



FLOW TEMP. CONTROLLER 3 (Cased) PAC-IF041B-E

INSTALLATION MANUAL

FOR INSTALLER

For safe and correct use, read this manual thoroughly before installing the FTC3 unit.

OPERATION MANUAL

FOR USER

For safe and correct use, please read this operation manual thoroughly before operating the FTC3 unit.

English

Contents

1. Safety precautions.....	2	6. Before test run.....	26
2. Installing the FTC3 unit.....	3	7. Main controller operation.....	27
3. System.....	5	8. Troubleshooting.....	41
4. Electrical work.....	10	9. Supplementary information (Pump down).....	44
5. Dip switch setting.....	22	Local application factors.....	45

"FTC3" is the abbreviation of "Flow Temperature Controller 3", which is described as "FTC3" in this manual.
Mitsubishi Electric is not responsible for the failure of locally supplied parts.

1. Safety precautions

- ▶ Before installing the FTC3 unit, make sure you read all the "Safety precautions".
- ▶ Please report to your 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," use, and maintenance of the unit based on the information in the Operation Manual provided by local application manufacture. Both the Installation Manual and the Operation Manual must be given to the user. These manuals must always be kept by the actual users.
⚠ : 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 be caused.
 - For installation work, follow the instructions in the Installation Manual and use tools and pipe components specifically made for use with refrigerant specified 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 FTC3 unit needs to be repaired or moved, ask an installer or an authorized technician.
- During installing a heat pump system, keep water from splashing on the FTC3 unit.
- When installing sensors and parts, do not expose the terminals.

1.1. Before installation (Environment)

- Caution:**
- Do not install the FTC3 unit in 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 use the unit in an unusual environment. If the FTC3 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.
 - Do not install the unit where combustible gases may leak, be produced, flow, or accumulate. If combustible gas accumulates around the unit, it may cause fire or explosion.

- 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 the FTC3 unit to malfunction or to breakdown. At the same time, the noise and electric interference from the FTC3 unit may disturb the proper operation of nearby medical equipment, and communications equipment.

1.2. Before installation or relocation

- 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.
- Do not wash the FTC3 unit. You may receive an electric shock.

1.3. Before electric work

- Caution:**
- 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 result.

1. Safety precautions

1.4. Before starting the test run

⚠ 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.
- 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 to get an electric shock.
- 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

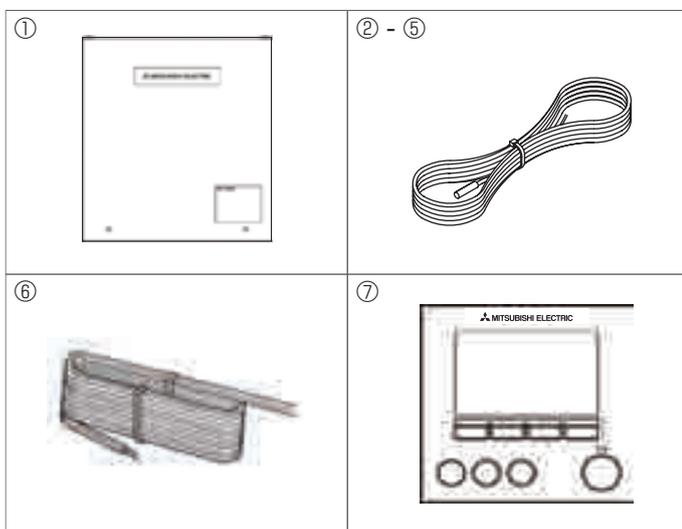
⚠ Warning:

- FTC3 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 to prevent water pipes freezing
ASHP/HP	Air source heat pump
COP	Coefficient of performance the efficiency of the heat pump
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 rate	Speed at which water circulates around the primary circuit
Flow temperature	Temperature at which water is delivered to the primary circuit
FTC3	Flow temperature controller, the circuit board in charge of controlling the system
Compensation curve mode	Space heating incorporating outdoor temperature compensation
Heating mode	Space heating through radiators or UFH
Legionella	Bacteria potentially found in plumbing, showers and water tanks that may cause Legionnaires disease
LP mode	Legionella prevention mode – a function on systems with tanks to prevent the growth of legionella bacterium
Packaged model	Plate heat exchanger in the outdoor heat pump unit
Refrigerant	A compound used within the heat cycle that goes through a phase change from gas to liquid
Split model	Plate heat exchanger in the indoor unit
TRV	Thermostatic radiator valve – a valve on the entrance or exit of the radiator panel controlling the heat output
UFH	Under floor heating – a system of water carrying pipes under the floor, that warms the floor surface

2. Installing the FTC3 unit



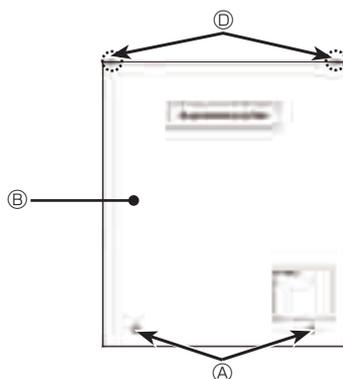
<Fig. 2.1.1>

2.1. Check the parts (Fig. 2.1.1)

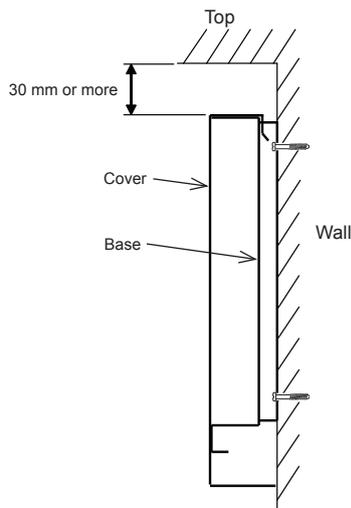
The FTC3 unit should be supplied with the following parts.

	Part name	Wiring diagram symbol	Q'ty
①	FTC3 unit		1
②	Liquid refrigerant temp. thermistor (Lead wire: 5m/Red, Connector: 3p/Yellow)	TH2	1
③	Flow water temp. and Return water temp. thermistor (Lead wire: 5m/Gray(Flow water temp.), 5m/Black(Return water temp.), Connector: 4p/Red)	THW1/2	1
④	Tank water temp. thermistor (Lead wire: 5m/Gray, Connector: 6p/White)	THW5B	1
⑤	Booster heater temp. thermistor (Lead wire: 5m/Black, Connector: 2p/White)	THW3	1
⑥	Main controller cable (5 m)		1
⑦	Main controller		1

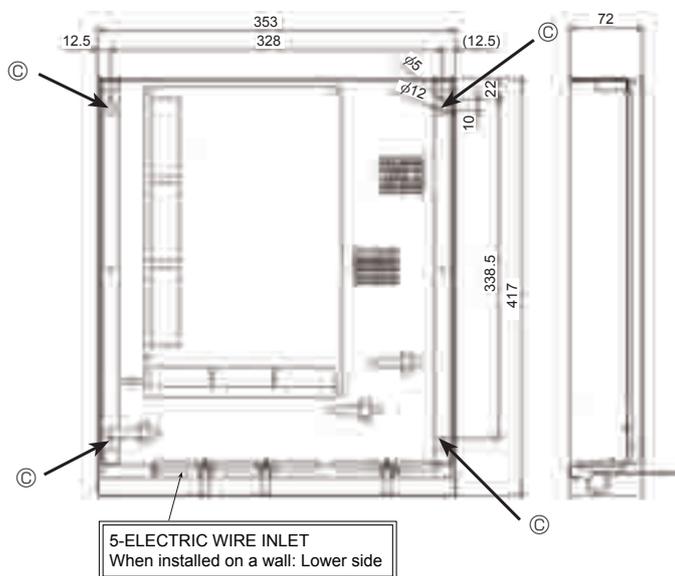
2. Installing the FTC3 unit



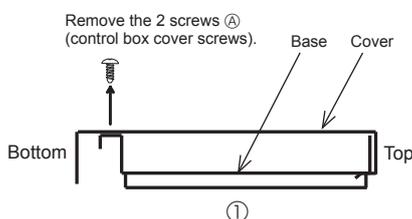
<Fig. 2.3.1>



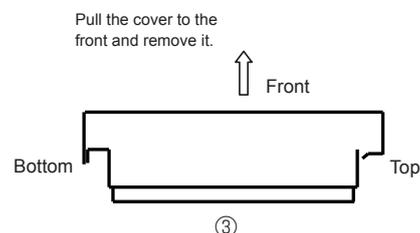
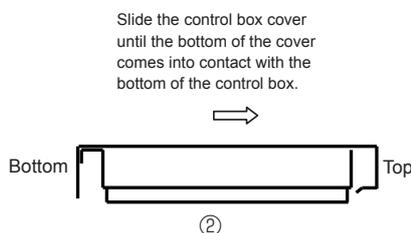
<Fig. 2.3.2>
Service space



<Fig. 2.3.3>



<Fig. 2.3.4>



2.2. Choosing the FTC3 unit installation location

- Do not install the FTC3 units outdoors as it is designed for indoor installation only. (The FTC3 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 location that is hot or humid for long periods of time.

2.3. Installing the FTC3 unit (Fig. 2.3.1, 2.3.2, 2.3.3, 2.3.4)

1. Remove 2 screws (A Screw) from FTC3 unit and remove the cover. (See Fig. 2.3.4)
2. Install the 4 screws (locally supplied) in the 4 holes (C Hole).
 - * 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)

- (A) Screw (B) Cover
(C) Hole for installation (D) Screw

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

Weight	4.1 kg + ACCESSORIES 1.0 kg
Allowable ambient temperature	0 to 35°C
Allowable ambient humidity	80% RH or less

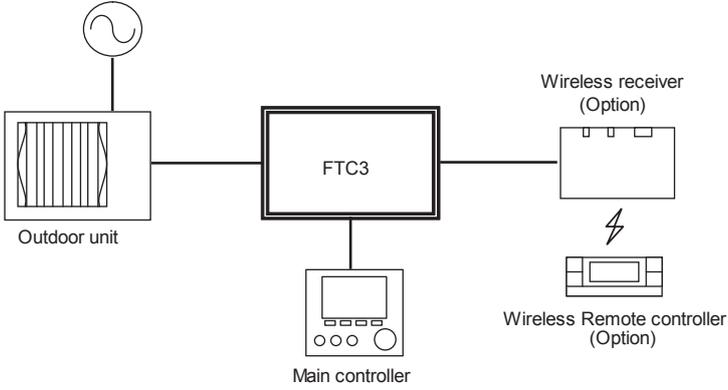
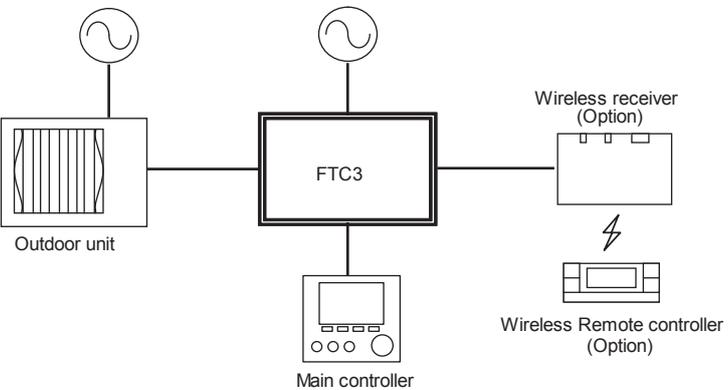
Optional extras

- Wireless Remote Controller PAR-WT40R-E
- Wireless Receiver PAR-WR41R-E
- Remote sensor PAC-SE41TS-E

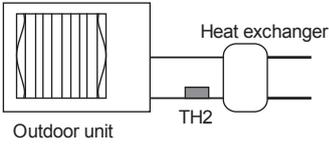
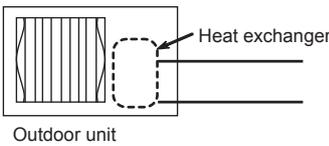
3. System

The FTC3 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.

First step (Electrical work)

Power supplies	System diagram	Reference chapter
FTC3 powered via outdoor unit		4.1 4.2
FTC3 powered by independent source		4.1 4.2

Second step (Outdoor unit type)

Outdoor unit type	System diagram	Thermistor	Reference chapter
Split		TH2: Liquid refrigerant temp.	4.4 5.1
Packaged		—	4.4 5.1

3. System

Third step (Functions setting)

DHW tank	Immersion heater	Booster heater	BH function	System diagram	Thermistor	Reference chapter	Remarks
Present	Absent	Present	For heating and DHW		THW1: Flow water temp. THW2: Return water temp. THW3: Booster heater temp. THW5B: Tank water temp.	4.4 4.5 5.2	
Present	Present	Present	For heating and DHW		THW1: Flow water temp. THW2: Return water temp. THW3: Booster heater temp. THW5B: Tank water temp.	4.4 4.5 5.2	
Present	Absent	Present	For heating only		THW1: Flow water temp. THW2: Return water temp. THW3: Booster heater temp. THW5B: Tank water temp.	4.4 4.5 5.2	1. 'Legionella Prevention Mode' cannot be selected in this system.
Present	Absent	Absent	—		THW1: Flow water temp. THW2: Return water temp. THW5B: Tank water temp.	4.4 4.5 5.2	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. THW3: Booster heater temp. THW5B: Tank water temp.	4.4 4.5 5.2	
Present	Present	Absent	—		THW1: Flow water temp. THW2: Return water temp. THW5B: Tank water temp.	4.4 4.5 5.2	
Absent	Absent	Present	—		THW1: Flow water temp. THW2: Return water temp. THW3: Booster heater temp.	4.4 4.5 5.2	
Absent	Absent	Absent	—		THW1: Flow water temp. THW2: Return water temp.	4.4 4.5 5.2	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

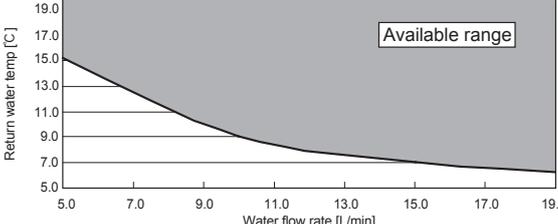
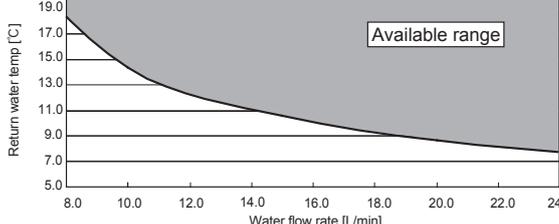
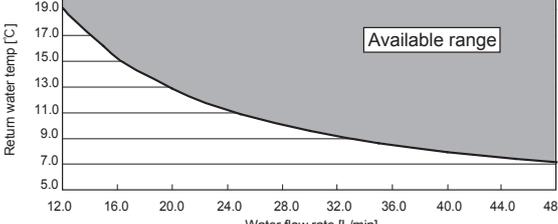
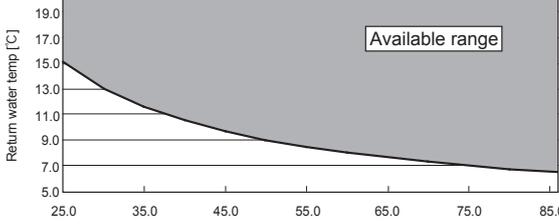
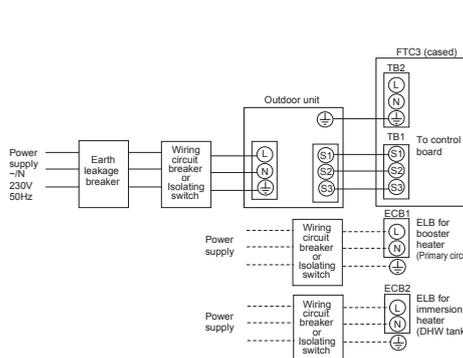
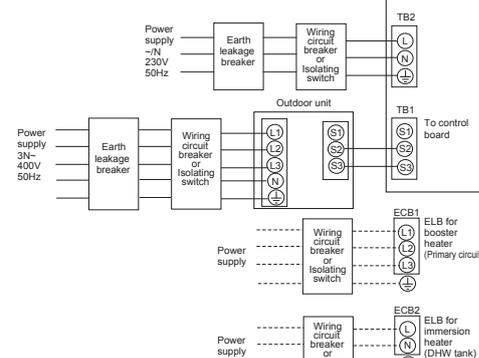
Fourth step (Functions setting)

※ Make sure to check the followings for your safety when designing a system. These are the minimum requirement for the safe use of FTC3.

Parts name	Requirement																																	
Flow switch	It is required to protect system from the effects of insufficient flow. (Reference value) The flow switch used for our Cylinder unit and Hydrobox : 5.5L/min																																	
Strainer /Magnetic filter (water circuit)	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).																																	
Pressure relief valve (Primary circuit side) (Sanitary water side)	It is required to protect system from reaching high pressure. Select the operating pressure depending on water pressure in the circuit in normal use. ※ Follow the national regulations.																																	
3-way valve	Current: 0.1A Max (If over 0.1A you must use a relay) Power supply: 230V AC Connect earth cable, if there is one. Type: SPST ※ SPDT type can NOT be used.																																	
2-way valve	Current: 0.1A Max (If over 0.1A you must use a relay) Power supply: 230V AC 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 by-pass 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.																																	
Water circulation pump	<p>Current: 1.0A Max, Power supply: 230V AC</p> <p>When connecting a pump with an electric current of $\geq 1A$ or multiple pumps, please note the following.</p> <ol style="list-style-type: none"> Use (a) relay(s). When power is supplied from outdoor unit, TOTAL current (including the other parts) requirement MUST be $\leq 3A$ (otherwise, the fuse on the outdoor unit PCB will blow.) When independent power supplies (i.e. from the FTC3 (cased) itself) , total current for the pump(s) is $\leq 2A$. (otherwise, the fuse on the FTC3 PCB will blow.) <p>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.</p> <table border="1"> <thead> <tr> <th rowspan="2">Model capacity</th> <th colspan="2">Water flow rate range [L/min]</th> </tr> <tr> <th>Minimum</th> <th>Maximum *</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Packaged</td> <td>50</td> <td>7.1</td> </tr> <tr> <td>85</td> <td>10</td> </tr> <tr> <td>112</td> <td>14.4</td> </tr> <tr> <td>140</td> <td>17.9</td> </tr> <tr> <td rowspan="9">Split</td> <td>35</td> <td>7.1</td> </tr> <tr> <td>50</td> <td>7.1</td> </tr> <tr> <td>60</td> <td>8.6</td> </tr> <tr> <td>71</td> <td>10.2</td> </tr> <tr> <td>100</td> <td>14.4</td> </tr> <tr> <td>125</td> <td>17.9</td> </tr> <tr> <td>140</td> <td>20.1</td> </tr> <tr> <td>200</td> <td>28.7</td> </tr> <tr> <td>250</td> <td>32.1</td> </tr> </tbody> </table> <p>* 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: 1.5m/s)</p> <p>(1) Packaged-type units</p> <p>■ Heating</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>PUHZ-W50VHA(-BS)</p> </div> <div style="text-align: center;"> <p>PUHZ-W85VHA2(-BS)</p> </div> </div> <div style="text-align: center; margin-top: 20px;"> <p>PUHZ-HW112/140YHA2(-BS) PUHZ-HW140VHA2(-BS)</p> </div>	Model capacity	Water flow rate range [L/min]		Minimum	Maximum *	Packaged	50	7.1	85	10	112	14.4	140	17.9	Split	35	7.1	50	7.1	60	8.6	71	10.2	100	14.4	125	17.9	140	20.1	200	28.7	250	32.1
Model capacity	Water flow rate range [L/min]																																	
	Minimum	Maximum *																																
Packaged	50	7.1																																
	85	10																																
	112	14.4																																
	140	17.9																																
Split	35	7.1																																
	50	7.1																																
	60	8.6																																
	71	10.2																																
	100	14.4																																
	125	17.9																																
	140	20.1																																
	200	28.7																																
	250	32.1																																

3. System

From the previous page.

Parts name	Requirement																																					
Water circulation pump	<p>(2) Split-type units</p> <p>■ Heating</p> <p>PUHZ-RP35/50VHA4 *1</p>  <p>PUHZ-RP60/71VHA4 *2 PUIZ-HRP71VHA2 *3</p>  <p>PUHZ-RP100/125/140VKA *3 PUIZ-HRP100VHA2 *3 PUHZ-RP100/125/140YKA *3 PUIZ-HRP100/125YHA2 *3</p>  <p>PUHZ-RP200/250YKA *4 PUIZ-HRP200YKA *4</p>  <p>*1 When the connected plate heat exchanger is ACH 30-30 made by ALFA LAVAL. *2 When the connected plate heat exchanger is ACH 70-30 made by ALFA LAVAL. *3 When the connected plate heat exchanger is ACH 70-40 made by ALFA LAVAL. *4 When two ACH 70-40 plate heat exchangers made by ALFA LAVAL are parallel-connected.</p>																																					
	<p>Booster heater</p> <p>General</p> <p>※ 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 bacterium growth. (Note) System without neither booster heater or immersion heater, 'Legionella Prevention Mode' is NOT available. (3) Water circuit should not be frozen during defrost operation.</p>																																					
	<p>Control Power for Contactor</p> <p>Current: 0.5A Max , Power supply: 230V AC ※ Use a relay.</p>																																					
	<p>Separate power for Heater</p> <p>Install an Earth Leakage Breaker (ELB) 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.2 5-6 (OUT6)) , and turn the Dip Sw2-3 to ON. (Booster heater capacity restriction)</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p><Fig. 1 (1 phase)></p> </div> <div style="text-align: center;">  <p><Fig. 2 (3 phase)></p> </div> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5">Heater capacity/Breaker/wiring (recommended)</th> </tr> <tr> <th colspan="5"><1 Phase></th> </tr> <tr> <th>Description</th> <th>Power supply</th> <th>Total capacity (BH1 + BH2)</th> <th>Breaker</th> <th>Wiring</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Booster heater (Primary circuit)</td> <td rowspan="2">~N 230V 50Hz</td> <td>2 kW (2 kW + 0 kW)</td> <td>16 A</td> <td>2.5 mm²</td> </tr> <tr> <td>6 kW (2 kW + 4 kW)</td> <td>32 A</td> <td>6.0 mm²</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5"><3 Phase></th> </tr> <tr> <th>Description</th> <th>Power supply</th> <th>Total capacity (BH1 + BH2)</th> <th>Breaker</th> <th>Wiring</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>※ 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.</p>	Heater capacity/Breaker/wiring (recommended)					<1 Phase>					Description	Power supply	Total capacity (BH1 + BH2)	Breaker	Wiring	Booster heater (Primary circuit)	~N 230V 50Hz	2 kW (2 kW + 0 kW)	16 A	2.5 mm ²	6 kW (2 kW + 4 kW)	32 A	6.0 mm ²	<3 Phase>					Description	Power supply	Total capacity (BH1 + BH2)	Breaker	Wiring	Booster heater (Primary circuit)	3~ 400V 50Hz	9 kW (3 kW + 6 kW)	16 A
Heater capacity/Breaker/wiring (recommended)																																						
<1 Phase>																																						
Description	Power supply	Total capacity (BH1 + BH2)	Breaker	Wiring																																		
Booster heater (Primary circuit)	~N 230V 50Hz	2 kW (2 kW + 0 kW)	16 A	2.5 mm ²																																		
		6 kW (2 kW + 4 kW)	32 A	6.0 mm ²																																		
<3 Phase>																																						
Description	Power supply	Total capacity (BH1 + BH2)	Breaker	Wiring																																		
Booster heater (Primary circuit)	3~ 400V 50Hz	9 kW (3 kW + 6 kW)	16 A	2.5 mm ²																																		
Safety device	<p>(1) Install the enclosed thermistor THW3 on the booster heater. (Microcomputer detecting temperature for protection: 80 °C) (2) 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 (3) Connect a pressure relief valve on the primary circuit side.</p>																																					

Continue to the next page.

3. System

From the previous page.

Parts name	Requirement										
Immersion heater	General ※ 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 bacterium growth. (Note) System without neither booster heater or immersion heater can not select 'Legionella Prevention Mode'.										
	Control Power for Contactor Current: 0.5A Max , Power supply: 230V AC ※ Use a relay.										
	Separate power for heater Install an Earth Leakage Breaker (ELB) for heater, separate from control power (See Fig.1 and Fig.2). Heater capacity/Breaker/wiring (recommended) <1 Phase> <table border="1" data-bbox="448 472 1062 517"> <thead> <tr> <th>Description</th> <th>Power supply</th> <th>Capacity</th> <th>Breaker</th> <th>Wiring</th> </tr> </thead> <tbody> <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> </tbody> </table> ※ When installing an immersion heater with the capacity of bigger than shown above, select an appropriate size breaker and cable (diameter) based on the maximum possible electric current.	Description	Power supply	Capacity	Breaker	Wiring	Immersion heater (DHW tank)	~N 230V 50Hz	3 kW	16 A	2.5 mm ²
	Description	Power supply	Capacity	Breaker	Wiring						
Immersion heater (DHW tank)	~N 230V 50Hz	3 kW	16 A	2.5 mm ²							
Safety device (1) Install the enclosed thermistor THW5B on the DHW tank. (Microcomputer detecting temperature for protection: 80 °C) (2) Use an overheat protection thermostat (manual reset type). Protection device operating temperature must be above 80 °C. Protection device should not operate quickly, 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.											
Expansion Vessel (Primary circuit side) Expansion Vessel (Sanitary water side)	When the water circuit is closed, select the expansion vessel according to water quantity of the water circuit. ※ Follow the national regulations.										
Limits of TOTAL electric current when connecting field supply parts	Option 1. (Power supply from outdoor unit) TOTAL current requirement MUST be $\leq 3A$ (otherwise, the fuse on the outdoor unit PCB will blow). Option 2. (Independent power supply (i.e. from the FTC3 (cased) itself)) TOTAL current of the pump(s) MUST be $\leq 2A$. The total current allowed for parts except pumps is $\leq 3A$. (otherwise, the fuse on the FTC3 PCB will blow.)										

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.

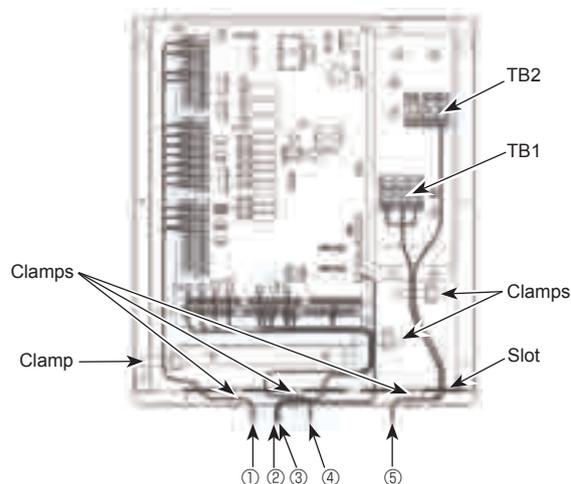
FTC3 can be powered in two ways.

1. Power cable is run from the outdoor unit to FTC3.
2. FTC3 has independent power source

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

Breaker abbreviation	Meaning
ECB1	ELB (Earth leakage breaker) for booster heater
ECB2	ELB (Earth leakage breaker) for immersion heater
TB1	Terminal bed 1
TB2	Terminal bed 2

Booster heater and immersion heater should be connected independently from one another to dedicated power supplies.



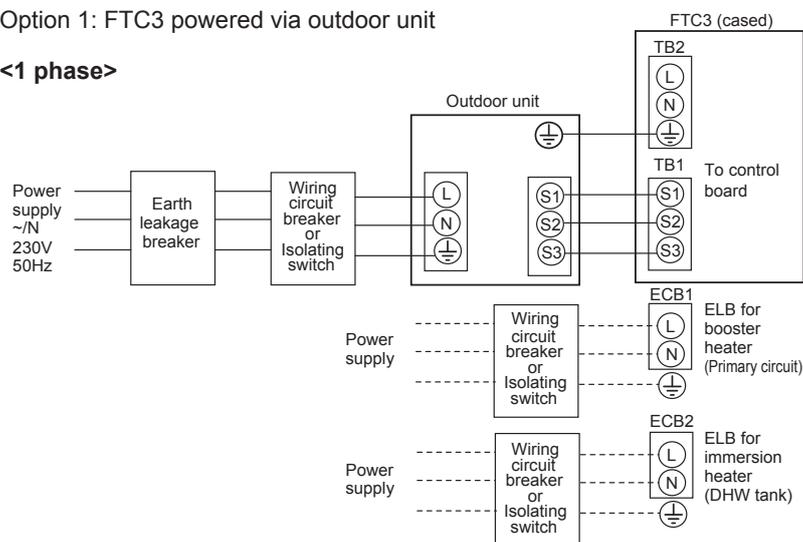
<Fig. 4.1.1>

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

- 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 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.

Option 1: FTC3 powered via outdoor unit

<1 phase>



* Affix label A that is included with the manuals near each wiring diagram for FTC3 and outdoor units.

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).

<Fig. 4.1.2>

Electrical connections 1 phase

Wiring No. Wiring size x size (mm ²)	FTC3 - Outdoor unit	*2	3 × 1.5 (polar)
	FTC3 - Outdoor unit earth	*2	1 × Min. 1.5
Circuit rating	FTC3 - Outdoor unit S1 - S2	*3	AC230V
	FTC3 - Outdoor unit S2 - S3	*3	DC24V

*1. 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.

*2. Max. 45 m
If 2.5 mm² used, Max. 50 m
If 2.5 mm² used and S3 separated, Max. 80 m

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

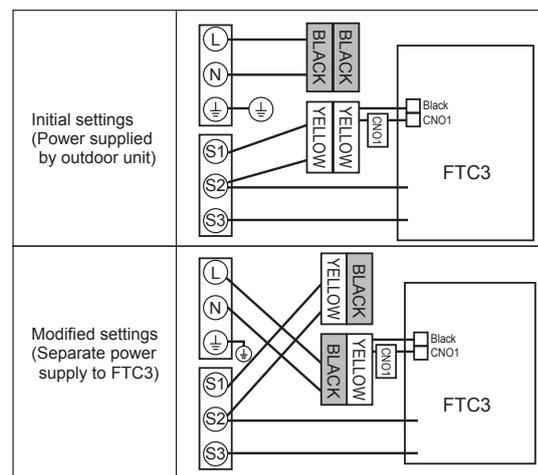
- Notes:**
1. Wiring size must comply with the applicable local and national codes.
 2. FTC3/outdoor unit connecting cords shall not be lighter than polychloroprene sheathed flexible cord. (Design 60245 IEC 57)
FTC3 power supply cords shall not be lighter than polychloroprene sheathed flexible cord. (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. Electrical work

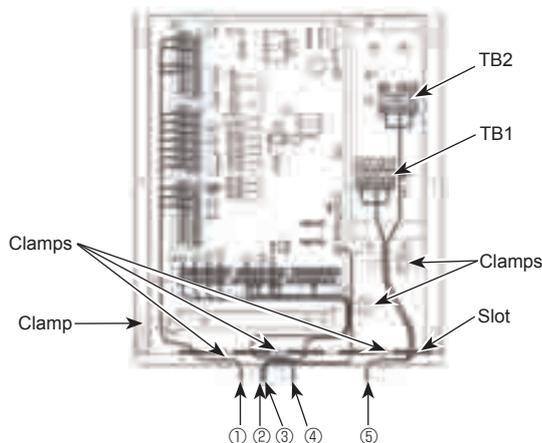
Option 2: FTC3 powered by independent source

If FTC3 and outdoor units have separate power supplies, the following requirements MUST be carried out:

- **FTC3 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 FTC3.**



<Fig. 4.1.3>

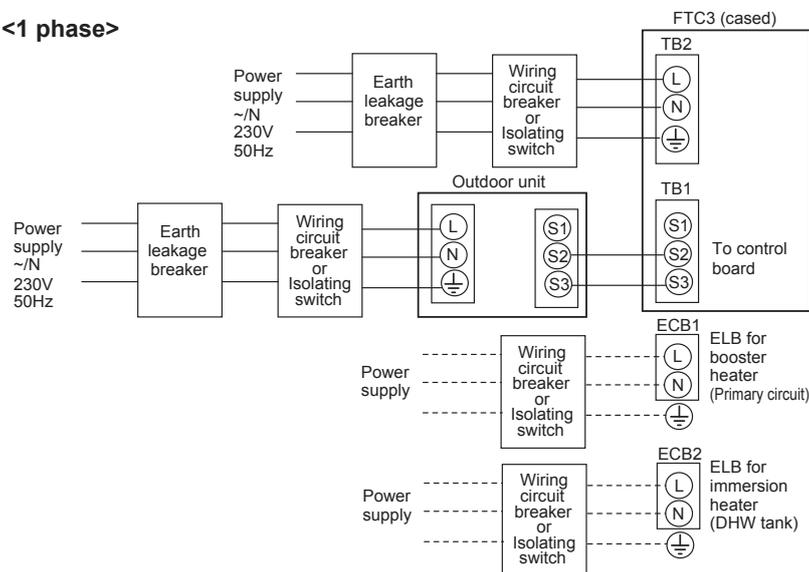


<Fig. 4.1.4>

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

- 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 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>



* Affix label B that is included with the manuals near each wiring diagram for FTC3 and outdoor units.

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).

<Fig. 4.1.5>
Electrical connections 1 phase

FTC3 power supply		~N 230 V 50 Hz
FTC3 input capacity		
Main switch (Breaker)		*1 16 A
Wiring No. x size (mm ²)	FTC3 power supply	2 x Min. 1.5
	FTC3 power supply earth	1 x Min. 1.5
	FTC3 - Outdoor unit	*2 2 x Min. 0.3
	FTC3 - Outdoor unit earth	—
Circuit rating	FTC3 L - N	*3 AC230V
	FTC3 - Outdoor unit S1 - S2	*3 —
	FTC3 - Outdoor unit S2 - S3	*3 DC24V

- *1. 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.
- *2. Max. 120 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. FTC3 unit/outdoor unit connecting cords shall not be lighter than polychloroprene sheathed flexible cord. (Design 60245 IEC 57) FTC3 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. Electrical work

4.2 Connecting the main controller

4.2.1 Connect the main controller cable to FTC3

Connect the main controller cable to 11 and 12 on the terminal block (TBI. 2) on the FTC3 controller. <Fig. 4.2.1>

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

The 5 m wire is attached as an accessory. Max. 500 m

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

Circuit rating: DC 12V

Circuit rating is NOT always against the ground.

Location to place the main controller

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

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

Notes:

Wiring for main 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 controller cable and power source wiring in the same conduit.) (Refer to Fig. 4.1.1)

When wiring to TBI.2, use the ring type terminals and insulate them from the cables of adjoining terminals.

4.2.2 Installing the main controller

1. The main 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 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 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 controller ready.

Remove the back cover from the main controller.

4. Connect the main controller cable to the terminal block on the back cover.

Modify the main controller cable as shown in <Fig. 4.2.5>, and thread the cable from behind the back cover.

Completely thread the cable to the front so that the unsheathed part of the cable cannot be seen behind the back cover.

Connect the main controller cable to the terminal block on the back cover.

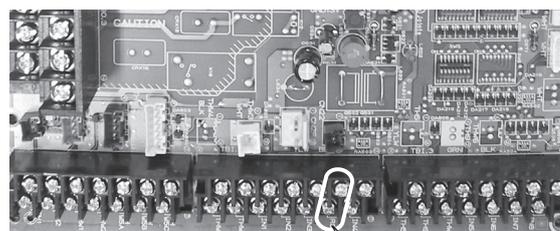
- Direct wall installation

- Seal the gap between the cable and the hole through which the cable is threaded.

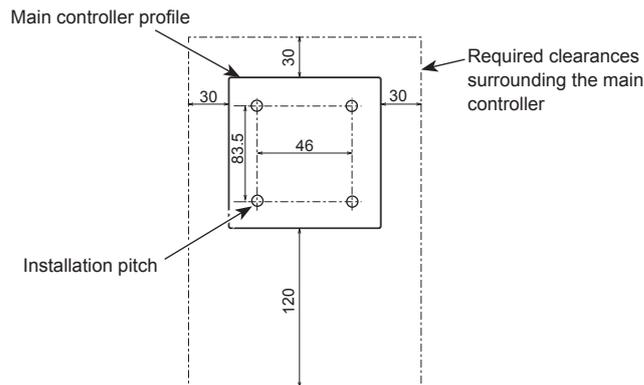
⚠ Caution

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

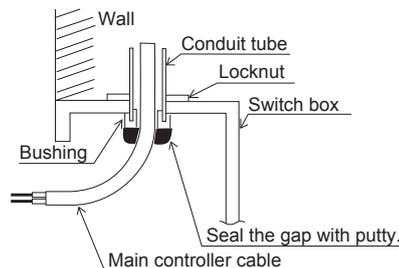
Do not use ring terminals to connect the wires to the terminal block on the back cover. The terminals will come in contact with the control board and the cosmetic cover, which will result in failure.



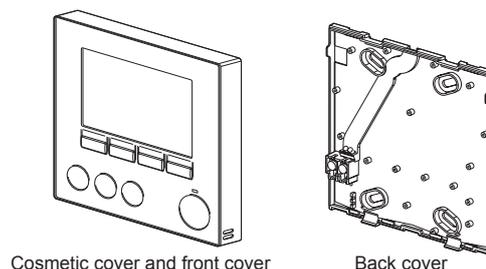
<Fig. 4.2.1>



<Fig. 4.2.2>



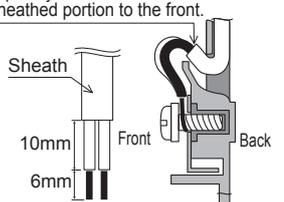
<Fig. 4.2.3>



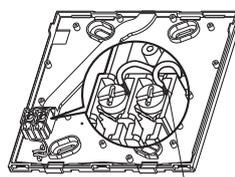
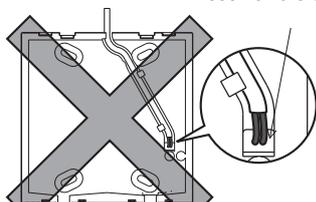
<Fig. 4.2.4>

Completely thread the unsheathed portion to the front.

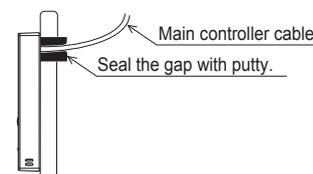
The 2 inner wires must not be seen on the back.



Thread the cable.



Connect the 2 inner wires to the terminal block (non polarized).



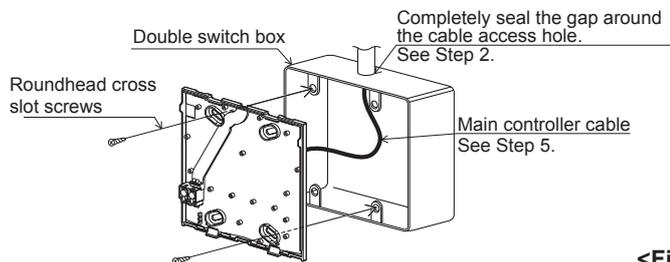
Thread the cable from behind the main controller.

<Fig. 4.2.5>

4. Electrical work

5. Install the back cover.

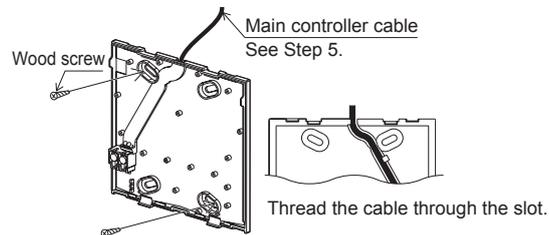
- Installation using a switch box
 - When installing the back cover in the switch box, secure at least two corners of the switch box with screws.



<Fig. 4.2.6>

■ Direct wall installation

- Thread the cable through the slot provided.
- When mounting the back cover on the wall, secure at least two corners of the main controller with screws.
- To prevent the back cover from lifting, use top-left bottom-right corners of the main controller (viewed from the front) to secure the back cover to the wall with wall plugs or the like.

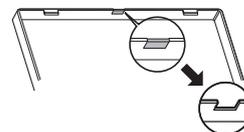


⚠ Caution:

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

6. Cut out the cable access hole.

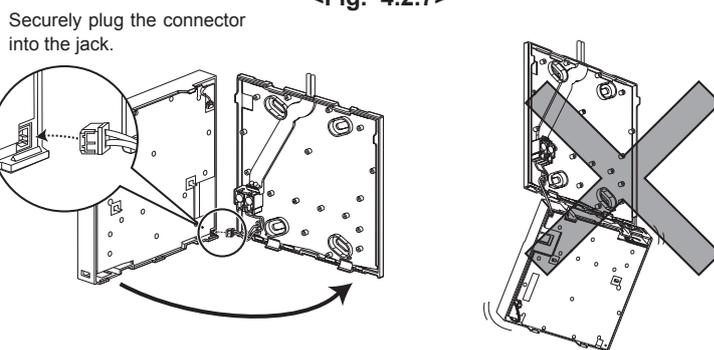
- Direct wall installation
 - Cut out the knockout hole (indicated with grey in <Fig. 4.2.7>) in the cosmetic cover by knife or nipper.
 - Thread the main controller cable from the slot behind the back cover through this access hole.



<Fig. 4.2.7>

7. Plug the lead wire cable into the front cover.

Plug the lead wire cable coming from the back cover into the front cover.



<Fig. 4.2.8>

⚠ Caution:

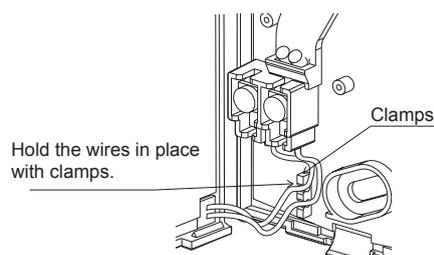
To avoid failures, do not remove the controller board protective sheet and the controller board from the front cover.

After the cable is plugged into the front cover, do not hang the front cover as shown in <Fig. 4.2.8>. Otherwise, the main controller cable could sever, which could cause malfunction to the main 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. 4.2.9>

4. Electrical work

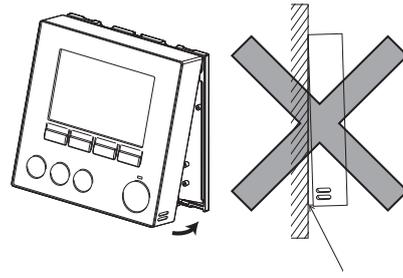
9. Fit the front cover and the cosmetic cover onto the back cover.

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

⚠ Caution:

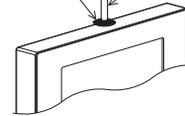
When the front cover is correctly attached to the back cover a click is heard. If the cover is not clicked into place it may fall off.

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



<Fig. 4.2.10>

Seal the gap between the cable and the access hole with putty. Use a cable cover.



Thread the main controller cable through the cable access hole at the top of the main controller.

<Fig. 4.2.11>

● Disassembling the front cover and the cosmetic cover

(1) Remove the cosmetic cover.

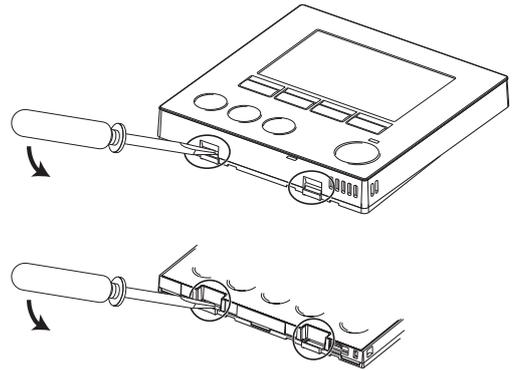
Insert a flat head screwdriver into either of two open slots at the bottom of the main controller and move the screwdriver handle downward as shown. The engagement of the tabs will be released. Then pull the cosmetic cover toward the front to remove the cosmetic cover.

(2) Remove the front cover.

Insert a flat head screwdriver into either of two open slots at the bottom of the main controller. The subsequent procedure is the same as that of the cosmetic 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>

4. Electrical work

4.3 Remote Controller Options

The FTC3 (cased) comes packaged with a main 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 controller is also used for servicing purposes. (This function is accessed via the password protected service menus.)

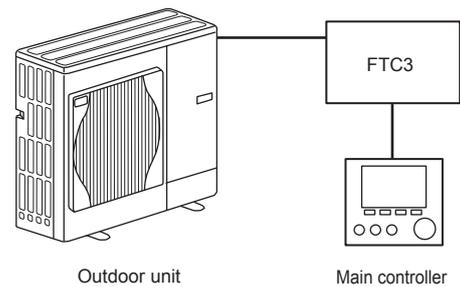
To provide the best efficiency Mitsubishi Electric recommends using automatic adaptation function based on room temperature. To use this function a room thermistor needs to be present in a main living area. This can be done in a number of ways the most convenient are detailed below.

Refer to heating section of this manual for instructions on how to set compensation curve, flow temp or room temp (Auto adaptation).

For instructions on how to set the thermistor input for the FTC3 please refer to initial settings section.

The factory setting for space heating is room temp (auto adaptation). If there is no room sensor present in the system, this setting must be changed to either compensation curve mode or flow temp mode.

Factory supplied standard



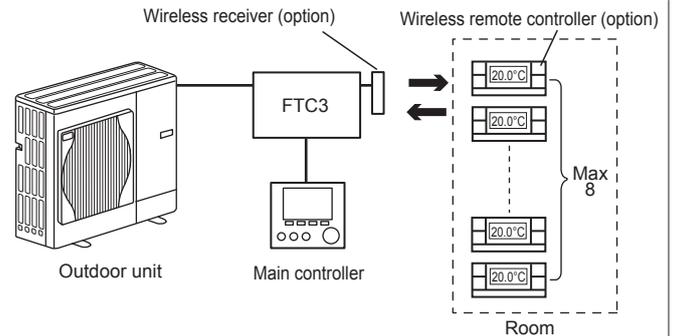
Control option A

This option features the main 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(*) and switch to holiday mode without having to directly use the main controller.

If more than one wireless remote controller is used, the most recent temperature settings entered will be used regardless of which controller is used to enter the settings.

The wireless receiver must be connected to the FTC3 as detailed in the wireless controller instruction manual.

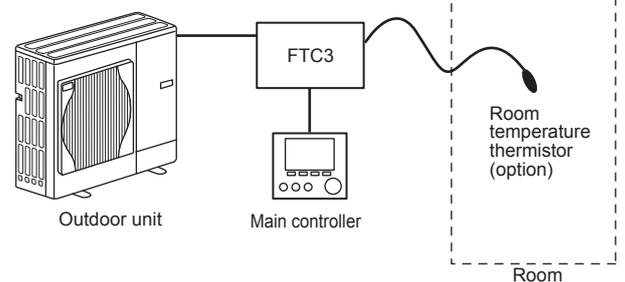
DIP SW1-8 should be ON (see chapter 5). Before operation wireless controller should be configured to transmit and receive data as detailed in the wireless controller installation manual.



Control option B

This option features the main controller and the Mitsubishi Electric thermistor wired to the FTC3. The thermistor is used to monitor room temperature but can not make any changes in control operation. Any changes to DHW(*) must be made using main controller.

The thermistor is wired to the FTC3 using TH1 terminal on the terminal block TBI.1. Only 1 room temperature thermistor can be connected to the FTC3 at any one time.

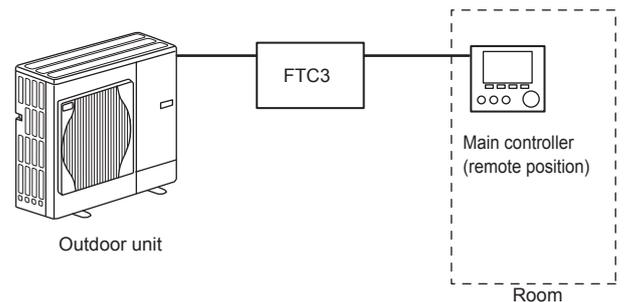


Control option C

This option features the main controller being removed from the FTC3 and situated in a different room. All features of the main controller are still available and the in-built thermistor can be used for monitoring the temperature of the room in which it is installed for Auto Adaptation function.

The main controller and the FTC3 are connected by a 2 core, 0.3 mm² , non polar cable (field supply) maximum length of 500 m.

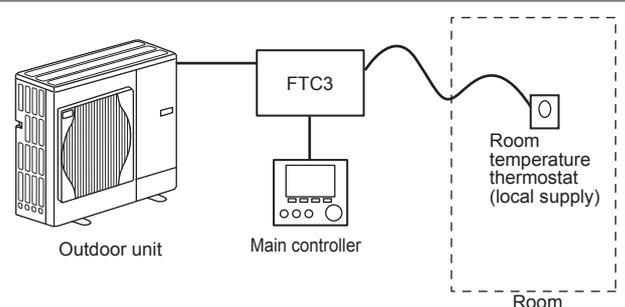
If using the sensor in the main controller it should be detached from FTC3. Otherwise it will detect the temperature of the FTC3 instead of room temperature. This will influence the output of the space heating.



Control option D (Flow temp. or compensation curve only)

This option features the main controller and locally supplied thermostat wired to the FTC3. The thermostat is used to set the upper limit of space heating. Any changes to DHW(*) must be made using main controller.

The thermostat is wired to the FTC3 using IN1 terminal on the terminal block TBI.2. Only 1 thermostat can be connected to the FTC3 at any one time.



(*) If applicable

4. Electrical work

4.4. Connecting the thermistor cables

Connect the thermistor for the FTC3 controller.

4.4.1 Connecting the room temp. thermistor (TH1) cable

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 controller or the wireless remote controller (optional), this part is not required.

Connect the TH1 cable to the TH1 connector on FTC3.

When the TH1 cable is too long, bundle the excess cable outside the FTC3 unit.

If impossible to bundle the cable, cut it to an appropriate length and connect the cable wires to the TH1 screw terminals on the TBI.1 terminal block on FTC3.

For more details, refer to Chapter 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 refrigerant pipe temp. thermistor (TH2) cable

Connect the TH2 cable to the TH2 connector on FTC3.

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 FTC3 unit.

If impossible to bundle the cable, cut it to an appropriate length and connect the cable wires to the TH2 screw terminals on the TBI.1 terminal block on FTC3.

Do not bind the wires in the FTC3 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.

4.4.3. 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 THW1 2 connector on FTC3.

When the THW1 and THW2 cables are too long, bundle the excess cables outside the FTC3 unit. If impossible to bundle the cables, cut them to appropriate lengths and connect the cable wires respectively to the THW1 and THW2 screw terminals on the TBI.1 terminal block on FTC3.

Do not bind the wires in the FTC3 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 temp. (water outlet side). For more details, see Page 6.

4.4.4 Connecting the booster heater temp. thermistor (THW3) cable

Connect the THW3 cable to the THW3 connector on FTC3 if the booster heater is available.

When the THW3 cable is too long, bundle the excess cable outside the FTC3 unit. If impossible to bundle the cable, cut it to an appropriate length and connect the cable wires to the THW3 screw terminals on the TBI.2 terminal block on FTC3.

Do not bind the wires in the FTC3 unit.

<Thermistor position>

Place THW3 on the position where inside temperature of the booster heater can be detected correctly (to detect unusual temperature increase/heating up without water).

It is recommended to protect the thermistor with heat insulating materials so as not to be affected by ambient temperature.

Note: When using multiple booster heaters, attach the thermistor on Booster heater 1.

4.4.5. Connecting the actual DHW tank thermistor (THW5B) cable

Connect the THW5B cable to the THW5B connector on FTC3 if the DHW tank is available.

When the THW5B cable supplied with FTC3 is too long, bundle the excess cable outside the FTC3 unit. If impossible to bundle the cable, cut it to an appropriate length and connect the cable wires to the THW5B screw terminals on the TBI.1 terminal block on FTC3.

Do not bind the wires in the FTC3 unit.

<Thermistor position>

Place THW5B 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:

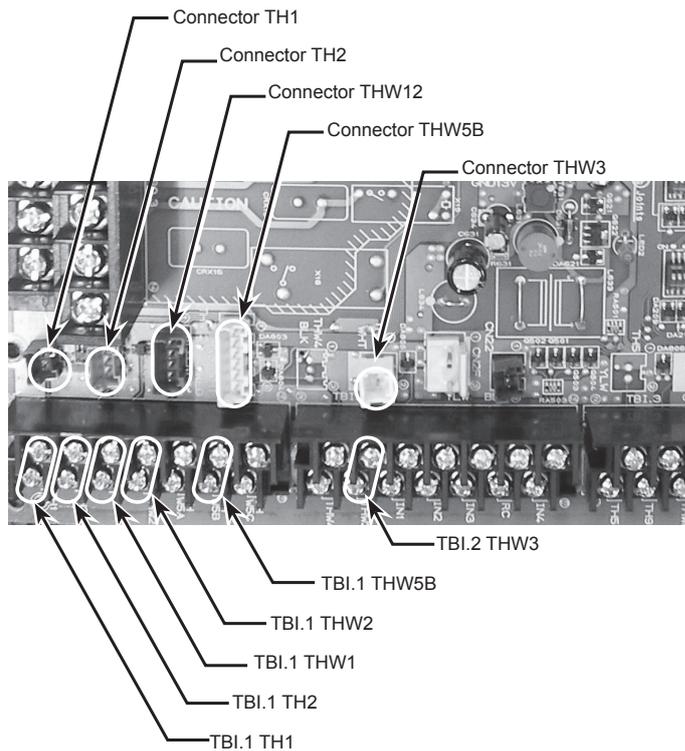
Connect the terminals by using the ring terminals and also insulate the cables of adjoining terminals when wiring to TBI.1 or 2.

⚠ 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.

(It should be separated, by supplementary insulation, from areas the user can access.)



<Fig. 4.4.1>

4. Electrical work

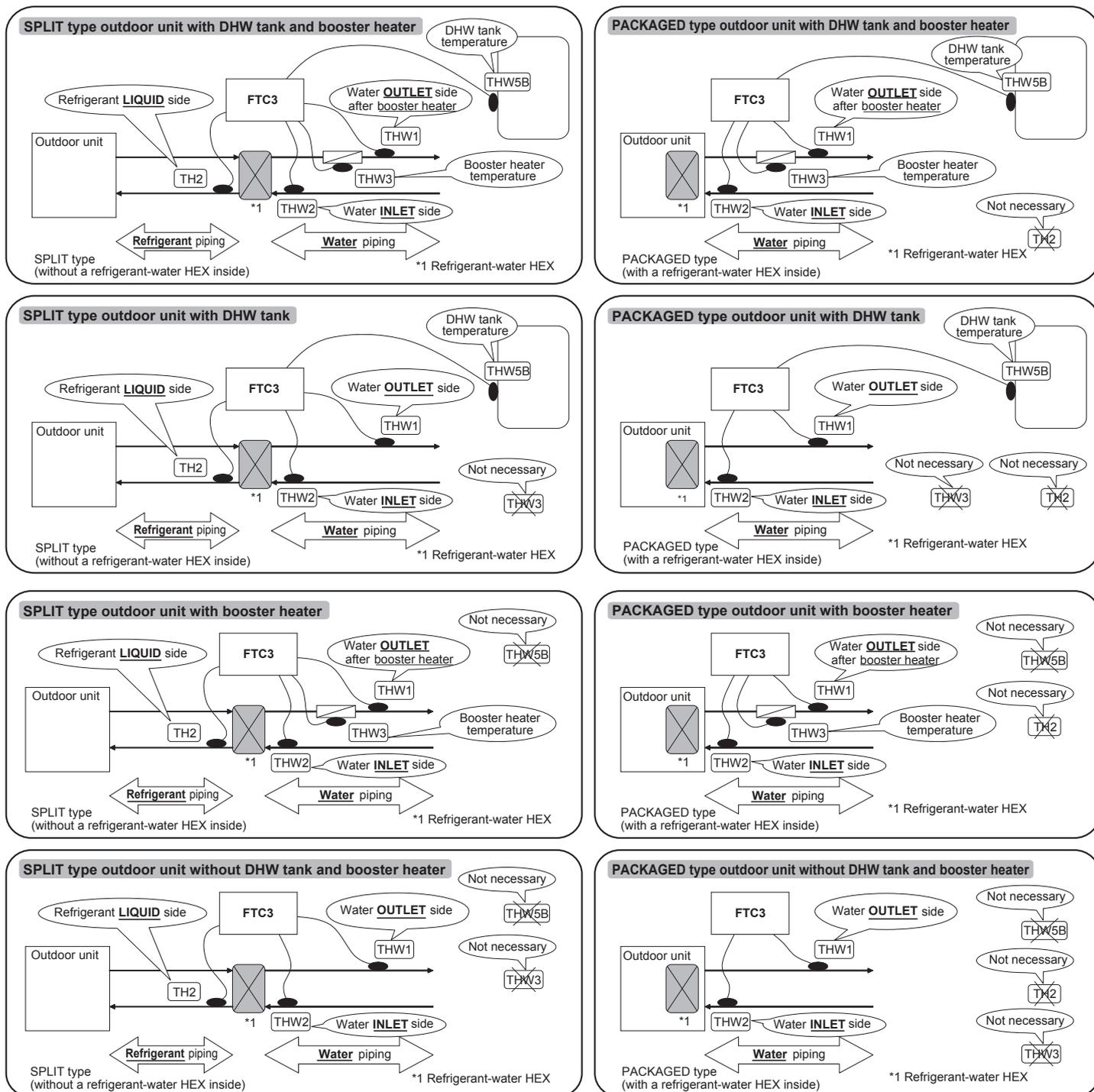
4.4.6. Thermistor position and necessity

<Thermistor position and necessity>

Outdoor unit type	DHW tank	Booster heater	TH2	THW1	THW2	THW3	THW5B
Split	Present	Present	○	○	○	○	○
		Absent	○	○	○	×	○
	Absent	Present	○	○	○	○	×
		Absent	○	○	○	×	×
Packaged	Present	Present	×	○	○	○	○
		Absent	×	○	○	×	○
	Absent	Present	×	○	○	○	×
		Absent	×	○	○	×	×

○: Necessary. Connect the thermistor.

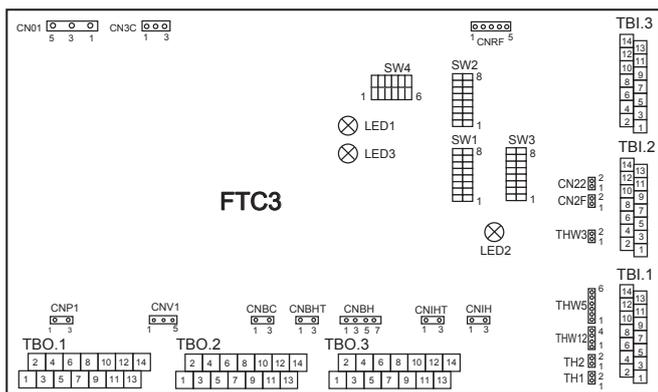
×: Not necessary. The thermistor is not required, do not connect.



<Fig. 4.4.2>

4. Electrical work

4.5 Connecting external input/output



<Fig. 4.5.1>

When wiring to the terminal blocks, use the ring type terminals and insulate them from the cables of adjoining terminals.

4.5.1 External input

Name	Terminal block	Connector	Item	OFF (Open)	ON (Short)
IN1	TBI.2 5-6	—	Room thermostat input	Refer to SW2-1 (See chapter 5)	Refer to SW2-1 (See chapter 5)
IN2	TBI.2 7-8	CN2F	Flow switch input	Refer to SW2-2 (See chapter 5)	Refer to SW2-2 (See chapter 5)
IN3	—	—	—	—	—
IN4	TBI.2 13-14	—	Heat source OFF	Normal	Heat source OFF
IN5	TBI.3 7-8	—	Outdoor thermostat input (*1)	Standard operation	Heater operation

*1. If using outdoor thermostat for controlling operation of heaters, the lifetime of the heaters and related parts may be reduced.

Wiring specification and field supply parts

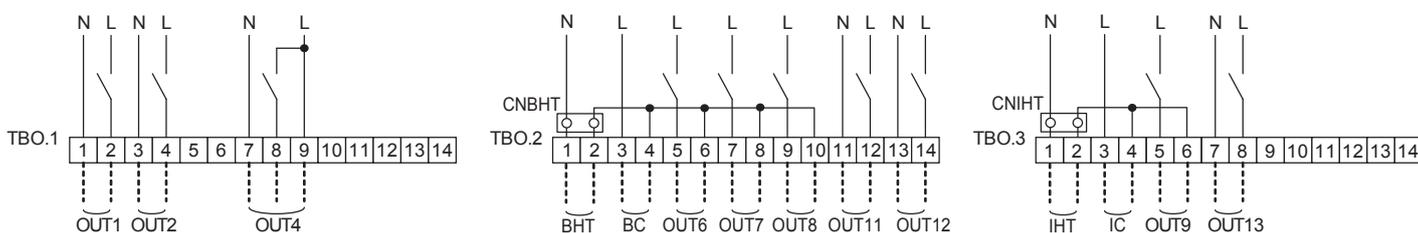
Item	Name	Model and specifications
External input function	External input signal wire	Use sheathed vinyl coated cord or cable. Max. 10 m Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.5 mm ² to 1.25 mm ² Solid wire: ø 0.65 mm to ø 1.2 mm
	Switch	Non-voltage "a" contact signals Remote switch: minimum applicable load DC 12V, 1mA

4.5.2 External output

Name	Terminal block	Connector	Item	OFF	ON	Signal/Max current
OUT1	TBO.1 1-2	CNP1	Water circulation pump1(AC) output (Space heating & DHW)	OFF	ON	AC230V 1.0A Max
OUT2	TBO.1 3-4	—	Water circulation pump2(AC) output (Space heating ONLY)	OFF	ON	AC230V 1.0A Max
OUT3	—	—	—	—	—	—
OUT4	TBO.1 7-9	CNV1	3-way valve (2-way valve1) output	Heating	DHW	AC230V 0.1A Max
	TBO.1 7-8	CNV1	2-way valve1 output	Heating	DHW	AC230V 0.1A Max
OUT5	—	—	—	—	—	—
OUT6	TBO.2 5-6	CNBH 1-3	Booster heater1 output	OFF	ON	AC230V 0.5A Max (Relay)
OUT7	TBO.2 7-8	CNBH 5-7	Booster heater2 output	OFF	ON	AC230V 0.5A Max (Relay)
OUT8	TBO.2 9-10	—	Booster heater2+ output	OFF	ON	AC230V 0.5A Max (Relay)
OUT9	TBO.3 5-6	CNIH	Immersion heater output	OFF	ON	AC230V 0.5A Max (Relay)
OUT10	—	—	—	—	—	—
OUT11	TBO.2 11-12	—	Error output	Normal	Error	AC230V 0.5A Max
OUT12	TBO.2 13-14	—	Defrost output	Normal	Defrost	AC230V 0.5A Max
OUT13	TBO.3 7-8	—	(2-way valve 2 output)	(DHW)	(Heating)	AC230V 0.1A Max
BHT	TBO.2 1-2	CNBHT	Thermostat for booster heater	Thermostat	Normal: short / High temp.: open	Refer to <Fig. 4.5.3> to <Fig. 4.5.6>
IHT	TBO.3 1-2	CNIHT	Thermostat for immersion heater	Thermostat	Normal: short / High temp.: open	
BC	TBO.2 3-4	CNBC	Booster heater protection output	OFF (BHT open)	ON (BHT short)	
IC	TBO.3 3-4	—	Immersion heater protection output	OFF (IHT open)	ON (IHT short)	AC230V 0.5A Max

← Output synchronised with Booster heater 2

Do not connect to the terminals that are indicated as "—" in the "Terminal block" field.



<Fig. 4.5.2>

4. Electrical work

<Care to be taken 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. 4.5.3>

When the connected booster heater(s) has a built-in indirect cut-off thermostat, perform wiring according to the following items. < Fig. 4.5.4>

- Connect the thermostat signal to BHT (TBO.2 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.2 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. 4.5.3>

<Care to be taken when connecting an immersion heater>

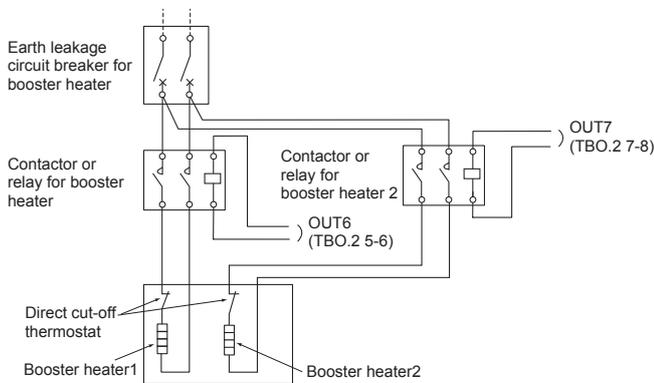
The initial setting assumes that the connected immersion heater has a built-in direct cut-off thermostat. <Fig. 4.5.5>

When the connected immersion heater has a built-in indirect cut-off thermostat, perform wiring according to the following items. < Fig. 4.5.6>

- Connect the thermostat signal to IHT (TBO.3 1-2).
- Remove the jumper wire from connector CNIHT.
- Connect a contactor (or relay) for protecting the immersion heater.
(Connect the electromagnetic coil terminals to IC (TBO.3 3-4)).

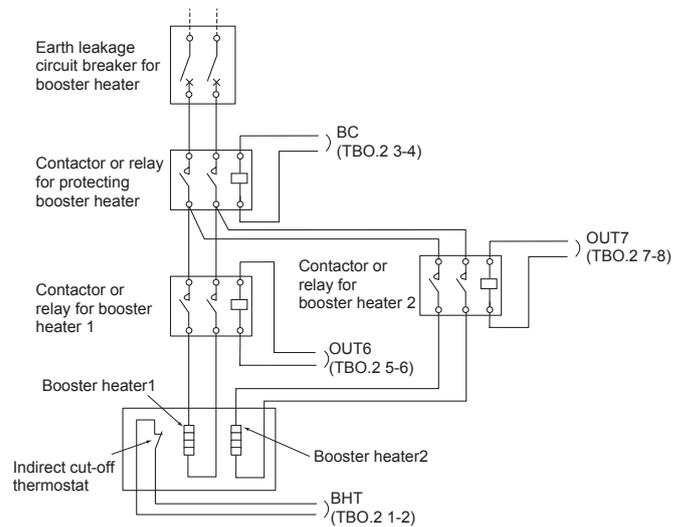
* Do not remove the jumper wire from connector CNIHT when the connected immersion heater has a built-in direct cut-off thermostat. < Fig. 4.5.5>

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



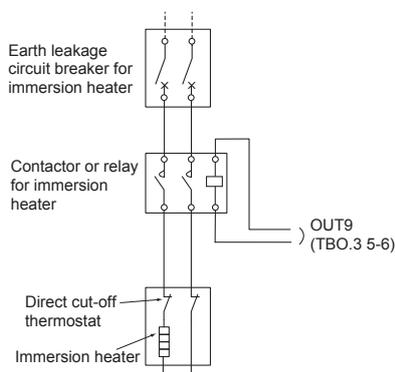
<Fig. 4.5.3>

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



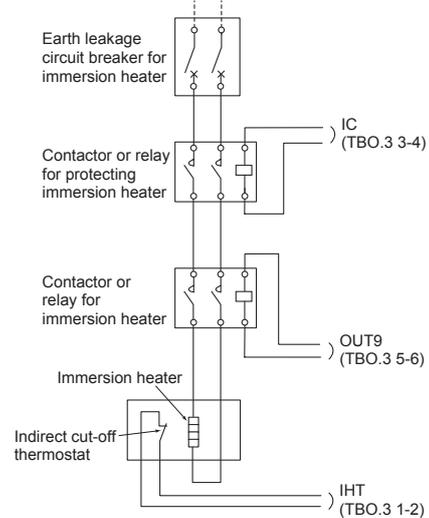
<Fig. 4.5.4>

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



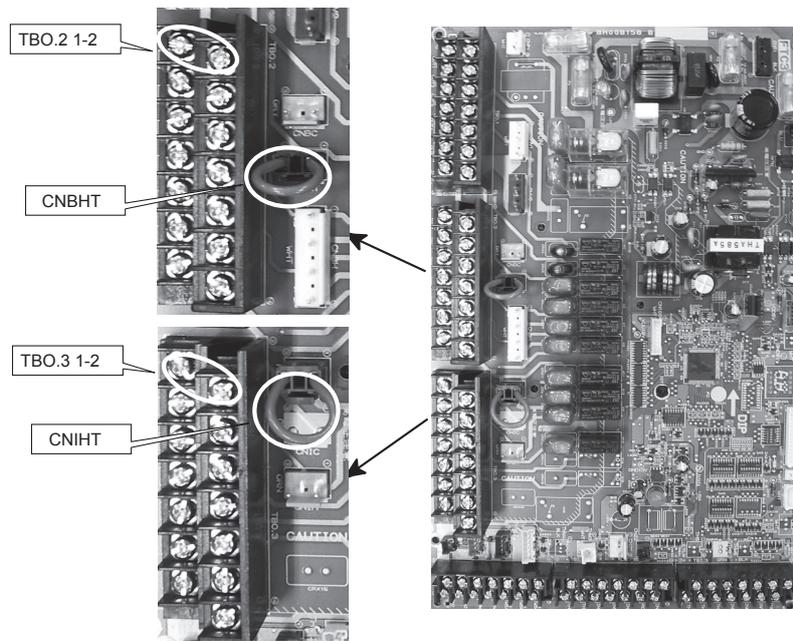
<Fig. 4.5.5>

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



<Fig. 4.5.6>

4. Electrical work



<Fig. 4.5.7>

Wiring specification and field supply parts

Item	Name	Model and specifications
External output function	External output signal wire	Use sheathed vinyl coated cord or cable. Max. 50 m Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.5 mm ² to 1.25 mm ² Solid wire: \varnothing 0.65 mm to \varnothing 1.2 mm
	Relay, etc.	AC 230V signal 0.5 A or less

Notes:

1. When connecting an auxiliary pump with an electric current of $\geq 1A$ or multiple auxiliary pumps with TOTAL current of $\geq 1A$, use (a) relay(s).
2. Do NOT connect pumps to both TBO.1 1-2 and CNP1 (see Fig. 4.5.1) at the same time.

<When connecting field supply optional pumps please note the following>

Option 1. (Power supply from outdoor unit)

TOTAL current requirement MUST be $\leq 3A$ (otherwise, fuse on the outdoor unit PCB will blow).

Option 2. (Independent power supply (i.e. from the FTC3 (cased) itself))

TOTAL current of the pump(s) MUST be $\leq 2A$ (otherwise, fuse on the FTC3 PCB will blow). The total current allowed for parts except pumps is 3A.

To avoid the fuses blowing please avoid having a total current of 3A or greater.

4. Electrical work

4.5.3 Installation procedure for DHW tank

Notes:

- Be aware that the respective DHW operations are greatly effected by the selections of the components such as tank, immersion heater, or the like.
- Follow 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 (field supply). The 3-way valve and the DHW tank should be positioned as shown in the system diagram on the page 6.
The use of two 2-way valves can perform the same function as a 3-way valve.
2. Install the enclosed thermistor THW5B on the DHW tank.
It is recommended to position the thermistor at the mid height of the DHW tank. 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 THW5B connector on the FTC3.
If the thermistor lead is too long it can be cut to the required length and then connected directly to the THW5B labeled terminals on the terminal block TBI.1.
4. The external output terminals for the 3-way valve is TBO.1 7-9 (OUT4).
The TBO.1 7-9 terminals on the FTC3 are shown in the wiring diagram below.
Choose the terminals that the 3-way valve is connected to between TBO.1 7-8, or TBO.1 7-9, according to the rated voltage.
When the rated current of the 3-way valve exceeds 0.1A, be sure to use a relay with maximum voltage and current ratings of 230V AC / 0.1A when connecting to the FTC3. The 3-way valve **MUST** be SPST type (refer to Page 7). Do not directly connect the 3-way valve cable to the FTC3.
Connect the relay cable to the TBO.1 7-8 terminals. For systems using 2-way valves instead of a 3-way valve please read the following;

Specification of 2-way valve (field supply)

- Power supply: 230V AC
- Current: 0.1A Max (**If over 0.1A you must use a relay**)
- Type: Normally closed

	Installation position	Electrical connection terminal block	Output signal		
			Heating	DHW	System OFF
2-way valve1	DHW	TBO.1 7-8	OFF (closed)	ON (open)	OFF (closed)
2-way valve2	Heating	TBO.3 7-8	ON (open)	OFF (closed)	OFF (closed)

Notes: Should the 2-way valve become blocked the water circulation will stop.

A by-pass valve or circuit should be installed between pump and 2-way valve for safety.

The TBO.3 7-8 terminals on the FTC3 are shown in the wiring diagram above.

The 2-way valve (field supply) should be installed according to the instructions supplied with it. Follow 2-way valve maker's instructions as to whether to connect an earth cable or not.

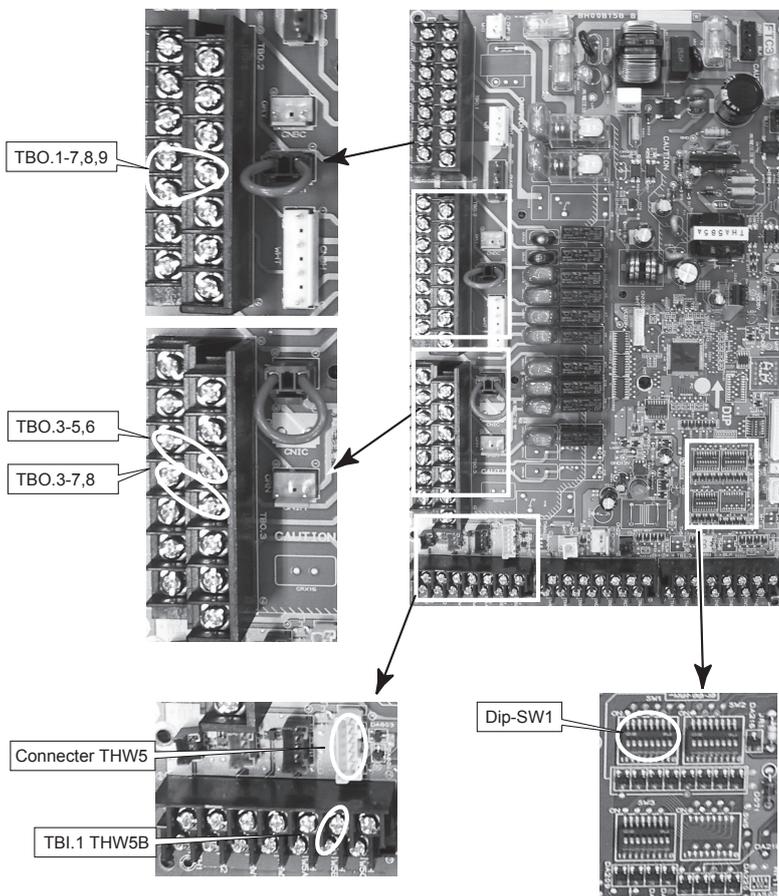
- For the 2-way valve, choose the one that slowly opens and shuts off to prevent water hammer sound.
- Choose the 2-way valve equipped with manual override, which is necessary for topping up or draining of water.

5. Turn the DIP SW1-3 on the FTC3 to ON.

6. When using the immersion heater (field supply), connect a contact relay cable for the immersion heater to TBO.3 5-6 (OUT9), and turn the Dip SW1-4 to ON. Do NOT directly connect the power cable to the FTC3.

Notes:

- 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.



- ⚠ WARNING: When connecting DHW tank**
- (1) When installing an immersion heater, use an overheat protection thermostat.
 - (2) Connect a pressure relief valve on the sanitary water side.
 - (3) Attach the enclosed thermistor THW5B.
 - (4) Always use earth leakage breaker when connecting immersion heater.

<Fig. 4.5.8>

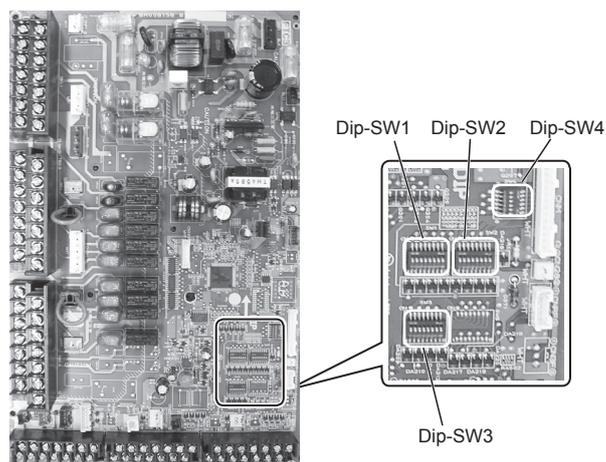
5. Dip Switch setting

Located on the FTC3 printed circuit board are 4 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.

All the Dip switches are set to OFF at factory settings. Be sure to change the Dip switch settings.

Note: Electrically ISOLATE BEFORE doing any such work.



Dip switch		Function	OFF	ON
SW1	SW1-1	—	—	—
	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 input (IN1) logic change	Operation stop at thermostat short	Operation stop at thermostat open
	SW2-2	Flow switch input (IN2) logic change	Failure detection at short	Failure detection at open
	SW2-3	Booster heater capacity restriction	Inactive	Active
	SW2-4	—	—	—
	SW2-5	Automatic switch to backup heater only operation (When outdoor unit stops by error)	Inactive	Active (*1)
	SW2-6	—	—	—
	SW2-7	—	—	—
	SW2-8	—	—	—
SW3	SW3-1	—	—	—
	SW3-2	—	—	—
	SW3-3	—	—	—
	SW3-4~8	—	—	—
SW4	SW4-1~4	—	—	—
	SW4-5	Emergency mode (Heater only operation)	Normal (*2)	Emergency mode (Heater only operation) (To be activated only when powered ON)
	SW4-6	—	—	—

<Table 5.1.1>

- Notes:
- *1. For safety reasons, this function is not available for certain errors. (System operation must be stopped and only pump keeps running.) External output (OUT11) will be available.
 - *2. If emergency mode is no longer required, please turn off both outdoor and indoor unit power supply before returning SW4-5 to OFF position.
 - *3. When “—” is indicated in the Function field, turn the relevant Dip switch to OFF.

5. Dip Switch setting

5.1 Outdoor unit type

Set Dip SW 1-7 to set the outdoor unit type.

Dip SW 1-7	Setting	Note
OFF	Split type	Necessary to connect TH2
ON	Packaged type	Not necessary to connect TH2

Set Dip SW 1-2 to set the heat pump maximum outlet water temperature.

Dip SW 1-2	Setting
OFF	55 °C
ON	60 °C

When the outdoor unit is a Packaged type, set the Dip SW 1-2 to ON.

However, when the outdoor unit is a Split type in the PUHZ-HRP series, set the Dip SW 1-2 to ON.

Note: When Dip SW 1-2 is OFF (55°C) and an electric heater is not installed (*), 'Legionella Prevention Mode' is NOT available.

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

Dip SW 1-2	Dip SW 1-4	Dip SW 1-5	Dip SW 1-6
OFF	OFF	ON	OFF
OFF	OFF	OFF	(ON/OFF)

5.2 Functions setting

Set Dip SW 1-3 to set whether the system has a DHW tank.

Dip SW 1-3	Setting	Note
OFF	WITHOUT DHW tank	Not necessary to connect THW5B
ON	WITH DHW tank	Necessary to connect THW5B

When Dip SW is OFF, DHW mode is not available.

Set Dip SW 1-4 to set whether the system has an immersion heater.

Dip SW 1-4	Setting
OFF	WITHOUT immersion heater
ON	WITH immersion heater

Set Dip SW 1-5 to set whether the system has a booster heater.

Dip SW 1-5	Setting	Note
OFF	WITHOUT booster heater	Not necessary to connect THW3
ON	WITH booster heater	Necessary to connect THW3

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. Or, make the sum of the capacities of OUT7 (Booster heater 2) and OUT8 (Booster 2+) greater than the capacity of OUT6 (Booster 1).

Reference: Summary of Booster heater control

The booster heater is controlled in the following three steps.

		Booster heater 1 (OUT6)	Booster heater 2 (OUT7)	Booster heater 2+ (OUT8)	
OFF		OFF	OFF	OFF	} Controlled to this extent when SW2-3 is ON
ON	STEP 1 ↓ ↑	ON	OFF	OFF	
	STEP 2 ↓ ↑	OFF	ON	ON	
	STEP 3 ↓ ↑	ON	ON	ON	
					} Output synchronised with Booster heater 2

Set Dip SW 1-6 to set the booster heater function.

Dip SW 1-6	Setting
OFF	For heating only
ON	For heating and DHW

5. Dip Switch setting

<Summary of Function setting>

Dip SW 1-3 (DHW tank)	Dip SW 1-4 (Immersion heater)	Dip SW 1-5 (Booster heater)	Dip SW 1-6 (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

5.3 Operation setting

Set Dip SW 1-8 to set whether the system has a wireless remote controller.

Dip SW 1-8	Setting
OFF	WITHOUT wireless remote controller
ON	WITH wireless remote controller

Set Dip SW 2-1 to set the room thermostat input (IN1) logic.

Dip SW 2-1	Setting
OFF	Operation stop at thermostat short
ON	Operation stop at thermostat open

Set Dip SW 2-2 to set the flow switch input (IN2) logic.

Dip SW 2-2	Setting
OFF	Failure detection at short
ON	Failure detection at open

Set Dip SW 2-3 to set the restriction on the capacity of booster heater.

Dip SW 2-3	Setting
OFF	Inactive
ON	Active

When Dip SW 2-3 is ON, booster heater 2 and 2+ operation is not available. (Only booster heater 1 is available)

Set Dip SW 2-5 to set the automatic switch to backup heater only operation. (When outdoor unit stops by error.)

Dip SW 2-5	Setting
OFF	Inactive
ON	Active

5.4 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 FTC3, and then turn Dip SW 4-5 to ON. Then, turn on FTC3 to start the emergency mode. FTC3 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.

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 1.0MΩ.

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

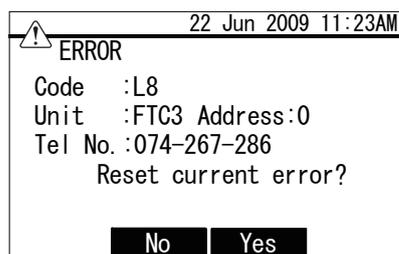
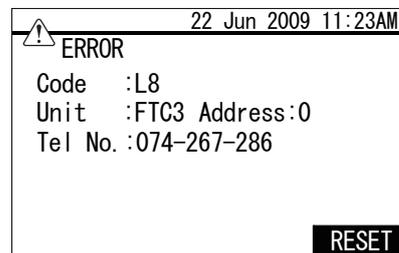
■ Indication of error details

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
L1	Booster heater overheat detection	Flow rate may be reduced check for; • Water leakage • Strainer blockage • Pump function (Error code may display during filling of primary circuit, complete filling and reset error code.)
L2	Booster heater thermistor (THW3) failure	Check the resistance of the thermistor.
L3	Circulation water temperature overheat protection	See Action for L1.
L4	Tank water temperature overheat protection	Check the DHW tank temperature.
L5	Indoor unit temperature thermistor (TH1, TH2, THW1, THW2, THW5B) failure	Check the resistance of the thermistor.
L6	Circulation water freeze protection	See Action for L1.
L7	3-way valve (2-way valve) defective	Check the motion of the 3-way valve (2-way valve).
L8	Heating operation error	Re-attach any thermistors that have become dislodged.
L9	Low primary circuit flow rate detected by flow switch	See Action for L1. If the flow switch itself does not work, replace it. The pump valves may be hot, please take care.
J0	Communication failure between FTC3 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)
E0 - E5	Communication failure between main controller and FTC3	Check connection cable for damage or loose connections.
E6 - E8	Communication failure between FTC3 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.
U*, F*	Outdoor unit failure	Refer to outdoor unit service manual.

Note: To cancel error codes please switch system off (Press button E, on Main Controller, for 3 secs).

For description of each LED (LED1~3) provided on the FTC3, 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 controller)	Indicates whether power is supplied to the main controller. This LED lights only in the case of the FTC3 unit which is connected to the outdoor unit refrigerant address "0".
LED 3 (Communication between FTC3 and outdoor unit)	Indicates state of communication between the FTC3 and outdoor unit. Make sure that this LED is always blinking.

7. Main controller operation

Note (Marking for WEEE)



This symbol mark is for EU countries only.

This symbol mark is according to the directive 2002/96/EC Article 10 Information for users and Annex IV.

Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and re-used.

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

- ▶ 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:

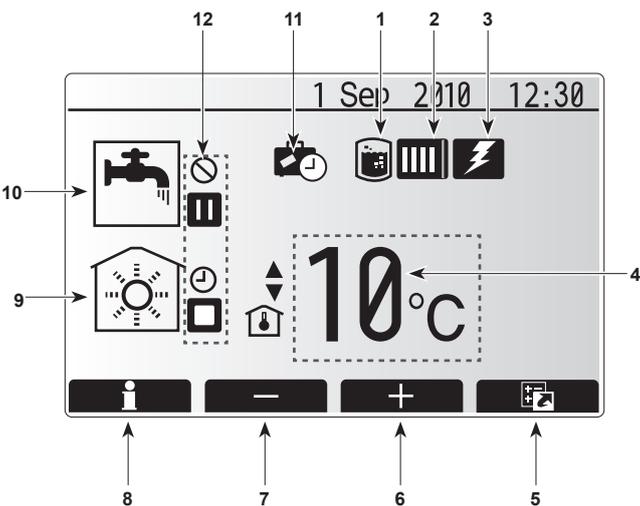
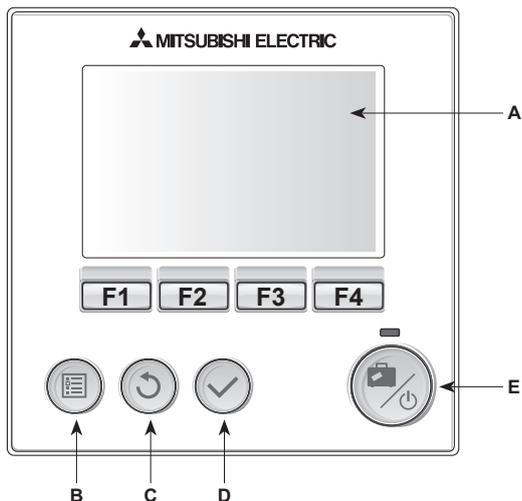
- Do not use any sharp object to push the buttons, as this may damage the main controller.
- Never block or cover the indoor or outdoor unit's intakes or outlets.

Disposing of the unit

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

7. Main controller operation

7.2 Main Controller



<Main controller parts>

Letter	Name	Function
A	Screen	Screen in which all information is displayed
B	Menu	Access to system settings for initial set up and modifications.
C	Back	Return to previous menu.
D	Confirm	Used to select or save. (Enter key)
E	Power/Holiday	If system is switched off pressing once will turn system on. Pressing again when system is switched on will enable Holiday Mode. Holding the button down for 3 secs will turn the system off. (*1)
F1-4	Function keys	Used to scroll through menu and adjust settings. Function is determined by the menu screen visible on screen A.

*1

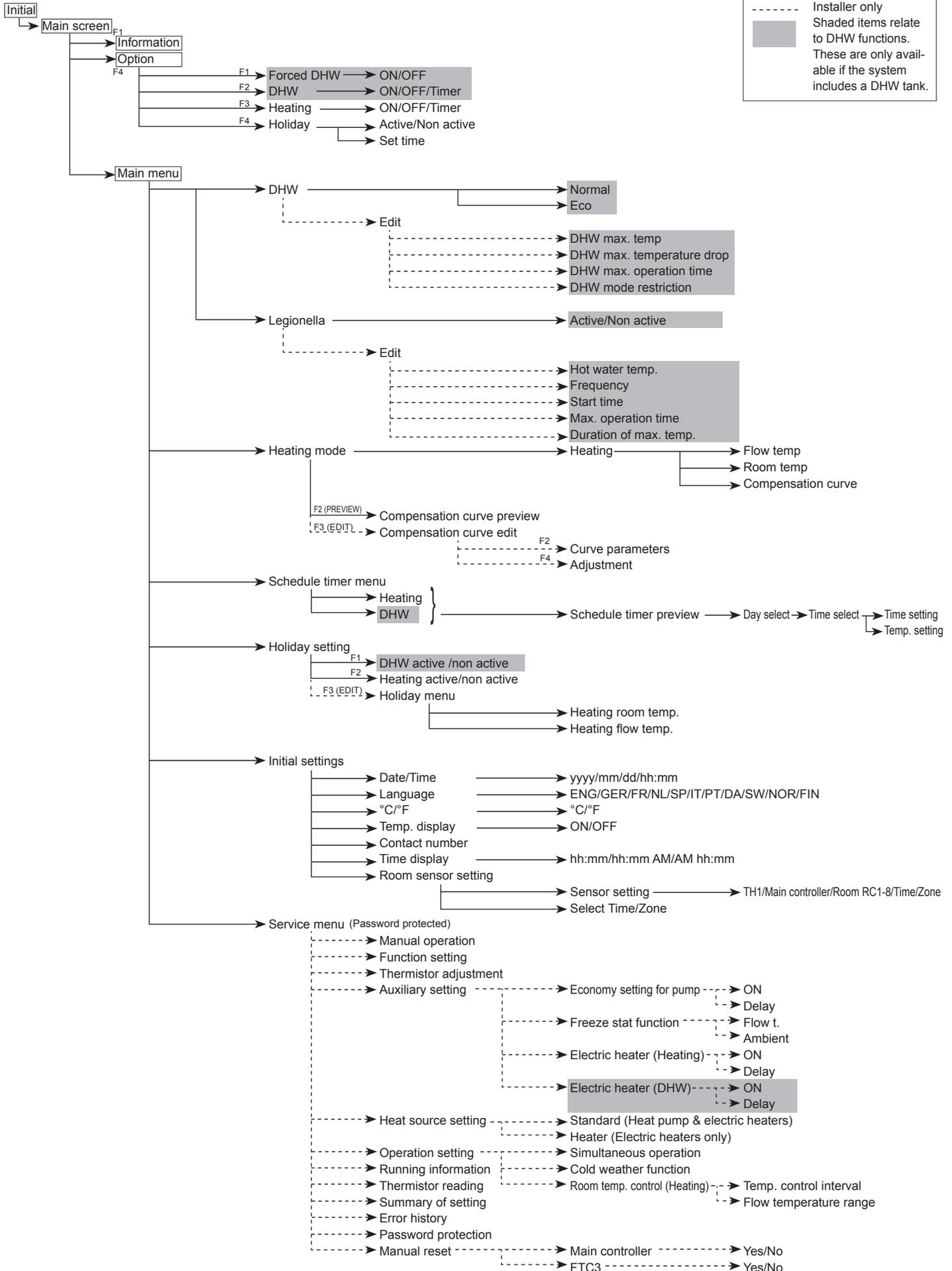
When the system is switched off or the power supply is disconnected, the water circuit protection functions (e.g. freeze stat. function) will NOT operate. Please beware that without these safety functions in operation the water circuit may be damaged.

<Main screen icons>

	Icon	Description						
1	Legionella prevention	When this icon is displayed 'Legionella Prevention mode' is active (if DHW tank in system).						
2	Heat pump	When this icon is displayed the 'Heat pump' is in use.						
3	Electric heater	When this icon is displayed the 'Electric heaters' are in use.						
4	Target temperature	<table border="1"> <tr> <td></td> <td>Target flow temperature</td> </tr> <tr> <td></td> <td>Target room temperature</td> </tr> <tr> <td></td> <td>Compensation curve</td> </tr> </table>		Target flow temperature		Target room temperature		Compensation curve
	Target flow temperature							
	Target room temperature							
	Compensation curve							
5	OPTION	Pressing the function button below this icon will display the quick view menu.						
6	+	Increase desired temperature.						
7	-	Decrease desired temperature.						
8	Information	Pressing the function button below this icon displays the information screen.						
9	Space heating mode	Heating mode						
10	DHW mode	Normal or ECO mode displayed (if DHW tank in system)						
11	Holiday mode	When this icon is displayed 'Holiday mode' time is set.						
12		Timer						
		Prohibited						
		Stand-by						
		Stop						
		Operating						

7. Main controller operation

<Main Controller Menu Tree>



7. Main controller operation

■ Setting the Main Controller

After the power has been connected to the outdoor and FTC3 units (See chapter 4.1) the initial system settings can be entered via the main controller.

1. Power supply

- i. Check all breakers and other safety devices are correctly installed and turn on power to the system.
- ii. Main controller will automatically start up.
Wait approximately 6 mins whilst the control menus load.

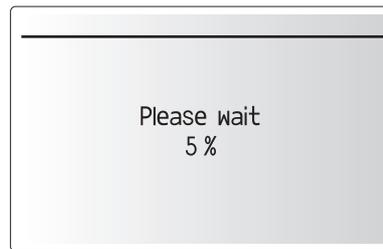
2. Controller settings

When the controller is ready a blank screen with a line running across the top will be displayed.

- i. Press button E (Power)

If this is the first time the controller has been switched on you will automatically be directed to the Initial settings menu.

* When the system is off, freeze stat. function is not performed.



■ Initial Settings

From the initial settings menu the installer can set the language, date/time, temperature unit (°C/°F), emergency contact number, room sensor setting, and display options.

1. Use buttons F1 and F2 to move scroll through the menu list. When the title is highlighted press CONFIRM to edit.
2. Use function buttons appropriate to edit each setting then press CONFIRM to save the setting.
3. For room sensor setting it is important to choose the correct room sensor depending on the heating mode the system will operate in.

Control option (p11)	Corresponding initial settings room sensor
A	Room RC1-8 (only 1 can be selected)
B	TH1
C	Main controller
D	N/A (Option D uses a thermostat with off/on signal only, actual room/space temperature is not detected by FTC3)

NOTE

If you wish to operate in time/zone mode please select this from the room sensor setting menu then edit the schedule under 'Select Time/Zone' to reflect which room sensor you want operational for the given time period.

Once the controller initial settings are complete, settings for the main modes can be entered. To return to the main settings menu screen from the initial settings screen, press the BACK button.

■ Main Settings Menu

The main settings menu can be accessed by pressing the MENU button. To reduce the risk of untrained end users altering the settings accidentally **there are two access levels** to the main settings; and the service section menu is password protected.

User Level – Short press

If the MENU button is pressed once for a short time the main settings will be displayed but without the edit function. This will enable the user to view current settings but **NOT** change the parameters.

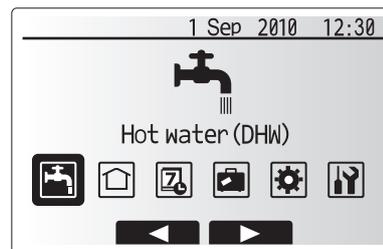
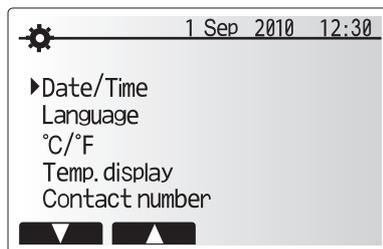
Installer Level – Long press

If the MENU button is pressed down for 3 secs the main settings will be displayed with all functionality available.

The following items can be viewed and/or edited (dependent on access level).

- Domestic Hot water (DHW)
- Heating
- Schedule timer
- Holiday mode
- Initial settings
- Service (Password protected)

Use the F2 and F3 buttons to move between the icons. The highlighted icon will appear as a larger version in the centre of the screen. Press CONFIRM to select and edit the highlighted mode.



Icon	Description
	Hot water (DHW)
	Heating
	Schedule timer
	Holiday mode
	Initial setting
	Service

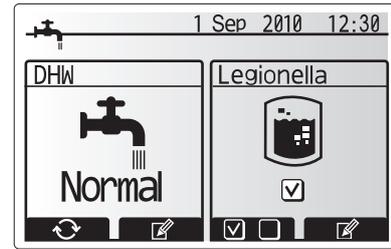
7. Main controller operation

■ Mode 1 - Domestic Hot Water (DHW)/Legionella Prevention

The domestic hot water and legionella prevention menus control the operation of domestic hot water tank heat ups.

<DHW mode settings>

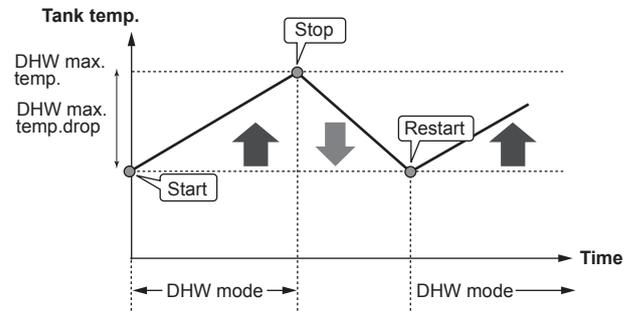
1. Highlight the hot water icon and press CONFIRM.
2. Use button F1 to switch between Normal and ECO heating modes.
3. To edit the mode press F2 to display the HOT WATER (DHW) SETTING menu.
4. Use F2 and F3 keys to scroll through the menu selecting each component in turn by pressing CONFIRM. See the table below for description of each setting.
5. Enter the desired number using the function keys and press CONFIRM.



Menu subtitle	Function	Range	Unit	Default value
DHW max. temp	Desired temperature of stored hot water	40–60	°C	50
DHW max. temperature drop	Difference in temperature between DHW max. temp and the temperature at which DHW mode re-starts	5–30	°C	10
DHW max. operation time	Max time allowed for stored water heating DHW mode	30–120	min	60
DHW mode restriction	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

<Explanation of DHW operation>

- When the tank temperature drops from "DHW max. temp" by more than the "DHW max. temperature drop" (set by installer), DHW mode operates and the flow from the primary heating circuit is diverted to heat the water in the storage tank.
- When the temperature of the stored water reaches the 'DHW max. temp.' set by the installer or if the 'DHW max. operation time' set by the installer is exceeded DHW mode ceases to operate.
- Whilst DHW mode is in operation hot water is not directed to the space heating circuit.
- Directly after DHW max. operation time 'DHW mode restriction' will operate. The duration of this feature is set by the installer and during its operation DHW mode can not be reactivated, allowing time for the system to deliver hot water to the space heating if required.
- After the 'DHW mode restriction' operation the DHW mode can operate again and tank heating will continue according to system demand.



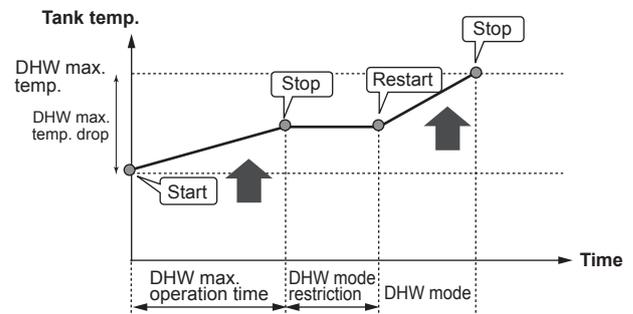
<Eco mode>

DHW mode can run in either 'Normal' or 'Eco' mode. Normal mode will heat the water circuit quickly using the full power of the heat pump. Eco mode takes a little longer to heat the water circuit but the energy used is reduced. This is because heat pump operation is restricted using signals from the FTC3 based on measured water circuit temperature.

Note:

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

Return to the DHW/legionella prevention menu.

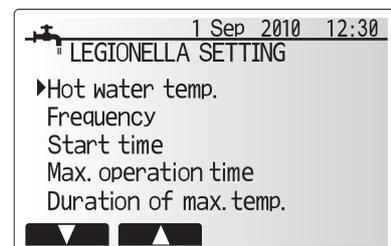


Legionella Prevention Mode settings (LP mode)

1. Use button F3 to chose legionella mode active YES/NO.
2. Use button F4 to edit the legionella function.
3. Use F2 and F3 keys to scroll through the menu selecting each subtitle in turn by pressing CONFIRM. See the table below for description of each setting.
4. Enter the desired number using the function keys and press CONFIRM.

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

Note: System without neither booster heater or immersion heater, 'Legionella Prevention Mode' is NOT available.

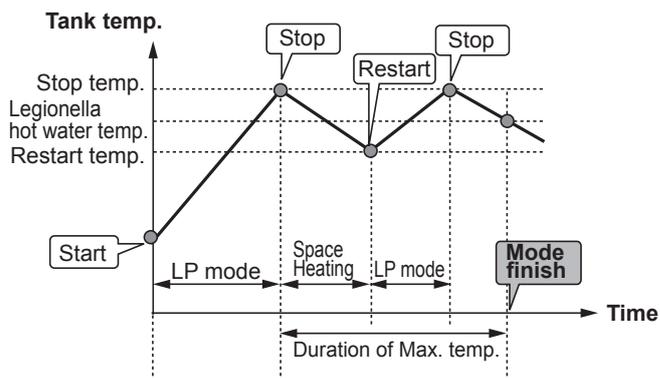


Menu subtitle	Function	Range	Unit	Default value
Legionella hot water temp.	Desired temp of stored hot water	60–70	°C	65
Frequency	Time between LP mode tank heat ups	1–30	day	15
Start time	Time when LP mode will begin	0:00–23:00	-	03:00
Max. operation time	Maximum time allowed for LP mode tank heat	1–5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

7. Main controller operation

<Explanation of Legionella Prevention Mode operation>

- At the time entered by the installer 'Start time' flow of useful heat from the system is diverted to heat the water in the storage tank.
- When the temperature of the stored water exceeds the 'Hot Water temp.' set by the installer (above 65°C) water is no longer diverted to the tank.
- Whilst LP mode is in operation hot water is not directed to the space heating circuit.
- Directly after LP mode operation 'Duration of max. temp' will operate. The duration of this feature is set by the installer and during its operation stored water temperature will be monitored.
- If stored water temperature should drop to LP restart temp, LP mode will restart and water flow from the plate heat exchanger will be directed to the tank to boost the temperature. Once the set time for Duration of Max. temp has passed LP mode will not recur for the set interval.
- It is the responsibility of the installer to ensure the settings for legionella prevention are compliant with local and national guidelines.



(LP mode : Legionella Prevention Mode)

Please note that LP mode uses the assistance of electric heaters to supplement the energy input of the heat pump. Place an electric heater on the DHW circuit. 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.

Forced DHW

The forced DHW function is used to force the system to operate in DHW mode. In normal operation the water in the DHW tank will be heated either to the set temperature or for the maximum DHW time, whichever occurs first. However should there be a high demand for hot water 'Forced DHW' function can be used to prevent the system switching to space heating and continue to provide DHW tank heating.

Forced DHW mode is activated by pressing button F1 when the 'Option Screen' is displayed. Following operation the system will automatically return to normal operation.

■ Mode 2 - Heating

The heating menu deals with space heating using either a radiator or under-floor system depending on the installation.

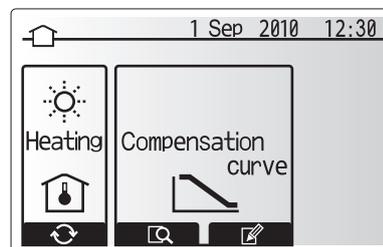
From the main settings menu

1. Use F1 and F2 buttons to highlight heating icon then press CONFIRM.
2. The heating menu will be displayed.
3. To select the sub-menus press the function button below the icon required. E.g. for MODE change press F1

Heating

1. Under this sub-menu the mode of heating is selected.
2. Choose between
 - Flow temperature (🔥)
 - Room temperature (🏠)
 - Compensation curve (📈)
3. To choose between the different modes for heating highlight the mode preferred and press select.
4. Press the BACK button to return to the heating menu.

If compensation curve mode was selected as the heating mode please read the following instructions.



7. Main controller operation

<Compensation curve setting (space heating)>

1. From the heating menu select edit using the F3 function button.
2. The compensation curve setting screen will be displayed.
3. Press F2 to alter the Hi parameter (when flow temp is maximum and outdoor temp is minimum).
4. Press F3 to alter the Lo parameter (when flow temp is minimum and outdoor temp is maximum).
5. Press F4 to add an extra point (adjust).

Pressing F2-4 will cause the relevant edit screen to be displayed. Editing Lo and Hi parameters is done in the same way; please see the following for more detailed explanation of parameter editing.

In the parameter (Lo/Hi) edit screen the flow temperature and outdoor temperature for the compensation curve graph can be set and altered for the 2 extremes of Hi and Lo.

1. Press F1 and F2 to change the flow temperature (y-axis of compensation curve).
2. Pressing F1 will raise the desired flow temperature for the set outdoor temperature.
3. Pressing F2 will lower the desired flow temperature for the set outdoor temperature.
4. Press F3 and F4 to change the outdoor temperature (x-axis of compensation curve).
5. Pressing F3 will lower the outdoor temperature for the set flow temperature.
6. Pressing F4 will raise the outdoor temperature for the set flow temperature.

< Explanation of compensation curve >

During late spring and summer usually the demand for space heating is reduced. To prevent the heat pump from producing excessive flow temperatures for the primary circuit the compensation curve mode can be used to maximise efficiency and reduce running costs.

The compensation curve is used to restrict the flow temperature of the primary space heating circuit dependent on the outdoor temperature. The FTC3 uses information from both an outdoor temperature sensor and a temperature sensor on the primary circuit supply to ensure the heat pump is not producing excessive flow temperatures if the weather conditions do not require it.

<Holiday mode>

Holiday mode can be activated in 2 ways. Both methods will result in the holiday mode activation screen being shown.

Option 1.

From the main menu screen button E should be pressed. Be careful not to hold down button E for too long as this will turn off the controller and system.

Option 2.

From the main menu screen press button F4. The current settings screen will be displayed. Press button F4 again to access the holiday mode activation screen.

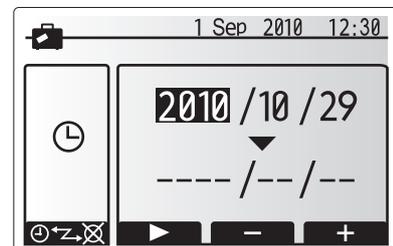
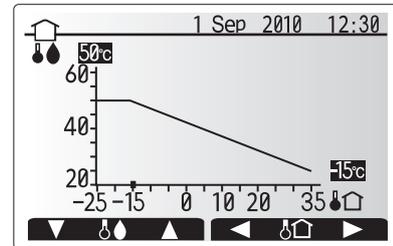
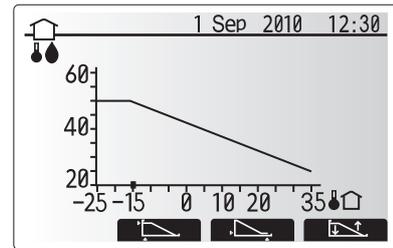
Once the holiday mode activation screen is displayed you can activate/deactivate and select the duration that you would like holiday mode to run for.

- Press button F1 to activate or deactivate holiday mode.
- Use buttons F2, F3 and F4 to input the date which you would like holiday mode to activate or deactivate for space heating.

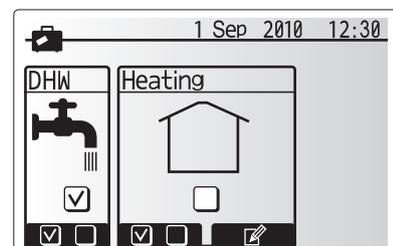
<Editing holiday mode>

To change the holiday mode settings e.g. the flow temp, you must access the holiday mode menu from the main settings menu.

1. From main menu screen press button B.
2. Use buttons F2 and F3 to scroll through menu until Holiday Mode is highlighted.
3. Press CONFIRM button.
4. The holiday mode status screen is displayed.
5. To change the flow temperature or room temperatures on heating mode press button F3.
6. A list of variables will be displayed. Choose the one you wish to modify using buttons F1/F2 then press CONFIRM.
7. Adjust the temperature using buttons F3 and F2 and press CONFIRM button to save changes.



Holiday Mode activation screen



Holiday Mode status screen

7. Main controller operation

Mode 3 - Schedule timer

The schedule timer mode allows daily and weekly space heating and DHW patterns to be entered.

1. From the main settings menu use F2 and F3 to highlight the schedule timer icon then press CONFIRM.
2. The schedule timer sub menu will be displayed. The icons show the following modes;
 - Heating
 - DHW
3. Use F2 and F3 buttons to move between mode icons press CONFIRM to be shown the PREVIEW screen for each mode.

The PREVIEW screen allows you to view the current settings. Days of the week are displayed across the top of the screen. Where day appears underlined the settings are the same for all those days underlined.

Hours of the day and night are represented as a bar across the main part of the screen. Where the bar is solid black, space heating/DHW (whichever is selected) is allowed.

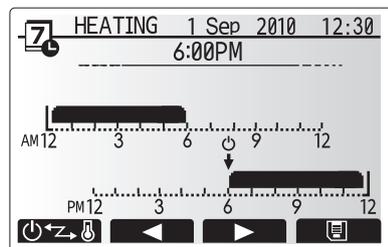
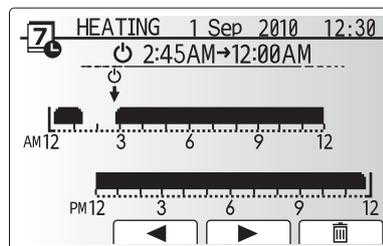
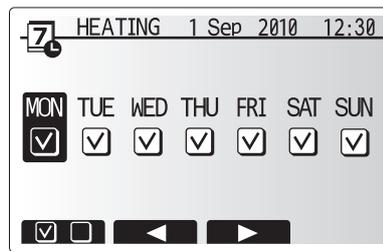
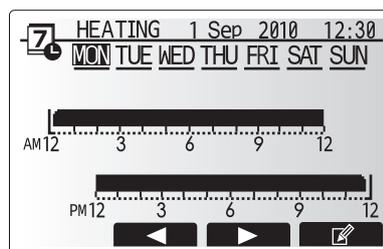
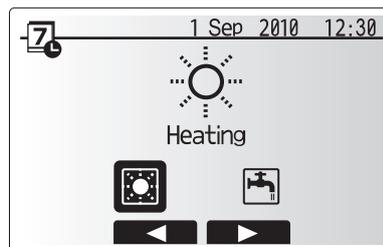
<Setting the schedule timer>

1. In the PREVIEW menu screen press F4 button.
2. First select the days of the week you wish to schedule.
3. Press F2/F3 buttons to move between days and F1 to check or uncheck the box.
4. When you have selected the days press CONFIRM.
5. The time bar edit screen will be displayed.
6. Use buttons F2/F3 to move to the point at which you do not want the selected mode to be active press CONFIRM to start.
7. Use F3 button to set the required time of inactivity then press CONFIRM.
8. You can add up to 4 periods of inactivity within a 24 hour interval.
9. Press F4 to save settings.

When scheduling heating, button F1 changes the scheduled variable between time and temperature. This enables a lower space temperature to be set for a number of hours e.g. a lower space temperature may be required at night when the occupants are sleeping.

Notes:

- The schedule timer for space heating and DHW are set in the same way. However for DHW only time can be used as scheduling variable.
- A small rubbish bin character is also displayed choosing this icon will delete the last unsaved action.
- It is necessary to use the SAVE function F4 button to save settings. CONFIRM does NOT act as SAVE for this menu.



7. Main controller operation

■ Service Menu

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

1. From the main setting menu use F2 and F3 to highlight the service icon then press CONFIRM.
2. You will be prompted to enter a password. **THE FACTORY DEFAULT PASSWORD IS "0000"**.
3. Press CONFIRM.
(It takes approx. 30 secs to load the service menu.)

The service menu is navigated using the F1 and F2 buttons to scroll through the functions. The menu is split across two screens and is comprised of the following functions;

1. Manual operation
2. Function setting
3. Thermistor adjustment
4. Auxiliary setting
5. Heat source setting
6. Operation setting
7. Running information
8. Thermistor reading
9. Summary of setting
10. Error history
11. Password protection
12. Manual reset

In this Installation Manual, instructions will be given only for the following functions;

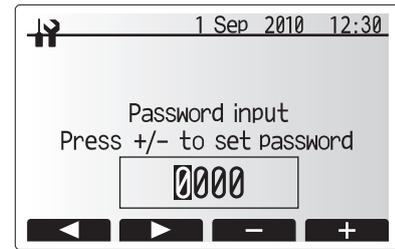
1. Auxiliary setting
2. Manual operation
3. Heat source setting
4. Password protection
5. Manual reset

Information on the other functions can be found by consulting the technical or service manuals.

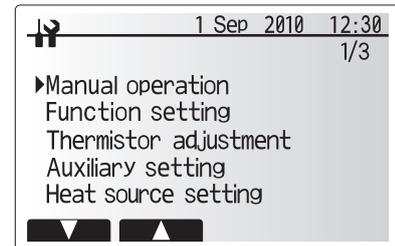
<General operation>

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 controller will display a reminder message prompting the installer to stop operation before continuing. By selecting **Yes**, the unit will cease operation and changes can be made to the service settings.

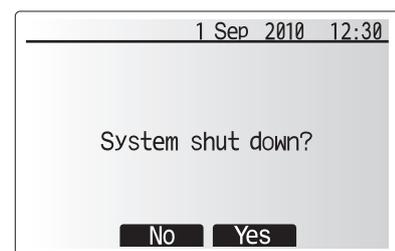
If text is displayed in white on a black background, CONFIRM button must be pressed to save this choice.



Screen 1 of service menu



Screen 2 of service menu



System off prompt screen



Action requires confirmation

Action is confirmed

7. Main controller operation

Auxiliary Setting

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

From the service menu use F1 and F2 buttons to highlight Auxiliary setting then press CONFIRM.

<Economy settings for pump>

1. From the Auxiliary setting menu highlight Economy Settings for pump.
2. Press CONFIRM.
3. The economy settings for pump screen will be displayed.
4. Use button F1 to switch the pump ON/OFF.
5. Use buttons F3 and F4 to adjust the time the pump will run. (3 - 60 mins)

<Frost prevention>

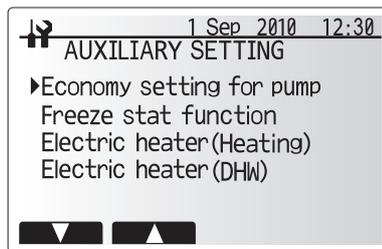
1. From the Auxiliary setting menu highlight Freeze Stat Function.
2. Press CONFIRM.
3. The freeze stat function screen will be displayed.
4. Use buttons F3 and F4 to adjust the minimum outdoor temperature which freeze stat function will begin to operate, (3 - 20 °C) or choose *.
If asterisk (*) is chosen freeze stat function is deactivated/disabled (i.e. freeze risk).

<Electric heater (Space heating)>

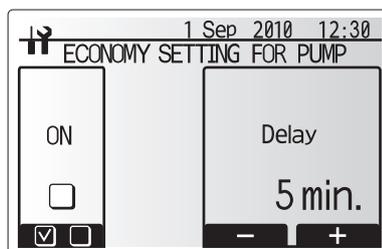
1. From the Auxiliary Setting menu highlight Electric heater (Space heating).
2. Press CONFIRM.
3. The Electric heater (Space heating) screen is displayed.
4. Press F1 button to switch the function ON/OFF.
5. Use F3 and F4 buttons to adjust the time period of heat pump-only operation before the booster heater will assist in space heating. (5 -180mins)

<Electric heater (DHW)>

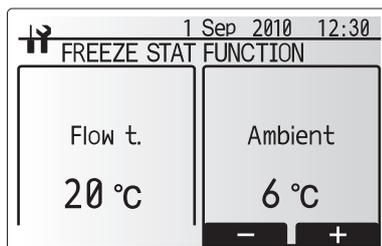
1. From the Auxiliary Setting menu highlight Electric heater (DHW).
2. Press CONFIRM.
3. The Electric heater (DHW) screen is displayed.
4. Press F1 button to switch the function ON/OFF.
5. Use F3 and F4 buttons to adjust the time period of heat pump-only operation before the booster heater and the immersion heater (if present) will assist in DHW heating. (15 -30mins)



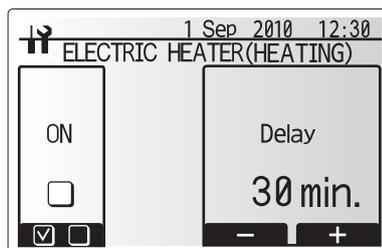
Auxiliary setting menu screen



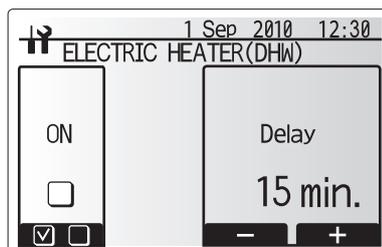
Economy settings for pump screen



Freeze stat function screen



Electric heater (Heating) screen



Electric heater (DHW) screen

7. Main controller operation

<Manual operation>

During the filling of the system the pump and 3-way valve can be manually overridden using manual operation mode.

When manual operation is selected a small timer icon appears in the screen. The timer selected will only remain in manual operation for a maximum of 2 hours. This is to prevent accidental permanent override of the FTC3.

1. From the service menu use F1 and F2 buttons to scroll through list until Manual Operation is highlighted.
2. Press CONFIRM.
3. Manual operation menu screen is displayed.
4. To activate manual operation press the function button under the desired part.
5. To return to service menu press MENU or BACK button.

► Example

Pressing F3 button will switch manual operation mode ON for the main 3-way valve. When filling of the tank is complete the installer should access this menu again and press F3 to deactivate manual operation of the part. Alternatively after 2 hours manual operation mode will no longer be active and FTC3 will resume control of the part.

NOTES:

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.

The OUT13 output of the 2-way valve 2 constitutes an inversion of the OUT4 output of the 2-way valve 1.

<Heat source setting>

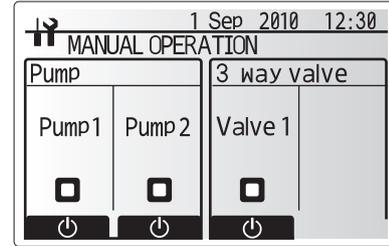
The default heat source setting is heat pump and all electric heaters present in the system to be operational. This is referred to as Standard operation on the menu.

1. From the service menu use F1 and F2 buttons to scroll through list until *Heat Source Setting* is highlighted.
2. Press CONFIRM.
3. Heat source setting menu screen is displayed.
4. Press F3 button until preferred heat source is displayed.
5. Press CONFIRM.
6. To return to service menu press MENU or BACK button.
7. If you wish to return to the service menu without saving the setting press return button. You will be asked if you are sure you wish to cancel the changes. Choose Yes or No as appropriate.

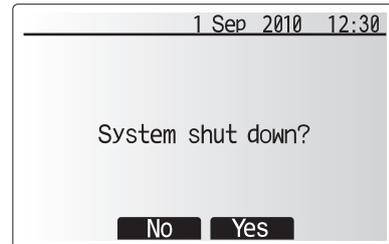
<Thermistor Adjustment>

This function allows adjustments to be made to the thermistor readings from -10 – 10 °C in 0.5 °C intervals.

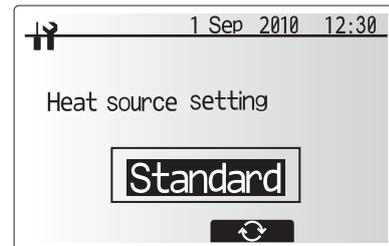
1. From the Service menu highlight Thermistor Adjustment
2. Press CONFIRM.
3. Use F1 and F2 to select thermistor.
4. Press CONFIRM.
5. Use F2 and F3 to change the thermistor temperature.
6. Press CONFIRM.



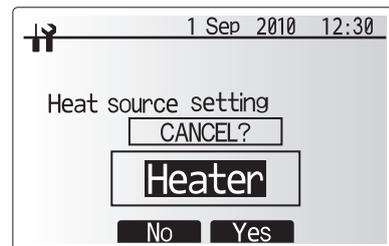
Manual operation menu screen



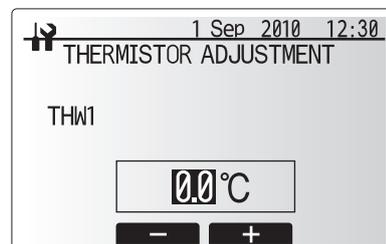
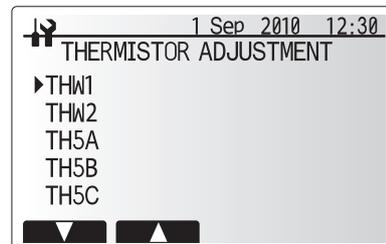
System off prompt screen



Heat source setting screen



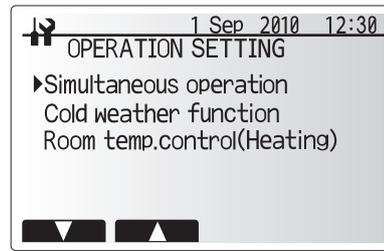
Cancel last action screen



7. Main controller operation

Operation Setting Menu

1. To access the Operation setting menu use F1 and F2 buttons to scroll through the service menu until Operation setting is highlighted.
2. Press CONFIRM.
3. Operation setting menu is displayed.

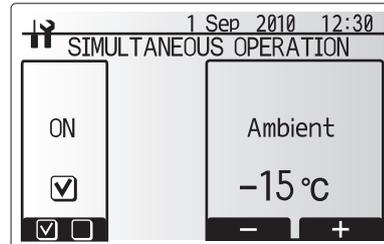


Operation setting menu screen

<Simultaneous Operation>

For periods of very low outside temperature this mode can be used. Simultaneous operation allows both DHW and space heating to be provided simultaneously by using the heat pump to provide space heating whilst only the immersion heater (if fitted) provides heating for DHW. This operation is only available if BOTH a DHW tank AND immersion heater are present on the system.

1. From the Operation setting menu use F1 and F2 buttons to scroll through the list until Simultaneous operation is highlighted.
 2. Press CONFIRM.
 3. Simultaneous operation screen is displayed.
 4. To switch simultaneous operation ON/OFF press F1.
 5. To alter the temperature at which simultaneous operation starts use F3 and F4.
- Note: Range of ambient (outdoor) temperature is -15°C to 10°C (default -15°C).
6. To return to Operation setting menu press BACK.

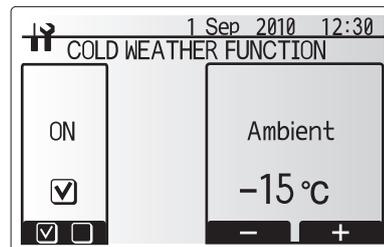


Simultaneous operation screen

<Cold weather function>

For extremely low outdoor temperature conditions when the heat pump's capacity is severely restricted the heating or DHW is provided by only the electric booster heater (and immersion if present). This function is intended for use during extreme cold periods only. Extensive use of direct electrical heaters ONLY will result in higher electric usage and may reduce working life of heaters and related parts.

1. From the Operation setting menu use F1 and F2 buttons to scroll through the list until Cold weather function is highlighted.
 2. Press CONFIRM.
 3. Cold weather function screen is displayed.
 4. To switch Cold weather function ON/OFF press F1.
 5. To alter the temperature at which heater switching function starts use F3 and F4.
- Note: Range of ambient (outdoor) temperature is -15°C to -10°C (default -15°C)
6. To return to Operation setting menu press BACK.

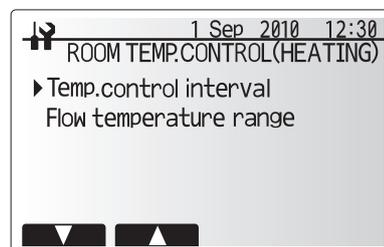


Cold weather function screen

<Room Temp Control (Heating)>

This function allows operational setting of flow temperature range from the Ecodan and also the time interval at which the FTC3 collects and processes data for the auto adaptation mode.

1. From the Operation setting menu use F1 and F2 buttons to scroll through the list until Room temp. control (HEATING) is highlighted.
 2. Press CONFIRM.
 3. Room temp. control (HEATING) screen is displayed.
 4. To alter the time period at which data will be collected use F1 and F2 buttons to highlight 'Temp. control interval'.
 5. Press CONFIRM.
 6. Use F3 and F2 buttons to alter the time interval.
- Note: Range 10 – 60 minutes at 10 minute intervals (default 10 minutes).
7. To alter the flow temperature limits, use F1 and F2 buttons to highlight 'Flow temperature range'.
 8. Press CONFIRM.
- Flow temperature range screen is displayed.
9. To alter minimum flow temp. use F1 and F2 buttons.
- Note: Range of minimum flow temp. is 25°C to 40°C (default 30°C).
10. To alter maximum flow temp. use F3 and F4 buttons.
- Note: Range of maximum flow temp. is 35°C to 60°C (default 50°C)
11. To return to Operation setting menu press BACK twice.



Room temp. control (HEATING) screen

7. Main controller operation

<Password protection>

Password protection is available to prevent unauthorised access to the service menu by untrained persons.

1. From the service menu use F1 and F2 buttons to scroll through list until *Password protection* is highlighted.
2. Press CONFIRM.
3. When password input screen is displayed use buttons F1 and F2 to move left and right between the four digits, F3 to lower the selected digit by 1, and F4 to increase the selected digit by 1.
4. When you have input your password press CONFIRM.
5. The password verify screen is displayed.
6. To verify your new password press button F3.
7. Your password is now set and the completion screen is displayed.
8. To return to service menu press MENU or BACK button.

<Resetting the password>

If you forget the password you entered, or have to service a unit somebody else installed, you can reset the password to the factory default of **0000**.

1. From the main settings menu scroll down the functions until Service Menu is highlighted.
2. Press CONFIRM.
3. You will be prompted to enter a password.
4. Hold down buttons F3 and F4 together for 3 secs
5. You will be asked if you wish to continue and reset the password to default setting.
6. To reset press button F3.
7. The password is now reset to **0000**.

<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.

1. From the service menu use F1 and F2 buttons to scroll through list until Manual Reset is highlighted.
2. Press CONFIRM.
3. The manual reset screen is displayed.
4. Choose either Manual Reset for FTC3 or Main Controller.
5. Press F3 button to confirm manual reset of chosen device.



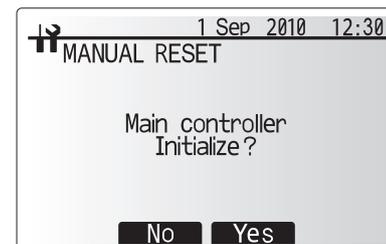
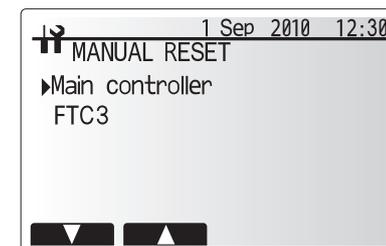
Password input screen



Password verify screen



Completion screen



7. Main controller operation

Should settings be changed from default please enter new setting in 'Field Setting' column. 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

			Parameters	Default setting	Field setting	Notes	
Main	Option	Forced DHW operation *2		On/Off	Off		
		DHW *2		On/Off/Timer	On		
		Heating		On/Off/Timer	On		
		Holiday mode		Active/Non active/Set time	Non active		
Setting	DHW	Operation mode		Normal/Eco	Normal		
		DHW max. temp		40°C – 60°C *3	50°C		
		DHW temperature drop		5°C – 30°C	10°C		
		DHW max. operation time		30 – 120 mins	60 mins		
		DHW mode restriction		30 – 120 mins	30 mins		
		Legionella prevention		Active	Yes/No	Yes	
			Hot water temp	60°C – 70°C *4	65°C *4		
			Frequency	1 – 30 days	15 days		
			Start time	00.00 – 23.00	03.00		
			Max. operation time	1 – 5 hours	3 hours		
			Duration of maximum temperature	1 – 120 mins	30 min		
	Heating		Operation mode Heating	Flow temp/Compensation curve/Room temp	Room temp		
			Heating room temp	10°C – 30°C	20°C		
			Heating flow temp	25°C – 60°C *3	45°C		
	Compensation curve	Lo set point	Outdoor ambient temp		-15°C – 35°C	35°C	
			Flow temp		25°C – 60°C *3	25°C	
		Hi set point	Outdoor ambient temp		-15°C – 35°C	-15°C	
			Flow Temp		25°C – 60°C *3	50°C	
		Adjust	Outdoor Ambient Temp		-14°C – 34°C	—	
			Flow temp		25°C – 60°C *3	—	
	Schedule timer		Active		Yes/No	No	
	Holiday	DHW *2		Active/Non active	Non active		
		Heating		Active/Non active	Active		
		Heating room temp		10°C – 30°C	15°C		
		Heating flow temp		25°C – 60°C *3	35°C		
	Initial settings	Language		ENG/PT/NOR/FIN/NL/DA/IT/SP/SW/GER/FR	ENG		
		°C/°F		°C/°F	°C		
		Temp display		On/Off	Off		
		Time display		hh:mm/hh:mm AM/AM hh:mm	—		
		Room sensor setting		TH1/Main RC/Room RC1-8/(Time/Zone)	TH1		
	Service menu	Manual operation		Supplementary pump or 3 way valve On/Off	Off		
		Thermistor adjustment		-10°C — +10°C	0°C		
		Auxiliary setting	Economy setting for pump		Active/Not active	Active	
Freeze stat function			Time before pump switched off (3 – 60 mins)*1	10 mins			
			Outdoor ambient temperature (3 – 20°C)	5°C			
Electric heater (Heating)			Space heating: Used/Not Used	Used			
			Electric heater delay timer (5 – 180 mins)	30 mins			
Electric heater (DHW)				DHW: Used/Not Used	Used		
				Electric heater delay timer (15 – 30 mins)	15 mins		
		Heat source setting		Standard/Heater	Standard		
Operation setting		Simultaneous operation	Active/Inactive		Inactive		
			Outdoor ambient temperature (-15 – 10°C)		-15°C		
		Cold weather function	Active/Inactive		Inactive		
			Outdoor ambient temperature (-15 – -10°C)		-15°C		
		Room temp control (Heating)	Temperature control interval (10 – 60 mins)		10 mins		
	Flow temperature range (Maximum temp.) (35 – 60°C)		50°C				
Flow temperature range (Minimum temp.) (25 – 40°C)			30°C				

*1. Decreasing "time before pump switched off" may increase the duration of stand-by in Heating mode.

*2. Only if the DHW tank is available (Dip-SW 1-3 ON).

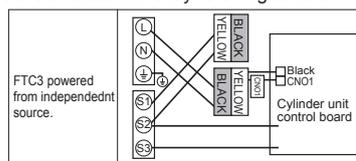
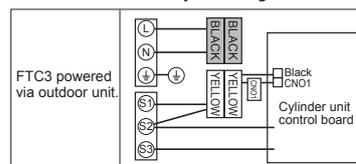
*3 The upper limit of the maximum set temperature will decrease to 55°C depending on the settings of Dip switches (SW1-2, 1-4, 1-5, 1-6).

*4 The upper limit of the maximum set temperature will decrease to 60°C or 'Legionella Prevention Mode' will be disabled depending on the settings of Dip switches (SW1-2, 1-4, 1-5, 1-6).

8. Troubleshooting

<Troubleshooting by inferior phenomena>

No.	Fault symptom	Possible cause	Explanation - Solution
1	Main controller display does not work.	<ol style="list-style-type: none"> There is no power supply to main controller. Power is supplied to main controller, however, the display on the main controller is not visible. 	<ol style="list-style-type: none"> Check LED2 on FTC3. <ol style="list-style-type: none"> When LED2 is lit. Check the main controller wiring for damage or contact failure. When LED2 is blinking. Refer to No.5 below. When LED2 is not lit. Refer to No.4 below. Check the following. <ul style="list-style-type: none"> Failure of main 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 controller.	<ol style="list-style-type: none"> "Please Wait" is displayed for up to 6 mins. Communication failure between the main controller and FTC3. Communication failure between FTC3 and outdoor unit. 	<ol style="list-style-type: none"> Normal operation. 3. Main controller start up checks/procedure. <ol style="list-style-type: none"> If main controller - FTC3 can not communicate the number displayed under "Please Wait" is 0%, or 50-99%. <ul style="list-style-type: none"> Check wiring connections on main controller Replace main controller or FTC3 boards. If 1-49% is displayed there is a communication error between the outdoor unit's and FTC3's boards. <ul style="list-style-type: none"> Check the wiring connections on the outdoor unit and FTC3 boards. (Ensure S1, S2 are not cross wired and S3 is securely connected and not damaged.) Replace the outdoor unit's and/or the FTC3's boards.
3	When pressing the "ON" button, the main screen is shown briefly then disappears.	If whilst changing the settings in the service menu, the system is shut down. When you return to the main screen you may have to wait a short while before the "ON" button will work.	Normal operation. The unit is processing the recent service menu changes and will be operational shortly.
4	LED2 on FTC3 is off.	<p>When LED1 on FTC3 is also off. <FTC3 powered via outdoor unit.></p> <ol style="list-style-type: none"> Power supply of rated voltage is not supplied to outdoor unit. Defective outdoor controller circuit board. Power supply of AC 220~240V is not supplied to FTC3. Defective FTC3. There are problems in the method of connecting the connectors. 	<ol style="list-style-type: none"> Check the voltage of outdoor power supply terminal block (L,N) or (L3,N). <ul style="list-style-type: none"> When AC220~240V is not detected, check the power wiring to outdoor unit and the breaker. When AC 220~240V is detected, check 2 (below). Check the voltage between outdoor terminal block S1 and S2. <ul style="list-style-type: none"> When AC 220~240V is not detected, check the fuse on outdoor controller circuit board, check the wiring connection. When AC 220~240V is detected, check 3 (below). Check the voltage between indoor terminal block S1 and S2. <ul style="list-style-type: none"> When AC 220~240V is not detected, check FTC3/outdoor unit connecting wire for miswiring. When AC 220~240V is detected, check 4 (below). Check the fuse on FTC3. <ul style="list-style-type: none"> Check the wiring connection. If no problems are found, FTC3 board is defective. Check that there is no problem in the method of connecting the connectors. <ul style="list-style-type: none"> When there are problems in the method of connecting the connectors, connect the connector correctly referring to below.
		<p><FTC3 powered from independent source></p> <ol style="list-style-type: none"> Power supply of AC 220~240V is not supplied to FTC3. There are problems in the method of connecting the connectors. Defective FTC3. 	<ol style="list-style-type: none"> Check the voltage of indoor power supply terminal block (L,N). <ul style="list-style-type: none"> When AC220~240V is not detected, check the power supply wiring. When AC220~240V is detected, check 2 (below). Check that there is no problem in the method of connecting the connectors. <ul style="list-style-type: none"> When there are problems in the method of connecting the connectors, connect the connector correctly referring to below. Check the fuse on FTC3. <ul style="list-style-type: none"> Check the wiring connection. If no problems are found, FTC3 board is defective.
		When LED1 on FTC3 is lit. Miss-setting of refrigerant address for outdoor unit. (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.)



8. Troubleshooting

No.	Fault symptom	Possible cause	Explanation - Solution
5	LED2 on FTC3 is blinking.	When LED1 on FTC3 is also blinking. Connection failure of FTC3/outdoor unit connecting wire	Check FTC3/outdoor unit connecting wire for connection failure.
		When LED1 on FTC3 is lit. 1. Miswiring of main controller wires Multiple indoor units have been wired to 1 outdoor unit. 2. Miss-setting of refrigerant address for outdoor unit (Outdoor unit refrigerant address should be set to "0") 3. Short-circuit of main controller wires 4. Defective main controller	1. Check the connection of main controller wires. Only 1 indoor unit should be wired to 1 outdoor unit. Supplementary indoor units should each be wired to a separate outdoor unit. 2. 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.) 3, 4. Remove main controller wires and check LED2 on FTC3. • If LED2 is blinking check the main controller wires are not short circuiting. • If LED2 is lit, connect main controller wires again and: - if LED2 is blinking, main controller is defective; - if LED2 is lit, connection failure of main controller terminal block etc. has returned to normal.
6	Cold water at tap	Direct – Booster heater cut out has triggered.	Check booster heater thermostat and press reset button if safe. Reset button is covered with white rubber cap see component parts diagram page 6 for position.
		Direct – Booster heater breaker (ECB1) has tripped.	Check the cause of the trip and reset if safe.
		Direct – The booster heater thermal cut-out has operated and can not be reset using the Manual reset button.	Check the resistance of the thermal cut out, if 0 then the connection is broken and the booster heater will have to be replaced. Please contact your Mitsubishi Electric dealer.
		Direct – Immersion heater cut out has triggered.	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.
		Direct – Immersion heater breaker (ECB2) has tripped.	Check the cause of the trip and reset if safe.
		Indirect – 3-way valve fault	Check plumbing/wiring to 3-way valve.
		Indirect – Heat pump not working. All hot water used.	Check heat pump – consult outdoor unit service manual. Ensure DHW mode is operating and wait for tank to re-heat.
7	Water discharges from expansion relief valve (Primary circuit side/sanitary water side)	If continual – locally supplied pressure reducing valve not working.	Check function of pressure reducing valve and replace if necessary.
		If continual – expansion relief valve seat may be damaged.	Remove cartridge – check seat and renew if necessary.
		If intermittent – expansion vessel charge may have reduced/bladder perished.	Check pressure in expansion vessel. Recharge as necessary. If bladder perished replace vessel.
		Unit is being back pressurised.	With cylinder cold check pressure in cylinder. If this is the same as the incoming mains pressure then you are getting backfeed. Install a balanced cold supply.
8	Water discharges from temperature and pressure relief valve (EHPT20X-VM2HA only)	Unit has overheated – thermal controls have failed.	Switch off power to the heat pump and immersion heaters. Leave water supply on. Wait until discharge stops. Isolate water supply and replace if faulty.
9	Milky/Cloudy water	Oxygenated water	Water from any pressurised system will release oxygen bubbles when flowing. The bubbles will settle out.
10	No hot water flow	Cold main off.	Check and open stop cock.
		Strainer blocked .	Isolate water supply and clean strainer.
11	Noise during hot water draw off typically worse in the morning	Loose airing cupboard pipework.	Install extra pipe fastening clips.
12	Noisy pump	Air in pump.	Use manual and automatic air vents to release trapped air from system. Top up water if necessary to achieve 1bar on primary circuit.
13	Pump runs for a short time for no reason.	Pump jam prevention mechanism to inhibit the build up of scale.	Normal operation no action necessary.
14	Hot or warm water from cold tap	If tap runs cold after a minute or so the pipe is picking up heat from heating pipe work.	Insulate/re-route pipe work.
15	Heating system does not get up to set temperature.	Prohibit, schedule timer or holiday mode selected.	Check settings and change as appropriate.
		Incorrectly sized radiators	Contact installer
		The room in which the temperature sensor is located is at a different temperature to the rest of the house.	Reposition the temperature sensor to a more suitable room.
		Battery problem *wireless control only	Check the battery power and replace if flat.
16	Mechanical noise heard coming from the cylinder unit.	Heaters switching on/off	Normal operation no action required.
		3-way valve changing position between DHW and heating mode.	Normal operation no action necessary.

8. Troubleshooting

No.	Fault symptom	Possible cause	Explanation - Solution
17	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 cylinder into space heating circuit. This is done to prevent the cylinder unit components from overheating. The amount of hot water directed into the space heating circuit is dependent on the type of system and the pipe run between the plate heat exchanger and the cylinder unit.	Normal operation no action necessary.
18	Heating mode has been on standby for a long time (does not start operation smoothly.)	Duration is set to excessively short time at "Economy setting for pump". (Go to "Service menu" → "Auxiliary setting" → "Economy setting for pump").	Set "Economy setting for pump" to longer period.
19	Heating emitter is hot in the DHW mode. (The room temperature rises.)	The 3-way valve may have foreign objects in it, or hot water may flow to the heating side due to malfunctions.	Manually override the 3-way valve several times to check whether the problem will be solved. If the problem persists replace the 3-way valve motor with a new one. If still no change replace the entire 3-way valve with a new one.
20	The system that was running in the heating mode before power failure is running in the DHW mode after power recovery.	The FTC3 is designed to initially run in an operation mode with a higher priority (i.e. DHW mode in this case) at power recovery.	<ul style="list-style-type: none"> • 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 (e.g. Heating mode).

9. Supplementary information

Refrigerant recovery (pump down) for split systems only

For split system the following procedures should be followed to recover system refrigerant:

Notes) Pump down operation can not be activated by switching the pump down switch (SWP) or test run switch on the outdoor unit PCB.

Ensure both the outdoor unit and the indoor unit are in emergency mode before carrying out the following.

For pump down operation in split systems both the indoor and the outdoor unit must be in emergency mode.

Please see the following instructions on how to activate emergency mode.

Before carrying out the pump down, ensure the water pump is functioning correctly and L9 error code is not displayed on the main controller.

If there is insufficient water circulation, the circuit may freeze causing damage to the plate HEX.

If there is a fault with the pump or L9 error code is displayed on the main controller, do not attempt pump down operation.

In this case a refrigerant recovery machine must be used.

1. Isolate outdoor unit from power supply by switching OFF relevant circuit breaker.
If the indoor unit is powered independently to the outdoor unit, ensure that BOTH units are isolated from the power supply.
**Notes) If the system includes a FTC3 (cased) and a 3rd party booster heater, the DipSW1-5 should already be set to ON (if not change to ON).
If the system includes a FTC3 (cased) but no booster heater, the DipSW1-5 should be changed from OFF → ON.
For cylinder and hydrobox units DipSW1-5 is set to ON so adjustment is unnecessary.**
2. Fully close the stop valve on the refrigerant (liquid) pipe and attach the pressure gauge to the port on the low pressure side of the compressor refrigerant pipe work.
Change the position of the connector CN31 to ON and change DipSW4-2 to OFF on the outdoor unit PCB.
Change the DipSW4-5 on the FTC3 (cased) to ON.
3. Switch ON power to the outdoor unit.
If the indoor unit is powered independently, switch on power to the indoor unit FIRST, then switch on power to the outdoor unit.
Outdoor and indoor unit will start operating in emergency mode.
**Notes) If the outdoor unit is operated whilst the indoor unit is switched off, this could cause SERIOUS DAMAGE to the plate HEX.
Always ensure the indoor unit power supply is ON and water pump is operating before switching ON power to the outdoor unit.
After reconnecting power supply, ensure the water pump is operating correctly.
If the water pump is not operating normally, then this could cause the water circuit to freeze and DAMAGE the plate HEX.**
4. When the pressure gauge reads close to 0MPa (G), close the valve on the refrigerant (gas) pipe and then switch power to outdoor unit OFF.
If the indoor unit is powered independently ensure power supply for unit is OFF.
**Notes) It is important that after closing the valve on the refrigerant (gas) pipe the power supply is QUICKLY switched OFF.
If the system is running at a pressure of 0MPa (G) or lower, it may cause DAMAGE to the compressor.**
5. After completing the pump down operation, return the position of the connector CN31 on the outdoor unit PCB to OFF.
Change the Dip SW4-5 on the FTC3 (cased) to OFF.
If the system includes a FTC3 (cased) but no booster heater, then the DipSW1-5 must be returned to OFF setting.
For the system containing a booster heater (FTC3 (cased) + 3rd party booster heater) DipSW1-5 should remain ON.

Local application factors

- * This FTC3 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) Heat exchanger internal capacity

Heat exchanger internal capacity must be within the capacity range shown below. If the heat exchanger below the minimum capacity is connected, it may result in the back flow of liquid or the failure of the compressor.

If the heat exchanger above the maximum capacity is connected, it may result in the deficiency in performance due to lack of refrigerant or overheating of the compressor.

Minimum capacity: $10 \times \text{Model capacity [cm}^3\text{]}$ / Maximum capacity: $30 \times \text{Model capacity [cm}^3\text{]}$

e.g. When connecting to PUHZ-HRP100 VHA

Minimum capacity : $10 \times 100 = 1000 \text{ cm}^3$

Maximum capacity : $30 \times 100 = 3000 \text{ cm}^3$

Model capacity	35	50	60	71	100	125	140	200	250
Maximum capacity [cm ³]	1050	1500	1800	2130	3000	3750	4200	6000	7500
Minimum capacity [cm ³]	350	500	600	710	1000	1250	1400	2000	2500

(4) 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 $\phi 9.52 \text{ mm}$

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.
- Water quality should be to European Directive 98/83 EC standards
 - pH value of 6.5 - 8
 - Calcium $\leq 100 \text{ mg/L}$
 - Chlorine $\leq 100 \text{ mg/L}$
 - Iron/Manganese $\leq 0.5 \text{ mg/L}$
- 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.**

EC DECLARATION OF CONFORMITY
EG-KONFORMITÄTSEKTLÄRUNG
DÉCLARATION DE CONFORMITÉ CE

EG-CONFORMITEITSVERKLARING
DECLARACIÓN DE CONFORMIDAD CE
DICHIARAZIONE DI CONFORMITÀ CE

DECLARAÇÃO DE CONFORMIDADE CE
EU-OVERENSTEMMELSESERKLÆRING
EG-DEKLARATION OM ÖVERENSSTÄMMELSE

CE-ERKLÆRING OM SAMSVAR
CE-VAAIMUSTENMUKAISUUSVAKUUTUS

mitsubishi electric air conditioning systems europe ltd.
NETTLEHILL ROAD, HOUSTOUN INDUSTRIAL ESTATE, LIVINGSTON, EH54 5EQ, SCOTLAND, UNITED KINGDOM

hereby declares under its sole responsibility that the heating system components described below for use in residential, commercial and light-industrial environments:
erklärt hiermit auf seine alleinige Verantwortung, dass die unten beschriebenen Zubehörteile für das Heizungs- / Kühlungs-System zur Benutzung im häuslichen, kommerziellen und leicht-industriellen Umfeld:
déclare par la présente et sous son entière responsabilité que les composants du système de chauffage/refroidissement décrits ci-dessous pour l'utilisation dans des environnements résidentiels, commerciaux et d'industrie légère :
verklaart hierbij als enige verantwoordelijke dat de componenten van het verwarmings-/koelsysteem die hieronder worden beschreven, bedoeld zijn voor gebruik in woonomgevingen en in commerciële en licht industriële omgevingen:
declara por la presente bajo su responsabilidad exclusiva que los componentes del sistema de calefacción/refrigeración descritos a continuación para su uso en zonas residenciales, comerciales y para la industria ligera:
con la presente dichiara, sotto la sua esclusiva responsabilità, che i componenti dell'impianto di riscaldamento/raffreddamento descritto di seguito, destinato all'uso in ambienti residenziali, commerciali e industriali:
através da presente declara sob sua única responsabilidade que os componentes do sistema de aquecimento/arrefecimento abaixo descritos para uso residencial, comercial e de indústria ligeira:
erklærer hermed under eneansvar, at de herunder beskrevne komponenter til opvarmning/køling til brug i privat boligbyggeri, erhvervsområder og inden for let industri:
intyggar härmed att uppvärmnings/nedkylningssystemkomponenterna som beskrivs nedan är för användning i bostäder, kommersiella miljöer och lätt industri:
erklærer hermed som sitt ansvar, ene og alene, at komponentene i varme- og kjølesystemet som beskrives nedenfor og som er beregnet for bruk i bolig-, forretnings- og lettindustri miljøer:
vakuuttaa täten asiasta yksin vastuussa, että alla kuvatut lämmitys/jäähdytysjärjestelmän osat, jotka on tarkoitettu käytettäväksi asuin-, toimisto- ja kevyen teollisuuden ympäristöissä:

mitsubishi electric, PAC-IF041B-E

Note: Its serial number is on the nameplate of the product.
Hinweis: Die Seriennummer befindet sich auf dem Kennschild des Produkts.
Remarque : Le numéro de série de l'appareil se trouve sur la plaque du produit.
Opmerking: het serienummer staat op het naamplaatje van het product.
Nota: El número de serie se encuentra en la placa que contiene el nombre del producto.
Nota: il numero di serie si trova sulla targhetta del prodotto.

Nota: o número de série encontra-se na placa que contém o nome do produto.
Bemærk: Seriennummeret står på produktets fabrikskilt.
Obs: Serienumret finns på produktens namnplåt.
Merk: Seriennummeret befinner seg på navneplaten til produktet.
Huomautus: Sen sarjanumero on tuotteen nimikilvessä.

Directives
Richtlijnen
Directives
Richtlijnen
Directivas
Direttive

Directivas
Direktiver
Direktiv
Direktiver
Direktiviit

2006/95/EC: Low Voltage
2004/108/EC: Electromagnetic Compatibility

Our authorized representative in EU, who is authorized to compile the technical file, is as follows.
Unser autorisierter Vertreter in der EU, der ermächtigt ist die technischen Daten zu kompilieren, ist wie folgt.
Notre représentant agréé dans L'UE, qui est autorisé à compiler le fichier technique, est le suivant.
Onze geautoriseerde vertegenwoordiger in de EU, die gemachtigd is het technische bestand te compileren, is als volgt.
Nuestro representante autorizado en la UE, que está autorizado para compilar el archivo técnico, es el siguiente.
Il nostro rivenditore autorizzato nell'UE, responsabile della stesura della scheda tecnica, è il seguente.

O nosso representante autorizado na UE, que está autorizado para compilar o ficheiro técnico, é o seguinte:
Vores autoriserede repræsentant i EU, som er autoriseret til udarbejdelse af den tekniske fil, er følgende.
Vår EG-representant som är auktoriserad att sammanställa den tekniska filen är följande.
Vår autoriserte EU-representant, som har autorisasjon til å utarbeide denne tekniske filen, er som følger.
Valtuutettu edustajamme EU:ssa, jolla on lupa laatia tekninen tiedosto, on seuraava.

mitsubishi electric europe, b.v.
HARMAN HOUSE, 1 GEORGE STREET, UXBRIDGE, MIDDLESEX UB8 1QQ, U.K.
Masami KUSANO
Product Marketing Director

Issued
LIVINGSTON

13 July, 2011

Akio FUKUSHIMA
President

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

 **mitsubishi electric corporation**

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

Authorized representative in EU: MITSUBISHI ELECTRIC EUROPE B.V.

HARMAN HOUSE, 1 GEORGE STREET, UXBRIDGE, MIDDLESEX UB8 1QQ, U.K.

This product is made by Mitsubishi Air Conditioning Systems Europe Ltd.: NETTLEHILL Rd, HOUSTOUN IND ESTATE, LIVINGSTON, EH54 5EQ, UK