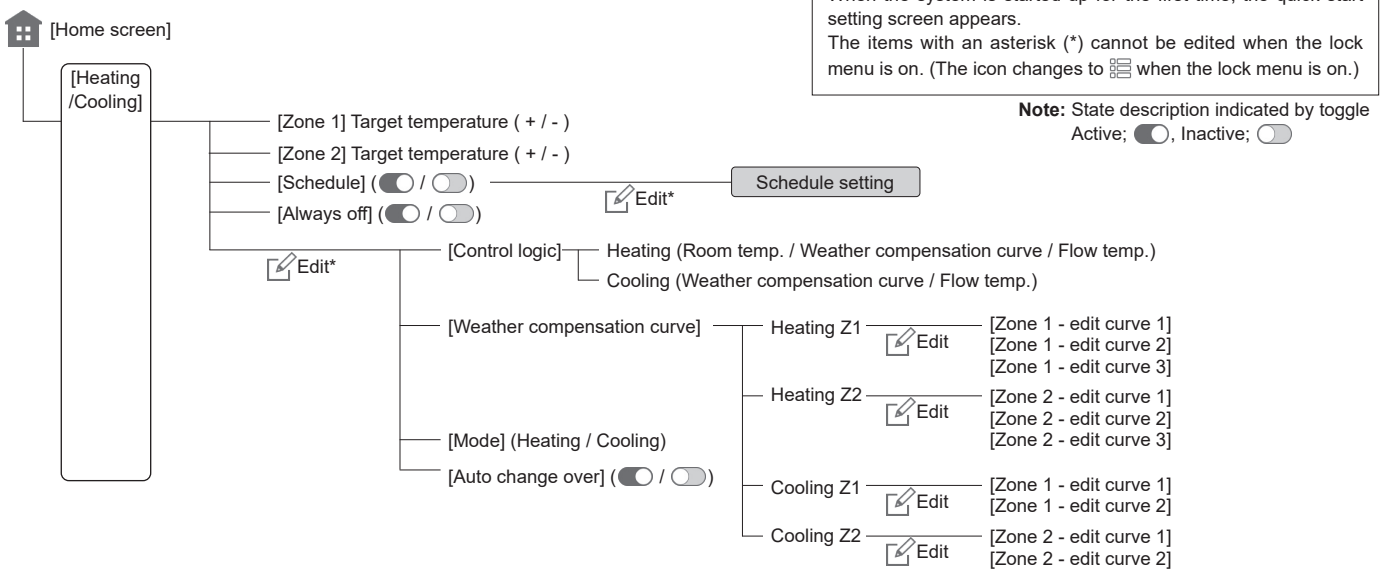


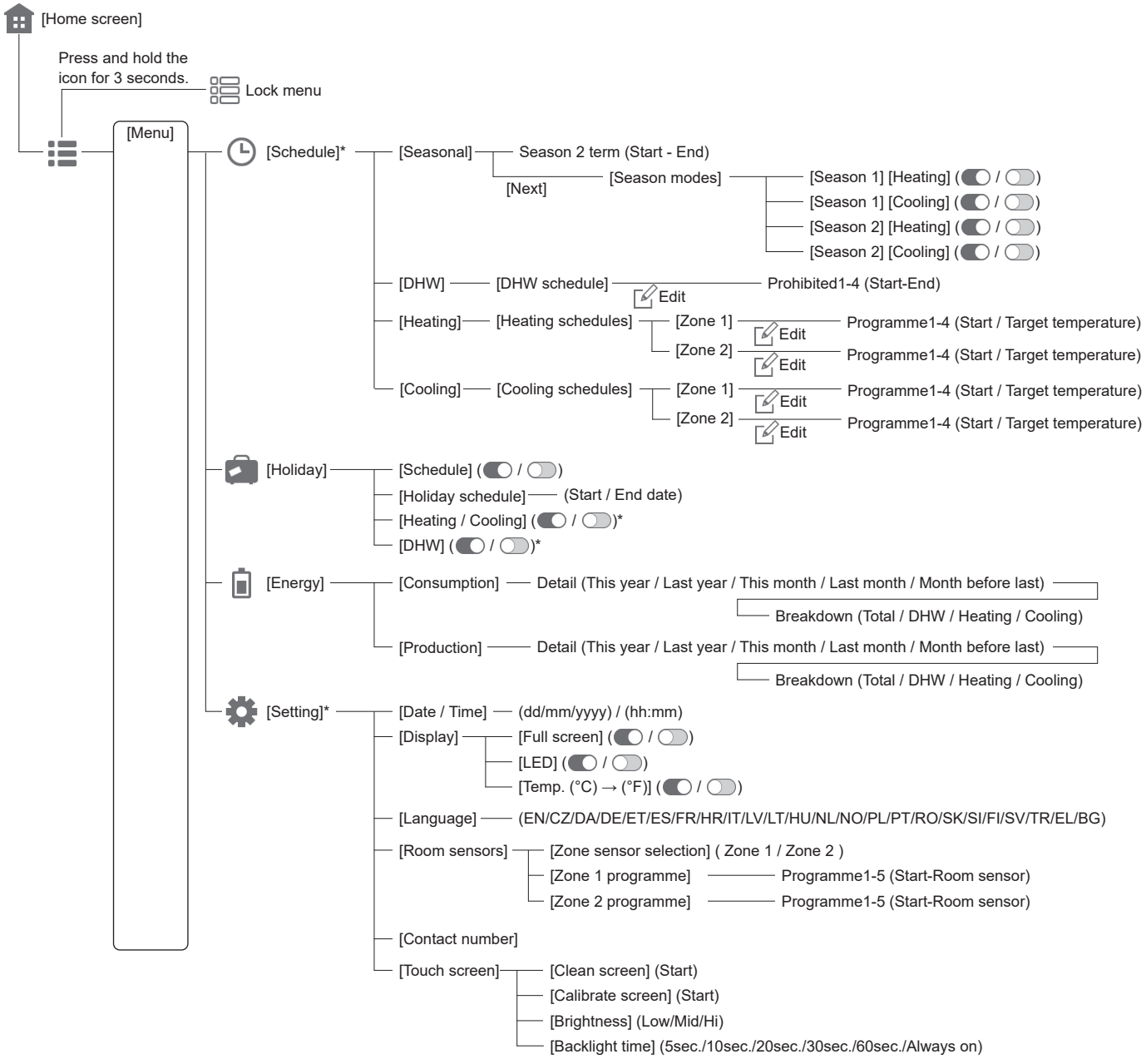
7. Remote controller

<Main Controller Menu Tree>

When the system is started up for the first time, the quick start setting screen appears.
The items with an asterisk (*) cannot be edited when the lock menu is on. (The icon changes to ☰ when the lock menu is on.)

Note: State description indicated by toggle
Active; ●, Inactive; ○





en

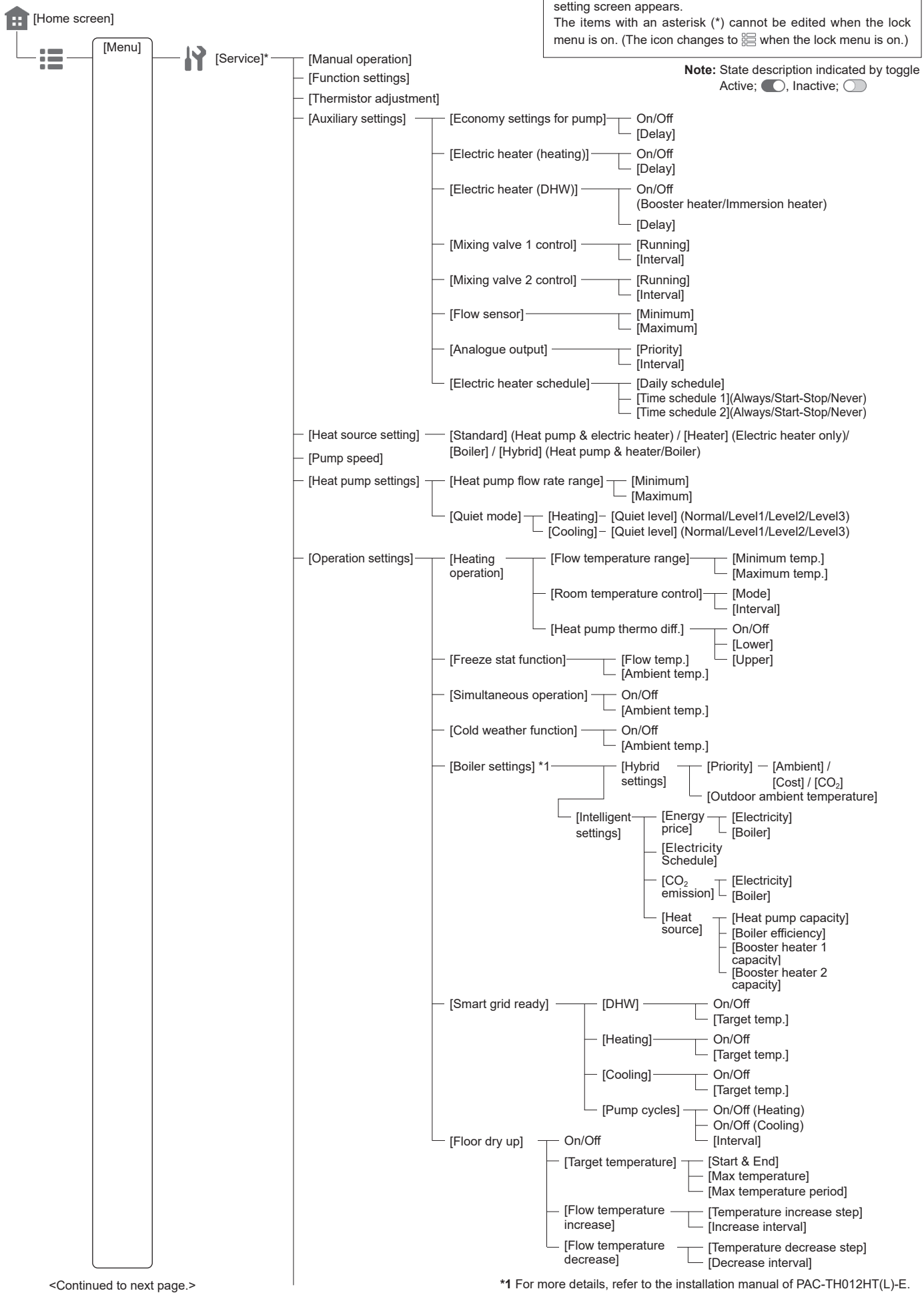
7. Remote controller

Continued from the previous page.

<Main Controller Menu Tree>

When the system is started up for the first time, the quick start setting screen appears.
The items with an asterisk (*) cannot be edited when the lock menu is on. (The icon changes to when the lock menu is on.)

Note: State description indicated by toggle
Active; , Inactive;



<Continued to next page.>

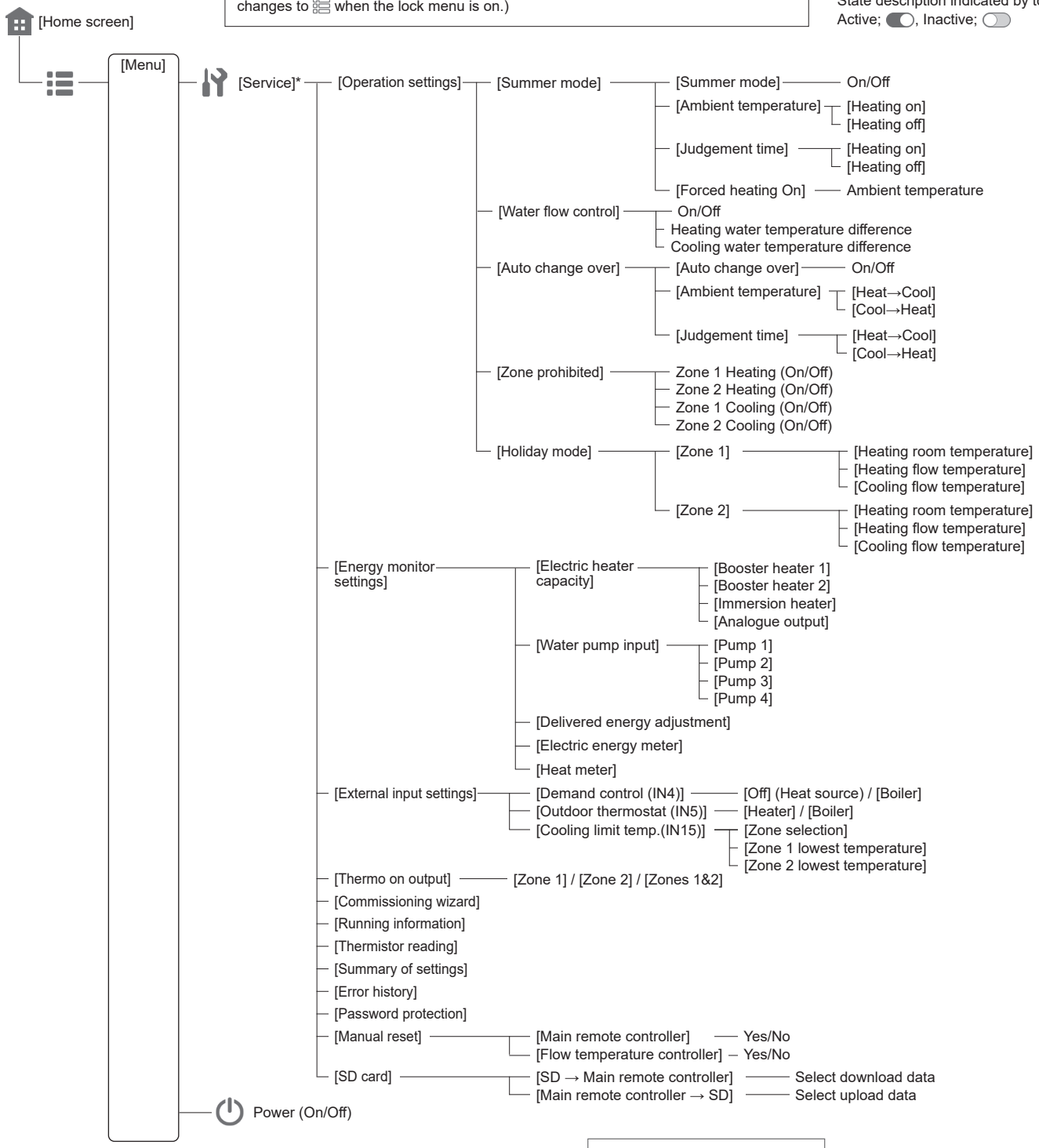
1 For more details, refer to the installation manual of PAC-TH012HT(L)-E.

Continued from the previous page.

<Main Controller Menu Tree>

When the system is started up for the first time, the quick start setting screen appears. The items with an asterisk (*) cannot be edited when the lock menu is on. (The icon changes to ☰ when the lock menu is on.)

- Note:
  State description indicated by toggle
  Active; ●, Inactive; ○

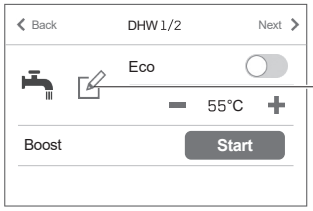


DHW (Domestic Hot Water) / Legionella Prevention

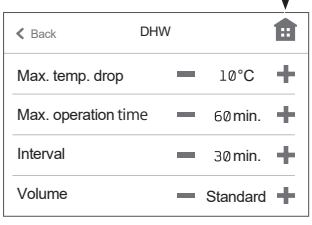
The DHW and legionella prevention menus control the operation of DHW tank heat ups.

DHW mode settings

- [DHW]: The Eco mode can be activated/deactivated by the toggle.
  The target temperature can be adjusted by +/-.
  From the edit icon ✎, [Max. temp. drop], [Max. operation time], [Interval], and [Volume] can be set.



[DHW]



[DHW]

en

Menu subtitle	Function	Range	Unit	Default value
DHW target temp.	Desired temperature of stored hot water	40 - 70*1	°C	50
[Max. temp. drop]	Difference in temperature between the DHW maximum temperature and the temperature at which DHW mode restarts	5 - 40*2	°C	10
[Max. operation time]	Maximum time allowed for stored water heating DHW mode	30 - 120	min.	60
[Interval]	The time period after DHW mode when space heating has priority over DHW mode temporarily preventing further stored water heating (Only when DHW max. operation time has passed.)	30 - 120	min.	30

***1 The maximum temperature differs depending on the connected outdoor unit. (60°C/65°C/70°C)**
***2 When the DHW maximum temperature is set over 55°C, the temperature at which DHW mode restarts must be less than 50°C to protect the device.**

[Eco]
DHW mode can run in either normal or Eco mode. Normal mode will heat the water in the DHW tank fast using the full power of the heat pump. Eco mode takes a little longer to heat the water in the DHW tank, but the energy used is reduced. This is because heat pump operation is restricted using signals from the FTC based on measured DHW tank temperature.

Note: The actual energy saved in Eco mode will vary according to outdoor ambient temperature.

[Volume]
Select the amount of DHW tank. If you need much hot water, select [Large].

Return to the DHW/legionella prevention menu.

Legionella prevention mode settings (LP mode)

- [Legionella]: It can be activated/deactivated by the toggle.
  The target temperature can be changed by +/-.
  From the edit icon, [Start time], [Duration], [Frequency], and [Max. operation time] can be set.
- [Schedule]: It can be activated/deactivated by the toggle.
- [Always off]: It can be activated/deactivated by the toggle.

During LP mode, the temperature of the stored water is increased above 60°C to inhibit legionella bacteria growth. It is strongly recommended that this is done at regular intervals. Please check local regulations for the recommended frequency of heat ups.

Please note that LP mode uses the assistance of electric heaters to supplement the energy input of the heat pump. Heating water for long periods of time is not efficient and will increase running costs. The installer should give careful consideration to the necessity of legionella prevention treatment whilst not wasting energy by heating the stored water for excessive time periods. The end user should understand the importance of this feature.
ALWAYS COMPLY WITH LOCAL AND NATIONAL GUIDANCE FOR YOUR COUNTRY REGARDING LEGIONELLA PREVENTION.

Note 1: When failures occur on the hydrobox, the LP mode may not function normally.
Note 2: Even when DHW operation is prohibited, LP mode will operate.

Menu subtitle	Function	Range	Unit	Default value
Hot water temp.	Desired temperature of stored hot water	60 - 70	°C	65
[Start time]	Time when LP mode will begin	0:00 - 23:00	-	03:00
[Duration]	The time period after LP mode desired water temperature has been reached	1 - 120	min.	30
[Frequency]	Time between LP mode DHW tank heat up	1 - 30	day	15
[Max. operation time]	Maximum time allowed for LP mode DHW tank heat	1 - 5	h	3

[Setting]

From the menu icon, access [Setting].
The following items can be edited in [Setting].

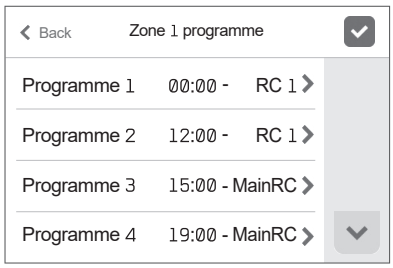
- [Date / time]
- [Display] (From [Setting], the screen can be switched to the full screen or the base screen.)
- [Language]
- [Room sensors]
- [Contact number]
- [Touch screen] ([Calibrate screen]*1, [Clean screen]*2, [Brightness], and [Backlight time])

Follow the procedure described in General Operation for the set up operation.

*1 Touching the 9 dots displayed on the screen starts calibration.
To properly calibrate the touch panel, use a pointy but not sharp object to touch the dots.
Note: A sharp object may damage or scratch the touch screen.

*2 You can wipe the screen while touch operations are invalid for 30 seconds.
Wipe with a soft dry cloth, a cloth soaked in water with mild detergent, or a cloth dampened with ethanol.
Do not use acidic, alkaline, or organic solvents.

[Room sensors]
For [Room sensors], it is important to choose the correct room sensor depending on the heating and cooling mode the system will operate in.



[Zone 1 programme]

<table>
<tr><th>Menu subtitle</th><th>Description</th></tr>
<tr><td>[Zone sensor selection]</td><td>When 2-zone temperature control is active and wireless remote controllers are available, select [Zone sensor selection] in [Room sensors] from [Setting], and then select zone No. (Zone 1/Zone 2) to assign each remote controller.</td></tr>
<tr><td>[Zone 1 programme]
[Zone 2 programme]</td><td>From [Zone 1 programme] or [Zone 2 programme], select a wireless remote controller to be used for monitoring the room temperature from Zone 1 and Zone 2 separately.
<table>
<tr><th rowspan="2">Control option *</th><th colspan="2">Corresponding initial settings room sensor</th></tr>
<tr><th>[Zone 1]</th><th>[Zone 2]</th></tr>
<tr><td>A
Zone 1 ; Auto Adaptation (Target room temperature)
Zone 2 ; Weather compensation curve or flow temperature control</td><td>RC 1~8
(Wireless remote controller)</td><td>*1</td></tr>
<tr><td>B
Zone 1 ; Auto Adaptation (Target room temperature)
Zone 2 ; Weather compensation curve or flow temperature control</td><td>TH1
(Room temperature thermistor (option))</td><td>*1</td></tr>
<tr><td>C
Zone 1 ; Auto Adaptation (Target room temperature)
Zone 2 ; Weather compensation curve or flow temperature control</td><td>[MainRC]
(Main remote controller)</td><td>*1</td></tr>
<tr><td>D
Zone 1 ; Weather compensation curve or flow temperature control
Zone 2 ; Weather compensation curve or flow temperature control</td><td>*1</td><td>*1</td></tr>
</table>
* Refer to the website manual for details.
*1. Not specified (if a locally-supplied room thermostat is used)
RC 1-8 (if a wireless remote controller is used as a room thermostat)
The wireless remote controller to be used can be changed up to 4 times within 24 hours according to the set time schedule. (Programme 1-5)</td></tr>
</table>

[Service]

The service menu provides functions to be used by installer or service engineer. It is NOT intended for the home owner to alter settings within this menu. It is for this reason password protection is required to prevent unauthorised access to the service settings.

The factory default password is “0000”.
Follow the procedure described in [Password protection] for the set up operation.

Many functions can not be set whilst the indoor unit is running. The installer should turn off the unit before trying to set these functions. If the installer attempts to change the settings whilst the unit is running, the main remote controller will display a reminder message prompting the installer to stop operation before continuing. By selecting “Yes”, the unit will cease operation.

[Manual operation]

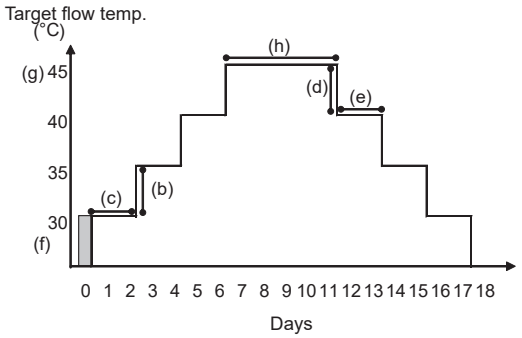
During the filling of the system, the primary circuit circulation pump, 3-way valve and mixing valve can be manually overridden using manual operation mode.
When manual operation is selected, a small timer icon appears in the screen. When selected, this function will only remain in manual operation for a maximum of 2 hours. This is to prevent accidental permanent override of the FTC.

Manual operation and heat source setting can not be selected if the system is running. A screen will be displayed asking the installer to stop the system before these modes can be activated.
The system automatically stops 2 hours after last operation.

[Floor dry up function]

The floor dry up function automatically changes the target hot water temperature in stages to gradually dry concrete when this particular type of underfloor heating system is installed.

Upon completion of the operation, the system stops all the operations except the Freeze stat. operation.
For floor dry up function, the target flow temperature of Zone 1 is the same as that of Zone 2.



- This function is not available when a PUHZ-FRP outdoor unit is connected.
- Disconnect wiring to external inputs of room thermostat, demand control, and outdoor thermostat, or the target flow temperature may not be maintained.

7. Remote controller

Functions		Symbol	Description	Option/Range	Unit	Default
[Floor dry up function]		a	Set the function to on and power on the system using the main remote controller, and the dry up heating operation will start.	on/off	—	off
[Flow temperature increase]	[Temperature increase step]	b	It sets the increase step of the target flow temperature.	+1 to +30	ºC	+5
	[Increase interval]	c	It sets the period for which the same target flow temperature is maintained.	1 to 7	day	2
[Flow temperature decrease]	[Temperature decrease step]	d	It sets the decrease step of the target flow temperature.	−1 to −30	ºC	−5
	[Decrease interval]	e	It sets the period for which the same target flow temperature is maintained.	1 to 7	day	2
[Target temperature]	[Start & End]	f	It sets the target flow temperature at the start and the finish of the operation.	20 to 60*	ºC	30
	[Max temperature]	g	It sets the maximum target flow temperature.	20 to 60*	ºC	45
	[Max temperature period]	h	It sets the period for which the maximum target flow temperature is maintained.	1 to 20	day	5

* The maximum temperature differs depending on the connected outdoor unit.

[Password protection]
Password protection is recommended to prevent unauthorised access to the service menu by untrained persons.

[Password reset]
If you forget the password you entered, or have to service a unit somebody else installed, you can reset and change the password.

1. From [Service] in [Menu], access the [Password protection] screen.
2. Press and hold the title section for 3 seconds to access the [Password reset] screen.
3. Enter a new password.
4. Touching [Back] or the confirm icon saves the password.

[Manual reset]
Should you wish to restore the factory settings at any time, you should use the manual reset function. Please note this will reset ALL functions to the factory default settings.

[Password protection]

[Password reset]

■ Engineers Forms

Should settings be changed from default, please enter and record new setting in 'Commissioning/Field settings record sheet' below. This will ease resetting in the future should the system use change or the circuit board need to be replaced.

Commissioning/Field settings record sheet

Main remote controller screen				Parameters	Default setting	Field setting	Notes
DHW	DHW *4		Eco	On/Off *5	Off		
			Boost	On/Off	—		
			DHW max. temp.	40°C to 55/60/65/70°C *6	50°C		
			Max. temp. drop	5°C to 40°C	10°C		
			Max. operation time	30 to 120 min.	60 min.		
			Interval	30 to 120 min.	30 min.		
			Volume	Large / Standard	Standard *7		
			Schedule	On/Off	Off		
			Always off	On/Off	Off		
	Legionella prevention *4		Legionella	On/Off	On		
			Hot water temp.	60°C to 70°C *6	65°C		
			Start time	00:00 to 23:00	03:00		
			Duration	1 to 120 min.	30 min.		
			Frequency	1 to 30 days	15 days		
			Max. operation time	1 to 5 h	3 h		
Heating / Cooling *3	Heating / Cooling		Zone 1 heating room temp.	10°C to 30°C	20°C		
			Zone 2 heating room temp. *1	10°C to 30°C	20°C		
			Zone 1 heating flow temp.	20°C to 60/70/75°C	45°C		
			Zone 2 heating flow temp. *2	20°C to 60/70/75°C	35°C		
			Zone 1 cooling flow temp. *3	5°C to 25°C	15°C		
			Zone 2 cooling flow temp. *3	5°C to 25°C	20°C		
			Zone 1 heating weather compensation curve	−9°C to +9°C	0°C		
			Zone 2 heating weather compensation curve *2	−9°C to +9°C	0°C		
			Zone 1 cooling weather compensation curve	−9°C to +9°C	0°C		
			Zone 2 cooling weather compensation curve *2	−9°C to +9°C	0°C		
			Schedule	On/Off	Off		
			Always off	On/Off	Off		
			Heating / Cooling	Heating / Cooling	Heating		
			Zone 1 control logic	Heating room temp./ Heating flow temp./ Heating weather compensation curve / Cooling flow temp./ Cooling weather compensation curve	Heating weather compensation curve		
			Zone 2 control logic *2	Heating room temp./ Heating flow temp./ Heating weather compensation curve / Cooling flow temp./ Cooling weather compensation curve	Heating weather compensation curve		
			Auto change over	On/Off	Off		
	Weather compensation curve (Heating)	Hi flow temp. set point	Zone 1 outdoor ambient temp.	−30°C to +33°C *8	−15°C		
			Zone 1 flow temp.	20°C to 60/70/75°C	50°C		
			Zone 2 outdoor ambient temp. *2	−30°C to +33°C *8	−15°C		
			Zone 2 flow temp. *2	20°C to 60/70/75°C	40°C		
		Lo flow temp. set point	Zone 1 outdoor ambient temp.	−28°C to +35°C *9	20°C		
			Zone 1 flow temp.	20°C to 60/70/75°C	25°C		
			Zone 2 outdoor ambient temp. *2	−28°C to +35°C *9	20°C		
			Zone 2 flow temp. *2	20°C to 60/70/75°C	25°C		
		Adjust	Zone 1 outdoor ambient temp.	−29°C to +34°C *10	—		
			Zone 1 flow temp.	20°C to 60/70/75°C	—		
			Zone 2 outdoor ambient temp. *2	−29°C to +34°C *10	—		
			Zone 2 flow temp. *2	20°C to 60/70/75°C	—		
	Weather compensation curve (Cooling)	Hi flow temp. set point	Zone 1 outdoor ambient temp.	10°C to 46°C	35°C		
			Zone 1 flow temp.	5°C to 25°C	15°C		
			Zone 2 outdoor ambient temp. *2	10°C to 46°C	35°C		
			Zone 2 flow temp. *2	5°C to 25°C	20°C		
		Lo flow temp. set point	Zone 1 outdoor ambient temp.	10°C to 46°C	25°C		
			Zone 1 flow temp.	5°C to 25°C	25°C		
			Zone 2 outdoor ambient temp. *2	10°C to 46°C	25°C		
			Zone 2 flow temp. *2	5°C to 25°C	25°C		
Menu	Energy		Energy monitor	Consumed electrical energy/Delivered energy	—		
	Holiday		Schedule	On/Off/Set time	—		
			DHW *4	On/Off	Off		
			Heating / Cooling *3	On/Off	On		
	Setting	Language	EN/CZ/DA/DE/ET/ES/FR/HR/IT/LV/LT/HU/NL/NO/PL/PT/RO/SK/SI/FI/SV/TR/EL/BG		EN		
		Room sensors	Zone sensor selection *2	Zone 1/Zone 2	Zone 1		
			Zone 1 programme	TH1/Main RC/Room RC1-8/"Time/Zone"	TH1		
			Zone 2 programme *2	TH1/Main RC/Room RC1-8/"Time/Zone"	TH1		
		Display	Temp. (°C) → (°F)	On/Off	Off		
		Touch screen	Clean screen	On/Off	Off		
			Calibrate screen	On/Off	Off		
			Brightness	Low / Mid / Hi	Mid		
			Backlight time	5sec./10sec./20sec./30sec./60sec./Always on	30sec.		

Continued to next page.

■ Engineers Forms

Commissioning/Field settings record sheet

Main remote controller screen					Parameters			Default setting	Field setting	Notes
Menu	Service	Thermistor adjustment		THW1	−10°C to +10°C			0°C		
				THW2	−10°C to +10°C			0°C		
				THW5B	−10°C to +10°C			0°C		
				THW6	−10°C to +10°C			0°C		
				THW7	−10°C to +10°C			0°C		
				THW8	−10°C to +10°C			0°C		
				THW9	−10°C to +10°C			0°C		
				THW10	−10°C to +10°C			0°C		
				THWB1	−10°C to +10°C			0°C		
		Auxiliary settings		Economy settings for pump.	On/Off *11			On		
					Delay (3 to 60 min.)			10 min.		
				Electric heater (heating)	Space heating: On (used)/Off (not used)			On		
					Electric heater delay timer (5 to 180 min.)			30 min.		
				Electric heater (DHW) *4	Booster heater	DHW: On (used)/Off (not used)		On		
					Immersion heater	DHW: On (used)/Off (not used)		On		
					Electric heater delay timer (15 to 30 min.)			15 min.		
				Mixing valve 1 control	Running (10 to 240 sec.)			120 sec.		
					Interval (1 to 30 min.)			2 min.		
				Mixing valve 2 control	Running (10 to 240 sec.)			120 sec.		
					Interval (1 to 30 min.)			2 min.		
				Flow sensor *12	Minimum (0 to 100 L/min)			5 L/min		
					Maximum (0 to 100 L/min)			100 L/min		
				Analogue output	Interval (1 to 30 min.)			5 min.		
					Priority (Normal / High)			Normal		
				Electric heater schedule *19	Daily schedule (Schedule 1/Schedule 2)			Shedule 1		
					Time schedule 1 (Always/Start-Stop/Never)			Always		
					Time schedule 2 (Always/Start-Stop/Never)			Always		
		Pump speed		DHW	Pump speed (1 to 5)			5		
				Heating / Cooling	Pump speed (1 to 5)			5		
		Heat source setting			Standard / Heater / Boiler / Hybrid *13			Standard		
		Heat pump settings		Heat pump flow rate range		Minimum (0 to 100 L/min)		5 L/min		
						Maximum (0 to 100 L/min)		100 L/min		
				Quiet mode	Heating	Day (Mon to Sun)		—		
						Time		0:00 to 23:45		
						Quiet level (Normal/ Level1/ Level2/ Level3)		Normal		
					Cooling	Day (Mon to Sun)		—		
						Time		0:00 to 23:45		
						Quiet level (Normal/ Level1/ Level2/ Level3)		Normal		
		Operation settings	Heating operation	Flow temperature range *14	Minimum temp. (20 to 45°C)			30°C		
					Maximum temp. (35 to 60/70/75°C)			50°C		
				Room temperature control *14	Mode (Auto/Quick/Normal/Slow)			Auto		
					Interval (10 to 60 min.)*15			10 min.		
				Heat pump thermo diff.	On/Off *11			On		
					Lower (−9 to −1°C)			−5°C		
					Upper (+3 to +5°C)			5°C		
			Freeze stat function *16		Ambient temp. (3 to 20°C) / **			5°C		
			Simultaneous operation (DHW/ Heating)		On/Off *11			Off		
					Ambient temp. (−30 to +10°C) *8			−15°C		
			Cold weather function		On/Off *11			Off		
					Ambient temp. (−30 to −10°C) *8			−15°C		
			Boiler settings		Hybrid settings	Outdoor ambient temp. (−30 to +10°C) *8		−15°C		
						Priority mode (Ambient/Cost/CO_2) *17		Ambient		
						Outdoor ambient temp. rise (+1 to +5°C)		+3°C		
					Intelligent settings	Energy price *18	Electricity (0.001 to 999 */kWh)	0.5 */kWh		
							Boiler (0.001 to 999 */kWh)	0.5 */kWh		
						CO_2 emission	Electricity (0.001 to 999 kg -CO_2/kWh)	0.5 kg -CO_2/ kWh		
							Boiler (0.001 to 999 kg -CO_2/kWh)	0.5 kg -CO_2/ kWh		
						Heat source	Heat pump capacity (1 to 40 kW)	11.2 kW		
							Boiler efficiency (25 to 150%)	80%		
							Booster heater 1 capacity (0 to 30 kW)	2 kW		
							Booster heater 2 capacity (0 to 30 kW)	4 kW		

Continued to next page.

■ Engineers Forms

Commissioning/Field settings record sheet (continued from the previous page)

Main remote controller screen					Parameters		Default setting	Field setting	Notes
Menu	Service	Operation settings	Smart grid ready	DHW	On/Off		Off		
					Target temp. (+1 to +30°C) / -- (Non active)		--		
				Heating	On/Off		Off		
					Target temp.	Switch-on recommendation (20 to 60/70/75°C)	50°C		
						Switch-on command (20 to 60/70/75°C)	55°C		
				Cooling	On/Off		Off		
					Target temp.	Switch-on recommendation (5 to 25°C)	15°C		
						Switch-on command (5 to 25°C)	10°C		
				Pump cycles	Heating (On/Off)		On		
					Cooling (On/Off)		On		
					Interval (10 to 120 min.)		10 min.		
			Floor dry up		On/Off *11		Off		
					Target temperature	Start & End (20 to 60/70/75°C)	30°C		
						Max temperature (20 to 60/70/75°C)	45°C		
						Max temperature period (1 to 20 days)	5 days		
					Flow temperature increase	Temperature increase step (+1 to +30°C)	+5°C		
						Increase interval (1 to 7 days)	2 days		
					Flow temperature decrease	Temperature decrease step (-1 to -30°C)	−5°C		
						Decrease interval (1 to 7 days)	2 days		
			Summer mode		On/Off		Off		
					Ambient temperature	Heating on (4 to 19°C)	10°C		
						Heating off (5 to 20°C)	15°C		
					Judgement time	Heating on (1 to 48 h)	6 h		
						Heating off (1 to 48 h)	6 h		
					Forced heating On (-30 to 10°C)		5°C		
			Auto change over		On/Off		Off		
					Ambient temperature	Heat→Cool (10 to 40°C)	28°C		
						Cool→Heat (5 to 20°C)	15°C		
					Judgement time	Heat→Cool (1 to 48 h)	6 h		
						Cool→Heat (1 to 48 h)	6 h		
			Water flow control		On/Off		Off		
					Water temperature difference *20	Heating (+3 to +20°C)	+5°C		
						Cooling (+3 to +10°C)	+5°C		
			Holiday mode		Zone 1 heating room temp.	10°C to 30°C	15°C		
					Zone 2 heating room temp. *1	10°C to 30°C	15°C		
					Zone 1 heating flow temp.	20°C to 60/70/75°C	35°C		
					Zone 2 heating flow temp. *2	20°C to 60/70/75°C	25°C		
					Zone 1 cooling flow temp. *3	5°C to 25°C	25°C		
					Zone 2 cooling flow temp. *3	5°C to 25°C	25°C		
			Zone prohibited		Heating (Zone 1)	Permitted/Prohibited	Permitted		
					Heating (Zone 2)	Permitted/Prohibited	Permitted		
					Cooling (Zone 1)	Permitted/Prohibited	Permitted		
					Cooling (Zone 2)	Permitted/Prohibited	Permitted		

Continued to next page.

■ Engineers Forms

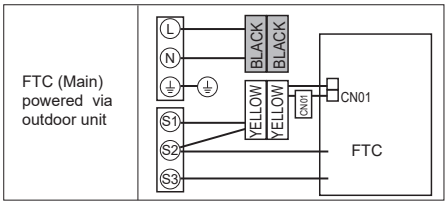
Commissioning/Field settings record sheet (continued from the previous page)

Main remote controller screen					Parameters	Default setting	Field setting	Notes
Menu	Service	Energy monitor settings	Electric heater capacity	Booster heater 1	0 to 30 kW	2 kW		
				Booster heater 2	0 to 30 kW	4 kW		
				Immersion heater	0 to 30 kW	0 kW		
				Analogue output	0 to 30 kW	0 kW		
			Delivered energy adjustment		−50 to +50%	0%		
			Water pump input	Pump 1	0 to 200 W or ***(factory fitted pump)	***		
				Pump 2	0 to 200 W	0 W		
				Pump 3	0 to 200 W	0 W		
				Pump 4 *7	0 to 200 W	72 W		
			Electric energy meter		0.1/1/10/100/1000 pulse/kWh	1000 pulse/kWh		
			Heat meter		0.1/1/10/100/1000 pulse/kWh	1000 pulse/kWh		
		External input settings	Demand control (IN4)		Heat source OFF/Boiler operation	Boiler operation		
			Outdoor thermostat (IN5)		Heater operation/Boiler operation	Boiler operation		
			Cooling limit temp. (IN15)	Zone selection	Zone 1/Zone 2/Zone 1&2	Zone 1		
				Zone 1 lowest temperature	5°C to 25°C	18°C		
				Zone 2 lowest temperature	5°C to 25°C	18°C		
		Thermo on output			Zone 1/Zone 2/Zone 1&2	Zone 1&2		

*1 The settings related to Zone 2 can be switched only when 2-zone temperature control or 2-zone valve ON/OFF control is active.
*2 The settings related to Zone 2 can be switched only when 2-zone temperature control is enabled (when DIP SW 2-6 and SW 2-7 are ON).
3 Cooling mode settings are available for ERS model only.
*4 Only available if DHW tank is present in system.
*5 When the indoor unit is connected with a PUMY-P outdoor unit, the mode is fixed to “Off”.
*6 For the model without both booster and immersion heater, it may not reach the set temperature depending on the outside ambient temperature.
*7 This setting is valid for only cylinder units.
*8 The lower limit is -15°C depending on the connected outdoor unit.
*9 The lower limit is -13°C depending on the connected outdoor unit.
*10 The lower limit is -14°C depending on the connected outdoor unit.
*11 On: the function is active; Off: the function is inactive.
*12 Do not change the setting since it is set according to the specification of flow sensor attached to the indoor unit.
*13 When DIP SW1-1 is set to OFF “WITHOUT Boiler” or SW2-6 is set to OFF “WITHOUT Mixing tank”, neither Boiler nor Hybrid can be selected.
*14 Valid only when operating in Heating room temperature.
*15 When DIP SW5-2 is set to OFF, the function is active.
*16 If asterisk (**) is chosen freeze stat function is deactivated. (i.e. primary water freeze risk)
*17 When the indoor unit is connected with a PUMY-P and PXZ outdoor unit, the mode is fixed to “Ambient”.
18 “” of “*/kWh” represents currency unit (e.g. €, £, or the like)
*19 Valid only during heating mode
*20 To enable this function in the outdoor unit of PUZ-S(H)WM, switch the [Mode 7] in [Function settings] to "2".
([Menu] → [Service] → [Function settings], [Ref. add: 0], [Unit: 1] → [Mode 7], 1-High temperature control (default) / 2-Water temperature difference control)

9. Troubleshooting

<Troubleshooting by inferior phenomena>

No.	Fault symptom	Possible cause	Explanation - Solution
1	Main remote controller display is blank.	1. There is no power supply to main remote controller.	1. Check LED2 on FTC (Main). (See Figure 4.5.1.) (i) When LED2 is lit. Check for damage or contact failure of the main remote controller wiring. (ii) When LED2 is blinking. Refer to No. 5 below. (iii) When LED2 is not lit. Refer to No. 4 below.
		2. Power is supplied to main remote controller, however, the display on the main remote controller does not appear.	2. Check the following: • Disconnection between the main remote controller cable and the FTC (Main) control board • Failure of the main remote controller if “Please Wait” is not displayed. • Refer to No. 2 below if “Please Wait” is displayed.
2	“Please Wait” remains displayed on the main remote controller.	1. "Please Wait" is displayed for up to 6 minutes. 2. Communication failure between the main remote controller and FTC (Main). 3. Communication failure between FTC (Main) and outdoor unit.	1. Normal operation. 2.,3. Main remote controller start up checks/procedure. (i) If “0%” or “50-99%” is displayed below "Please Wait", there is a communication error between the main remote controller and the FTC (Main) control board. • Check wiring connections on the main remote controller. • Replace the main remote controller or the FTC (Main) control board. (ii) If “1-49%” is displayed there is a communication error between the outdoor unit's and FTC (Main) control boards. • Check the wiring connections on the outdoor unit control board and the FTC (Main) control board. (Ensure S1 and S2 are not cross-wired and S3 is securely wired with no damage. (See section 4.1.) • Replace the outdoor unit's and/or the FTC (Main) control boards.
3	The main screen appears with a press of the “ON” button, but disappears in a second.	The main remote controller operations do not work for a whilst after the settings are changed in the service menu. This is because the system takes time to apply the changes.	Normal operation. The indoor unit is applying updated settings made in the service menu. Normal operation will start shortly.
4	LED2 on FTC (Main) is off. (See <Figure 4.5.1>.)	When LED1 on FTC (Main) is also off. (See Figure 4.5.1.) <FTC (Main) powered via outdoor unit.>	
		1. The outdoor unit is not supplied at the rated voltage.	1. Check the voltage across the terminals L and N or L3 and N on the outdoor power board. (See section 4.1.) • When the voltage is not 220 to 240 V AC, check wiring of the outdoor unit and of the breaker. • When the voltage is at 220 to 240 V AC, go to “2.” below.
		2. Defective outdoor controller circuit board	2. Check the voltage across the outdoor unit terminals S1 and S2. (See section 4.1.) • When the voltage is not 220 to 240 V AC, check the fuse on the outdoor control board and check for faulty wiring. • When the voltage is 220 to 240 V AC, go to “3.” below.
		3. FTC (Main) is not supplied with 220 to 240V AC	3. Check the voltage across the indoor unit terminals S1 and S2. (See section 4.1.) • When the voltage is not 220 to 240 V AC, check FTC (Main)-outdoor unit wiring for faults. • When the voltage is 220 to 240V AC, go to “4.” below.
		4. FTC (Main) failure	4. Check the FTC (Main) control board. • Check the fuse on FTC (Main) control board. • Check for faulty wiring. • If no problem found with the wiring, the FTC (Main) control board is faulty.
		5. Faulty connector wiring	5. Check the connector wiring. • When the connectors are wired incorrectly, re-wire the connectors referring to below. (See section 4.1.) 

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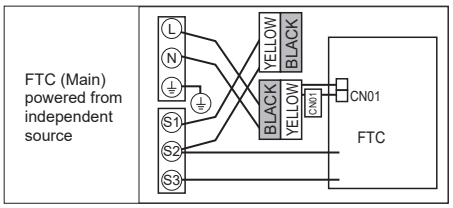
9. Troubleshooting

No.	Fault symptom	Possible cause	Explanation - Solution
4.	LED2 on FTC (Main) is off. (See Figure <4.5.1>)	<FTC (Main) powered on independent source> 1. FTC (Main) is not supplied with 220 to 240 V AC.	1. Check the voltage across the L and N terminals on the indoor power supply terminal block. (See section 4.1.) • When the voltage is not 220 to 240 V AC, check for faulty wiring to power supply. • When the voltage is 220 to 240 V AC, go to 2. below.
		2. There are problems in the method of connecting the connectors.	2. Check for faulty wiring between the connectors. • When the connectors are wired incorrectly re-wire them correctly referring to below. (See section 4.1 and a wiring diagram on the control and electrical box cover.)  • If no problem found with the wiring, go to 3. below.
		3. FTC (Main) failure	3. Check the FTC (Main) control board. • Check the fuse on FTC (Main) control board. • Check for faulty wiring. • If no problem found with the wiring, the FTC (Main) control board is faulty.
		When LED1 on FTC (Main) is lit., the setting of refrigerant address for outdoor unit is incorrect. (None of the refrigerant address is set to "0".)	Recheck the refrigerant address setting on the outdoor unit. Set the refrigerant address to “0”. (Set refrigerant address using SW1 (3 - 6) on outdoor controller circuit board.)
5	LED2 on FTC (Main) is blinking. (See Figure 4.5.1.)	When LED1 is also blinking on FTC (Main). Faulty wiring between FTC (Main) and outdoor unit	Check for faulty wiring between FTC (Main) and outdoor unit.
		When LED1 on FTC (Main) is lit. 1. Faulty wiring in main remote controller Multiple indoor units have been wired to a single outdoor unit. 2. Short-circuited wiring in main remote controller 3. Main remote controller failure	1. Check for faulty wiring in main remote controller. The number of indoor units that can be wired to a single outdoor unit is one. Additional indoor units must be wired individually to a single outdoor unit. 2.,3. Remove main remote controller wires and check LED2 on FTC (Main). (See Figure 4.5.1.) • If LED2 is blinking check for short circuits in the main remote controller wiring . • If LED2 is lit, wire the main remote controller again and: - if LED2 is blinking, the main remote controller is faulty; - if LED2 is lit, faulty wiring of the main remote controller has been corrected.
6	LED4 on FTC (Main) is off. (See Figure 4.5.1.)	1. SD memory card is NOT inserted into the memory card slot with correct orientation. 2. Not an SD standards compliant memory card.	1. Correctly insert SD memory card in place until a click is heard. 2. Use an SD standards compliant memory card. (Refer to section 4.11.)
	LED4 on FTC (Main) is blinking. (See Figure 4.5.1.)	1. Full of data 2. Write-protected 3. NOT formatted 4. Formatted in NTFS file system	1. Move or delete data, or replace microSD memory card with a new one. 2. Release the write-protect switch. 3. Refer to "4.11 Using microSD memory card". 4. FTC is not compatible with NTFS file system. Use a microSD memory card formatted in FAT file system.
7	No water at hot tap.	1. Cold main off 2. Strainer (local supply) blocked.	1. Check and open stop cock. 2. Isolate water supply and clean strainer.
8	Cold water at tap.	1. Hot water run out. 2. Prohibit, schedule timer or holiday mode selected. 3. Heat pump not working. 4. Booster heater cut-out tripped. 5. The earth leakage circuit breaker for booster heater breaker (ECB1) tripped. 6. The booster heater thermal cut-out has tripped and cannot be reset using the manual reset button. 7. Immersion heater cut-out tripped. 8. Immersion heater breaker (ECB2) tripped. 9. 3-way valve fault	1. Ensure DHW mode is operating and wait for DHW tank to re-heat. 2. Check settings and change as appropriate. 3. Check heat pump – consult outdoor unit service manual. 4. Check booster heater thermostat and press reset button if safe. 5. Check the cause and reset if safe. 6. Check resistance across the thermal cut-out, if open then the connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer. 7. Check immersion heater thermostat and press reset button, located on immersion heater boss, if safe. If the heater has been operated with no water inside it may have failed, so please replace it with a new one. 8. Check the cause and reset if safe. 9. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to [Manual operation] in section 7. Remote controller) If the valve does not still function, go to (ii) below. (ii) Replace 3-way valve coil. If the valve does not still function, go to (iii) below. (iii) Replace 3-way valve. (Refer to the service manual.)

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9. Troubleshooting

No.	Fault symptom	Possible cause	Explanation - Solution
9	Water heating takes longer.	1. Heat pump not working. 2. Booster heater cut-out tripped. 3. Booster heater breaker tripped. 4. The booster heater thermal cut-out has tripped and cannot be reset using the manual reset button. 5. Immersion heater cut-out has been triggered. 6. Immersion heater breaker tripped. 7. Decreased flow rate in DHW circuit. (Only when the external plate HEX for DHW is used.)	1. Check heat pump – consult outdoor unit service manual. 2. Check booster heater thermostat and press reset button if safe. 3. Check the cause and reset if safe. 4. Check resistance across the thermal cut-out, if open then connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer. 5. Check immersion heater thermostat and press reset button located on immersion heater boss, if safe. If the heater kept running with no water inside, this may have resulted in failure, so replace it with a new one. 6. Check the cause and reset if safe. 7. Check the water circulation pump 4 (DHW).
10	Temperature of DHW tank water dropped.	When DHW operation is not running, the DHW tank emits heat and the water temperature decreases to a certain level. If water in the DHW tank is reheated frequently because of a significant drop in water temperature, check for the following. 1. Water leakage in the pipes that connect to the DHW tank 2. Insulation material coming loose or off. 3. 3-way valve failure	1. Take the following measures. • Retighten the nuts holding the pipes onto the DHW tank. • Replace seal materials. • Replace the pipes. 2. Fix insulation. 3. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to [Manual operation] in section 7. Remote controller) If the valve does not still function, go to (ii) below. (ii) Replace 3-way valve coil. If the valve does not still function, go to (iii) below. (iii) Replace 3-way valve. (Refer to the service manual.)
11	Hot or warm water from cold tap	Heat of hot water pipe is transferred to cold water pipe.	Insulate/re-route pipework.
12	Water leakage	1. Poorly sealed connections of water circuit components 2. Water circuit components reaching the end of life	1. Tighten connections as required. 2. Refer to the parts catalog in the service manual for expected part lifetimes and replace them as necessary.
13	Heating system does not reach the set temperature.	1. Prohibit, schedule timer or holiday mode selected. 2. Check settings and change as appropriate. 3. The temperature sensor is located in a room that has a different temperature relative to that of the rest of the house. 4. Heat pump not working. 5. Booster heater cut-out tripped. 6. Booster heater breaker (ECB1) tripped. 7. The booster heater thermal cut-out tripped and can not be reset using the manual reset button. 8. Incorrectly sized heat emitter 9. 3-way valve failure 10. Battery problem (*wireless control only) 11. If a mixing tank is installed, the flow rate between the mixing tank and the heat exchanger is less than that between the mixing tank and the local system.	1. Check settings and change as appropriate. 2. Check the battery power and replace if flat. 3. Reposition the temperature sensor to a more suitable room. 4. Check heat pump – consult outdoor unit service manual. 5. Check booster heater thermostat and press reset button if safe. 6. Check the cause of the trip and reset if safe. 7. Check resistance across the thermal cut-out, if open then the connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer. 8. Check the heat emitter surface area is adequate Increase size if necessary. 9. Check plumbing/wiring to 3-way valve. 10. Check the battery power and replace it flat. 11. Increase the flow rate between the mixing tank and the heat exchanger decrease that between the mixing tank and the local system.
14	In 2-zone temperature control, only Zone 2 does not reach the set temperature.	1. When Zone 1 and Zone 2 are both in heating mode, the hot water temperature in Zone 2 does not exceed that in Zone 1. 2. Faulty wiring of motorized mixing valve 3. Faulty installation of motorized mixing valve 4. Incorrect setting of running time 5. Motorized mixing valve failure	1. Normal operation no action necessary. 2. Refer to "4.7 Wiring for 2-zone temperature control". 3. Check for correct installation. (Refer to the manual included with each motorized mixing valve.) 4. Check for correct setting of running time. 5. Inspect the mixing valve. (Refer to the manual included with each motorized mixing valve.)
15	After DHW operation room temperature rises a little	At the end of the DHW mode operation the 3-way valve diverts hot water away from the DHW circuit into space heating circuit. This is done to prevent the system components from overheating. The amount of hot water directed into the space heating circuit varies according to the type of the system.	Normal operation no action necessary.

9. Troubleshooting

No.	Fault symptom	Possible cause	Explanation - Solution
16	The room temperature rises during DHW operation.	3-way valve failure	Check the 3-way valve.
17	Water discharges from pressure relief valve. (Primary circuit)	1. If continual – pressure relief valve may be damaged. 2. If intermittent – expansion vessel charge may have reduced/bladder perished.	1. Turn the handle on the pressure relief valve to check for foreign objects in it. If the problem is not still solved, replace the pressure relief valve with a new one. 2. Check pressure in expansion vessel. Recharge to 1 bar if necessary. If bladder perished replace expansion vessel with a new one.
18	Water discharges from pressure relief valve (field supplied item). (Sanitary circuit)	1. If continual – field supplied pressure reducing valve not working. 2. If continual – pressure relief valve seat may be damaged. 3. If intermittent – expansion vessel charge may have reduced/bladder perished. 4. DHW tank may have subjected to backflow.	1. Check function of pressure reducing valve and replace if necessary. 2. Turn the handle on the pressure relief valve to check for foreign objects inside. If the problem is not still solved, replace the pressure relief valve. 3. Check gas-side pressure in expansion vessel. Recharge to correct precharge pressure if necessary. If bladder perished replace expansion vessel with a new one with appropriate precharge. 4. Check gas-side pressure in DHW tank. If pressure in DHW tank is similar to that in incoming mains, cold water supply that merges with incoming mains water supply could flow back to DHW tank. Investigate source of back-feed and rectify error in pipework/fitting configuration. Adjust pressure in cold supply.
19	Noisy water circulation pump	Air in water circulation pump	Use manual and automatic air vents to remove air from system. Top up water if necessary to achieve 1 bar on primary circuit.
20	Noise during hot water draw off typically worse in the morning.	1. Loose airing cupboard pipework 2. Heaters switching on/off	1. Install extra pipe fastening clips. 2. Normal operation no action necessary.
21	Mechanical noise heard coming from the system.	1. Heaters switching on/off 2. 3-way valve changing position between DHW and heating mode	Normal operation no action necessary.
22	Water circulation pump runs for a short time unexpectedly .	Water circulation pump jam prevention mechanism (routine) to inhibit the build-up of scale	Normal operation no action necessary.
23	Milky/Cloudy water (Sanitary circuit)	Oxygenated water	Water from any pressurised system will release oxygen bubbles when water is running. The bubbles will settle out.
24	Heating mode has been on standby for a long time (does not start operation smoothly.)	The time of “Delay” set in “Economy settings for pump” is too short. (Go to [Service]→[Auxiliary settings]→[Economy settings for pump])	Increase the time of [Delay] in [Economy settings for pump].
25	The FTC unit that was running in the heating mode before power failure is running in the DHW mode after power recovery.	The FTC unit is designed to run in an operation mode with a higher priority (i.e. DHW mode in this case) at power recovery.	• Normal operation. • After the DHW max. operation time has elapsed or the DHW max. temperature has been reached, the DHW mode switches to the other mode (ex. heating mode).
26	Cooling mode is NOT available.	DIP SW2-4 is OFF.	Turn DIP SW2-4 to ON. (Refer to “5.1 DIP switch functions” in this manual.)
27	The cooling system does not cool down to the set temperature.	1. When the water in the circulation circuit is unduly hot, Cooling mode starts with a delay for the protection of the outdoor unit. 2. When the outdoor temperature is lower than the preset temperature below which the freeze stat. function is activated, Cooling mode does not start running.	1. Normal operation. 2. To run Cooling mode overriding the freeze stat. function, adjust the preset temperature below which the freeze stat. function is activated. (Refer to “Freeze stat function” on Page 38.
28	The electric heaters are activated shortly after DHW or LP mode starts running after Cooling mode.	The setting time period of Heat-pump-only operation is short.	Adjust the setting time period of Heat-pump only operation. (Refer to “Electric heater (DHW)“ in the table of [Auxiliary settings] on Page 19.)
29	During DHW or LP mode following the cooling mode, error L6 (circulation water freeze protection) occurs and operation stops frequently.	If the preset temperature below which the freeze stat. function is activated is low, error L6 is more likely to occur interruption operation before the freeze stat. function is activated.	Adjust the preset temperature below which the freeze stat. function is activated. (Refer to “Freeze stat function” on Page 38.)
30	Heat pump is forced to turn ON and OFF.	Smart grid ready input (IN11 and IN12) is used, and switch-on and off commands are input.	Normal operation no action necessary.

10. Multiple outdoor units control

10.1 Wiring for multiple outdoor units control

To establish a larger system, up to 6 outdoor units of the same model (same type / same capacity / same phase) can be connected in one system.

Note:

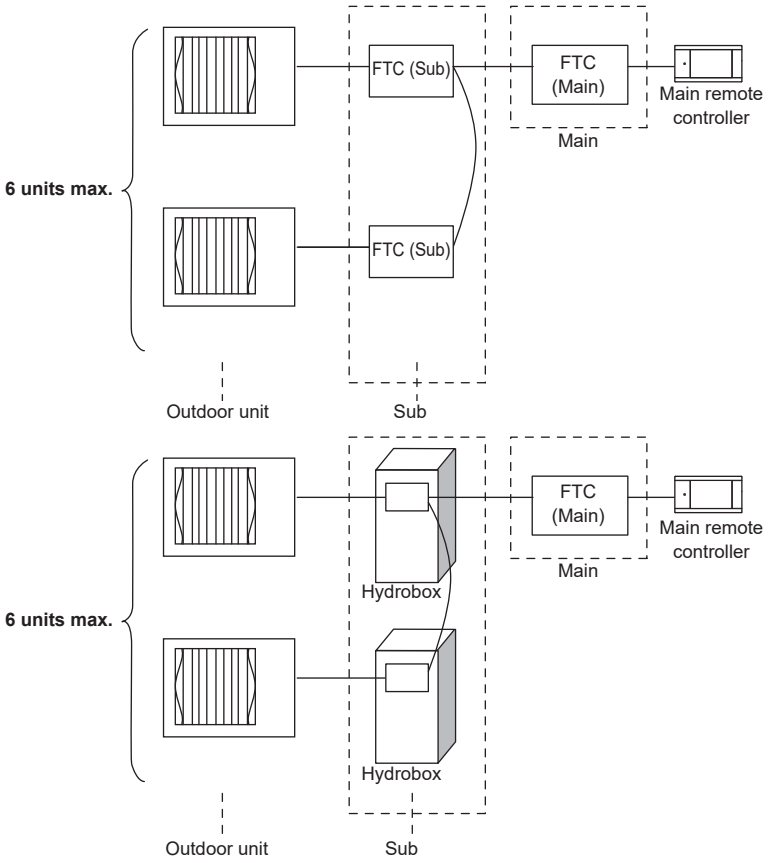
- **Flow sensor is necessary for packaged outdoor unit.**
- **Packaged outdoor unit DIP switch settings changed to SW5-5 ON.**
- **PUZ-S(H)WM outdoor unit can be connected when hydrobox is used as a sub unit.**
- **SUZ-SWM outdoor unit can not be connected.**

10.1.1 Requirements

<Outdoor unit>
(a) Up to 6 units can be connected.
(b) All the outdoor units must be of the same model.
(c) The outdoor units must be connected to sub units.

<FTC: Main unit>
Each sub unit is controlled by the main unit.
(a) The outdoor units must NOT be connected to the main unit.
Make sure that the main unit is powered by independent source.
(b) Wire the main remote controller to TB5 1-2 on the main unit.
(c) Wire the electric heater to the main unit.

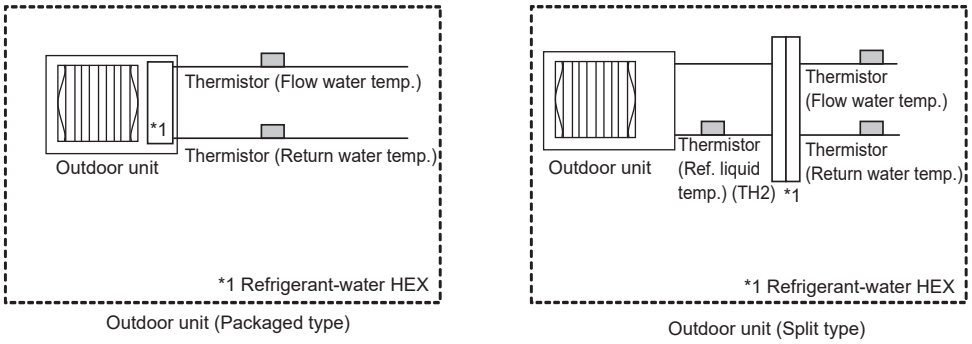
<FTC: Sub unit>
The hydrobox or main unit is used as a sub unit
(a) Connect each outdoor unit to a sub unit.
(b) The main remote controller must NOT be wired to a sub unit.



10.2 Pipe work

Following is the system example of two outdoor units being connected in one system.

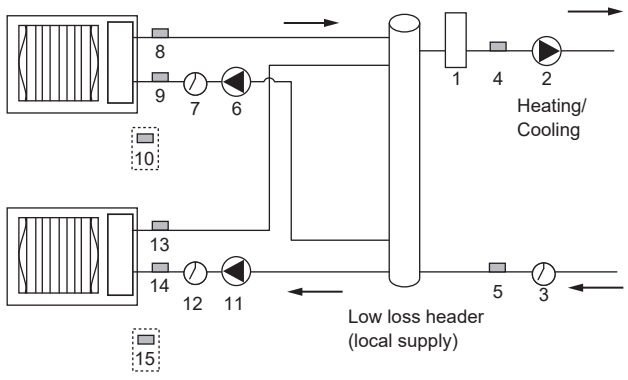
IMPORTANT NOTE
Keep the minimum amount of water required in the space heating circuit according to the number of outdoor units.



<Fig. 10.2.1>

System 1: Heating/Cooling system

- Install a low loss header (local supply).
- Install booster heater toward the local system, relative to the low loss header.



<Fig. 10.2.2>

No.	Component	Wiring		
		Main	Sub 1	Sub 2
1	Booster heater (local supply)	✔		
2	Circulation pump1 (local supply)	✔		
3	Flow switch1 or sensor *2	✔		
4	Thermistor (Flow water temp.) (THW1)	✔		
5	Thermistor (Return water temp.) (THW2)	✔		
6	Sub 1 circulation pump1 (local supply)		✔	
7	Sub 1 flow switch or sensor *2		✔	
8	Sub 1 thermistor (Flow water temp.) (THW1)		✔	
9	Sub 1 thermistor (Return water temp.) (THW2)		✔	
10	Sub 1 thermistor (Ref. liquid temp.) (TH2) *1		✔	
11	Sub 2 circulation pump1 (local supply)			✔
12	Sub 2 flow switch or sensor *2			✔
13	Sub 2 thermistor (Flow water temp.) (THW1)			✔
14	Sub 2 thermistor (Return water temp.) (THW2)			✔
15	Sub 2 thermistor (Ref. liquid temp.) (TH2) *1			✔

*1 When the outdoor unit is split type, TH2 needs to be installed. <Fig. 10.2.1>
*2 For safety protection, it is recommended to install.

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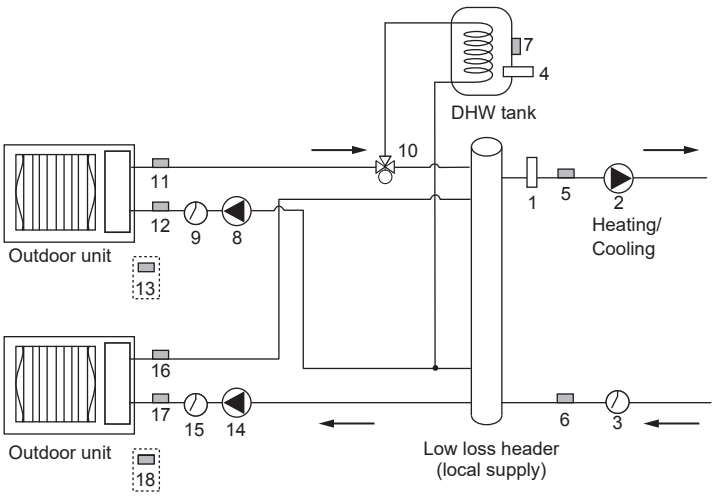
System 2: Heating/Cooling & DHW system

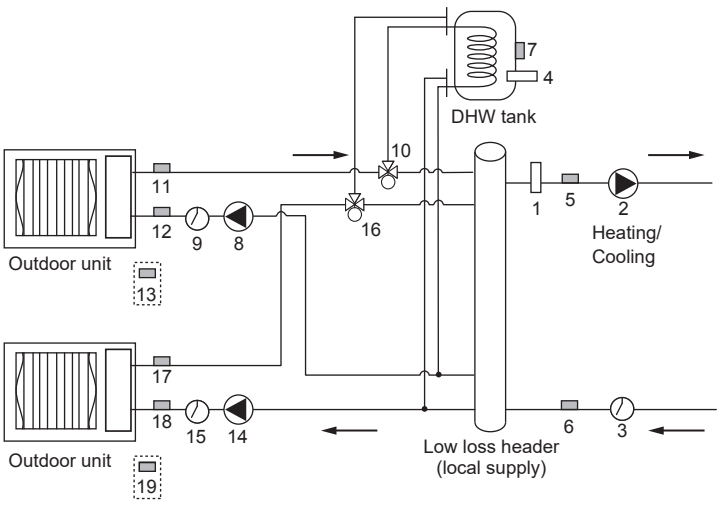
- Install DHW tank toward the outdoor unit , relative to the low loss header.
- Wire 3-way valve or 2-way valve 1, 2 to FTC (sub unit).
- LP mode uses assistance of electric heater. Place an immersion heater on the DHW circuit.
- Install a low loss header (local supply).
- Install booster heater toward the local system, relative to the low loss header.



<Fig. 10.2.3>

No.	Component	Wiring		
		Main	Sub 1 *4	Sub 2
1	Booster heater (local supply)	✔		
2	Circulation pump1 (local supply)	✔		
3	Flow switch 1 or sensor *2	✔		
4	Immersion heater (local supply)	✔		
5	Thermistor (Flow water temp.) (THW1)	✔		
6	Thermistor (Return water temp.) (THW2)	✔		
7	Thermistor (DHW tank lower water temp.) (THW5B)	✔		
8	Sub 1 circulation pump 1 (field supply)		✔	
9	Sub 1 flow switch or sensor *2		✔	
10	Sub 1 3-way valve (local supply) *3		✔	
11	Sub 1 thermistor (Flow water temp.) (THW1)		✔	
12	Sub 1 thermistor (Return water temp.) (THW2)		✔	
13	Sub 1 thermistor (Ref. liquid temp.) (TH2) *1		✔	
14	Sub 2 circulation pump1 (local supply)			✔
15	Sub 2 flow switch or sensor *2			✔
16	Sub 2 thermistor (Flow water temp.) (THW1)			✔
17	Sub 2 thermistor (Return water temp.) (THW2)			✔
18	Sub 2 thermistor (Ref. liquid temp.) (TH2) *1			✔

*1 When the outdoor unit is split type, TH2 needs to be installed. (Fig. 10.2.1)
*2 For safety protection, it is recommended to install.
*3 The use of two 2-way valves can perform the same function as a 3-way valve.
*4 DHW operation requires to use the main unit (or hydrobox) as the sub controller.



<Fig. 10.2.4>

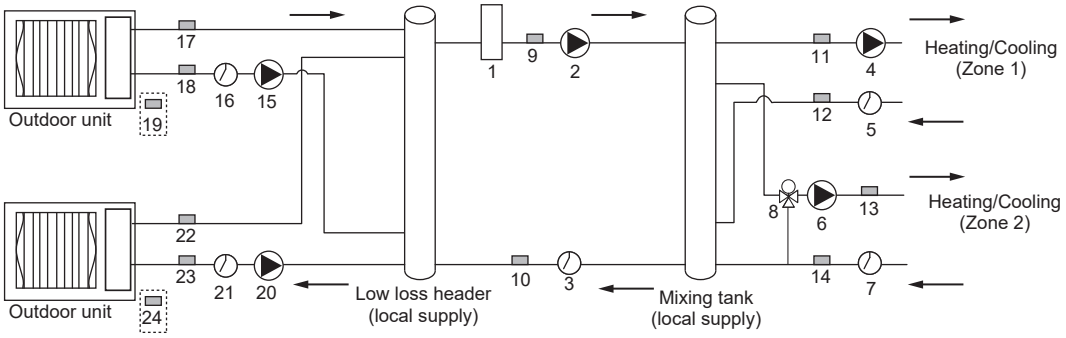
No.	Component	Wiring		
		Main	Sub 1 *4	Sub 2 *4
1	Booster heater (local supply)	✔		
2	Circulation pump 1 (local supply)	✔		
3	Flow switch 1 or sensor *2	✔		
4	Immersion heater (local supply)	✔		
5	Thermistor (Flow water temp.) (THW1)	✔		
6	Thermistor (Return water temp.) (THW2)	✔		
7	Thermistor (DHW tank lower water temp.) (THW5B)	✔		
8	Sub1 circulation pump 1 (local supply)		✔	
9	Sub1 flow switch or sensor *2		✔	
10	Sub1 3-way valve (local supply) *3		✔	
11	Sub 1 thermistor (Flow water temp.) (THW1)		✔	
12	Sub 1 thermistor (Return water temp.) (THW2)		✔	
13	Sub 1 thermistor (Ref. liquid temp.) (TH2) *1		✔	
14	Sub2 circulation pump 1 (local supply)			✔
15	Sub2 flow switch or sensor *2			✔
16	Sub2 3-way valve (local supply) *3			✔
17	Sub 2 thermistor (Flow water temp.) (THW1)			✔
18	Sub 2 thermistor (Return water temp.) (THW2)			✔
19	Sub 2 thermistor (Ref. liquid temp.) (TH2) *1			✔

*1 When the outdoor unit is split type, TH2 needs to be installed. (Fig. 10.2.1)
*2 For safety protection, it is recommended to install.
*3 The use of two 2-way valves can perform the same function as a 3-way valve.
*4 DHW operation requires to use the main unit (or hydrobox) as the sub controller.

10. Multiple outdoor units control

System 3: 2-zone temperature control

- Install a mixing tank (local supply) for 2-zone temperature control.
- Install a low loss header (local supply).
- Install booster heater toward the local system, relative to the low loss header.
- For details on 2-zone installation, refer to '2-zone temperature control' in "3.5 Local system".



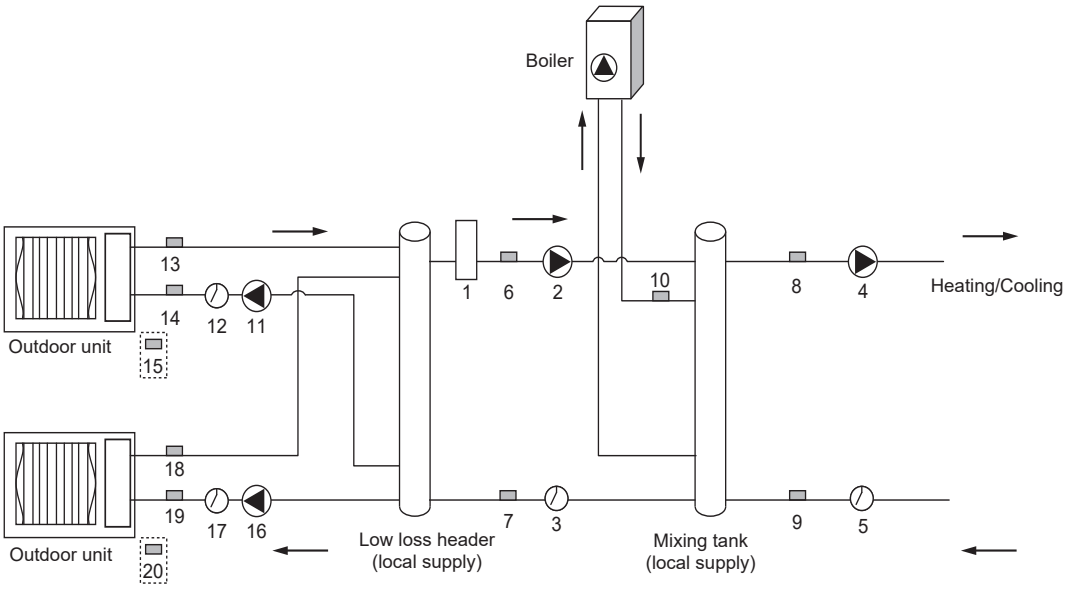
<Fig. 10.2.5>

No.	Component	Wiring		
		Main	Sub 1	Sub 2
1	Booster heater (local supply)	✔		
2	Circulation pump 1 (local supply)	✔		
3	Flow switch 1 or sensor *2	✔		
4	Circulation pump 2 (local supply)	✔		
5	Flow switch 2 (local supply) *2	✔		
6	Circulation pump 3 (local supply)	✔		
7	Flow switch 3 (local supply) *2	✔		
8	Motorized mixing valve (local supply)	✔		
9	Thermistor (Flow water temp.) (THW1)	✔		
10	Thermistor (Return water temp.) (THW2)	✔		
11	Thermistor (Zone 1 flow water temp.) (THW6) (option)	✔		
12	Thermistor (Zone 1 return water temp.) (THW7) (option)	✔		

No.	Component	Wiring		
		Main	Sub 1	Sub 2
13	Thermistor (Zone 2 flow water temp.) (THW8) (option)	✔		
14	Thermistor (Zone 2 return water temp.) (THW9) (option)	✔		
15	Sub 1 circulation pump 1 (local supply)		✔	
16	Sub 1 flow switch or sensor *2		✔	
17	Sub 1 thermistor (Flow water temp.) (THW1)		✔	
18	Sub 1 thermistor (Return water temp.) (THW2)		✔	
19	Sub 1 thermistor (Ref. liquid temp.) (TH2) *1		✔	
20	Sub 2 circulation pump1 (local supply)			✔
21	Sub 2 flow switch or sensor *2			✔
22	Sub 2 thermistor (Flow water temp.) (THW1)			✔
23	Sub 2 thermistor (Return water temp.) (THW2)			✔
24	Sub 2 thermistor (Ref. liquid temp.) (TH2) *1			✔

*1 When the outdoor unit is split type, TH2 needs to be installed. (Fig. 10.2.1)
*2 For safety protection, it is recommended to install.

System 4: Heating/Cooling system (with Boiler)
- Install a mixing tank (local supply) for connection of the boiler.
- Install a low loss header (local supply).
- Install booster heater between low loss header and mixing tank.
- For more details, refer to the installation manual of PAC-TH012HT-E.



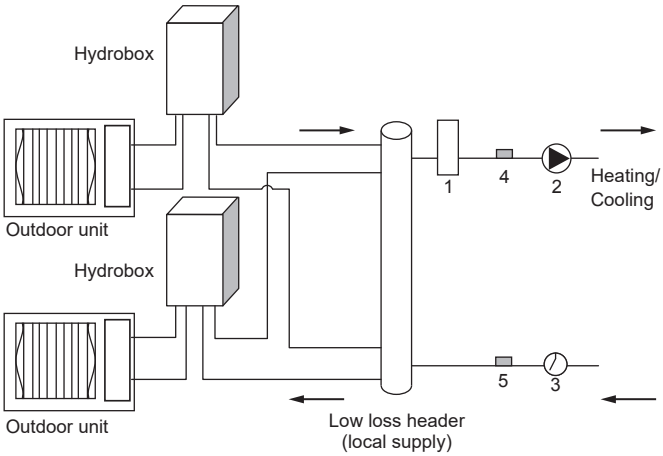
<Fig. 10.2.6>

No.	Component	Wiring		
		Main	Sub 1	Sub 2
1	Booster heater (local supply)	✔		
2	Circulation pump 1 (local supply)	✔		
3	Flow switch 1 or sensor *2	✔		
4	Circulation pump 2 (local supply)	✔		
5	Flow switch 2 (local supply) *2	✔		
6	Thermistor (Flow water temp.) (THW1)	✔		
7	Thermistor (Return water temp.) (THW2)	✔		
8	Thermistor (Zone 1 flow water temp.) (THW6) (option)	✔		
9	Thermistor (Zone 1 return water temp.) (THW7) (option)	✔		
10	Thermistor (Boiler flow water temp.) (THWB1) (option)	✔		

No.	Component	Wiring		
		Main	Sub 1	Sub 2
11	Sub 1 circulation pump 1 (local supply)		✔	
12	Sub 1 flow switch or sensor *2		✔	
13	Sub 1 thermistor (Flow water temp.) (THW1)		✔	
14	Sub 1 thermistor (Return water temp.) (THW2)		✔	
15	Sub 1 thermistor (Ref. liquid temp.) (TH2) *1		✔	
16	Sub 2 circulation pump 1 (local supply)			✔
17	Sub 2 flow switch or sensor *2			✔
18	Sub 2 thermistor (Flow water temp.) (THW1)			✔
19	Sub 2 thermistor (Return water temp.) (THW2)			✔
20	Sub 2 thermistor (Ref. liquid temp.) (TH2) *1			✔

*1 When the outdoor unit is split type, TH2 needs to be installed. (Fig. 10.2.1)
*2 For safety protection, it is recommended to install.

System 5: Heating/Cooling system (with Hydrobox)*1
- Install a low loss header (local supply).
- Install booster heater toward the local system, relative to the low loss header.



<Fig. 10.2.7>

No.	Component	Wiring		
		Main	Sub 1 (Hydrobox)	Sub 2 (Hydrobox)
1	Booster heater (local supply)	✔		
2	Circulation pump 1 (local supply)	✔		
3	Flow switch 1 or sensor *2	✔		
4	Thermistor (Flow water temp.) (THW1)	✔		
5	Thermistor (Return water temp.) (THW2)	✔		

*1 Cooling system is available only with ERS or ERP models.
*2 For safety protection, it is recommended to install.

10. Multiple outdoor units control

10.3 Electrical connection

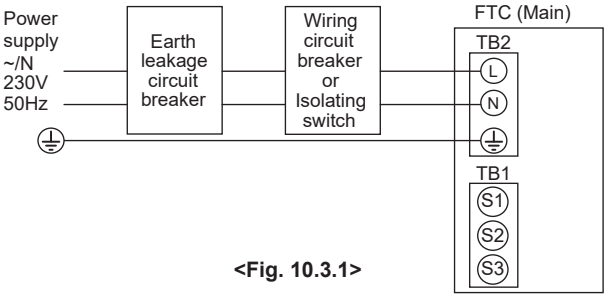
All electrical work should be carried out by a suitably qualified technician. Failure to comply with this could lead to electrocution, fire, and death. It will also invalidate product warranty. All wiring should be according to national wiring regulations.

10.3.1 Main unit

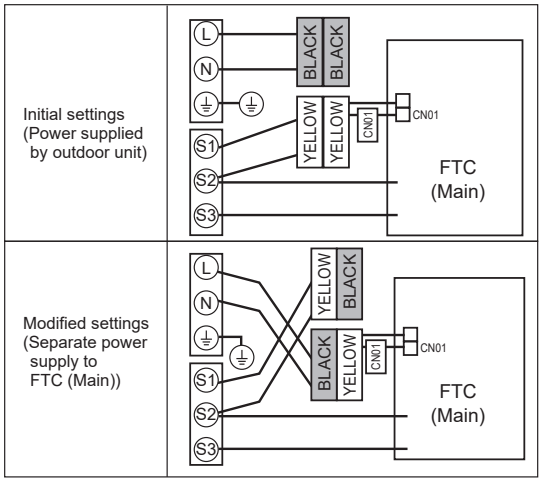
■ FTC (Main)

Outdoor unit must NOT be connected to FTC (Main) unit.

FTC (Main) unit electrical box connector connections changed. (See Fig. 10.3.2.)



<Fig. 10.3.1>



<Fig. 10.3.2>

10.3.2 Sub unit

Connect each outdoor unit to a sub unit.
FTC (Sub) can be powered in two ways.
1. Power cable is run from the outdoor unit to a sub unit.
2. FTC (Sub) has independent power source.

■ FTC (Main) (PAC-IF08*B-E) used as sub

• For wiring as a sub controller, refer to "4.1 Electrical connection". *1

*1 Do not connect the power cable to the booster heater because it does not work in sub controller setting.

■ Hydrobox

• For wiring as a sub controller (hydrobox) , refer to "4.4 Electrical Connection" in Hydrobox installation manual.

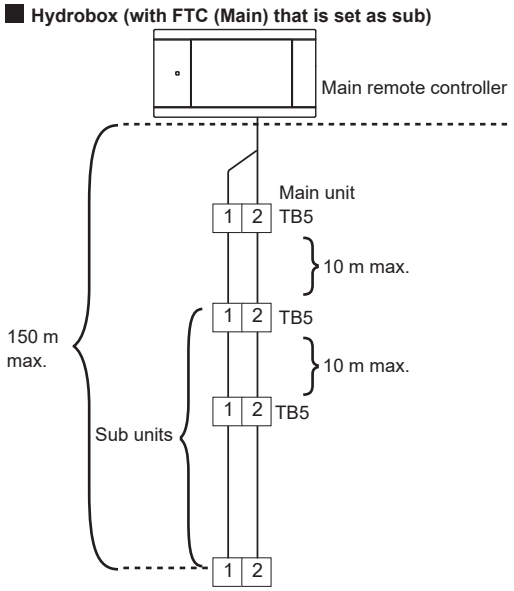
Notes: 1. Do not connect the power cable to the booster heater because it doesn't work in sub controller setting.
2. Do not connect the main remote controller cable.

<Before system set up>
Insert the included SD memory card into the FTC control board. (Refer to section 4.11.)

10. Multiple outdoor units control

10.4 Main remote controller wiring

(a) Wire the main remote controller to TB5 RC terminals on the main unit. The main remote controller must NOT be connected to a sub unit.
(b) Tighten the main unit and sub units wiring together to TB5 RC terminals. *1
*1 The maximum length between each units wiring is 10 m. The maximum length of total daisy-chain wiring is 150 m.



<Fig. 10.4.1>

Note: Wiring for main remote controller cable and daisy chain cable shall be (5 cm or more) apart from power source wiring so that it is not influenced by electrical noise from power source wiring. (Do NOT insert main remote controller cable and power source wiring in the same conduit.)

10.5 Connecting the thermistor cables

Connect the thermistor for the FTC (Sub) controller.

10.5.1. Connecting the refrigerant pipe temp. thermistor (TH2) cable

Connect the TH2 cable to the CN21 connector on FTC (Sub).
For split outdoor unit : Connect TH2.
For packaged outdoor unit : It is NOT necessary to connect TH2.

When the TH2 cable is too long, bundle the excess cable outside the FTC (Sub) unit.
Do not bind the wires in the FTC (Sub) unit.

<Thermistor position>
Place TH2 on **refrigerant** piping (**liquid** side).
It is recommended to protect the thermistor with heat insulating materials so as not to be affected by ambient temperature.
Note: Be sure to place TH2 where it correctly detects refrigerant piping temp. (liquid side).
Because;
(1) TH2 is required to detect heating subcool correctly.
(2) Refrigerant temperature of water-to-refrigerant heat exchanger also needs to be detected for protection purpose.

10.5.2. Connecting the flow water temp. thermistor (THW1) cable and the return water temp. thermistor (THW2) cable

The THW1 and the THW2 cables share a connector, and the connector connects to CNW12 connector on FTC (Sub).

When the THW1 and THW2 cables are too long, bundle the excess cables outside the FTC (Sub) unit. Do not bind the wires in the FTC (Sub) unit.

<Thermistor position>
Place THW1 on **water** piping (water **outlet** side) after booster heater, and THW2 on the water inlet side.
It is recommended to protect the thermistor with heat insulating materials so as not to be affected by ambient temperature.
Note: Be sure to attach THW1 where it correctly detects flow temperature (water outlet side). For more details, see Page 5.

⚠ **CAUTION:**
Do not route the thermistor cables together with power cables.
The sensor part of the thermistor should be installed where user can not access.

10.6 DIP switch functions

<Outdoor unit>
• Set refrigerant address on each outdoor unit from 1 to 6.

Note: Do NOT use refrigerant address 0 as 0 is used for FTC (Main). The address range is from 1 to 6.

Split model (SW1-3 to SW1-6)

DIP switch	Refrigerant address number					
	Add. 1	Add. 2	Add. 3	Add. 4	Add. 5	Add. 6
SW1-1	—	—	—	—	—	—
SW1-2	—	—	—	—	—	—
SW1-3	ON	OFF	ON	OFF	ON	OFF
SW1-4	OFF	ON	ON	OFF	OFF	ON
SW1-5	OFF	OFF	OFF	ON	ON	ON
SW1-6	OFF	OFF	OFF	OFF	OFF	OFF

Packaged model

Refer to outdoor unit installation manual.

<FTC: Main>
• Set DIP SW4-1 and SW4-2 to ON.
• For more details refer to “5. DIP Switch setting.”

<FTC: Sub>
• Set DIP SW4-1 to ON "Active :multiple outdoor unit control".
• Set DIP SW1-7 (Outdoor unit type) on each sub unit according to each connected outdoor unit type.
• Set only DIP-SW1-3 to ON on the sub unit that runs DHW operation.

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10. Multiple outdoor units control

DIP Switch		Function	OFF	ON	Main	Sub*1
SW1	SW1-1	Boiler	WITHOUT Boiler	WITH Boiler	✔	—
	SW1-2	Heat pump maximum outlet water temperature	55˚C	60˚C	✔	✔
	SW1-3	DHW tank	WITHOUT DHW tank	WITH DHW tank	✔	✔
	SW1-4	Immersion heater	WITHOUT Immersion heater	WITH Immersion heater	✔	—
	SW1-5	Booster heater	WITHOUT Booster heater	WITH Booster heater	✔	—
	SW1-6	Booster heater function	For heating only	For heating and DHW	—	—
	SW1-7	Outdoor unit type	Split type	Packaged type	—	✔
	SW1-8	Wireless remote controller	WITHOUT Wireless remote controller	WITH Wireless remote controller	✔	—
SW2	SW2-1	Room thermostat 1 input (IN1) logic change	Zone 1 operation stop at short	Zone 1 operation stop at open	✔	—
	SW2-2	Flow switch 1 input (IN2) logic change	Failure detection at short	Failure detection at open	✔	✔
	SW2-3	Booster heater capacity restriction	Inactive	Active	✔	—
	SW2-4	Cooling mode function	Inactive	Active	✔	—
	SW2-5	"Automatic switch to backup heater only operation (When outdoor unit stops by error)"	Inactive	Active	✔	—
	SW2-6	Mixing tank	WITHOUT Mixing tank	WITH Mixing tank	✔***2**	—
	SW2-7	2-zone temperature control	Inactive	Active	✔	—
	SW2-8	Flow sensor	WITHOUT Flow sensor	WITH Flow sensor	✔	✔
SW3	SW3-1	Room thermostat 2 input (IN6) logic change	Zone 2 operation stop at short	Zone 2 operation stop at open	✔	—
	SW3-2	Flow switch 2 and 3 input logic change	Failure detection at short	Abnormality detection at open	✔	—
	SW3-3	—	—	—	—	—
	SW3-4	—	—	—	—	—
	SW3-5	Heating mode function	Inactive	Active	✔	—
	SW3-6	2-zone valve ON/OFF control	Inactive	Active	✔	—
	SW3-7	—	—	—	—	—
	SW3-8	—	—	—	—	—
SW4	SW4-1	Multiple unit control	Inactive	Active	ON	ON
	SW4-2	Position of multiple outdoor units control	Sub	Main	ON	OFF
	SW4-3	—	—	—	—	—
	SW4-4	—	—	—	—	—
	SW4-5	Emergency mode (Heater only operation)	Normal	"Emergency mode (Heater only operation) (To be activated only when powered ON)"	✔	—
	SW4-6	Emergency mode (Boiler operation)	Normal	"Emergency mode (Boiler operation) (To be activated only when powered ON)"	✔	—
SW5	SW5-1	—	—	—	—	—
	SW5-2	Advanced Auto Adaptation	Inactive	Active	✔	—
	SW5-3	—	—	—	—	—
	SW5-4	—	—	—	—	—
	SW5-5	—	—	—	—	—
	SW5-6	—	—	—	—	—
	SW5-7	—	—	—	—	—
	SW5-8	—	—	—	—	—
SW6	SW6-1	—	—	—	—	—
	SW6-2	—	—	—	—	—
	SW6-3	Pressure sensor	Inactive	Active	—	✔
	SW6-4	Analog output signal (0-10 V)	Inactive	Active	✔	—
	SW6-5	—	—	—	—	—
	SW6-6	—	—	—	—	—
	SW6-7	—	—	—	—	—
	SW6-8	—	—	—	—	—
SW7	SW7-1	Mixing valve setting	Only Zone 2	Zone 1 and Zone 2	✔	—
	SW7-2	Forced cooling mode input (IN13) logic change	Active at short	Active at open	✔	—
	SW7-3	Cooling limit temp. input (IN15) logic change	Active at short	Active at open	✔	—
	SW7-4	—	—	—	—	—
	SW7-5	—	—	—	—	—
	SW7-6	—	—	—	—	—
	SW7-7	—	—	—	—	—
	SW7-8	—	—	—	—	—

*1 When FTC (Main) in Hydrobox is set as Sub.

*2 Set DIP SW2-6 to ON in "System 3 (2 zone)" and in "System 4 (with Boiler)" mentioned in "10.2 Pipe work."

✔ : Setting is required

— : NO setting (function is not available)

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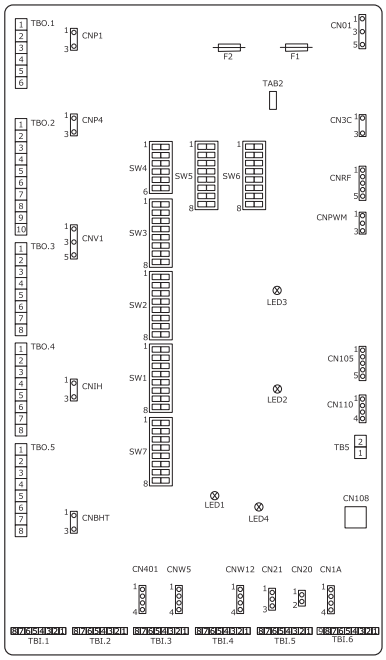
10. Multiple outdoor units control

10.7 Connecting inputs/outputs

<Electrical connection for main controller>
• Refer to "4.5 Connecting inputs/outputs"

<Electrical connection for sub controller>

■ **PAC-IF08*B-E**



<Fig. 10.7.1>

Signal inputs

Name	Terminal block	Connector	Item
RC	TB5 1-2	—	Communication cable between indoor units
IN2	TBI.1 5-6	—	Flow switch 1 input
INA1	TBI. 6 3-5	CN1A	Flow sensor input

Wiring specification and local supply parts

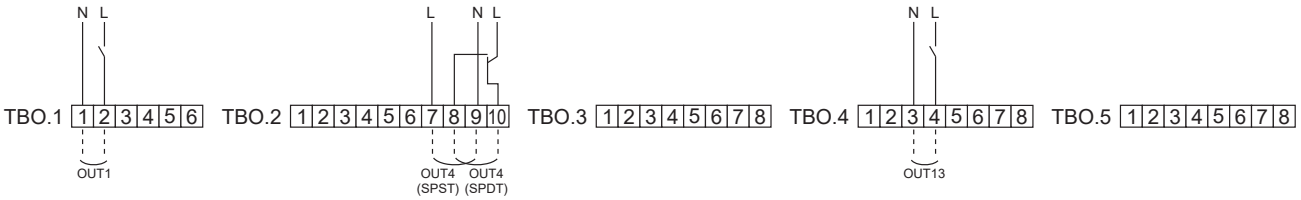
Item	Name	Model and specifications
Signal input function	Signal input wire	Use sheathed vinyl coated cord or cable: 10 m max. Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.13 mm² to 1.25 mm² Solid wire: ø0.4 mm to ø1.2 mm
	Switch	Non-voltage “a” contact signals Remote switch: minimum applicable load 12 V DC, 1 mA

Thermistor inputs

Name	Terminal block	Connector	Item	Optional part model
TH2	—	CN21	Thermistor (Ref. liquid temp.)	—
THW1	—	CNW12 1-2	Thermistor (Flow water temp.)	—
THW2	—	CNW12 3-4	Thermistor (Return water temp.)	—

Outputs

Name	Terminal block	Connector	Item	OFF	ON	Signal/Max. current
OUT1	TBO.1 1-2	CNP1	Water circulation pump 1 output	OFF	ON	230V AC 1.0 A max.
OUT4	TBO.2 7-9	—	3-way valve SPST (2-way valve 1) output	Heating	DHW	230V AC 0.1 A max.
	TBO.2 8-10	CNV1	3-way valve SPDT output			
OUT13	TBO.4 3-4	—	2-way valve 2 output	DHW	Heating	230V AC 0.1 A max.

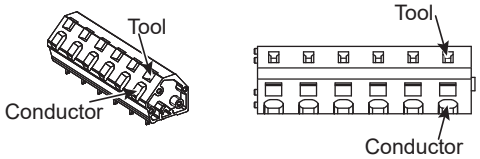


<Fig. 10.7.2>

Wiring specification and local supply parts

Item	Name	Model and specifications
External output function	Outputs wire	Use sheathed vinyl coated cord or cable : 30 m max. Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.25 mm² to 1.5 mm² Solid wire: 0.25 mm² to 1.5 mm²

How to use TBO.1 to 5



Outline view **Top view**

Connect them using either way as shown above.

<Fig. 10.7.3>

Note:
1. Do not connect multiple water circulation pumps directly to each output (OUT1). In such a case, connect them via (a) relay(s).
2. Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).

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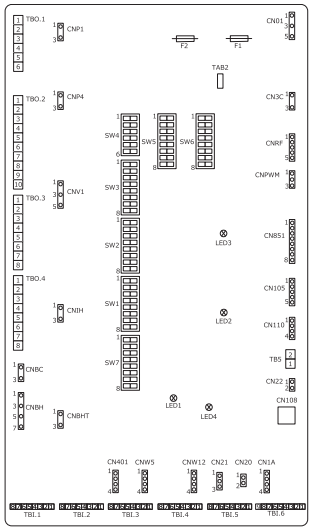
10. Multiple outdoor units control

■ Hydrobox



<Fig. 10.7.4>

Signal inputs

Name	Terminal block	Connector	Item
RC	TB5 1-2	CN22	Communication cable between indoor units
INA1	TBI.6 3-5	CN1A	Flow sensor input

Wiring specification and local supply parts

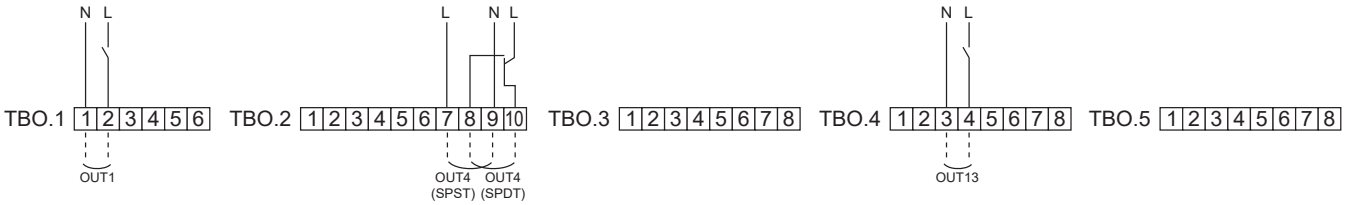
Item	Name	Model and specifications
Signal input function	Signal input wire	Use sheathed vinyl coated cord or cable: 10 m max. Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.5 mm² to 1.25 mm² Solid wire: ø0.65 mm to ø1.2 mm

Thermistor inputs

Name	Terminal block	Connector	Item	Optional part model
TH2	—	CN21	Thermistor (Ref. liquid temp.)	—
THW1	—	CNW12 1-2	Thermistor (Flow water temp.)	—
THW2	—	CNW12 3-4	Thermistor (Return water temp.)	—

Outputs

Name	Terminal block	Connector	Item	OFF	ON	Signal/Max. current
OUT1	TBO.1 1-2	CNP1	Water circulation pump 1 output	OFF	ON	230 V AC 1.0 A max.
OUT4	TBO.2 7-9	—	3-way valve SPST (2-way valve 1) output	Heating	DHW	230 V AC 0.1 A max.
	TBO.2 8-10	CNV1	3-way valve SPDT output			
OUT13	TBO.4 3-4	—	2-way valve 2 output	DHW	Heating	230 V AC 0.1 A max.

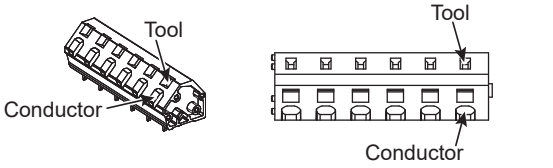


<Fig. 10.7.5>

Wiring specification and local supply parts

Item	Name	Model and specifications
External output function	Outputs wire	Use sheathed vinyl coated cord or cable: 30 m max. Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.25 mm² to 1.5 mm² Solid wire: 0.25 mm² to 1.5 mm²

How to use TBO.1 to 4



Outline view **Top view**

Connect them using either way as shown above.

<Fig. 10.7.6>

Note:

1. **Do not connect multiple water circulation pumps directly to each output (OUT1). In such a case, connect them via (a) relay(s).**
2. **Do not connect water circulation pumps to both TBO.1 1-2 and CNP1 at the same time.**
3. **Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).**

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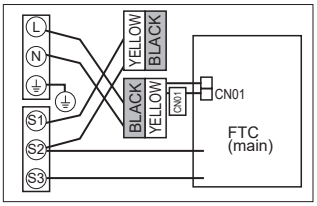
10. Multiple outdoor units control

■ Basic Troubleshooting for multiple outdoor units control

No.	Fault symptom	Possible cause	Explanation - Solution
1	Main remote controller display is blank.	1. There is no power supply to main remote controller.	1. Check LED2 on the FTC main controller. (See Figure 4.5.1.) (i) When LED2 is lit. Check for damage or contact failure of the main remote controller wiring. (ii) When LED2 is blinking. Refer to No. 4 below. (iii) When LED2 is not lit. Refer to No. 3 below.
		2. Power is supplied to the main remote controller, however, the display on the main remote controller does not appear.	2. Check the following: • Disconnection between the main remote controller cable and the FTC main controller. • Failure of the main remote controller if “Please Wait” is not displayed. • Refer to No. 2 below if “Please Wait” is displayed.
2	“Please Wait” remains displayed on the main remote controller.	1. "Please Wait" is displayed for up to 6 minutes. 2. Communication failure between the main remote controller and FTC main/sub controller. 3. Communication failure between FTC sub controller and outdoor unit.	1. Normal operation. 2.,3. Main remote controller start up checks/procedure. (i) If “0%” or “50-99%” is displayed below "Please Wait" there is a communication error between the main remote controller and the FTC main/sub controller. • Check wiring connections on the main remote controller. • Replace the main remote controller or FTC main/sub controller. (ii) If “1-49%” is displayed there is a communication error between the outdoor unit's control board and FTC sub controller. • Check the wiring connections on the outdoor unit control board and the FTC sub controller. (Ensure S1 and S2 are not cross-wired and S3 is securely wired with no damage. (See section 4.5.) • Replace the outdoor unit's control board and/or the sub controller.
3	Warning symbol is displayed on the main remote controller.	Sub unit failure	1. Press CONFIRM button on the main remote controller while the warning symbol is displayed. 2. Check the error details.
4	LED2 on FTC main controller is off. (See Figure 4.5.1.)	When LED1 on FTC main controller is also off. (See Figure 4.5.1.)	
		1. FTC main controller is not supplied with 220 to 240V AC.	1. Check the voltage across the L and N terminals on the indoor power supply terminal block. (See section 4.5.) • When the voltage is not 220 to 240V AC, check for faulty wiring to power supply. • When the voltage is 220 to 240V AC, go to 2. below.
		2. There are problems in the method of connecting the connectors.	2. Check for faulty wiring between the connectors. • When the connectors are wired incorrectly re-wire them correctly referring to below. (See section 4.5 and a wiring diagram on the control and electrical box cover.)  • If no problem found with the wiring, go to 3. below.
		3. FTC main controller failure	3. Check the FTC main controller. • Check the fuse on the FTC main controller. • Check for faulty wiring. • Check DIP SW4-2 is ON. • If no problem found with the wiring, the FTC main controller is faulty.
5	LED2 on FTC is blinking. (See Figure 4.5.1.)	When LED1 is also blinking on FTC main controller.	Check for faulty wiring in FTC main controller.
		When LED1 on FTC main controller is lit.	
		1. Faulty wiring in main remote controller Multiple indoor units have been wired to a single outdoor unit.	1. Check for faulty wiring in main remote controller. The number of indoor units that can be wired to a single outdoor unit is one. Additional indoor units must be wired individually to a single outdoor unit.
		2. Short-circuited wiring in main remote controller 3. Main remote controller failure	2.,3. Remove main remote controller wires and check LED2 on FTC main controller. (See Figure 4.5.1.) • If LED2 is blinking check for short circuits in the main remote controller wiring. • If LED2 is lit, wire the main remote controller again and: - if LED2 is blinking, the main remote controller is faulty; - if LED2 is lit, faulty wiring of the main remote controller has been corrected.
		4. DIP SW setting failure	4. Check DIP SW4-2 on the FTC sub controller is OFF.
6	Main remote controller communication failure E0/E4 E3/E5	1. Connection failure of the earth cable	1. Electrical connection (FTC powered via outdoor unit) • Check for looseness or breakage of the earth cables of outdoor units. • Daisy-chain the outdoor units with earth cables and earth them with one of the cables. Electrical connection (FTC powered via independent source) • Check for looseness or breakage of the earth cables of FTC units. • Daisy-chain the FTC units with earth cables and earth them with one of the cables.
		2. Incorrect wiring of main remote controller.	2. The main remote controller must NOT be wired to FTC sub controller.

For other details, refer to "8. Troubleshooting".

11. Supplementary information

11.1 Refrigerant collecting (pumpdown) for split model systems only

Refer to “Refrigerant collection” in the outdoor unit installation manual or service manual.

11.2 Back-up operation of boiler

Heating operation is backed up by boiler.
For more details, refer to the installation manual of PAC-TH012HT-E.

<Installation & System set up>
1. Set DIP-SW 1-1 to ON "With boiler" and SW2-6 to ON “With Mixing tank”.
2. Install the thermistor (Boiler flow water temp.) (THWB1) *1 on the boiler circuit.
3. Connect the output wire (OUT10: Boiler operation) to the signal input (room thermostat input) on the boiler. *2
4. Install one of the following room temp. thermostats. *3

- Wireless remote controller (option)
- Room temp. thermostat (local supply)
- Main remote controller (remote position)

<Remote controller settings>
1. Go to [Service] menu, then [Heat source setting], and choose [Boiler] or [Hybrid]. *4
2. Go to [Service] menu, and choose [Operation settings], then [Boiler settings] to make detailed settings for [Hybrid settings].

*1 The thermistor (Boiler flow water temp.) is an optional part.
*2 OUT10 has no voltage across it.
*3 Boiler heating is controlled on/off by the room temperature thermostat.
*4 [Hybrid] automatically switches heat sources between heat pump (and electric heater) and boiler.

MITSUBISHI ELECTRIC

Mitsubishi Electric Erp Directive Related Product Information: **erp.mitsubishielectric.eu/erp**
Details and precautions on installation, maintenance and assembly can be found in the installation and or operation manuals.
This information is based on EU regulation No 811/2013 and No 813/2013.

PRODUCT FICHE OF TEMPERATURE CONTROLS

1	Parts name	5	Main Remote controller	7	Wireless remote controller & receiver
2	Model name	6	(Indoor Unit Accessory)		PAR-WT60R-E & PAR-WR61R-E
3	The class of the temperature control		VI		VI
4	The contribution to seasonal space heating energy efficiency (%)		4		4

Local application factors

* This FTC is designed to connect Mr.Slim/ Ecodan inverter outdoor unit of MITSUBISHI ELECTRIC to local systems. Please check the following when designing the local system.
* MITSUBISHI ELECTRIC does not take any responsibility for the local system design.

Heat exchanger

(1) Withstanding pressure

Designed pressure of outdoor unit is 4.15 MPa. Following must be satisfied for burst pressure of connecting application.
Burst pressure: More than 12.45 MPa (3 times more than designed pressure)

(2) Performance

Secure the heat exchanger capacity which meets the following conditions. If the conditions are not met, it may result in malfunction caused by the protection operation or the outdoor unit may be turned off due to the operation of protection system.
• In case of hot water supply, condense temperature is less than 58°C in max. frequency operation with the outside temperature 7°C D.B./6°C W.B.

(3) Contamination maintenance

1. Wash the inside of heat exchanger to keep it clean. Be sure to RINSE not to leave flux. Do not use chlorine detergent when washing.
2. Be sure that the amount of contamination per unit cubic content of heat transfer pipe is less than the following amount.
   Example) In case of Φ9.52 mm
   Residual water: 0.6 mg/m, Residual oil: 0.5 mg/m, Solid foreign object: 1.8 mg/m

Thermistor position

Refer to 4.4.

Notes

· Install the hydraulic filter at the water inlet pipework.
· Inlet water temperature of heat exchanger should be within the range 5 °C - 55 °C.
· The water in both primary and sanitary circuit should be clean and with pH value of 6.5-8.0
· The followings are the maximum values;
  Calcium: 100 mg/L, Ca hardness: 250 mg/L
  Chloride: 100 mg/L, Copper: 0.3 mg/L
· Other constituents should be to European Directive 98/83 EC standards.
· Refrigerant pipe diameter from outdoor unit to refrigerant-water HEX (Only for SPLIT type)
  Use the pipe with same diameter size as the refrigerant pipe connection diameter of outdoor unit. (Refer to outdoor unit installation manual.)
· Ensure that there is sufficient anti-freeze chemical in the water circuit. It is recommended to use 7 : 4 anti-freeze to water ratio.
· The water velocity in pipes should be kept within certain limits of material to avoid erosion, corrosion and excessive noise generation.
  Be aware, and take care of, that local velocities in small pipes, bends and similar obstructions can exceed the values above.
  e.g. Copper: 1.5 m/s

⚠ **WARNING:**

· Always use water that meets the above quality requirements. Using water that does not meet these standards may result in damage to the system pipework and heating components.
· Never use anything other than water as a medium. It may cause a fire or an explosion.
· Do not use heated water that is produced by the air to water heat pump directly for drinking or cooking. There is a risk to damage your health. There is also a risk that installing the water heat exchanger may corrode if the necessary water quality for air to water heat pump system cannot be maintained. If you wish to use the heated water from the heated pump for these purposes, take measure such as to the second heat exchanger within the water piping system.
· The water quality must comply with European Directive (EU) 2020/2184 standards.

Additional Requirements

1. Important Notice (Fire safety)
R32 and R290 is flammable refrigerant, and the fire safety warranty for the whole system (including outdoor unit) must be done by your side.
Conformity of regulations (e.g. IEC 60335-2-40) and laws must be confirmed on the system by your side.

2. PUZ-(H)WM series**
Flow sensor (PAC-FS01-E) is required. Outdoor unit is equipped with 1 x 3 bar PRV. Installation of an additional PRV is therefore not recommended. In case of heat exchanger failure, a small amount of R32 could leak inside the building through PRV.

3. PUZ-WZ series**
Flow sensor (PAC-FS01-E) is required. Outdoor unit is equipped with 2 x 3 bar PRV. Installation of an additional PRV is therefore not recommended. In case of heat exchanger failure, a small amount of R290 could leak inside the building through PRV.

This product is designed and intended for use in the residential, commercial and light-industrial environment.

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Please be sure to put the contact address/telephone number on
this manual before handing it to the customer.

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