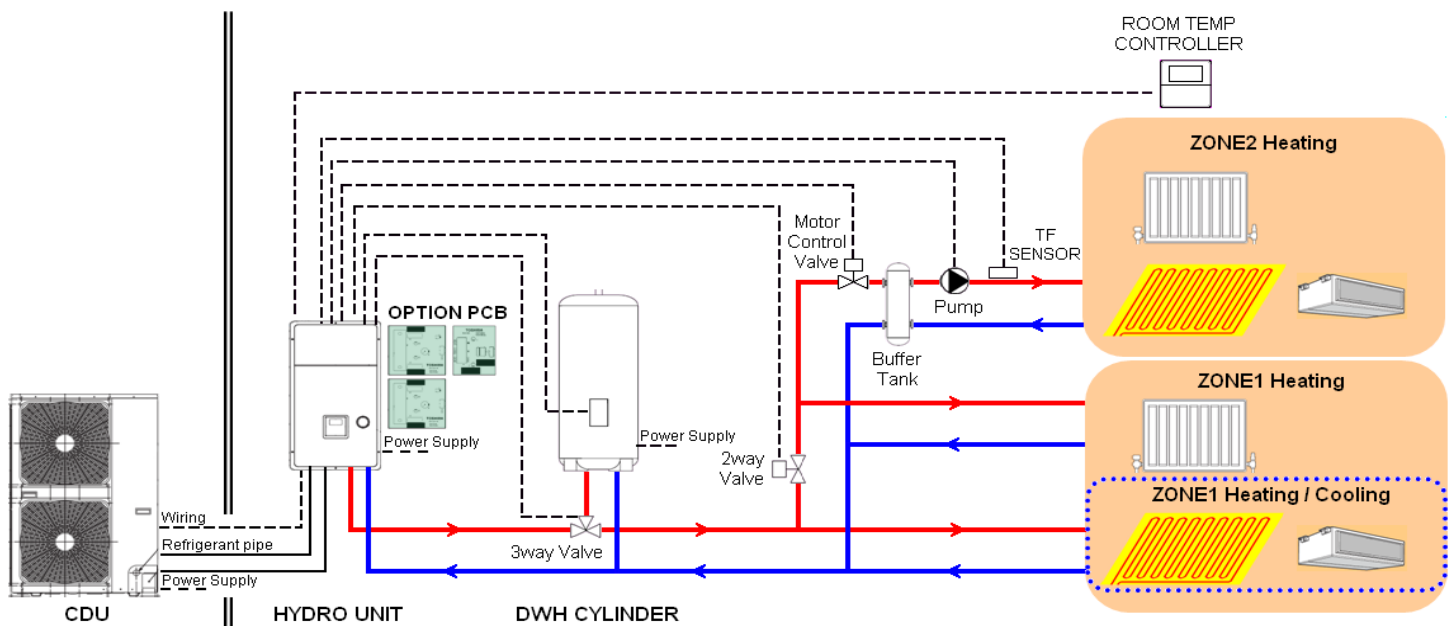
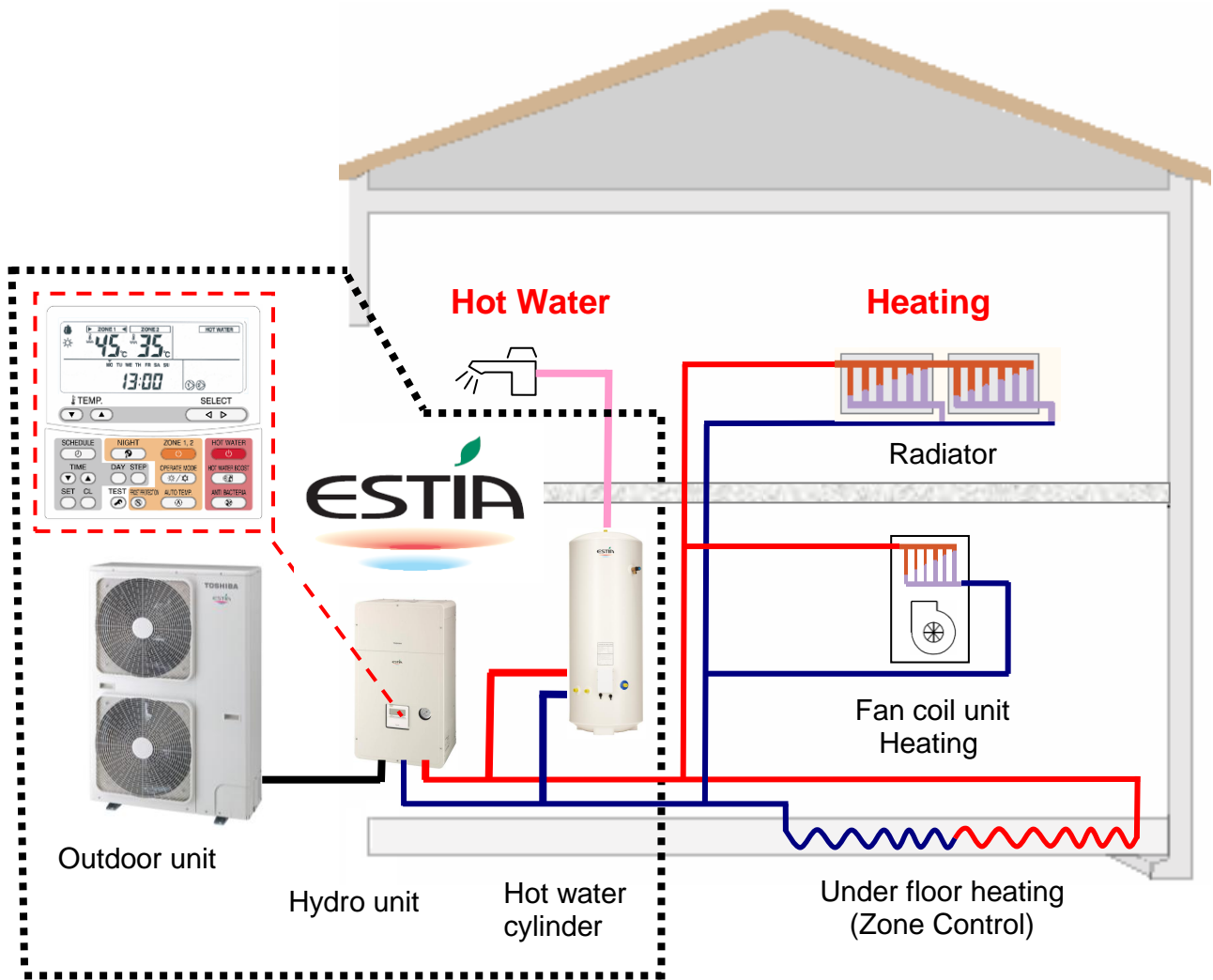




# Air to Water Heat Pump Series 4



# Estia System



## Component Combinations

Hydro Unit	Outdoor Unit									Back Up Heater
	HWS-804H-**	HWS-1104H-**	HWS-1404H-**	HWS-1104H8-**	HWS-1404H8-**	HWS-1604H8-**	HWS-1104H8R-**	HWS-1404H8R-**	HWS-1604H8R-E	
HWS-804XWHM3-**	✓	-	-	-	-	-	-	-	-	~, 3Kw
HWS-804XWHT6-**	✓	-	-	-	-	-	-	-	-	3N, 6kW
HWS-804XWHT9-**	✓	-	-	-	-	-	-	-	-	3N, 9kW
HWS-1404XWHM3-**	-	✓	✓	✓	✓	✓	✓	✓	✓	~, 3Kw
HWS-1404XWHT6-**	-	✓	✓	✓	✓	✓	✓	✓	✓	3N, 6kW
HWS-1404XWHT9-**	-	✓	✓	✓	✓	✓	✓	✓	✓	3N, 9kW

Hydro Unit	Hot Water Cylinder					
	HWS-1501 CSHM3-E	HWS-2101 CSHM3-E	HWS-3001 CSHM3-E	HWS-1501 CSHM3-UK	HWS-2101 CSHM3-UK	HWS-3001 CSHM3-UK
HWS-804XWHM3-**						
HWS-804XWHT6-**						
HWS-804XWHT9-**						
HWS-1404XWHM3-**			✓			
HWS-1404XWHT6-**						
HWS-1404XWHT9-**						

### New Features for 4 Series ESTIA:

- A-rated water circulating pump installed in hydro unit
- Hydro unit pump ON / OFF cycling function – to momentarily operate water pump during long periods of system OFF
- Option to use an external cylinder thermostat, on locally supplied hot water cylinders, for domestic hot water production
- Improved control for second remote controller when used with under floor heating
- Improved control for ESTIA / boiler connection
- New expansion vessel for hydro unit
- New compressor for single phase ESTIA outdoor units

### Note:

Under floor heating components, fan coil units, radiators, valves and other installation materials must be procured locally.

### Notes on System Design

- The input water temperature to the hydro unit must be 50°C or less. This is especially important if the hydro unit is used in conjunction with any other external heating source (auxiliary boiler, electric booster heaters etc.)

Unit failure or water leaks may result if the return water temperature, to the hydro unit, exceeds 50°C

- The minimum flow rate for the circulating water in the heating circuit must meet the following range:-r

**8 kW:** 13.0 L/minute or more

**11, 14 and 16 kW:** 17.5 L/minute or more

If the flow rate becomes less than the flow rate specified above, the flow switch in the hydro unit is activated to stop operation.

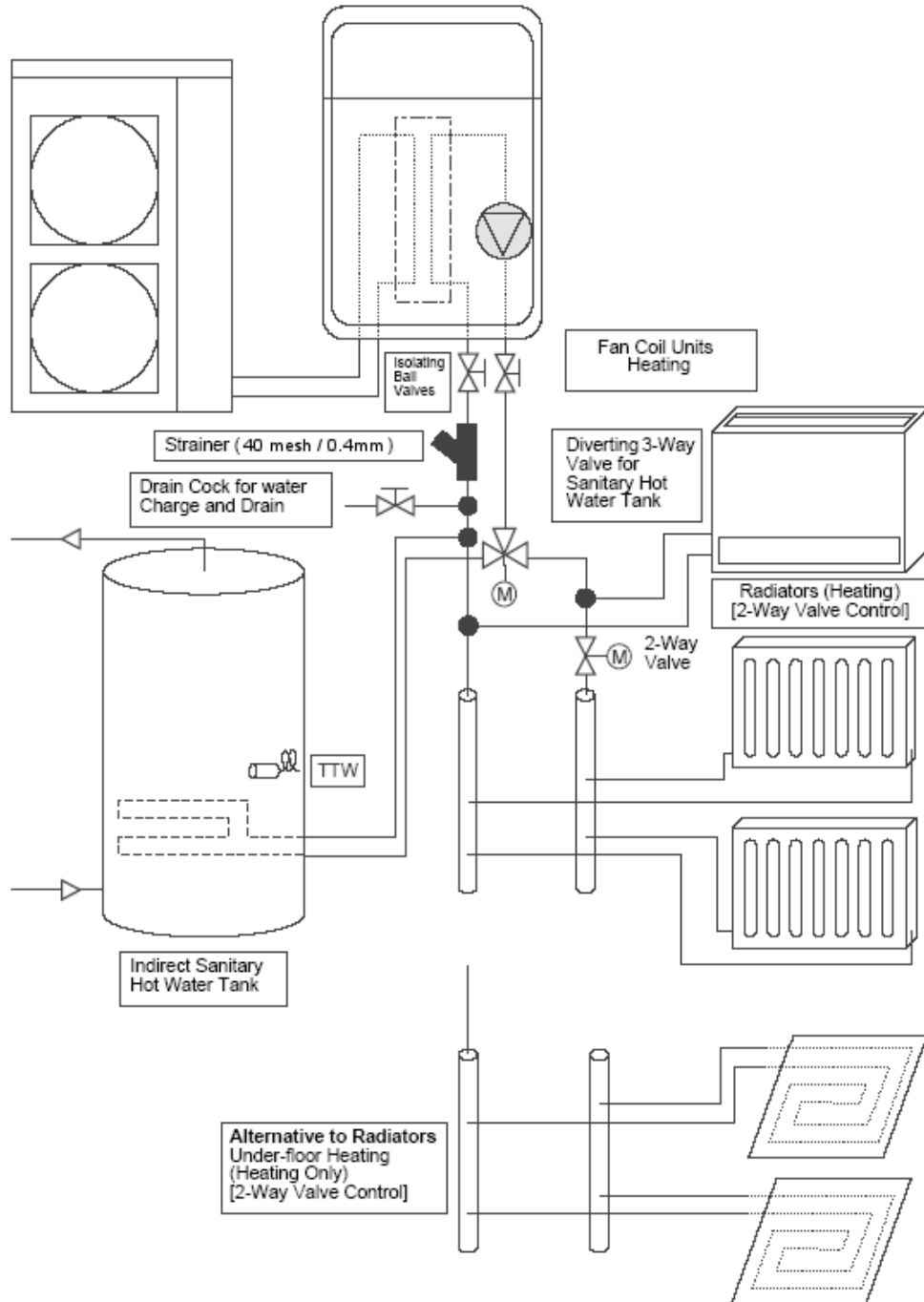
When thermostatic devices are used for temperature control a bypass valve must be fitted to the heating circuit, to ensure the minimum water flow rate is maintained in the event of all thermostatic devices closing at the same time

- Only use the water pump, built into the hydro unit, to circulate the water in the heating circuit
- The hydro unit back up heaters will operate to assist the heat pump capacity output during low ambient conditions
- The hydro unit has been designed for indoor installations. Do not install outside where there is a risk of low ambient conditions. This may cause the water in the pipe work to freeze
- Make the water circuit closed. Never use it as an open circuit.
- To prevent damage to the system the volume of the circulating water must be **20 litres or more**. If total volume of water amount is less than 20 litres, then the unit may not function fully due to the operation of protective controls.

# Installation Examples

## Heating with Domestic Hot Water

When heating and domestic hot water are used, install a 2-way valve to the pipe to the room for heating only.

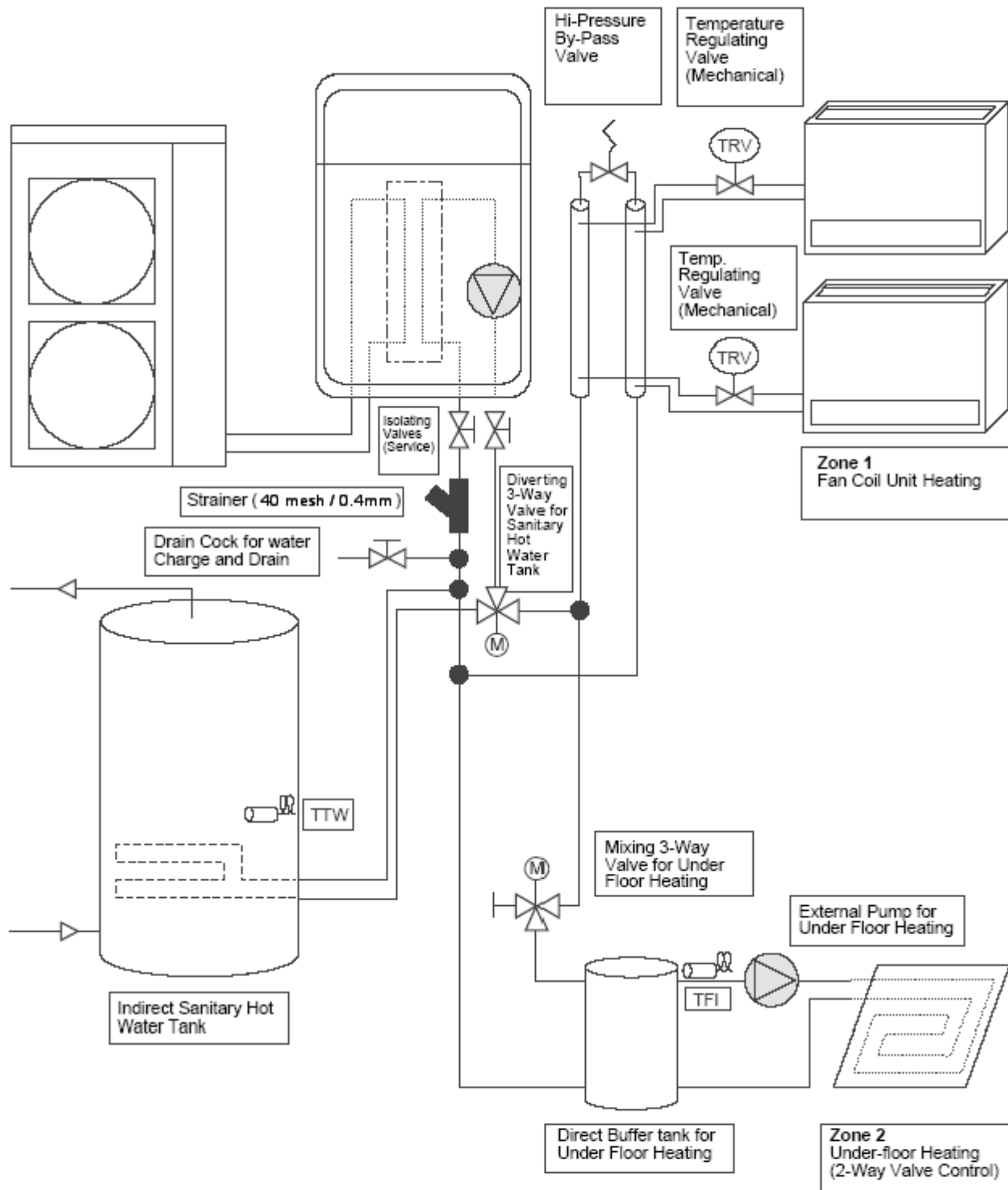


# Installation Examples (cont.)

## 2-Zone Temperature Control with Domestic Hot Water

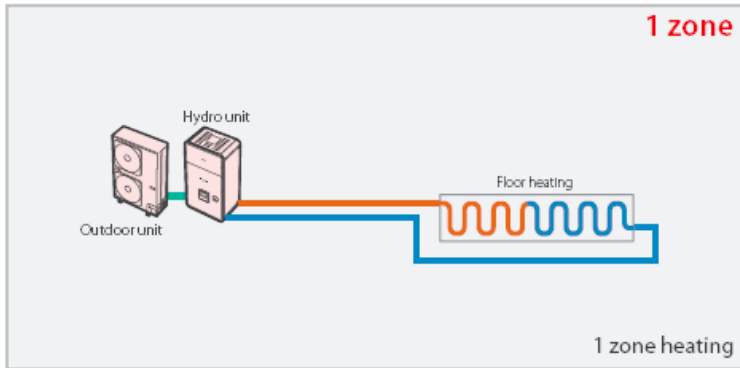
The following shows an example of the 2-zone temperature control.

A buffer tank and a water pump are required for the 2-zone temperature control.

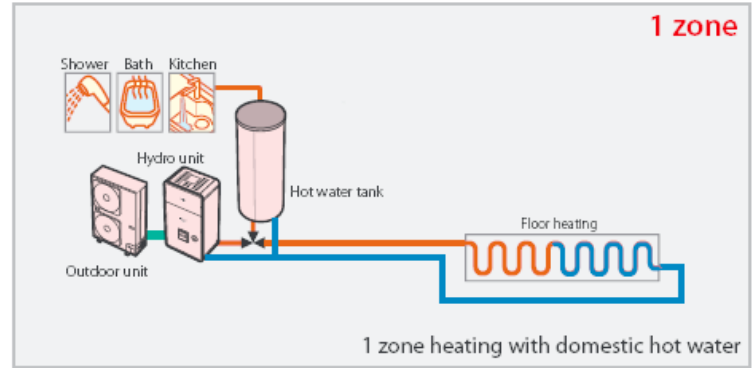


Installation example of water circuit:-

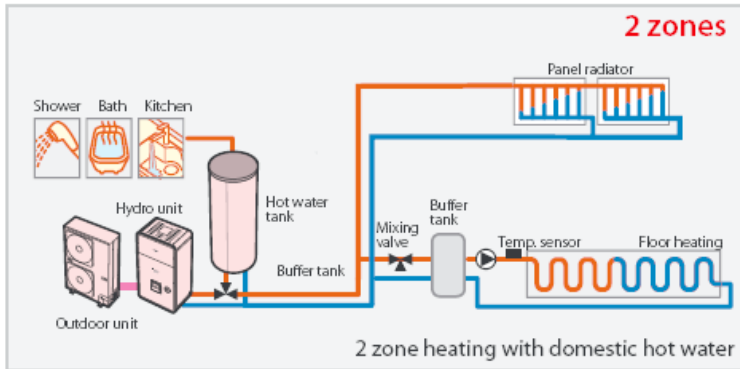
(1)



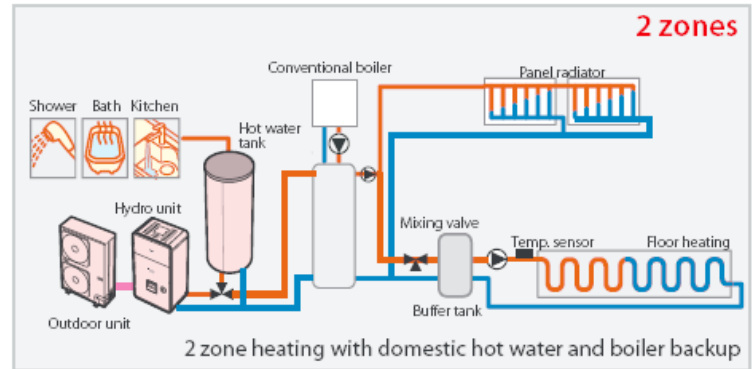
(2)



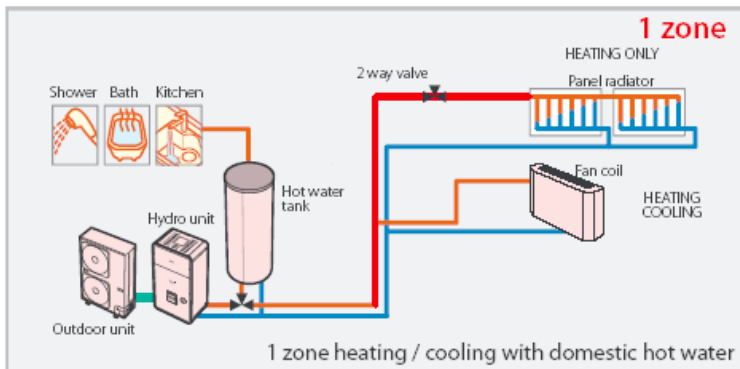
(3)



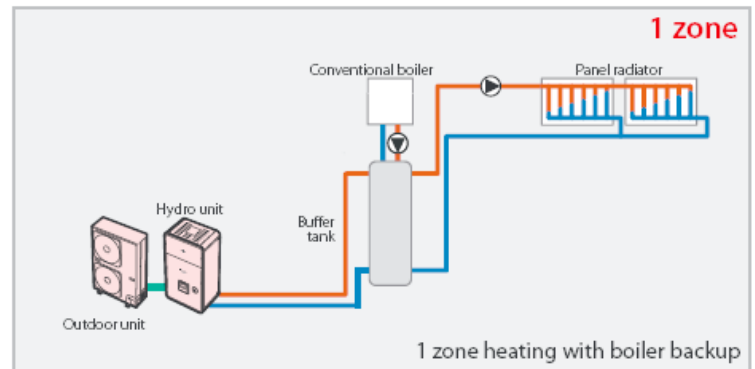
(4)



(5)



(6)

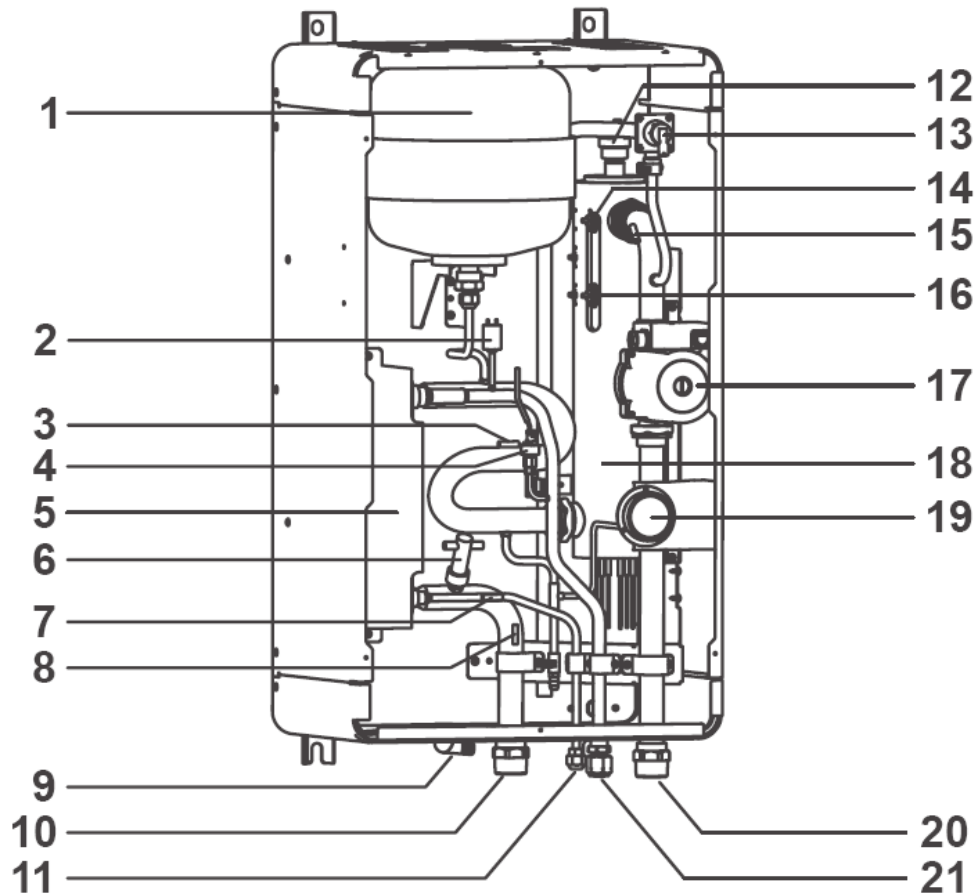


The water circuit for a system without a buffer tank [ (1) , (2) , (3) , (5) ] requires 17.5l/min (804XWH = 13.0l/min) or more. This water flowing requires 5 or more branches of Floor heating or Radiators etc.

Less than 5 branches may cause a flow deficiency. In this case, please provide a buffer tank and secondary pumps, as shown in (4).

Please check how to install the boiler.

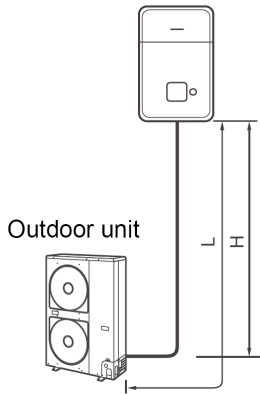
## Hydro Unit – Exploded View



1. Expansion vessel
2. Hi Pressure switch (4.15 MPa)
3. Temperature sensor (for Heat pump outlet -TWO)
4. Pressure sensor
5. Heat exchanger
6. Flow switch (13.0 L/min 17.5 L/min)
7. Temperature sensor (for refrigerant -TC)
8. Temperature sensor (for water inlet -TWI)
9. Drain nipple
10. Water inlet connection
11. Refrigerant liquid connection
12. Air relief valve
13. Pressure relief valve (0.3 MPa (3 bar))
14. Thermal protector (auto)
15. Temperature sensor (for water outlet THO)
16. Thermal protector (Single operation)
17. A-rated water pump
18. Backup heater (3 kW, 3 kW x 2, 3 kW x 3)
19. Manometer
20. Water outlet connection
21. Refrigerant gas connection

### Refrigerant Pipe Lengths and Height

The length and height of the refrigeration pipe must be within the following values.  
As long as the Hydro Unit is installed within these ranges, no additional refrigerant is required.



#### Minimum Pipe Length

- HWS-804H-E : 5 m
- HWS-1104H\*\*-E : 5 m
- HWS-1404H\*\*-E : 5 m
- HWS-1604H\*\*-E : 5m

#### Maximum Pipe Length and Height

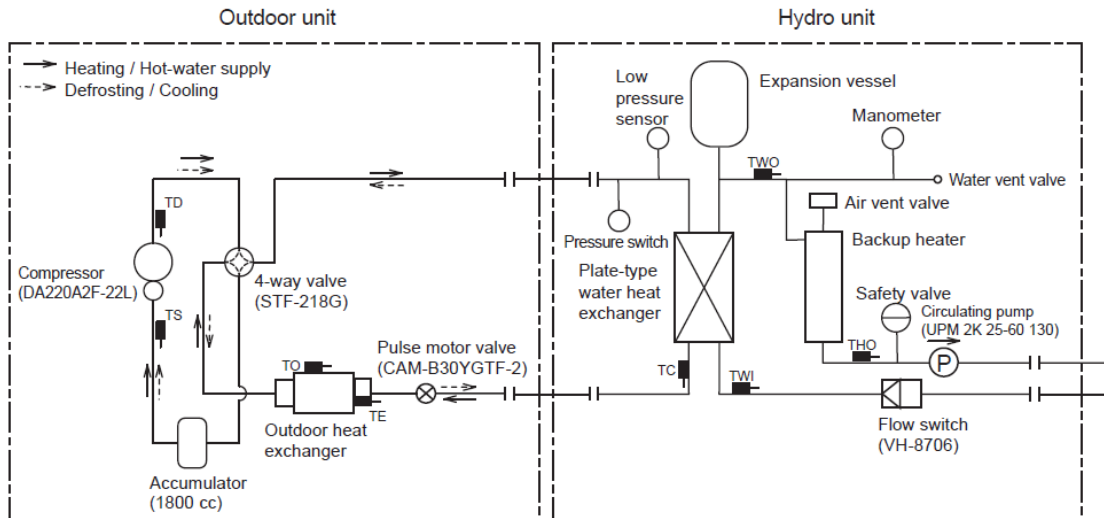
- H: Max. ±30 m (above or below)
- L: Max. 30 m

#### Note

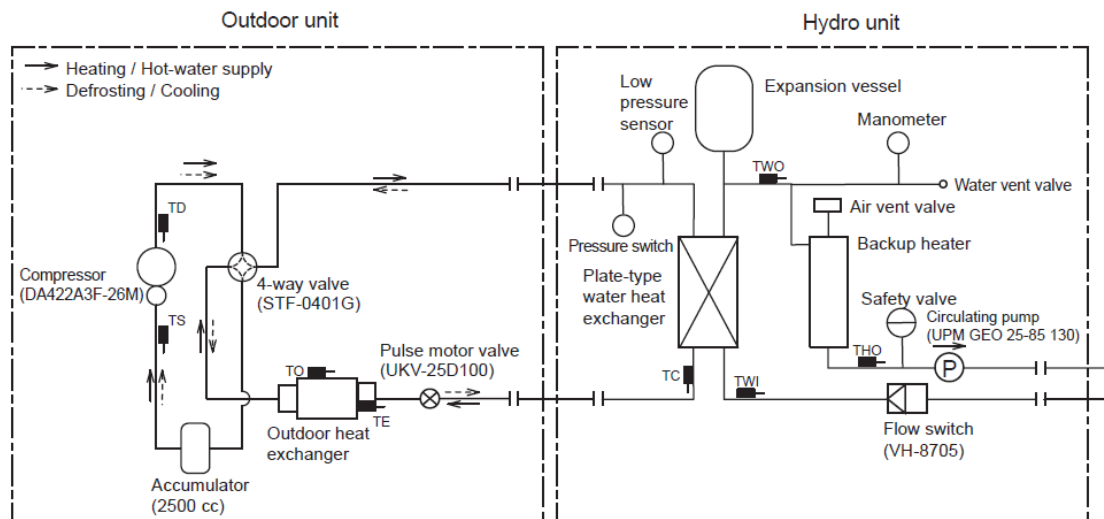
- The maximum pipe length cannot be increased by increasing the refrigerant charge
- The minimum pipe length cannot be decreased by reducing the refrigerant charge

### Refrigeration and Water Cycle Diagrams

**Outdoor Unit:** HWS-804H-E  
**Hydro Units:** HWS-804XWH\*\*-E

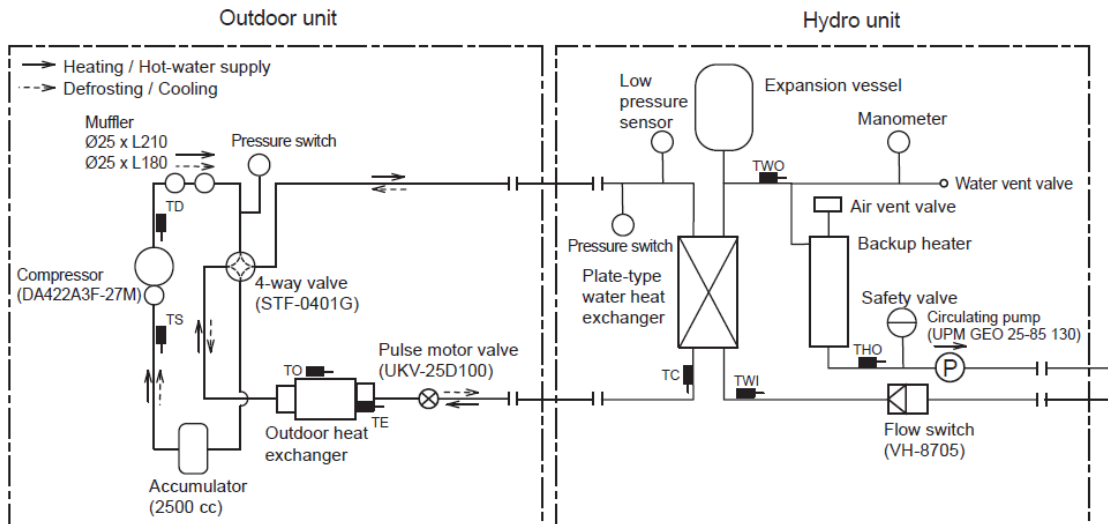


**Outdoor Units:** HWS-1104H\*\*-E, HWS-1404H\*\*-E  
**Hydro Units:** HWS-1404XWH\*\*-E





**Outdoor Units:** HWS-1104H8(R)-E, HWS-1404H8(R)-E, HWS-1604H8(R)-E  
**Hydro Units:** HWS-1404XWH\*\*-E



**Water Piping**

**⚠ WARNING**

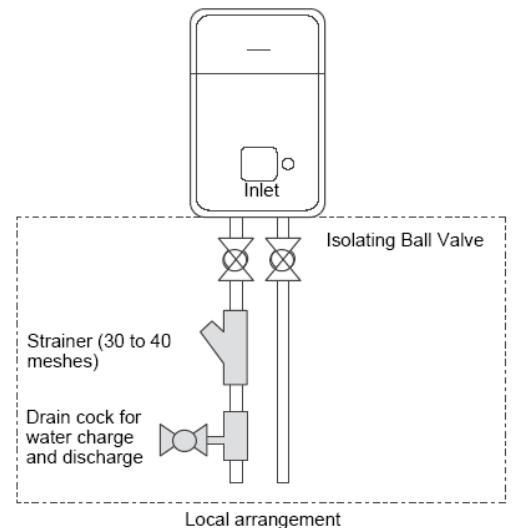
- Ensure that the heating circuit, and all components of the heating circuit, are installed in accordance with all National and local regulations
- The water pipes must not be installed where they are exposed to low ambient air temperatures. This is to prevent the water freezing in the pipes
- Make sure that water pipes have sufficient pressure resistance (The setting value of the pressure relief valve is 0.3 MPa).

**⚠ CAUTION**

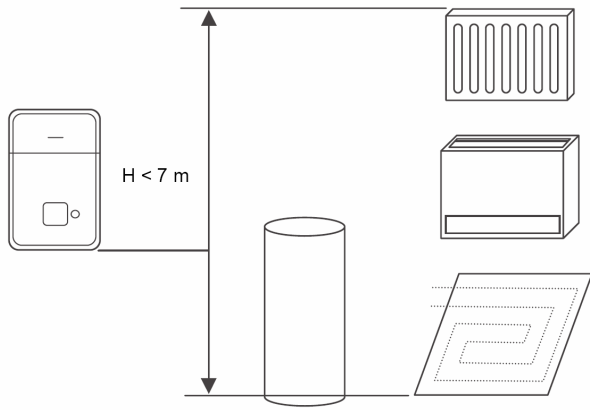
- Do not use zinc plated water pipes. When steel pipes are used, insulate both ends of the pipes.
- The water to be used must meet the water quality standards specified in EN directive 98/83 EC.

**Water Circuit**

- Install a strainer with 30 to 40 meshes (procure locally) at the water inlet of the Hydro Unit
- Install drain cocks (procure locally) for water charge and discharge at the lower part of the Hydro Unit
- The ESTIA system can only be used on pressurised heating circuits. If the system is used on gravity fed heating circuits then system failure may occur



**Water Piping Limitations**

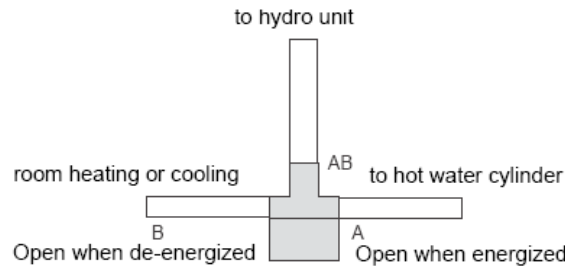


Design the water pipe length within the QH characteristics of the pump (flow-rate and pump head).

The maximum height difference for the water pipes is 7 metres.

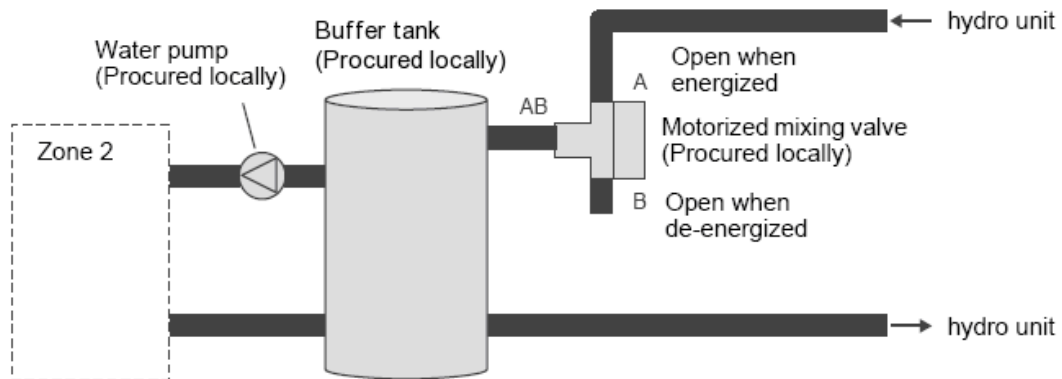
**Piping to hot water tank (option)**

Water supplied to the hot water cylinder is branched by a motorized 3-way valve (procured locally). Connect the hot water cylinder to port A (open when energized) of the valve.



**Piping to 2-zone operation (option)**

To perform 2-zone temperature control circulate water using another pump (procured locally) through a motorized mixing valve (procured locally) and a buffer tank (procured locally).



**Checking water volume and initial pressure of expansion vessel**

The expansion vessel of the Hydro Unit has a capacity of 12 litres.

The initial pressure of the expansion vessel is 0.1 MPa (1 bar).

The pressure of the safety valve is 0.3 MPa (3 bar).

Verify whether the capacity of the expansion vessel is sufficient using the following expression. If the volume is insufficient, install an appropriate external expansion vessel.

$$V = \frac{\epsilon \times V_s}{1 - \frac{P_1}{P_2}}$$

V	Action
< 12 L	Internal Expansion Vessel Size OK
> 12 L	Internal Expansion Vessel Size too small. Install appropriate external expansion vessel

V: Necessary total vessel capacity (L)

ε: Water expansion coefficient at average hot water temperature

Vs: Total water volume in the closed system (Do not include Hot Water Cylinder)

P1: System pressure at tank setting position (Mpa\_abs\*).

(Pipe inner pressure during pump operation before heating device operates = water supply pressure)

P2: Maximum pressure used during operation at tank setting position (MPa\_abs\*).

(= safety valve setting pressure)

\* The absolute pressure value (abs.) is obtained by adding the atmospheric pressure (0.1 MPa (1 bar)) to the gauge pressure.

Water temperature and expansion coefficient (ε)	
Hot water temperature (°C)	Expansion rate (ε)
0	0.0002
4	0.0000
5	0.0000
10	0.0003
15	0.0008
20	0.0017
25	0.0029
30	0.0043
35	0.0050
40	0.0078
45	0.0100

Water temperature and expansion coefficient (ε)	
Hot water temperature (°C)	Expansion rate (ε)
50	0.0121
55	0.0145
60	0.0171
65	0.0198
70	0.0229
75	0.0258
80	0.0292
85	0.0324
90	0.0361
95	0.0397
-	-

**Example**

Maximum Hot Water temperature: 55°C

Initial water charge: 0.2MPa

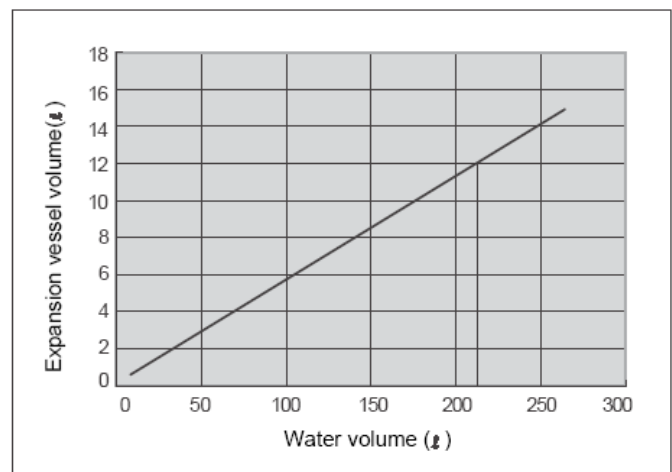
System volume: 200 L.

Calculate Vessel capacity (V):-

$$V = \frac{0.0145 \times 200}{1 - \frac{(0.2 + 0.1)}{(0.3 + 0.1)}}$$

$$V = 11.6L$$

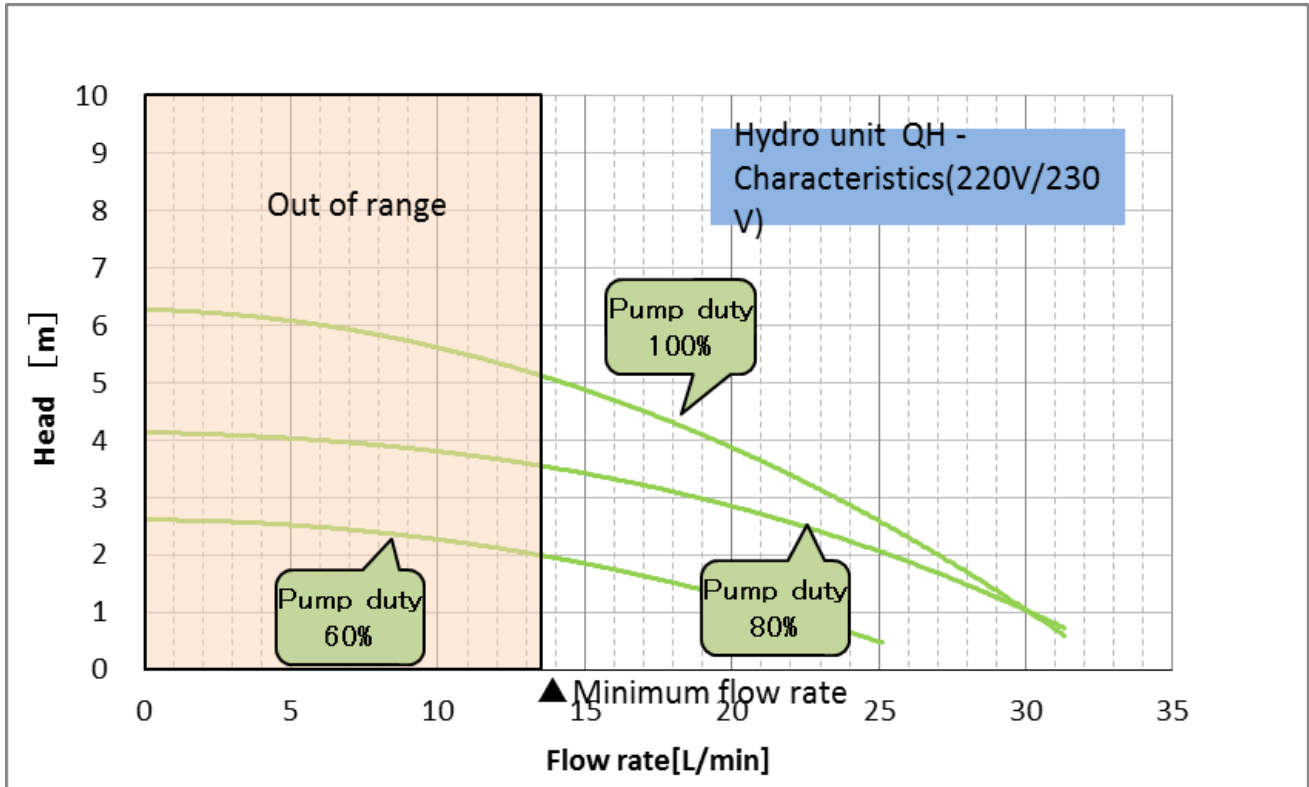
In this case V < 12 L therefore the internal expansion vessel is sufficient, so there is no need to install an external expansion vessel.



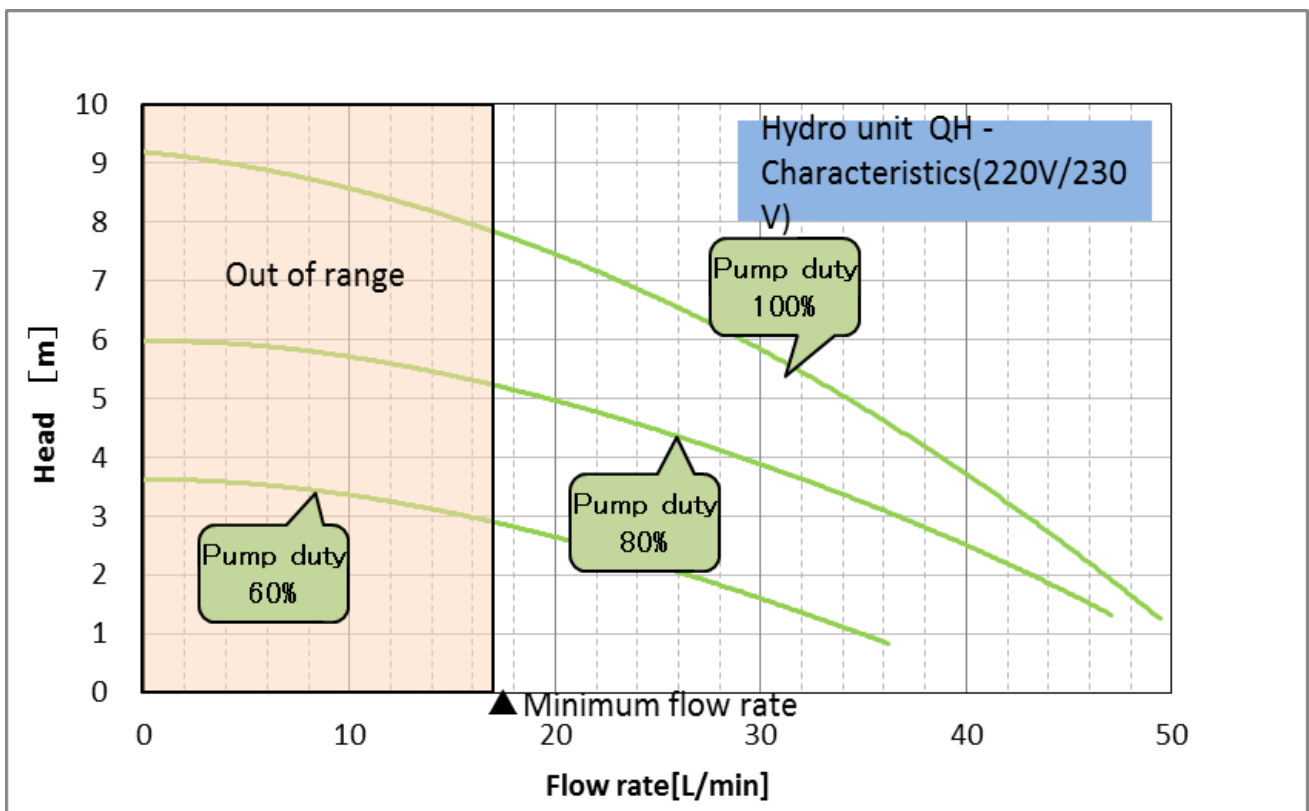
\*Hot water temperature 55°C

Pump QH curves

- HWS-804XWHM3-E, T6-E, T9-E



- HWS-1404XWHM3-E, T6-E, T9-E



### Water charging

Charge the water, in the heating circuit, until the pressure gauge shows 0.2 MPa (2 bar).

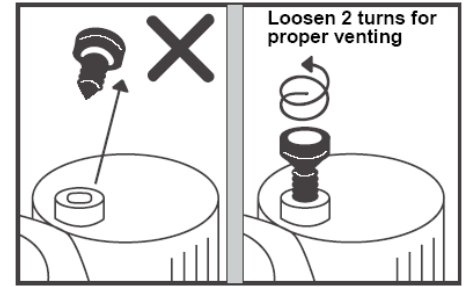
The hydraulic pressure may drop when the trial run begins. In this case, add water until the hydraulic pressure returns to 0.2MPa (2 bar)

Air may enter the heating circuit if the hydraulic pressure is low.

Loosen the Air relief valve cap by two turns to release air (see diagram).

Ensure all air is removed from the system. If air remains in the system then the system operation may STOP.

**Note: Due to the design of the electrical back up heater it is not recommended to add any corrosion inhibitors / additives to the heating circuit.**



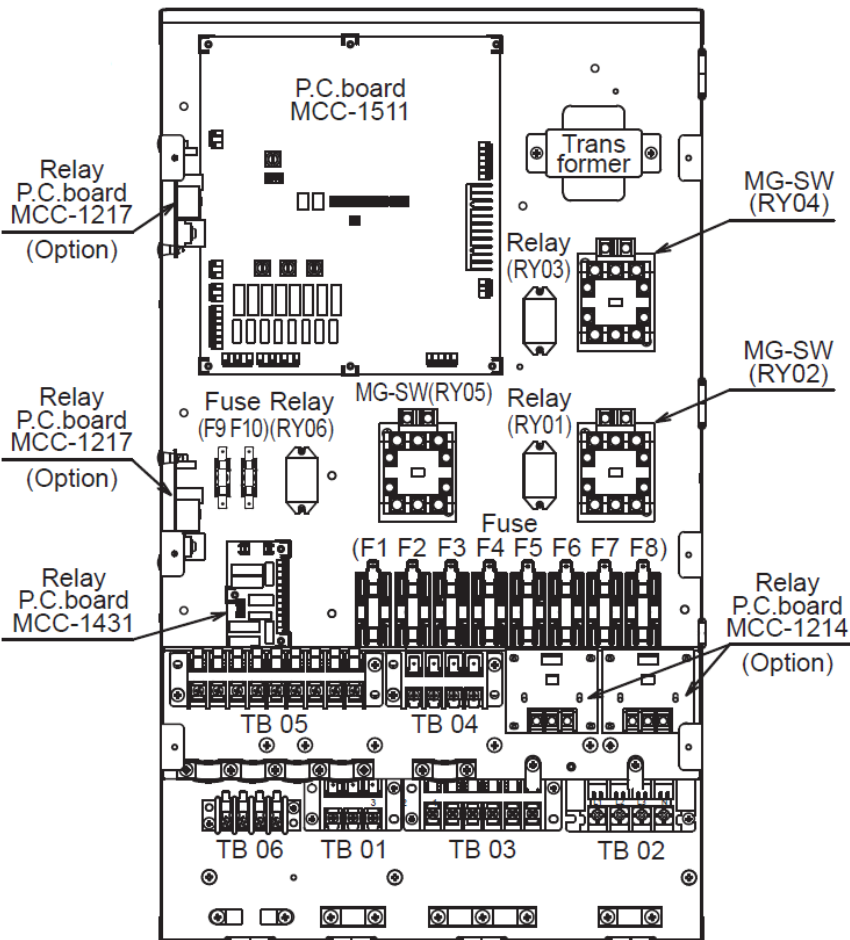
### Water quality

The water used must satisfy EN directive 98/83 EC.

### Piping insulation

It is recommended that insulation is fitted to all pipes, apply insulation with a rating of 20t or more.

**Electrical Connections**  
**E Box layout**



**Fuses (AC250V T30A):**

- F1&F2:** Hot water cylinder electric heater supply
- F3&F4:** Back up heater 1 (3kW)
- F5&F6:** Back up heater 2 (3kW)
- F7&F8:** Back up heater 3 (3kW)

**Fuses (AC250V T3.15A)**

- F9&F10:** A rated water pump

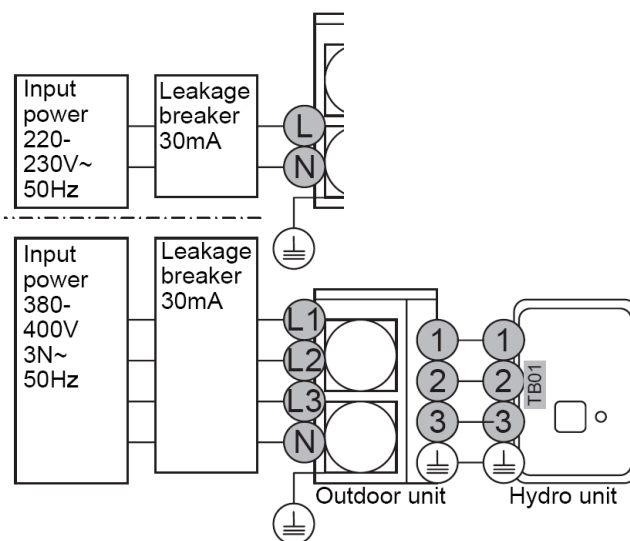
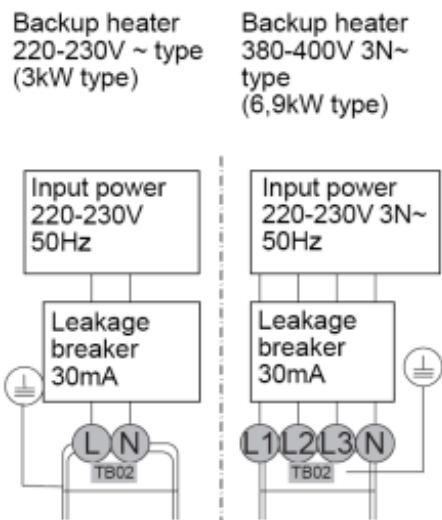
**PCB's:**

- MCC-1214:** TCB-PCMO3E (optional input PCB)
- MCC-1217:** TCB-PCIN3E (optional output PCB)
- MCC-1431:** Relay PCB for control of second water pump, 2 way valve and booster heater outputs
- MCC-1511:** Main hydro unit control / interface PCB

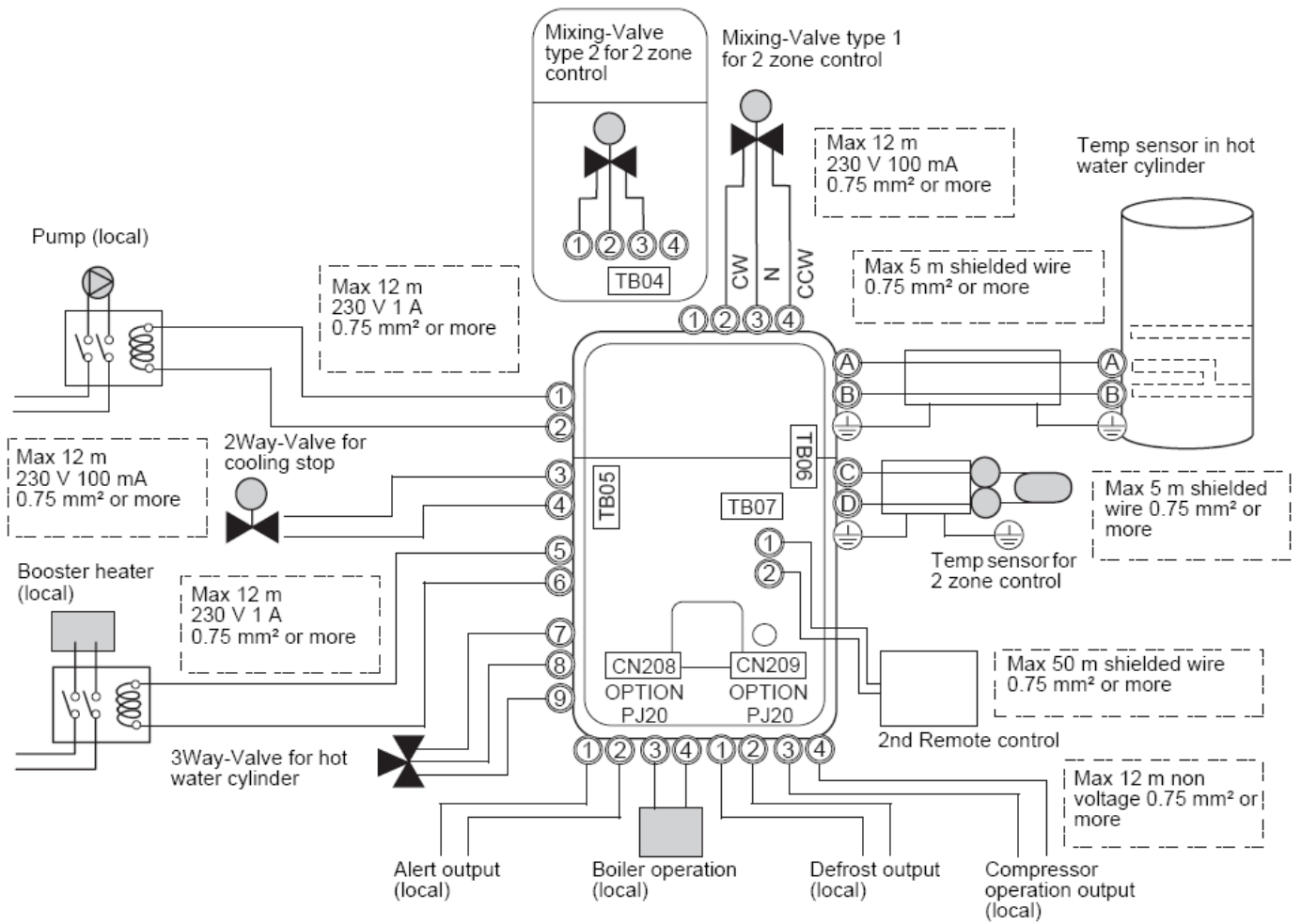
**Contactors & Relays:**

- RY01:** Interlock relay – flow switch / back up heater circuit
- RY02:** Power contactor for back up heater supply
- RY03:** Control relay for back up heaters 2 & 3 operation
- RY04:** Power contactor for back up heater supply
- RY05:** Power contactor for hot water cylinder electric heater supply
- RY06:** Control relay for mixing valve (2 zone) operation

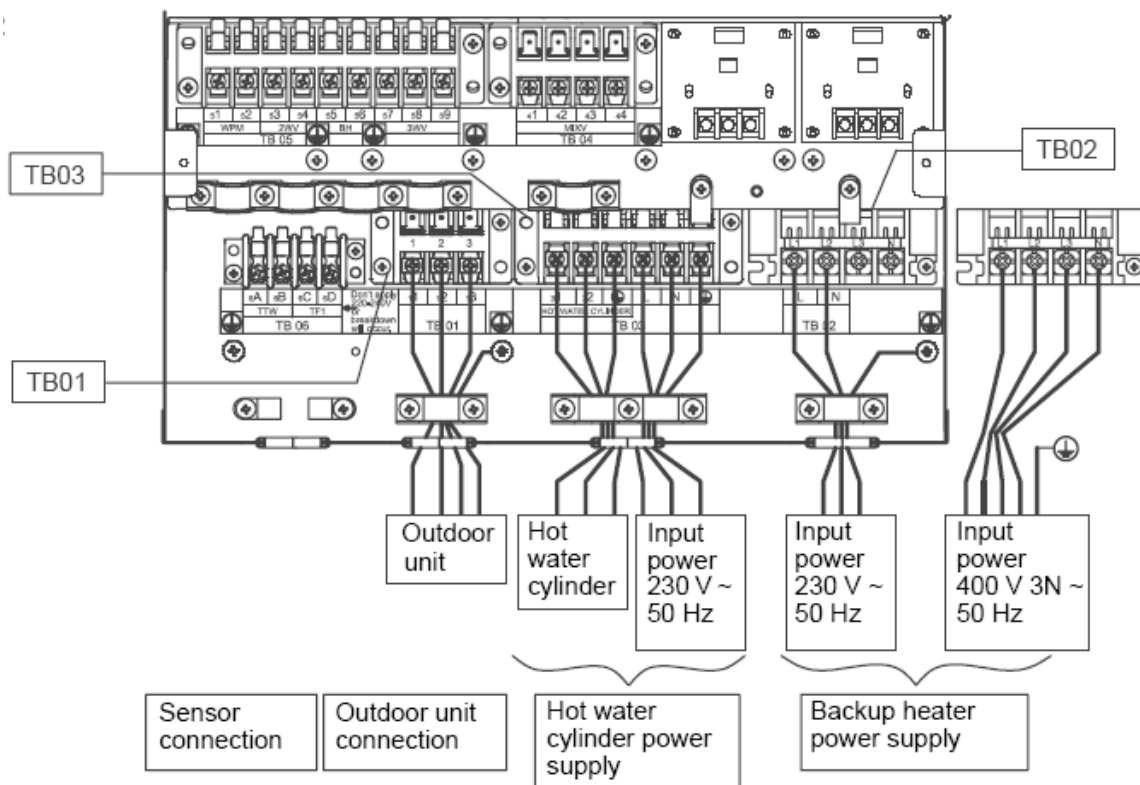
**Power Lines Schematic**



### Control Lines Schematic



### Terminal Block Connections



## Electrical supply / cable specifications

### Wiring specifications (power line)

Description		Model Name HWS	Power Supply	Current (Max)	Install Fuse Rating	Power Cable	Connection Destination	
Outdoor Unit Power	Power Input	1404H-E	220V-230V ~ 50Hz	22.8A	25A	≥2.5mm <sup>2</sup>	L, N	-
		1104H-E	220V-230V ~ 50Hz	22.8A	25A	≥2.5mm <sup>2</sup>		
		804H-E	220V-230V ~ 50Hz	19.2A	20A	≥2.5mm <sup>2</sup>		
		1604H8(R)-E	380-400V 3N~ 50Hz	14.6A	16A	≥2.5mm <sup>2</sup>	L1, L2, L3, N	-
		1404H8(R)-E	380-400V 3N~ 50Hz	14.6A	16A	≥2.5mm <sup>2</sup>		
		1104H8(R)-E	380-400V 3N~ 50Hz	14.6A	16A	≥2.5mm <sup>2</sup>		
Hydro unit electric heater power	Power input for back up heater	1404XWHM3-E	220V-230V ~ 50Hz	13A	16A	≥1.5mm <sup>2</sup>	L, N	TB02
		1404XWHT6-E	380-400V 3N~ 50Hz	13A (13Ax2P)	16A	≥1.5mm <sup>2</sup>	L1, L2, L3, N	
		1404XWHT9-E	380-400V 3N~ 50Hz	13A (13Ax3P)	16A	≥1.5mm <sup>2</sup>		
		804XWHM3-E	220V-230V ~ 50Hz	13A	16A	≥1.5mm <sup>2</sup>	L, N	
		804XWHT6-E	380-400V 3N~ 50Hz	13A (13Ax2P)	16A	≥1.5mm <sup>2</sup>	L1, L2, L3, N	
		804XWHT9-E	380-400V 3N~ 50Hz	13A (13Ax3P)	16A	≥1.5mm <sup>2</sup>		
	Power input for DHW cylinder heater	220V-230V ~ 50Hz	12A	16A	≥1.5mm <sup>2</sup>	L, N	TB03	
Outdoor – hydro unit connection	-	-	-	-	≥1.5mm <sup>2</sup>	1, 2, 3	TB01	
Hydro unit to DHW cylinder	-	-	-	-	≥1.5mm <sup>2</sup>	1, 2	TB03	

### Wiring specification (control line)

Description	Line Spec	Current (Max)	Length (Max)	Cable Diameter	Connection Destination
3 way diverting valve	2 or 3 wire	100mA	12m	1.0mm <sup>2</sup>	7, 8, 9 (TB05)
2 way valve	2 wire	100mA	12m	1.0mm <sup>2</sup>	3, 4 (TB05)
3 way mixing valve (2 zone)	3 wire	100mA	12m	1.0mm <sup>2</sup>	1, 2, 3 or 2, 3, 4 (TB04)
2 zone thermo sensor (TFI)	2 wire	100mA	5m	1.0mm <sup>2</sup>	C, D (TB06)
HW cylinder thermo sensor (TTW)	2 wire +GND (screened cable)	100mA	5m	1.0mm <sup>2</sup>	A, B (TB06)
2 <sup>nd</sup> remote controller	2 wire	50mA	50m	≥ 0.5mm <sup>2</sup>	1, 2 (TB07)



**Control parts specifications**

Component	Power	Current (Max)	Specification
3 way diverting valve	AC 230V	100mA	Default: 2 wire spring return valve or 3 wire SPST valve Option: 3 wire SPDT valve (set DPSW13_1 to ON)
2 way valve	AC 230V	100mA	2 wire spring return valve (normally OPEN)
3 way mixing valve (2 zone control)	AC 230V	100mA	Default drive time = 60 seconds to 90° 3 wire SPST or SPDT with drive times to 90° between 30 and 240 seconds

**Output line specifications**

Description	Output	Current (Max)	Voltage (Max)	Cable Length (Max)	Comments
External water pump (P2)	AC230V	1A	-	12m	
External booster heater	AC230V	1A	-	12m	Output enabled when outdoor air temperature is ≤ -20°C
Alarm output	No volt contacts	0.5A	AC230V	12m	
		1A	DC24V	12m	
Boiler output	No volt contacts	0.5A	AC230V	12m	Output enabled when outdoor air temperature is ≤ -10°C (output trigger temperature can be changed using FC23)
		1A	DC24V	12m	
Defrost output	No volt contacts	0.5A	AC230V	12m	
		1A	DC24V	12m	
Compressor ON output	No volt contacts	0.5A	AC230V	12m	
		1A	DC24V	12m	

**Input line specifications**

Description	Input	Cable Length (Max)
External stop control	No voltage	12m
Cylinder thermostat	No voltage	12m
Room thermostat (heating)	No voltage	12m

## ⚠ CAUTION

### Earthing arrangements

The Hydro Unit and related equipment must be earthed in accordance with your local and national electrical regulations.

It is essential that the equipment is earthed to prevent the electric shock and damage to the equipment.

### Electrical connection to hydro unit

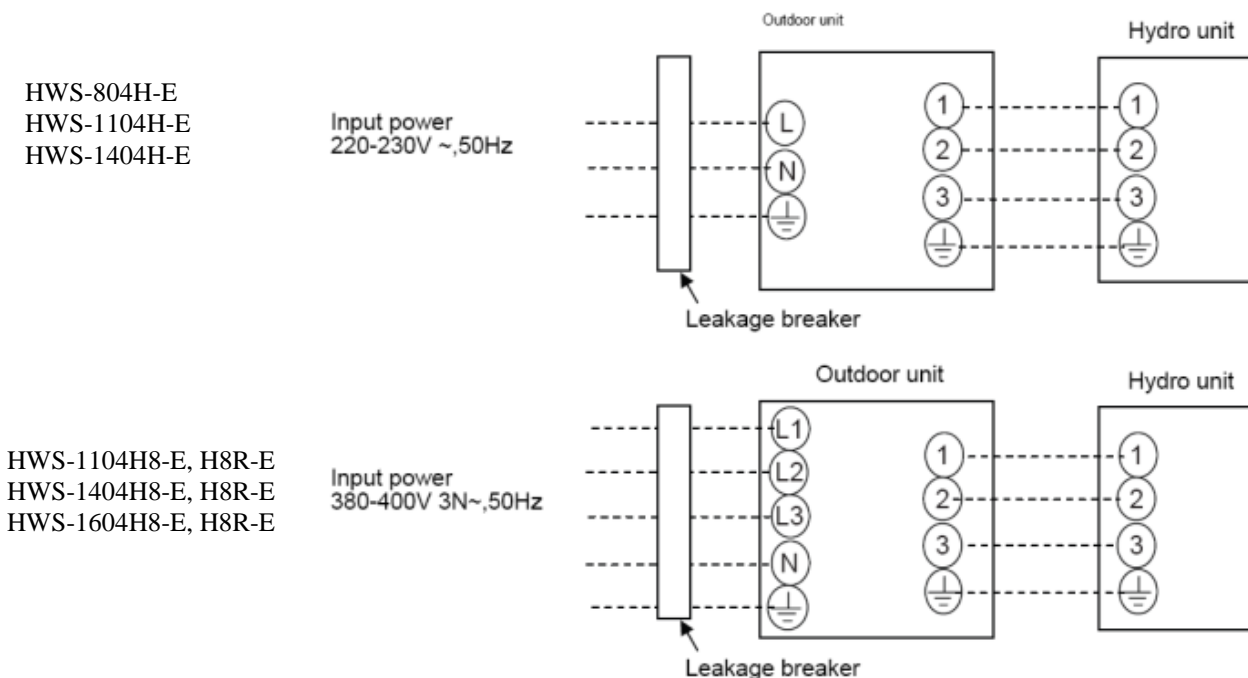
- Remove the front cover and the electrical box cover from the Hydro Unit.
- The Hydro Unit power cable, for the electrical back up heaters, must be sized in accordance with the Wiring Specifications table shown on page 15
- Connect the Hydro Unit power cable, for the electrical back up heaters, to Terminal 02 as shown below.

Single Phase Units:      Live conductor – Terminal L1  
    Neutral conductor – Terminal L2  
    Earth conductor – Earth terminal

Three Phase Units:      Phase 1 conductor – Terminal L1  
    Phase 2 conductor – Terminal L2  
    Phase 3 conductor – Terminal L3  
    Neutral conductor – Terminal N  
    Earth conductor – Earth

- Ensure the Hydro Unit power cable, for the electrical back up heaters, is secured using the cable clamp fitted in the electrical box.
- Ensure the Hydro Unit power cable connection (for the electrical back up heaters) terminals are tight.

### Outdoor unit to hydro unit electrical connection



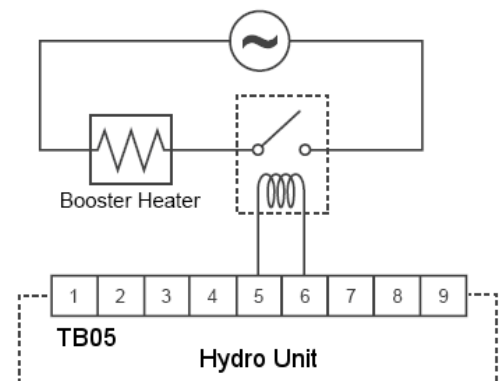
- Ensure electrical circuits are isolated before commencing work.
- The Outdoor Unit to Hydro Unit interconnecting cable must be sized in accordance with the “Wiring Specification” table shown on page 15
- Connect the Outdoor Unit to Hydro Unit interconnecting cable as shown in the diagram above.
- Ensure the Outdoor Unit to Hydro Unit interconnecting cable is secured using the cable clamp fitted in the electrical box.
- Ensure the Outdoor Unit to Hydro Unit interconnecting cable connection terminals are tight.

## Electrical connection for external booster heater

### ⚠ CAUTION

- The maximum current available from the booster heater output is 1 A. Do not connect the booster heater directly to Terminal Block 05 on the Hydro Unit. A separate contactor, supplied locally, must be used to supply the booster heater.
- The booster heater can be installed only for room heating and cannot be used for hot water supply.
- Install the booster heater downstream of the 3-way valve on the heating circuit side of the installation
- The booster heater is an external heater, supplied locally, used to assist the Hydro Unit during low ambient conditions.
- The AC230 V 1 A output from the Hydro Unit must only be used to energize an external contactor (supplied locally).
- The output from the Hydro Unit is only enabled when either the outdoor air temperature to be lower than -20°C.
- Ensure the external booster heater is installed and set up in accordance with all Local, National and International regulations.

- Connect the external booster heater to the Hydro Unit according to the diagram shown opposite:-
- The contactor will energize in the event of low ambient conditions.
- A separate dedicated electrical supply must be used for the external booster heater. This must be connected through the contacts on the field supplied contactor.

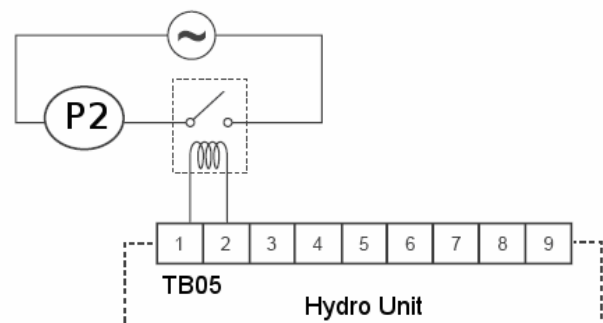


## Electrical connection for external additional pumps

### ⚠ CAUTION

- The maximum current available from the additional pump output is 1 A. Do not connect the additional pump directly to Terminal Block 05 on the Hydro Unit. A separate contactor, supplied locally, must be used to supply the additional pump.
- The Hydro Unit has the facility to connect an additional circulating pump, if required, into the heating system.
- Install the pump so that its motive power does not affect the internal pump.
- The AC230 V 1 A output from the Hydro Unit must only be used to energize an external contactor (supplied locally).
- The output for the pump is synchronized with the operation of the main circulating pump (P1) inside the Hydro Unit.
- Ensure the pump is installed and set up in accordance with all Local, National and International regulations.

- Connect the additional pump (P2) as shown in the diagram opposite:-
- The contactor will energize synchronously with operation of the main circulation pump (P1).
- A separate dedicated electrical supply must be used for the pump. This must be connected through the contacts on the field supplied contactor.



### 3-way valve (diverter) connection

#### Required Valve Specification:

Electrical Specification: 230 V; 50 Hz; <100 mA

Valve Diameters: Port A, Port B: Ø 1 1/4"

Return Mechanism: 3 types of 3-way valve (diverter) can be used.

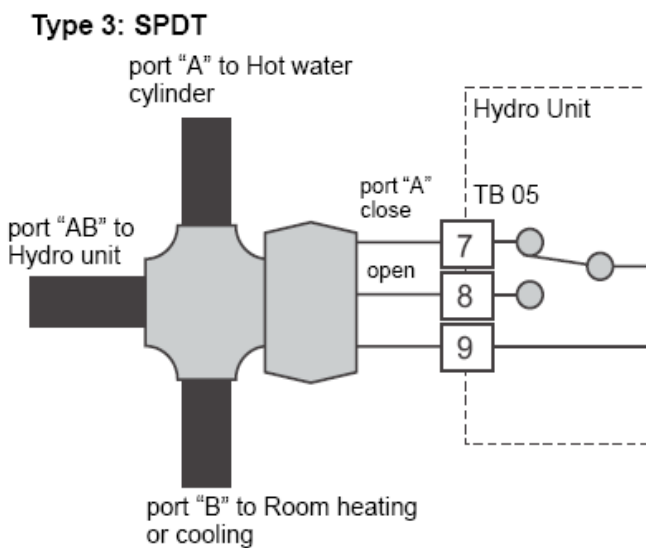
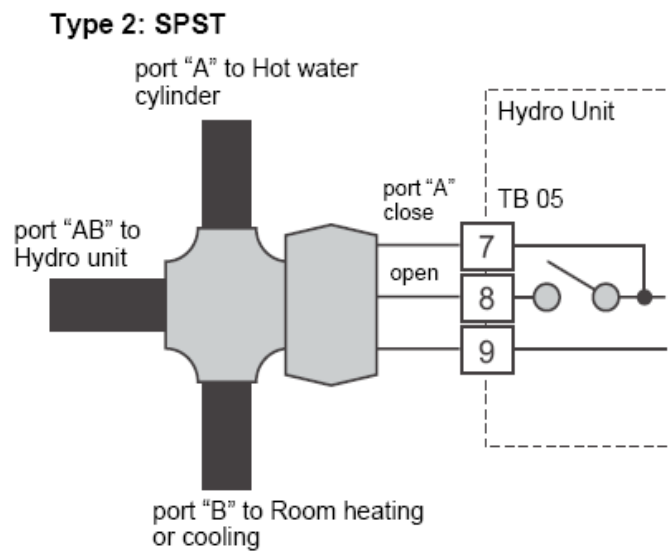
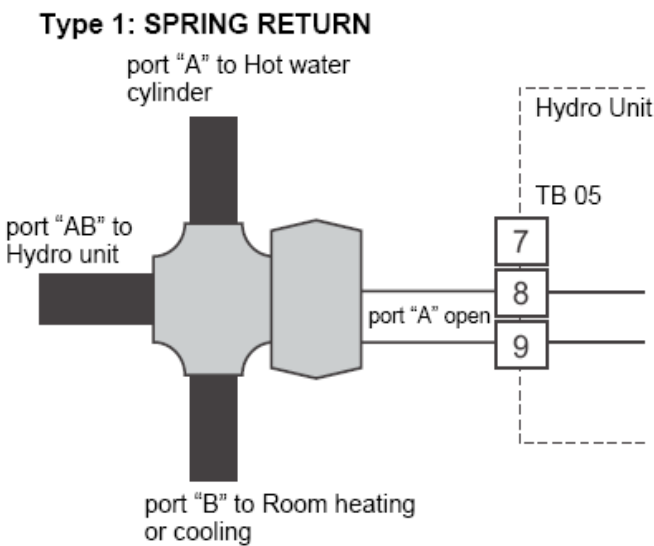
Set the 3-way valve in use with the DIP switch SW13-1 on the Hydro Unit board.

Diverter Valve	Description	DPSW13-1
Type 1	2-wire spring return	OFF
Type 2	3-wire SPST	OFF
Type 3	3-wire SPDT	ON

#### NOTE

Continuous operation of the valve motor at the fully open position is not recommended.

- The 3-way diverter valve is used to select either domestic hot water or zone1 / zone2 space heating
- Connect the 3-way diverter valve in accordance with the diagram below:-



**3-way mixing valve connection**

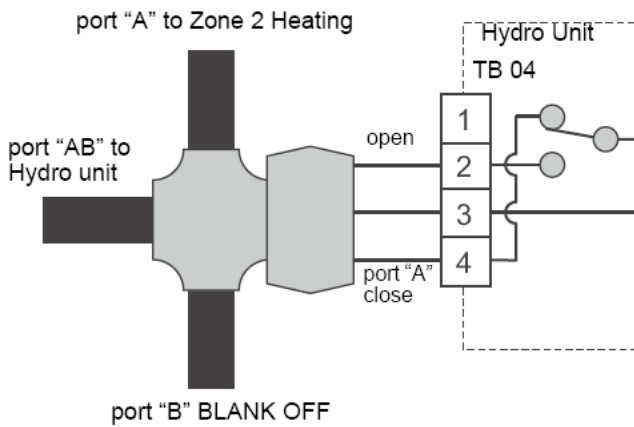
**Required Actuator Specification**

Electrical Specification: 230 V; 50 Hz; <100 mA

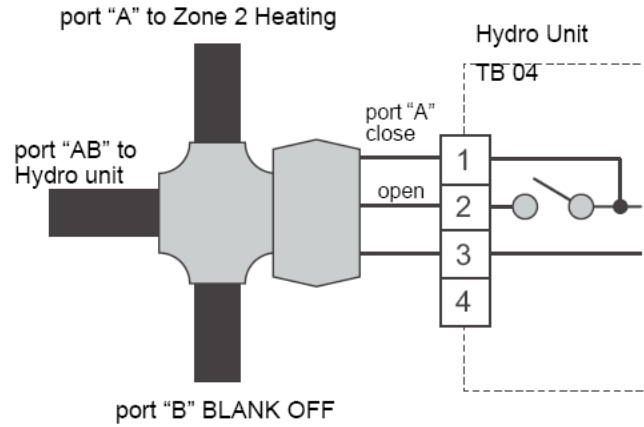
The 3-way mixing valve is used to achieve the temperature differential needed in a 2-zone heating system.

- Connect the 3-way mixing valve in accordance with the diagrams below:-

**Type 1: SPDT**



**Type 2: SPST**



**Hot water cylinder connection (optional)**

- Please refer to “Electrical supply/cable specifications” for fuse/cable size and for connection details.

**Electrical Connection (Hot Water Cylinder Electric Heater)**

- The electric heater, incorporated in the hot water cylinder, requires a separate supply to the Hydro Unit.
- Connect the hot water cylinder heater electrical supply in accordance with shown below:

Live conductor: Terminal L on Terminal Block 03

Neutral conductor: Terminal N on Terminal Block 03

Earth Conductor: Earth terminal on Terminal Block 03

- Connect the hot water cylinder heater to the Hydro Unit as shown below:

Live conductor to hot water cylinder: Terminal 1 on Terminal Block 03

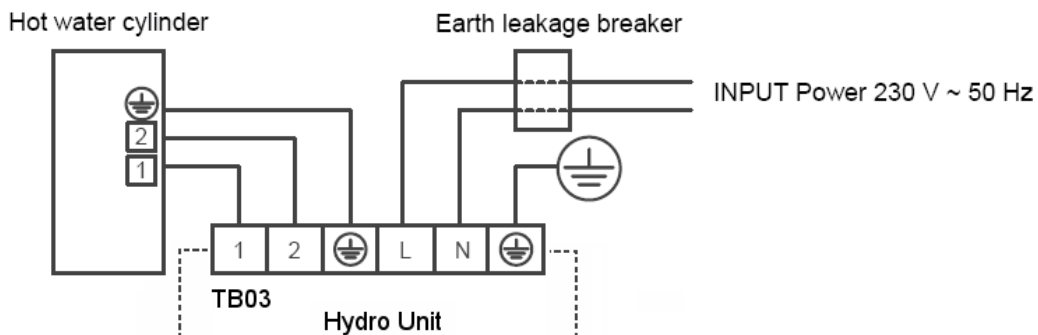
Neutral conductor to hot water cylinder: Terminal 2 on Terminal Block 03

Earth conductor to hot water cylinder: Earth terminal on Terminal Block 03

- Please ensure that the interconnecting cable, between the Hydro Unit and the hot water cylinder, is connected to earth at both ends of the cable using the shield wire or the earth conductor of the interconnecting cable.

**Electrical Connection (Hot Water Cylinder temperature Sensor)**

- Connect the hot water cylinder temperature sensor as shown below to terminals A & B on Terminal Block 06 in the Hydro Unit.

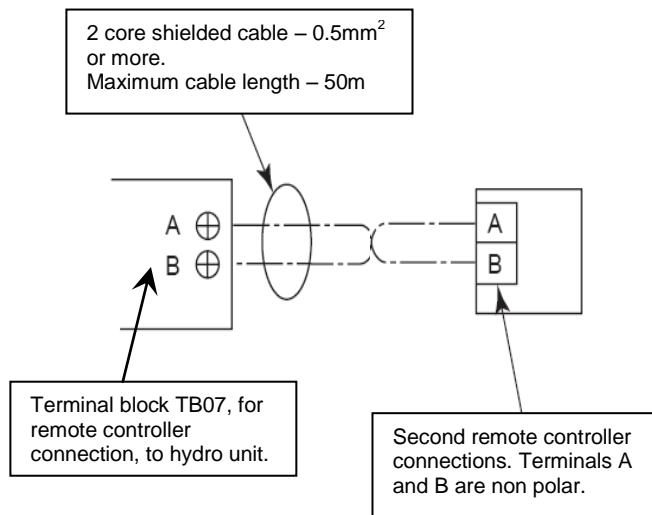


### Second Remote Controller Installation (optional)

It is possible to connect a second remote controller to the ESTIA system.

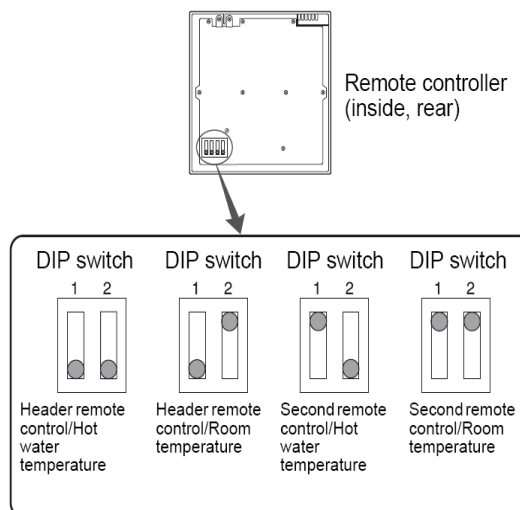
- The remote controller should be installed between 1m to 1.5m above floor level so that the remote controller measures the average room temperature
- The remote controller must not be installed in areas of:
  - Direct sunlight or areas exposed to outside air influences
  - Poor ventilation (near windows or other openings)
  - External heat sources (above radiators etc.)
  - Freezing or refrigerated areas
- The remote controller must be installed in a vertical position

### Second Remote Controller Connection



The remote controller can be set as either the header or second remote controller and to measure either water temperature or room air temperature.

### Remote Controller DIPS Switches - Setting



- Set one of the remote controllers as the header remote controller (remote controller of hydro unit is preset as the header remote controller (DPSW1 = OFF))
- Set the DPSW's on the other remote controller PC boards to "second" (optional remote controller is preset as "second" – DPSW1 = ON)

For room air temperature control

- set function code 40 (on the hydro unit) to "1"
- **Set DPSW2 to ON only on the remote controller used for room temperature measurement**
- Either the header or the second remote controller can be set for room temperature measurement. **Please do not set DPSW2 to ON on both the header and follower remote controllers**

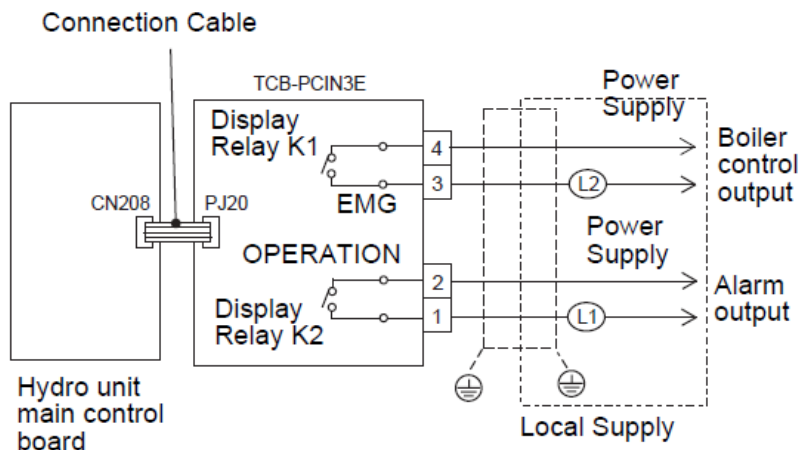
**Input / Output Option PCB's – Installation**

**Output Options:**

It is possible to connect to outputs, using the TCB-PCIN3E option PCB's, on the ESTIA hydro unit for the following functions:

- Alarm output
- Boiler output
- Defrost
- Compressor ON

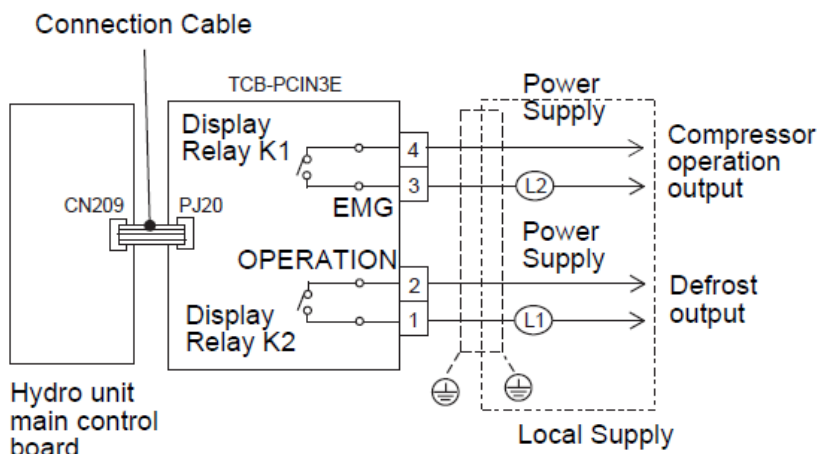
**System alarm & boiler outputs:**



**Alarm output (L1):** Output ON when the system is in alarm/fault conditions. The output is available through a volt free contact on the TCB-PCIN3E option PCB.

**Boiler control output (L2):** Output ON when outdoor ambient temperature is less than or equal to the temperature set in FC23. The output is available through a volt free contact on the TCB-PCIN3E option PCB.

**Defrost & compressor ON outputs:**



**Defrost output (L1):** Output ON when the system / outdoor unit is under defrost control. The output is available through a volt free contact on the TCB-PCIN3E option PCB.

**Compressor ON output (L2):** Output ON when the outdoor unit compressor is operating. The output is available through a volt free contact on the TCB-PCIN3E option PCB.

**Volt free contact specification:** The volt free contact specification, for the outputs detailed above, is shown below:

**AC230V:** 0.5A (maximum)

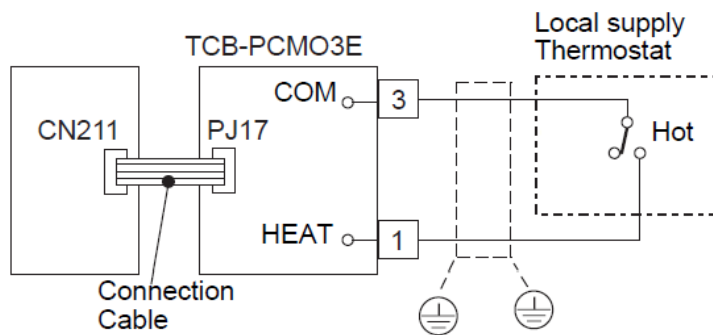
**DC24V:** 1.0A (maximum)

**Input Options:**

It is possible to connect inputs, using the TCB-PCMO3E option PCB's, on the ESTIA hydro unit for the following functions:

- External room thermostat
- External hot water cylinder thermostat
- External STOP

**External room thermostat:**



For heating operation connect the heating contact, on the thermostat, between terminals 1 (HEAT) & 3 (COM) on the option PCB (as shown above).

**Control Logic:**

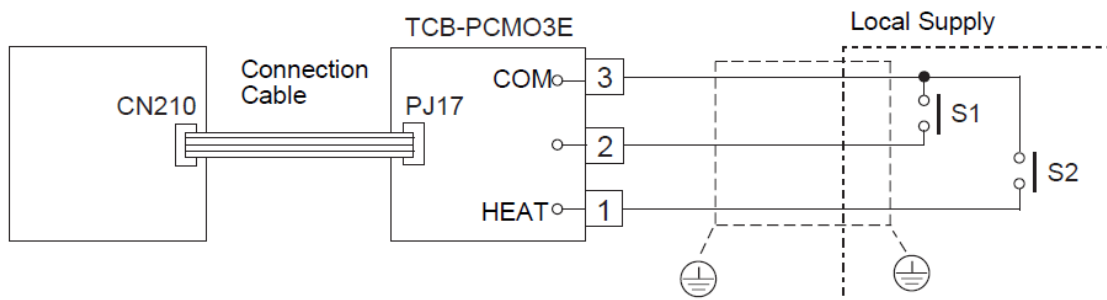
Option PCB Terminal Nos.	Heating Operation	
	ON	OFF
1 ~ 3	CLOSED	OPEN



### External hot water cylinder thermostat:

Connect the external hot water cylinder thermostat (S1 in the diagram below) to terminals 2 and 3 (COM) on the option PCB.

When the hot water cylinder thermostat contact, S1, is CLOSED then there is a hot water demand and the system will produce hot water (if all DPSW's and function codes are set correctly)



### External system STOP:

Connect the external STOP signal / contact (S2 in the diagram above) to terminals 1 (HEAT) and 3 (COM) on the option PCB.

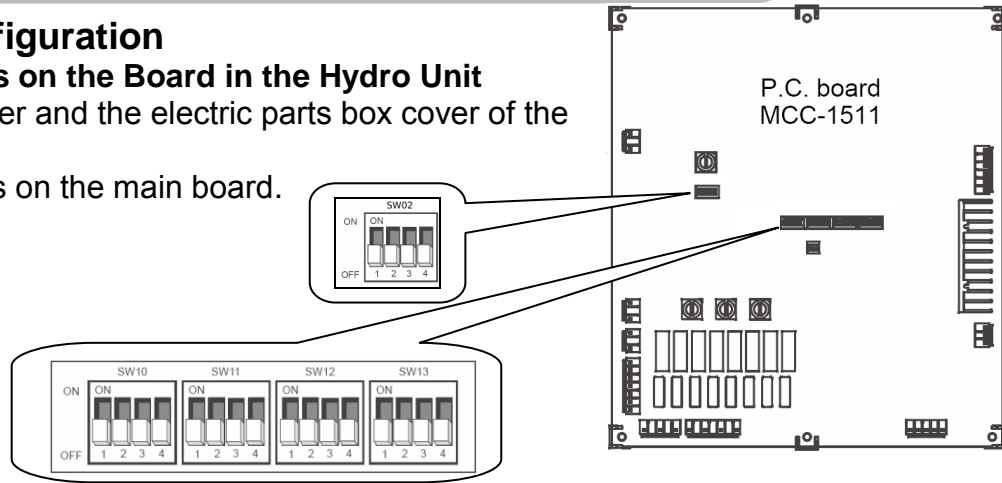
It is possible to set the operating logic of contact S2 (normally OPEN contact, normally CLOSED contact or pulse input) using function code FC52 and the operating mode of the system, on restart, using FC61 (see function code list on page 31 for options).

The external stop option can also be used for TEMPO control where an external signal, from the customers electricity measuring meter, is applied to the option PCB (contact S2 connections). TEMPO control can be used as part of the price contract provided by French electric power company EDF. The TEMPO control options are set using FC61.

## Start up and Configuration

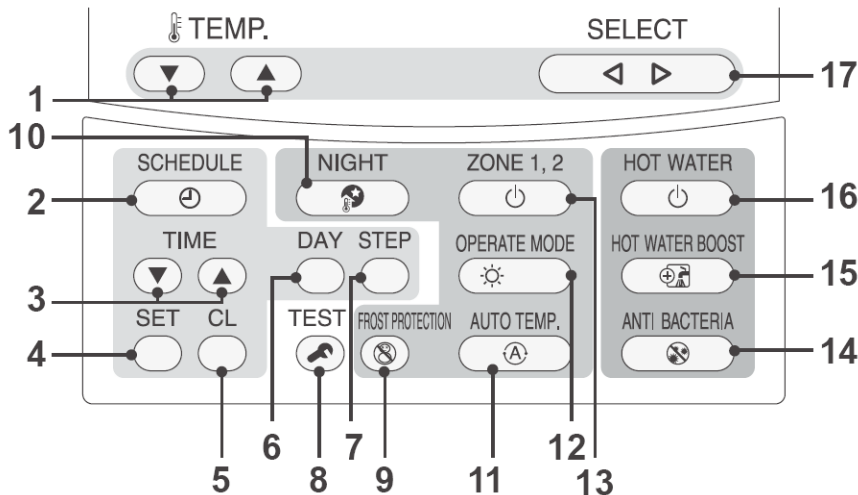
### Setting DIP Switches on the Board in the Hydro Unit


















- Detach the front cover and the electric parts box cover of the Hydro Unit.
- Set the DIP switches on the main board.



Switch No.	Bit No.	Description	Factory Position
02	1	Determines the position of the auxiliary boiler in the system installation: <b>OFF</b> = Boiler positioned after the 3 way valve <b>ON</b> = Boiler installed before the 3 way valve	<b>OFF</b>
	2	<b>Not Used</b>	-
	3	Used when an external cylinder thermostat is connected: <b>OFF</b> = external cylinder thermostat not connected <b>ON</b> = external room thermostat connected	<b>OFF</b>
	4	Used when an external room thermostat is connected: <b>OFF</b> = external room thermostat not connected <b>ON</b> = External room thermostat connected	<b>OFF</b>
10	1	Synchronises pump P1 with HP during hot water production: <b>OFF</b> = Pump P1 synchronised with HP during hot water mode when electric cylinder heater is energised <b>ON</b> = Pump P1 continuous operation	<b>OFF</b>
	2	Pump P1 control using TO control (heating mode only): <b>OFF</b> = Pump P1 continuous operation <b>ON</b> = Pump P1 OFF when TO > 20°C (temperature can be changed using FC9E)	<b>OFF</b>
	3	Synchronises pump P2 with pump P1: <b>OFF</b> = Pump P2 continuous operation (P2 OFF when remote controller switched OFF) <b>ON</b> = Pump P2 synchronised with pump P1	<b>OFF</b>
	4	Pump P1 ON/OFF cycling (during long periods of system OFF): <b>OFF</b> = Pump P1 normal operation <b>ON</b> = Pump P1 ON for 10 minutes duration (if system has been stopped for 72 hours)	<b>OFF</b>
11	1	Used to enable the hydro unit back up heaters: <b>OFF</b> = Back up heater control enabled <b>ON</b> = Back up heater control disabled	<b>OFF</b>
	2	Used to enable the hot water cylinder electric heater: <b>OFF</b> = Hot water cylinder heater control enabled <b>ON</b> = Hot water cylinder heater control disabled	<b>OFF</b>
	3	Used to enable the external booster heater output control: <b>OFF</b> = External booster heater control enabled (TO must be ≤ -20°C) <b>ON</b> = External booster heater control disabled	<b>OFF</b>
	4	<b>Not Used</b>	-
12	1	Used to determine hot water cylinder connection to the system: <b>OFF</b> = Hot water cylinder connected to the system <b>ON</b> = Hot water cylinder not connected to the system	<b>OFF</b>
	2	Used to enable Zone 1 operation: <b>OFF</b> = Zone 1 control enabled <b>ON</b> = Zone 1 control disabled	<b>OFF</b>
	3	Used to enable Zone 2 operation: <b>OFF</b> = Zone 2 control disabled <b>ON</b> = Zone 2 control enabled	<b>OFF</b>
	4	<b>Not Used</b>	-
13	1	Used to determine type of 3 way diverting valve connected to system: <b>OFF</b> = 2 wire spring return or 3 wire SPST valve connected <b>ON</b> = 3 wire SPDT valve connected	<b>OFF</b>
	2	Used to enable the external boiler output control (used with FC23): <b>OFF</b> = External boiler output control disabled <b>ON</b> = External boiler output control enabled	<b>OFF</b>
	3	Used to enable system auto restart after system power failure: <b>OFF</b> = Auto restart control enabled <b>ON</b> = Auto restart control disabled	<b>OFF</b>
	4	<b>Not Used</b>	-

### Hydro Unit Remote Control Buttons

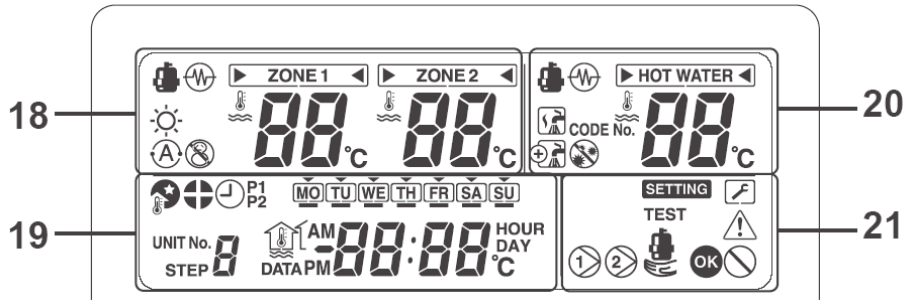


<b>1. TEMP. button:</b> 	Changes the set temperature for each operation mode (ZONE1 / ZONE2 / HOT WATER) by 1°C step.	<b>10. NIGHT button:</b> 	Controls the night set back operation.
<b>2. SCHEDULE button:</b> 	Sets the current time and scheduled weekly operation.	<b>11. AUTO TEMP. button:</b> 	Switches setting temperature automatically according to outside temperature. (Pressing this button long changes the mode to data setting mode).
<b>3. TIME button:</b> 	Changes time for current time setting and scheduled weekly operation setting with ▼ and ▲ buttons.	<b>12. OPERATE MODE button:</b> 	Selects ZONE1 / ZONE2 operation mode (heating).
<b>4. SET button:</b> 	Determines the entered current time setting and scheduled weekly operation setting.	<b>13. ZONE1, 2 button:</b> 	Turns on/off the zone (floor heating/radiator/FCU) operation.
<b>5. CL button:</b> 	Clears settings for the current time and scheduled weekly operation.	<b>14. ANTI BACTERIA button:</b> 	Regularly increases the hot water temperature in the tank for sterilization. (Pressing this button long changes the mode to data setting mode).
<b>6. DAY button:</b> 	Sets days of the week for current time setting and scheduled weekly operation setting.	<b>15. HOT WATER BOOST button:</b> 	Boosts boiling when high tapping temperature is required temporarily.
<b>7. STEP button:</b> 	Specifies switching STEP number in a day for weekly schedule.	<b>16. HOT WATER button:</b> 	Turns on/off hot water operation.
<b>8. TEST button:</b> 	Used for test run or service.	<b>17. SELECT button:</b> 	Selects an operation mode when changing the set temperature of each operation mode.
<b>9. FROST PROTECTION button:</b> 	Controls minimum operation for unused period (going out, absence, etc.) for anti freezing.		

**NOTE**

Some functions are not provided depending on the system specification in use.

Display Explanation



18: ZONE1, ZONE2	
Display	Description
	Lights when floor heater or radiator is connected (when the system has floor heater or radiator).
	ZONE1 selected for Temperature to be changed.
	Lights when system configured to have 2 zones.
	ZONE2 selected for Temperature to be changed.
	Lights during heating operation using the heat pump.
	Lights when the internal heater is energized during heating operation.
	Lights when heating is selected.
	Lights when the FROST PROTECTION button is pressed and goes out when the button is pressed again.
	Lights when Auto operation is selected.
	Displays heating set temperature. (Heating: 20 to 55°C, Factory setting. Goes out when Auto operation is selected.
	Lights when the set temperature or sensor's water temperature is displayed with the 7-segment indicator.

20: HOT WATER	
Display	Description
	Lights when hot water supply system is connected (when the system has hot water supply).
	HOT WATER selected for Temperature to be changed.
	Lights when hot water supply operation is performed by heat pump.
	Lights when the internal heater is energized during hot water supply operation.
	Lights during hot water supply operation.
	Lights while hot water boost is activated.
	Lights when the ANTI BACTERIA button is pressed and goes out when the button is pressed again.
	Lights when unit enters the data set mode.
	Displays hot water set temperature. (40 to 75°C, factory setting: 65°C)
	Lights when the set temperature or sensor's water temperature is displayed with the 7-segment indicator.

Display Explanation (cont.)

19: TIMER	
Display	Description
	Clock: Displays the current time (AM or PM).
	Displays days of the week (Sunday to Saturday).
	Lights when the NIGHT button is pressed and goes out when the button is pressed again.
	Lights when night time quiet operation is set.
<b>P1</b>	Indicates scheduled operation 1 status (including setting time).
<b>STEP 8</b>	Displays the scheduled operation step when the scheduled operation STEP1-5 program is set.
	Lights during time setting and scheduled operation setting.

21: CONTROL	
Display	Description
	Lights while internal pump (P1) or external pump (P2) is driven.
	Lights during backup operation only by the heater.
<b>SETTING</b>	Lights when the unit enters the data set mode and goes out when the unit exits the data set mode.
	Lights when the unit enters the service mode and goes out when the unit exits the service mode.
	Lights when an error occurs and goes out when the error is cleared.
<b>OK</b>	Lights for two seconds when settings are completed.
	Lights for two seconds when settings failed.

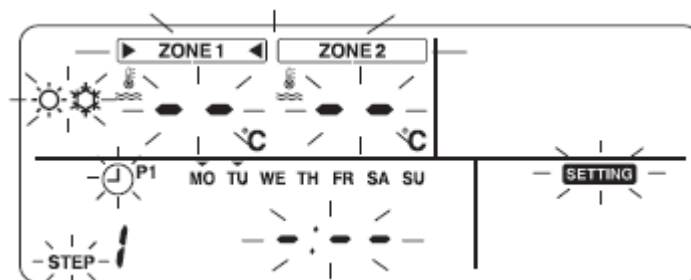
Remote Controller – Schedule Timer

It is possible to set up timer control schedules on the ESTIA remote controller (when two remote controllers are fitted to the ESTIA system the schedule timer is only available from the HEADER remote controller).

A maximum of eight control STEPS can be programmed / scheduled, into the ESTIA remote controller, for each day of the week.

Using the schedule timer function (see page 42 for example):

- Accessing the schedule timer function:**  
 Press the SCHEDULE button for 4 second or more to enter the schedule timer setting mode. The remote controller will show the following display:



- Specifying the day for the schedule timer:**  
 Press the Day button to move the ▼ symbol, displayed above the days of the week on the remote controller, to the day when the scheduled timer is to take place. Each press of the DAY button moves the ▼ symbol to the next displayed day. When the ▼ symbol is above the required day, press the SET button to confirm the day to be set
- Specifying the control STEP number:**  
 Press the STEP button to specify the control STEP to be set. The STEP selection increments by 1 STEP for each press of the STEP button from STEP 1 to STEP 8. Steps “C” and “L” are also available by continuing to press the STEP button when the remote controller display shows STEP 8.

If "C" is selected then the control details, already set for the specified day, are copied. These details can be copied to other days of the scheduled timer

If "L" is selected then all of the control details, set for the specified day, are deleted

- **Specifying the Step ON/OFF time, operation mode & set temperature:**

ON/OFF Time: Use the TIME ▲ ▼ buttons to set the required ON/OFF time for the specified control step

Operating Mode: To select or deselect the hot water function press the HOT WATER button on the remote controller

To select or deselect either space heating function press the Zone1, 2 button on the remote controller

When the function is selected to turn ON (at the specified time) then a numerical temperature is displayed in the relevant window on the remote controller. When the function is selected to Turn OFF (at the specified time) then the remote controller will display - - - -

To select heating press the OPERATE MODE button on the remote controller. When heating is selected then ☀ will be displayed on the remote controller.

Set Point Temperature: Press the SELECT button, on the remote controller to select either space Zone 1, Zone 2 or HOT WATER. Press the TEMPERATURE ▲ ▼ buttons to set the required temperature

When the ON/OFF time, operating mode and set point temperature have been entered into the schedule timer press the SET button to confirm the settings

- **Leaving the schedule timer function:**

When the scheduled timer function has been set for the required days press the SCHEDULE button to end the schedule setting function. The remote controller display will return to the main display screen and the ☹ icon, on the remote controller display, will flash. Press the SET button within 5 seconds of the icon flashing – the ☹ icon changes to lit and is continuously displayed. The timer schedule is now in operation

- **How to copy a program**

When specifying the STEP number (see details above) select "C" and press the SET button. This copies all of the previously set data for that day.

Press the DAY button to move the ▼ above the new schedule timer day. Press the SET button to copy the required data into the new day.

Repeat this process for all days required

### Function Code Access

Set function codes for various operation modes, input using the remote controller.

There are 2 types of settings:-

- 1) Hydro Unit function code setting.
- 2) Remote controller function code setting.

### Setting procedure for Hydro Unit function code

1. Press and hold + <sup>SET</sup> + buttons for four seconds or more to enter the hydro unit function code setting mode.
2. Set the function code number with the TEMP. buttons
3. Set data with the TIME buttons .
4. Press <sup>SET</sup> to confirm the settings.
5. Note that the Clear button <sup>CL</sup> is enabled only before the SET button is pressed and the function code is changed.
6. Press to exit the settings menu.



### Setting procedure for Remote Controller function code

1. Press and hold + <sup>CL</sup> + TEMP. buttons for four seconds or more to enter the remote controller function code setting mode.
2. Set the function code number with the TEMP. buttons
3. Set data with the TIME buttons .
4. Press <sup>SET</sup> to determine the settings.
5. Note that the Clear button <sup>CL</sup> is enabled only before the SET button is pressed and the function code is changed.
6. Press to exit the settings menu.



## Function Code Setting

Function Code Setting		Function Code		Range	Default
		Setting Address			
		Hydro Unit	Remote Controller		
Setting Temperature	Heating Upper Limit - Zone 1	1A	-	37~55°C	55
	Heating Lower Limit - Zone 1	1B	-	20~37°C	20
	Heating Upper Limit - Zone 2	1C	-	37~55°C	55
	Heating Lower Limit - Zone 2	1D	-	20~37°C	20
	Hot Water - Upper limit	1E	-	60~80°C	75
	Hot Water - Lower limit	1F	-	40~60°C	40
Hot Water Operation	Heat Pump Start Temperature	20	-	20~45°C	38
	Heat Pump Stop Temperature	21	-	40~50°C	45
Hot Water Temperature Compensation	Temperature Compensation Outside Air Temperature (°C)	24	-	-20~10°C	0
	Compensation Temperature (K)	25	-	0~15K	3
Hot Water Boost	Operation Time (x10 min)	08	-	3~18	6
	Setting Temperature (°C)	09	-	40~80°C	75
Anti Bacteria	Setting Temperature (°C)	0A	-	65~80°C	75
	Start Cycle (Day)	-	0D	1~10	7
	Start Time (Hour)	-	0C	0~23	22
	Operation Time (min)	0B	-	0~60	30
System Priority Setting	Hot water v heating – switching temperature (°C)	22	-	-20~20°C	0
	External boiler – output ON temperature (°C)	23	-	-20~20°C	-10
	Hot water produced by electric cylinder heater 1 = Hot water priority. Hot water produced by HP	0F	-	0~1	0
Heating Auto Curve Settings	Outside Temperature T1 (°C)	29	-	-15~0°C	-10
	Outside Temperature T2 (°C)	-	-	0	0
	Outside Temperature T3 (°C)	2B	-	0~15°C	10
	Setting Temperature A @ OAT -20°C (°C)	2C	-	20~55°C	40
	Setting Temperature B @ OAT T1 (°C)	2D	-	20~55°C	35
	Setting Temperature C @ OAT T2 (°C)	2E	-	20~55°C	30
	Setting Temperature D @ OAT T3 (°C)	2F	-	20~55°C	25
	Setting Temperature E @ OAT 20°C (°C)	30	-	20~55°C	20
Ratio Of Zone 2 In Zone 1 Auto Mode (%)	31	-	0~100%	80	
Auto Curve - Temperature Shift (K)	27	-	-5~5K	0	
Frost Protection	Function 0=Invalid; 1=Valid	3A	-	0~1	1
	Frost Protection Setting Temperature (°C)	3B	-	10~20°C	15
	Frost Protection – Schedule End Day	-	12	0~20	0
	Frost Protection – Schedule End Time	-	13	0~23	0
Back Up Heater Control	Downtime Back Up Heater 0=5min; 1=10min;2=15min;3=20min	33	-	0~3	1
	Uptime Back Up Heater 0=10min; 1=20min; 2=30min; 3=40min	34	-	0~3	0
Hot Water Cylinder Heater Control	Determines the time between HP operation and cylinder heater ON time 0 = 30 min, 1 = 60 min, 2 = 90 min, 3 = 120 min	73	-	0 ~3	0
Night Setback	Change Setback Temperature	26	-	3~20K	5
	Zone selection 0=Zone 1 & 2; 1= Zone 1 Only	58	-	0~1	0
	Start Time (Hour)	-	0E	0~23	22
	End Time (Hour)	-	0F	0~23	06
CDU Night Time Low Noise Operation	Low Noise Operation: 0 = Control disabled 1 = Control enabled	-	09	0~1	0
	Start time (Hr)	-	0A	0~23	22
	End time (Hr)	-	0B	0~23	6



Function Code Setting		Function Code		Range	Default
		Setting Address			
		Hydro Unit	Remote Controller		
<b>Pump Control</b>	Hydro unit pump (P1) synchronisation: 0 = P1 stops when in DHW mode and the electric cylinder heater is energised (no heating demand) 1 = P1 runs continuously	5A		0~1	0
	Pump P1 operation ON/OFF controlled by room temperature: 0 = Pump P1 operates continuously 1 = Pump P1 synchronised with room temperature control. When using the room temperature controller or external room thermostat, pump P1 will STOP when the room air temperature reaches thermo OFF condition	65	-	0~1	0
	Pump P1 control using TO sensor (heating mode only): P1 OFF when TO>set value in FC9E (DPSW10_2 must be ON)	9E	-	10~30	20
	A-rated pump (P1) speed control. Changes the percentage duty of the PWM control: 00 = 100% PWM duty (Max. RPM) 01 = 90% 02 = 80% 03 = 70% 04 = 60% 05 = 50%	A0	-	0~5	0
<b>E-Stop Switch Logic / System Restart &amp; TEMPO Control</b>	Forced stop input – switch logic: 0 = Contacts low > high (terminals 1-3 CLOSE) system stop. System restart with remote controller 1 = Contacts high > low (terminals 1-3 OPEN) system stop. System restart with remote controller 2 = Contacts high > low (terminals 1-3 OPEN) system stop. Contacts low > high (terminals 1-3 CLOSE) system restart 3 = Contacts low > high (terminals 1-3 CLOSE) system stop. Contacts low > high (terminals 1-3 CLOSE -second time) system restart (PULSE INPUT)	52	-	0~3	0
	System Restart Logic / TEMPO Control: 0 = System restarts in heating and hot water mode 1 = System restarts in the last mode prior to stopping 2 = System restarts in hot water mode 3 = System restarts in heating mode 4 = TEMPO Control 1: All electric heaters disabled 5 = TEMPO Control 2: HP and all electric heaters disabled	61	-	0~5	0
<b>A02 Error Detection with Boiler Output Enabled</b>	Allows A02 error detection to be enabled / disabled when boiler output is ON: 0 = A02 active: When TWI,TWO or THO≥70°C then the boiler output is switched OFF 1 = A02 deactivated: When TWI,TWO or THO≥70°C then the boiler output stays ON	62	-	0~1	0

Function Code Setting		Function Code		Range	Default
		Setting Address			
		Hydro Unit	Remote Controller		
<b>Auxiliary Boiler / Heat Pump Operation</b>	Boiler / heat pump synchronisation. Allows the controlling device to be set: 0 = Boiler & heat pump synchronised. The heat pump is the controlling device. When TWI reaches the target water temperature of the hydro unit the boiler output switches OFF  1 = Boiler & heat pump not synchronised. The heat pump and auxiliary boiler work as independent devices. When TWI reaches the target water temperature of the hydro unit the boiler output remains ON	3E	-	0~1	0
	System operating mode when TO ≤ FC23: 0 = HP & boiler operation 1 = Boiler only operation (pump P1 remains ON) 2 = Electric heater operation 3 = Boiler only operation (pump P1 OFF)	5B	-	0~2	3
<b>Room Temperature Control</b>	Room temperature control (2 <sup>nd</sup> RC) selection: 0 = control disabled 1 = control enabled	40	-	0~1	0
	Setting room temperature range (2 <sup>nd</sup> RC): Heating room temperature upper limit	94	-	15~30	29
	Setting room temperature range (2 <sup>nd</sup> RC): Heating room temperature lower limit	95	-	15~30	18
	Room temperature offset - HEATING (offset between actual room temperature and measured room temperature)	-	02	-10~10	-1
	Sets water temperature when HP to restart when the control is in A zone (based on TWI control: FCB1 = 2)	B2	-	20~37	25
	Initial target water temperature – HEATING (2 <sup>nd</sup> RC or external room thermostat)	9D	-	20~55	40
<b>Hydro Unit 3 Way Valve Operation Control</b>	Sets the operating logic for the 3 way diverting valve: 0 = Valve energised during hot water operation 1 = Valve de-energised during hot water operation	54	-	0~1	0
<b>Zone 2 Mixing Valve Control</b>	Sets the specified drive time for the mixing valve (x 10 sec)	0C	-	3~24	6
	Sets the sample time (drive OFF) period, for the mixing valve control (mins)	59	-	1~30	4

Function Code Setting		Function Code		Range	Default
		Setting Address			
		Hydro Unit	Remote Controller		
<b>Remote Controller Time Display Format</b>	Sets the format for the time display on the remote controller: 0 = 24hr clock display 1 = 12hr clock display	-	05	0~1	0
<b>Remote Controller Alarm Tone</b>	Enables or disables the alarm tone, from the remote controller, when the system generates a fault code alarm: 0 = alarm tone OFF 1 = alarm tone ON	-	11	0~1	1
<b>Remote Controller Pump P2 Icon Display</b>	Enables or disables the display icon for pump P2: 0 = P2 icon not displayed 1 = P2 icon displayed	42	-	0~1	0
<b>Function Change for Option PCB (connected to CN209)</b>	Sets the output function of the option PCB connected to CN209 on the hydro unit PCB: 0 = EMG terminals – output ON during defrost, OPERATION terminals – output ON when compressor is running 1 = EMG terminals – output ON when error/alarm detected, OPERATION terminals – output ON during operation (remote controller ON)	67	-	0~1	0
<b>Hydro Unit Capacity Setting</b>	Sets the hydro unit capacity (804XWH**E & 1404XWH**E). This code is factory set but setting required for PCB replacement or if FC reset completed 0012 = 804XWH**E 0017 = 1404XWH**E	01	-	0012 Or 0017	Depending on hydro unit model code

### CAUTION

- The following procedures require access to the hydro unit electrical box while the system electrical supply is switched ON
- Please ensure all National and Local regulations are followed with regards to working on LIVE equipment

### Function Code Reset Procedure:

The following procedure explains how to reset the hydro unit function codes back to the factory default settings:

1. Turn the ESTIA system OFF using the ESTIA remote controller
2. Turn OFF the power supply to the ESTIA system
3. Remove the hydro unit front cover and the cover to the hydro unit electrical box
4. Set DPSW06\_1 and DPSW06\_2, on the hydro unit PCB, to ON
5. Turn ON the power supply to the ESTIA system – the yellow LED, near the MCU, will start to flash (SLOW)
6. Press and hold the tactile switch, SW07, for 15 seconds. During this time the yellow LED will go through a sequence of flashing / LED OFF / LED ON
7. Turn OFF the power supply to the ESTIA system
8. Set DPSW06\_01 and DPSW06\_2, on the hydro unit PCB, to OFF
9. Replace the cover to the hydro unit electrical box and the front cover for the hydro unit
10. Turn ON the power supply to the ESTIA system
11. Reset function code FC01 to the correct capacity code. L09 fault code will be displayed if FC01 is not set to show the correct capacity setting for the system

### Component Operation Check Mode using Hydro Unit PCB:

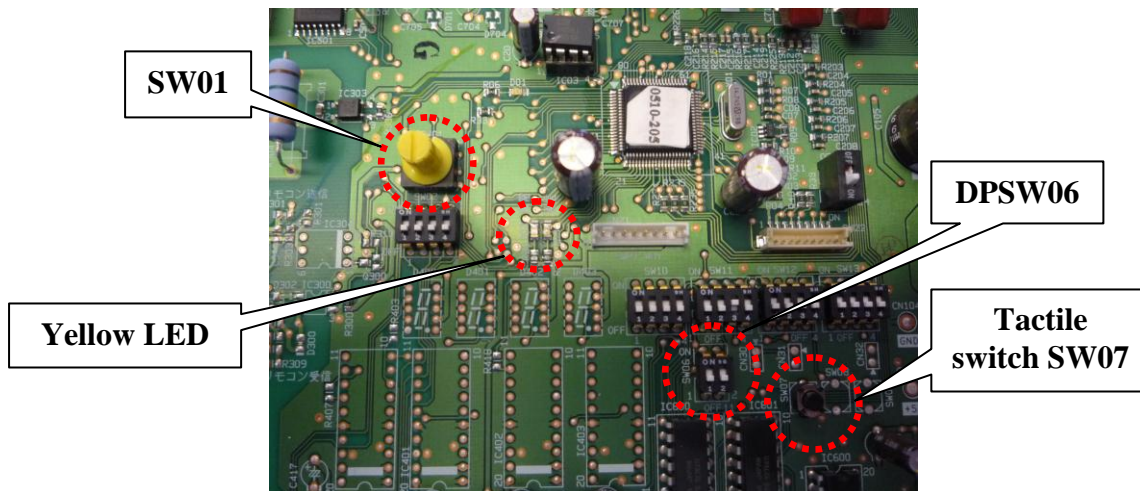
This mode allows the commissioning engineer to check the operation of various components (pump, 2 way valve, 3 way valve etc.) installed in the heating circuit.

1. Turn the ESTIA system OFF using the ESTIA remote controller
2. Turn OFF the power supply to the ESTIA system
3. Remove the hydro unit front cover and the cover to the hydro unit electrical box
4. Set DPSW06\_2 to ON
5. Turn ON the electrical supply to the ESTIA system

6. Turn rotary switch SW01 to position 1 and press and hold the tactile switch, SW07, for 8 seconds
7. The operation of the heating circuit components can be checked by rotating SW01 to the relevant position detailed in the table below
8. Set DPSW06\_2 to OFF
9. Replace the cover to the hydro unit electrical box and the front cover for the hydro unit

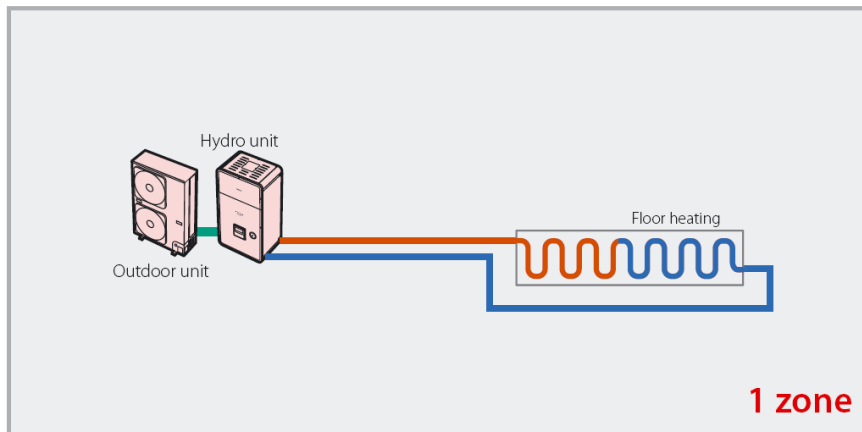
SW01 Pos	Heating Circuit Component	Component Operation Using Check Mode	Comments
1	None	-	
2	2 way valve	Cycle: valve ON for 2 sec ~ valve OFF for 3 sec	
3	3 way diverting valve		
4	Mixing valve	Cycle: Drive valve OPEN 30 sec ~ Drive valve CLOSED 30 sec	
5	Hydro unit pump (P1)	Pump ON 20 sec	
6	External water pump (P2)	Pump ON 20 sec	
7	None (reserved)	-	-
8	Hydro unit back up heaters	Cycle: stage 1 ON, stage 2 ON, all OFF every 20 sec	Hydro unit pump will operate
9	DHW cylinder electrical heater	Cycle: Heater ON 10 sec ~ heater OFF 10 sec	
10	Booster heater output	Cycle: heater output ON 10 sec ~ heater output OFF 10 sec	Hydro unit pump will operate
11	Alarm output*	Cycle: output ON 10 sec ~ output OFF 10 sec	
12	Boiler output*	Cycle: output ON 10 sec ~ output OFF 10 sec	
13	Defrost output*	Cycle: output ON 10 sec ~ output OFF 10 sec	
14	Compressor ON output*	Cycle: output ON 10 sec ~ output OFF 10 sec	
15	None	-	
16	Hydro unit pump (P1) continuous operation	Continuous operation of hydro unit pump (P1)	Do not operate the hydro unit pump continuously if there is no water in the heating circuit

**SW01, SW07 & DPSW06 Location**



System Installation – Set Up Examples

- 1 Zone Heating



Equipment Required:

CDU	TOSHIBA				TCUK	Supplied By Installer				
	Hydro Unit	TFI Sensor (Supplied with Hydro Unit)	Option PCB TCB-PCIN3E	Option PCB TCB-PCMO3E	Hot Water Cylinder (including TTW Sensor)	3 Way Diverting Valve	3 Way Mixing Valve	2 Way Valve (Cooling)	Buffer Tank	Additional Water Pump
✓	✓	X	X	X	X	X	X	X	X	X

DPSW Settings:

	DPSW 02					DPSW 10					DPSW 11					DPSW 12					DPSW 13			
	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
ON																								
OFF																								

DPSW11\_2 = ON: Hot water cylinder electric heater disables  
 DPSW12\_1 = ON: Hot water cylinder not connected to system  
 All other DPSW's set in the OFF position.

Function Code Settings:

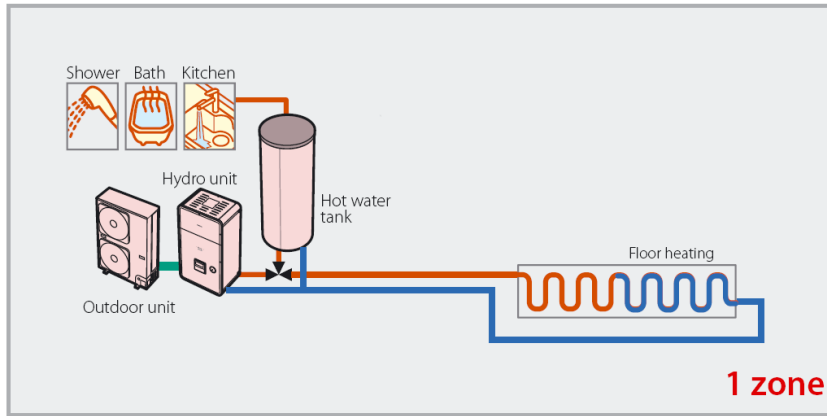
FC No	FC Description	FC Range	Default Setting
1A	Heating – upper temperature set point limit - Zone 1 ( °C)	37 ~ 55	55
1B	Heating – lower temperature set point limit - Zone 1 ( °C)	20 ~ 37	20

Please check the following pages for the set-up of:

- External room thermostat pg.40
- Room temperature controller (HWS-AMS11-E) pg.41
- Auto curve set up pg.43

**Note: Care should be taken when setting FC1A if the heating emitter used for Zone 1 is under floor heating. If FC1A is set to high there is a risk that the floor surface could be damaged.**

• 1 Zone Heating with Domestic Hot Water



Equipment Required:

CDU	TOSHIBA				TCUK	Supplied By Installer				
	Hydro Unit	TFI Sensor (Supplied with Hydro Unit)	Option PCB TCB-PCIN3E	Option PCB TCB-PCMO3E	Hot Water Cylinder (including TTW Sensor)	3 Way Diverting Valve	3 Way Mixing Valve	2 Way Valve (Cooling)	Buffer Tank	Additional Water Pump
✓	✓	X	X	X	✓	✓	X	X	X	X

DPSW Settings:

		DPSW 02				DPSW 10				DPSW 11				DPSW 12				DPSW 13				
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
ON																		ON	*			
OFF																		OFF				

All DPSW's set in the OFF position.

DPSW 13\_1 to be set depending on the type of 3 way diverting valve fitted(2 wire / spring return, 3 wire SPST or 3 wire SPDT)

Function Code Settings:

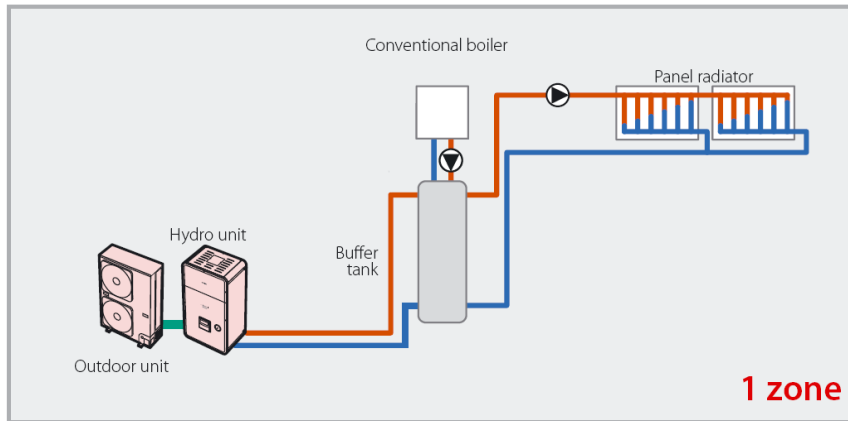
FC No	FC Description	FC Range	Default Setting
1A	Heating – upper temperature set point limit - Zone 1 (°C)	37 ~ 55	55
1B	Heating – lower temperature set point limit - Zone 1 (°C)	20 ~ 37	20
1E	Hot water – upper temperature set point limit (°C)	50 ~ 80	75
1F	Hot water – lower temperature set point limit (°C)	40 ~ 60	40
20	Heat pump start temperature – hot water operation (TTW:°C)	20 ~ 45	38
21	Heat pump stop temperature – hot water operation (TTW:°C)	40 ~ 50	45
22	Hot water / heating priority switching temperature (°C)	-20 ~ 20	0
24	Hot water temperature compensation – OAT start temperature (°C)	-20 ~ 10	0
25	Hot water set point temperature – compensation temperature (°C)	0 ~ 15	3

Please check the following pages for the set-up of:

- External room thermostat pg.40
- Room temperature controller (HWS-AMS11-E) pg.41
- Auto curve set up pg.43
- Hot water anti bacteria function pg.47
- Hot water boost function pg.48

**Note: Care should be taken when setting FC1A if the heating emitter used for Zone 1 is under floor heating. If FC1A is set to high there is a risk that the floor surface could be damaged.**

• Zone 1 Heating With Existing Auxiliary Boiler



Equipment Selection:

CDU	TOSHIBA				TCUK	Supplied By Installer				
	Hydro Unit	TFI Sensor (Supplied with Hydro Unit)	Option PCB TCB-PCIN3E	Option PCB TCB-PCMO3E	Hot Water Cylinder (including TTW Sensor)	3 Way Diverting Valve	3 Way Mixing Valve	2 Way Valve (Cooling)	Buffer Tank	Additional Water Pump
✓	✓	X	✓	X	X	X	X	X	✓	✓

DPSW Settings:

DPSW 02					DPSW 10					DPSW 11					DPSW 12					DPSW 13				
	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
ON					ON					ON					ON					ON	*			
OFF					OFF					OFF					OFF					OFF				

DPSW11\_2 = ON: Hot water cylinder electric heater disables  
 DPSW12\_1 = ON: Hot water cylinder not connected to system  
 DPSW13\_2 = ON: Boiler output control enabled (use in conjunction with FC23)  
 All other DPSW's set in the OFF position.

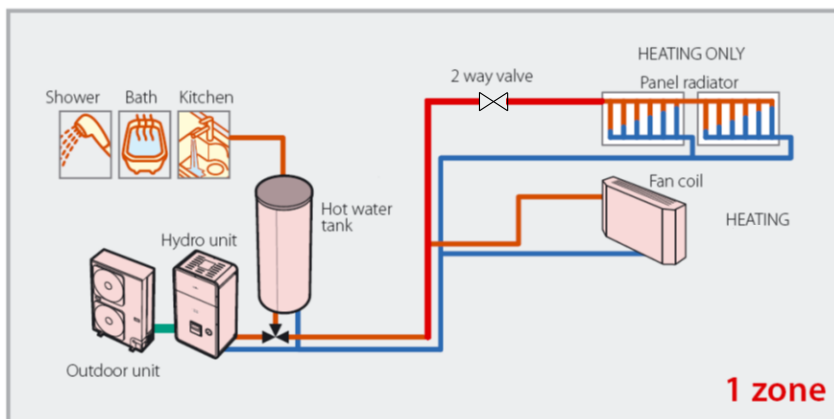
Function Code Settings:

FC No	FC Description	FC Range	Default Setting
1A	Heating – upper temperature set point limit - Zone 1 ( °C)	37 ~ 55	55
1B	Heating – lower temperature set point limit - Zone 1 ( °C)	20 ~ 37	20
23	Trigger temperature to turn boiler output (on TCB-PCIN3E) ON ( °C)	-20 ~ 20	-10
3E	Boiler / heat pump synchronisation: 0 = synchronised; 1 = not synchronised	0 ~ 1	0

Please check the following pages for the set-up of:

- External room thermostat pg.40
- Room temperature controller (HWS-AMS11-E) pg.41
- Auto curve set up pg.43
- Auxiliary boiler output pg.44

• 1 Zone Heating With Domestic Hot Water



Equipment Selection:

TOSHIBA					TCUK	Supplied By Installer				
CDU	Hydro Unit	TFI Sensor (Supplied with Hydro Unit)	Option PCB TCB-PCIN3E	Option PCB TCB-PCMO3E	Hot Water Cylinder (including TTW Sensor)	3 Way Diverting Valve	3 Way Mixing Valve	2 Way Valve (Cooling)	Buffer Tank	Additional Water Pump
✓	✓	X	X	X	✓	✓	X	✓	X	X

DPSW Settings:

DPSW 02					DPSW 10					DPSW 11					DPSW 12					DPSW 13									
		1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4
ON						ON						ON						ON						ON	*				
OFF						OFF						OFF						OFF						OFF					

All DPSW's set in the OFF position.

DPSW 13\_1 to be set depending on the type of 3 way diverting valve fitted

Function Code Settings:

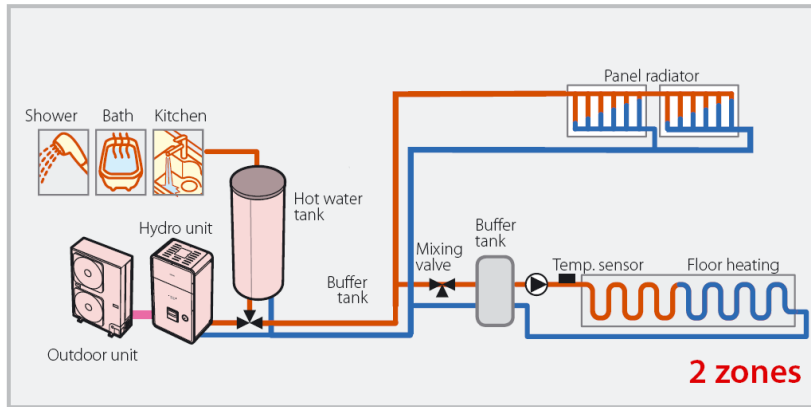
FC No	FC Description	FC Range	Default Setting
1A	Heating – upper temperature set point limit - Zone 1 ( °C)	37 ~ 55	55
1B	Heating – lower temperature set point limit - Zone 1( °C)	20 ~ 37	20
1E	Hot water – upper temperature set point limit (°C)	50 ~ 80	75
1F	Hot water – lower temperature set point limit (°C)	40 ~ 60	40
20	Heat pump start temperature – hot water operation (TTW:°C)	20 ~ 45	38
21	Heat pump stop temperature – hot water operation (TTW:°C)	40 ~ 50	45
22	Hot water / heating priority switching temperature (°C)	-20 ~-20	0
24	Hot water temperature compensation – OAT start temperature (°C)	-20 ~ 10	0
25	Hot water set point temperature – compensation temperature (°C)	0 ~ 15	3
0F	0 = hot water produced by electric cylinder heater; 1 = hot water priority – hot water produced by heat pump	0 ~ 1	0

Please check the following pages for the set-up of:

- External room thermostat pg.40
- Room temperature controller (HWS-AMS11-E) pg.41
- Auto curve set up pg.43
- Hot water anti bacteria function pg.47
- Hot water boost function pg.48



• 2 Zone Heating With Domestic Hot Water



Equipment Selection:

TOSHIBA					TCUK	Supplied By Installer				
CDU	Hydro Unit	TFI Sensor (Supplied with Hydro Unit)	Option PCB TCB-PCIN3E	Option PCB TCB-PCMO3E	Hot Water Cylinder (including TTW Sensor)	3 Way Diverting Valve	3 Way Mixing Valve	2 Way Valve (Cooling)	Buffer Tank	Additional Water Pump
✓	✓	✓	X	X	✓	✓	✓	X	✓	✓

DPSW Settings:

DPSW 02					DPSW 10					DPSW 11					DPSW 12					DPSW 13				
		1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4	
ON						ON				*		ON						ON	*					
OFF						OFF						OFF						OFF						

DPSW 10\_3: Set switch to ON if end user requests pump P2 (Zone 2 pump) is synchronised with pump P1 (hydro unit)

DPSW12\_3 = ON: Zone 2 control enabled

DPSW 13\_1 to be set depending on type of 3 way diverter valve fitted (2 wire / spring return, 3 wire SPST or 3 wire SPDT)

All other DPSW's set in the OFF position

Function Code Settings:

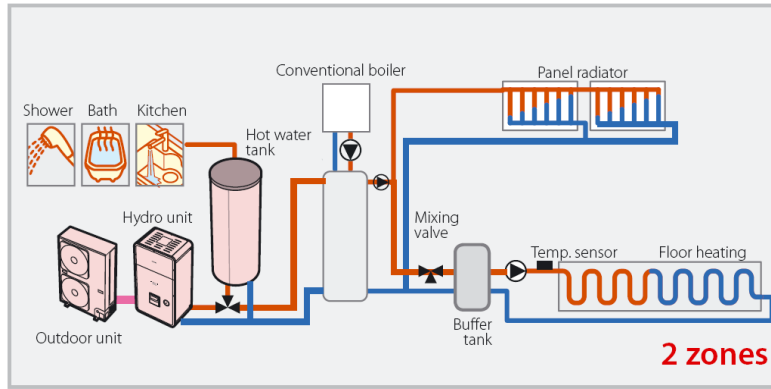
FC No	FC Description	FC Range	Default Setting
1A	Heating – upper temperature set point limit - Zone 1 ( °C)	37 ~ 55	55
1B	Heating – lower temperature set point limit - Zone 1 ( °C)	20 ~ 37	20
1C	Heating – upper temperature set point limit – Zone 2 ( °C)	37 ~ 55	55
1D	Heating – lower temperature set point limit – Zone 2 ( °C)	20 ~ 37	20
1E	Hot water – upper temperature set point limit ( °C)	50 ~ 80	75
1F	Hot water – lower temperature set point limit ( °C)	40 ~ 60	40
20	Heat pump start temperature – hot water operation (TTW:°C)	20 ~ 45	38
21	Heat pump stop temperature – hot water operation (TTW:°C)	40 ~ 50	45
22	Hot water / heating priority switching temperature ( °C)	-20 ~20	0
24	Hot water temperature compensation – OAT start temperature ( °C)	-20 ~ 10	0
25	Hot water set point temperature – compensation temperature ( °C)	0 ~ 15	3
0C	Specified drive time for mixing valve – 0° ~ 90° (10sec)	3 ~ 24	6
59	Sets the sample time (drive OFF) period, for the mixing valve control (mins)	1 ~ 30	4

Please check the following pages for the set-up of:

- External room thermostat pg.40
- Room temperature controller (HWS-AMS11-E) pg.41
- Auto curve set up pg.43
- Mixing valve set up pg.46
- Hot water anti bacteria function pg.47
- Hot water boost function pg.48

**Note: Care should be taken when setting FC1C if the heating emitter used for Zone 2 is under floor heating. If FC1C is set to high there is a risk that the floor surface could be damaged.**

• 2 Zone Heating with Auxiliary Boiler



Equipment Selection:

TOSHIBA					TCUK	Supplied By Installer				
CDU	Hydro Unit	TFI Sensor (Supplied with Hydro Unit)	Option PCB TCB-PCIN3E	Option PCB TCB-PCMO3E	Hot Water Cylinder (including TTW Sensor)	3 Way Diverting Valve	3 Way Mixing Valve	2 Way Valve (Cooling)	Buffer Tank	Additional Water Pump
✓	✓	✓	✓	X	✓	✓	✓	X	✓	✓

DPSW Settings

		DPSW 02				DPSW 10				DPSW 11				DPSW 12				DPSW 13			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ON								*										ON	*		
OFF																					

DPSW12\_3 = ON: Zone 2 control enabled

DPSW 13\_1 to be set depending on type of 3 way diverter valve fitted (2 wire / spring return, 3 wire SPST or 3 wire SPDT)

DPSW13\_2 = ON: Boiler output control enabled (use in conjunction with FC23)

All other DPSW's set in the OFF position

Function Code Settings:

FC No	FC Description	FC Range	Default Setting
1A	Heating – upper temperature set point limit - Zone 1 (°C)	37 ~ 55	55
1B	Heating – lower temperature set point limit - Zone 1 (°C)	20 ~ 37	20
1C	Heating – upper temperature set point limit – Zone 2 (°C)	37 ~ 55	55
1D	Heating – lower temperature set point limit – Zone 2 (°C)	20 ~ 37	20
1E	Hot water – upper temperature set point limit (°C)	50 ~ 80	75
1F	Hot water – lower temperature set point limit (°C)	40 ~ 60	40
20	Heat pump start temperature – hot water operation (TTW:°C)	20 ~ 45	38
21	Heat pump stop temperature – hot water operation (TTW:°C)	40 ~ 50	45
22	Hot water / heating priority switching temperature (°C)	-20 ~ -20	0
23	Trigger temperature to turn boiler output (on TCB-PCIN3E) ON (°C)	-20 ~ 20	-10
24	Hot water temperature compensation – OAT start temperature (°C)	-20 ~ 10	0
25	Hot water set point temperature – compensation temperature (°C)	0 ~ 15	3
3E	Boiler / heat pump synchronisation: 0 = synchronised; 1 = not synchronised	0 ~ 1	0
0C	Specified drive time for mixing valve – 0° ~ 90° (10sec)	3 ~ 24	6
59	Sets the sample time (drive OFF) period, for the mixing valve control (mins)	1 ~ 30	4

Please check the following pages for the set-up of:

- External room thermostat pg.40
- Room temperature controller (HWS-AMS11-E) pg.41
- Auto curve set up pg.43
- Auxiliary boiler output pg.44
- Mixing valve set up pg.46

- **Remote Controller Schedule Timer**

On an ESTIA site the customer requires the hot water function to be ON between the hours of 01:00 and 06:00. The customer requires the set point for the domestic hot water to be set to 65°C

For space heating the customer requires the ESTIA to run in heating mode for the following periods:

Period 1: 07:00 ~ 10:00

Period 2: 15:00 ~ 22:00

The customer is using radiators as the heating emitters and requires the water set point temperature to be set to 50°C. The schedule timer must be set the same for all days of the week.

For each day the timer function will be set as shown below:

STEP No.	Time	Function
STEP 1	01:00	DHW ON, DHW set point = 65°C
STEP 2	06:00	DHW OFF
STEP 3	07:00	Zone 1 ON, heating mode, water set point = 50°C
STEP 4	10:00	Zone 1 OFF
STEP 5	15:00	Zone 1 ON, heating mode, water set point = 50°C
STEP 6	22:00	Zone 1 OFF

### Schedule Timer Set Up

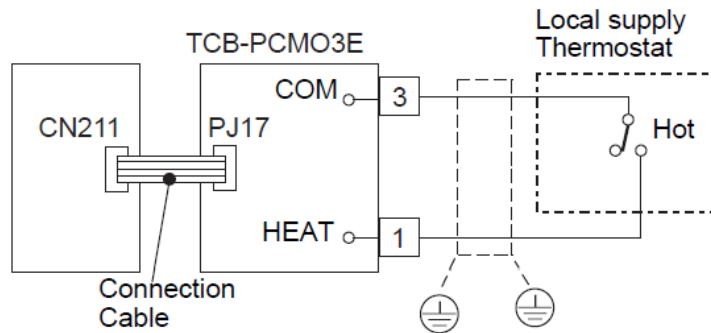
1. Access remote controller (RC) timer function – press the SCHEDULE button for a minimum of 4 seconds. Check the RC display changes to show the schedule timer display
2. Select the required day for the schedule timer – press the DAY button until the ▼ symbol is displayed above the required day. Press the SET button to accept the command
3. Set up the required timer steps for the selected day – press the STEP button until STEP 1 is displayed on the RC:
  - Press the **STEP** button > check STEP 1 is displayed on the RC
  - Press the **SET** button
  - Press the **TIME ▼ ▲** buttons to set 01:00 on the time display of the RC
  - Press the **HOT WATER** button to set the hot water function ON > check that a numerical temperature is displayed on the RC for the hot water function
  - Press the **TEMPERATURE ▼ ▲** buttons to set the 65°C hot water set point
  - Press the **SET** button
  - Press the **STEP** button > check STEP 2 is displayed on the RC
  - Press the **SET** button
  - Press the **TIME ▼ ▲** buttons to set 06:00 on the time display of the RC
  - Press the **HOT WATER** button to set the hot water function to OFF > check that the RC display changes to - - - - for the hot water function
  - Press the **SET** button
  - Press the **STEP** button > check STEP 3 is displayed on the RC
  - Press the **TIME ▼ ▲** buttons to set 07:00 on the time display of the RC
  - Press the **ZONE1, 2** button to set the space heating function ON > check that a numerical temperature is displayed on the RC for the zone 1 function
  - Press the **OPERATING MODE** button > check that the heating mode symbol is displayed on the RC
  - Press the **TEMPERATURE ▼ ▲** buttons to set the 50°C zone 1 set point
  - Press the **SET** button
  - Press the **STEP** button > check STEP 4 is displayed on the RC
  - Press the **SET** button
  - Press the **TIME ▼ ▲** buttons to set 10:00 on the time display of the RC
  - Press the **ZONE1, 2** button to set the space heating function OFF > check that the RC display changes to - - - - for zone 1
  - Press the **SET** button
  - Press the **STEP** button > check STEP 5 is displayed on the RC
  - Press the **SET** button

- Press the **TIME ▼ ▲** buttons to set 07:00 on the time display of the RC
  - Press the **ZONE1, 2** button to set the space heating function ON > check that a numerical temperature is displayed on the RC for the zone 1 function
  - Press the **OPERATING MODE** button > check that the heating mode symbol is displayed on the RC
  - Press the **TEMPERATURE ▼ ▲** buttons to set the 50°C zone 1 set point
  - Press the **SET** button
  - Press the **STEP** button > check STEP 4 is displayed on the RC
  - Press the **SET** button
  - Press the **TIME ▼ ▲** buttons to set 10:00 on the time display of the RC
  - Press the **ZONE1, 2** button to set the space heating function OFF > check that the RC display changes to - - - - for zone 1
  - Press the **SET** button
4. Copy the data, shown above, for use on other days of the week:
- Press the **STEP** button until STEP C is displayed on the RC
  - Press the **SET** button
5. Paste the copied timer schedule into the other days of the week
- Press the **DAY** button until the ▼ symbol is displayed above all day's of the week (timer schedule to run on all days of the week)
  - Press the **SET** button
  - Repeat the above steps for all the days of the week
6. Exit schedule timer function
- Press the **SCHEDULE** button > check that the RC display changes back to the main screen and that CLOCK icon, on the RC display is flashing
  - Press the **SET** button > check that the CLOCK icon changes from flashing to continuously lit.
  - The timer schedule is now set

## ESTIA - System Set Up

**Please refer to the ESTIA Service Manual for a detailed description for each of the controls / functions listed below**

## 1. External room thermostat



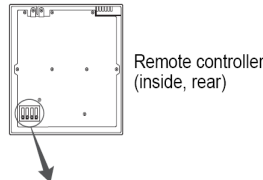
- Isolate the electrical supply to the ESTIA system and remove the cover to the electrical box in the hydro unit
- Install the room thermostat into the room to be monitored / controlled. Care must be taken to ensure that the thermostat is installed in the correct position and away from the influences of other external heat sources (sunlight, radiators etc.). Follow the thermostat manufacturers installation instructions for correct positioning
- Connect the room thermostat as to the TCB-PCBMO3E option PCB as shown in the diagram above
- In the hydro unit set DPSW 02\_4 to ON
- **For HEATING mode:**
- Set FC1A to the required setting. This will set the maximum target water temperature of the system when running in heating mode. This setting is particularly important – if the heating emitter used is under floor heating then damage may be caused to the floor surface if FC1A is set too high
- Set FC1B to the required setting. This will set the minimum target water temperature of the system when running in heating mode
- Set FC9D to the required setting. This will set the initial target water temperature of the system, when the electrical supply is restored to the ESTIA system, when running in heating mode
- Replace the cover on the electrical box in the hydro unit and restore the electrical supply to the ESTIA system

**NOTE:**

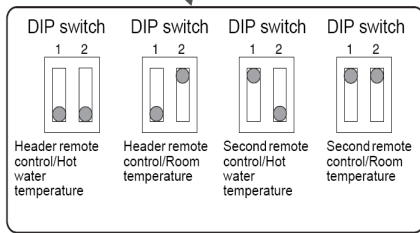
When the external thermostat is connected the end user will be unable to set any water temperatures, for the space heating functions, on the remote controller. The system is controlled by the OPEN or CLOSED contact on the room thermostat.

**2. Room temperature control**

- Isolate the electrical supply to the ESTIA system
- Install the 2<sup>nd</sup> ESTIA remote controller (RC), for room temperature control, using 2 core screened cable. The maximum cable length specified, for the 2<sup>nd</sup> RC is 50m
- Position the 2<sup>nd</sup> RC as detailed in the installation instructions supplied with the controller. It is important to position the 2<sup>nd</sup> RC correctly as poor positioning will affect the accuracy of the room temperature control
- The remote controllers need to be configured as header and follower controllers using the DPSW's on the back of each remote controller (see below).



For example a customer requests that the remote controller on the hydro unit is set as the header device and the 2<sup>nd</sup> RC, in the room, is set as the follower to measure room air temperature. Set the DPSW's as shown below:



	Remote Controller DPSW – Bit Number			
	1	2	3	4
Hydro unit (HEADER)	OFF	OFF	OFF	OFF
2 <sup>nd</sup> RC (FOLLOWER)	ON	ON	OFF	OFF

**Note:**

**Do not set DPSW2, on both the HEADER and FOLLOWER remote controllers, to ON. This will result in poor temperature control in the room**

- Restore the electrical supply to the ESTIA system
- Change FC40 from 0 to 1. This will allow the ESTIA system to control using the air temperature measurement form the 2<sup>nd</sup> RC

**For HEATING mode:**

- Set FC94 to the required setting. This will set the maximum room air temperature that can be selected on the remote controllers when running in heating mode.
- Set FC95 to the required setting. This will set the minimum room air temperature that can be selected on the remote controllers when running in heating mode.
- Set FC9D to the required setting. This will set the initial target water temperature of the system, when the electrical supply is restored to the ESTIA system, when running in heating mode
- Set FCB1 to the required setting. This will select the required control option for the room temperature control when running in heating mode

**System Commissioning:**

- Measure the actual room temperature using a locally supplied temperature measuring device.
- Measure the room temperature using the sensor temperature monitoring function on the remote controller (see page 51 -use code no. 03). This must process be completed on the remote controller that will be used to measure the room temperature
- Compare the 2 temperature readings. If the temperature readings are the same then there is no requirement to adjust the room temperature offset FC's. If there is a difference between the temperature reading then adjust the room temperature offset using remote controller function code (RCFC) RCFC02 for heating

For example:

Temperature Measurement	Measured Temperature	RCFC Adjustment*
Actual	23°C	No adjustment required
Remote Controller	23°C	

Temperature Measurement	Measured Temperature	RCFC Adjustment*
Actual	23°C	Change from -1 to -3
Remote Controller	25°C	

Temperature Measurement	Measured Temperature	RCFC Adjustment*
Actual	25°C	Change from -1 to +1
Remote Controller	23°C	

REMEMBER: The default offset setting is -1. Please consider the default offset when making any changes to either RCFC02 or RCFC03

### 3. Auto curve control

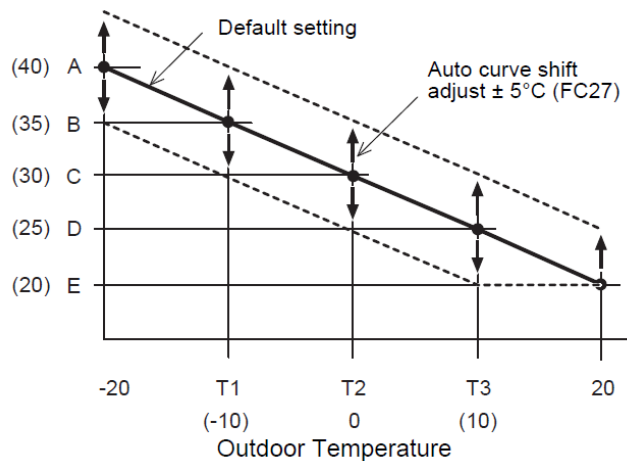
The auto curve function allows the software on the hydro unit PCB to automatically calculate the target water temperature of the system depending the outdoor air temperature (OAT). This function is only available for 1 zone space heating (water temperature control).

The auto curve function is **NOT** available when:

- Using an external room thermostat
- Using a 2<sup>nd</sup> RC for room temperature control

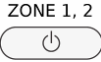
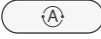
The auto curve control is set using function codes and by pressing the “Auto” button on the remote controller.

#### To set the auto curve temperatures:



- STOP the ESTIA system using the remote controller
- Set the following function codes to the required setting:
- FC27: Sets the auto curve temperature shift / curve adjustment
- FC29: Sets the OAT control temperature at point T1 on the diagram above
- FC2B: Sets the OAT control temperature at point T3 on the diagram above
- FC2C: Sets the target water temperature for the system when the OAT is  $-20^\circ\text{C}$
- FC2D: Sets the target water temperature for the system when the OAT is at T1 position
- FC2E: Sets the target water temperature for the system when the OAT is at T2 position ( $0^\circ\text{C}$ )
- FC2F: Sets the target water temperature for the system when the OAT is at T3 position
- FC30: Sets the target water temperature for the system when the OAT is  $20^\circ\text{C}$
- FC31: Sets the percentage ratio of the Zone 1 target water temperature to be applied for Zone 2 control

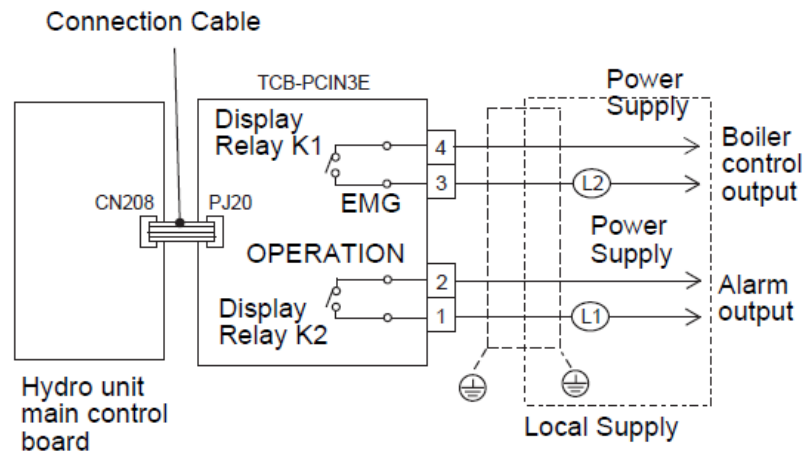
#### To activate the auto curve control:

- Press  on the remote controller to activate space heating
- Press  on the remote controller to activate the auto curve control
- When the auto curve control is active the numerical temperature display for Zone 1 and Zone 2, on the remote controller, is displayed with “A” for each zone

**NOTE:** If the heating emitter for Zone 2 is an under floor heating circuit then care should be taken when setting FC31 to prevent any risk of damaging the floor surface due to high water temperatures



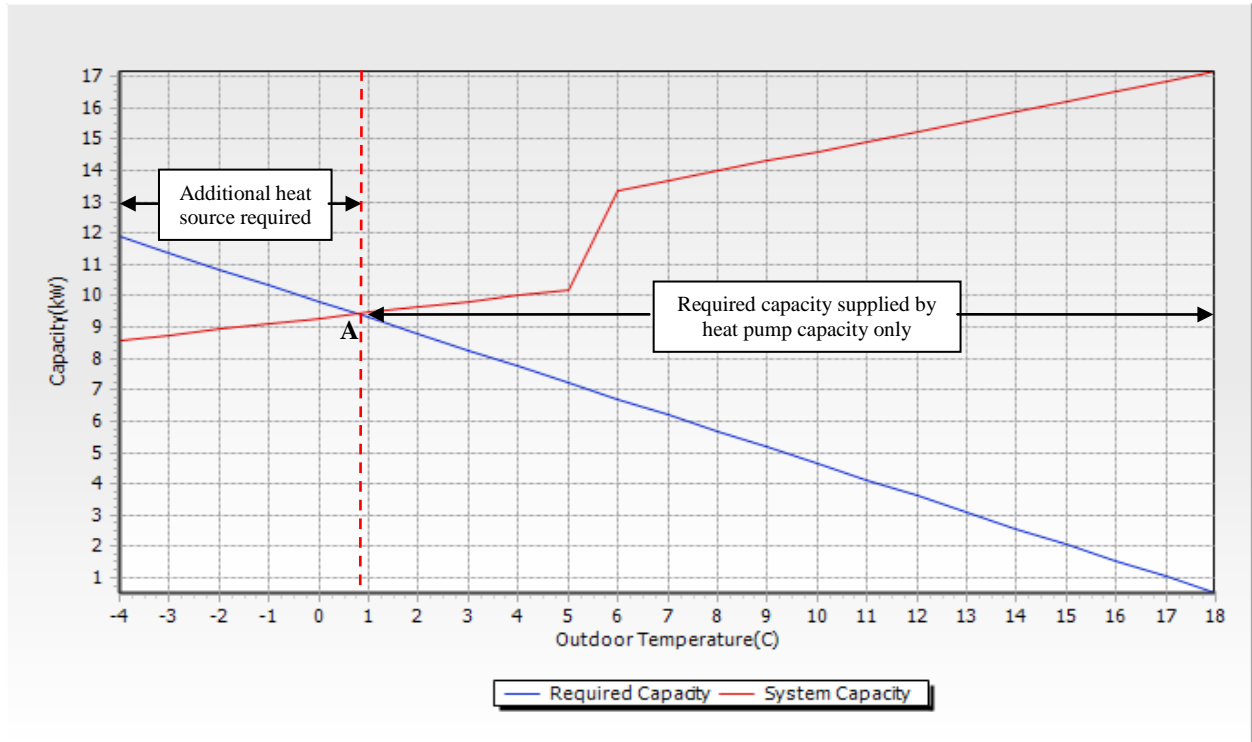
#### 4. Auxilliary boiler control



- Isolate the electrical supply to the ESTIA system and remove the cover to the electrical box in the hydro unit
- Connect the start signal for the auxilliary boiler to terminals 3 & 4 (EMG) of the TCB-PCIN3E option PCB as shown in the diagram above
- Set DPSW 13\_2 to ON. This enables the control for boiler output control
- Replace the cover on the electrical box in the hydro unit and restore the electrical supply to the ESTIA system
- Set the following function codes to the required setting:
- FC23: Sets the OAT where the boiler output is switched ON
- FC3E: Allows the boiler output to be synchronised with the heat pump or to run as an independent device
  - If FC3E is set to 0 then the boiler is synchronised with the heat pump. In this condition the heat pump and the boiler will run at the same time. When the water temperature, inside the hydro unit, reaches thermo OFF conditions then the heat pump will STOP and the boiler output will turn OFF
  - If FC3E is set to 1 then the heat pump and the boiler will run as independent devices. When the water temperature, inside the hydro unit, reaches thermo OFF conditions then the heat pump will STOP. However with FC3E = 1 the boiler output will remain ON. The temperature of the water, from the boiler, will be controlled by the boilers' own thermostat
- FC5B: Sets the operating mode for the system when the boiler output is ON:
  - FC5B = 0: The heat pump and the boiler will operate when  $OAT \leq FC23$
  - FC5B = 1: Boiler only operation (in this mode of operation the hydro unit pump will continue to run)
  - FC5B = 2: Electric heater only operation (in this mode of operation the hydro unit pump will continue to run)
  - FC5B = 3: Boiler only operation (in this mode of operation the hydro unit pump will STOP and the boiler output will stay ON)

### How to determine the setting for FC23:

The boiler output is used to switch an external boiler ON / OFF to support the ESTIA system during low ambient conditions. It is possible to estimate the switching temperature, required for the boiler output, using the system/installation capacity graph generated by the ESTIA Sales Support Software (see graph below).



#### On the graph above:

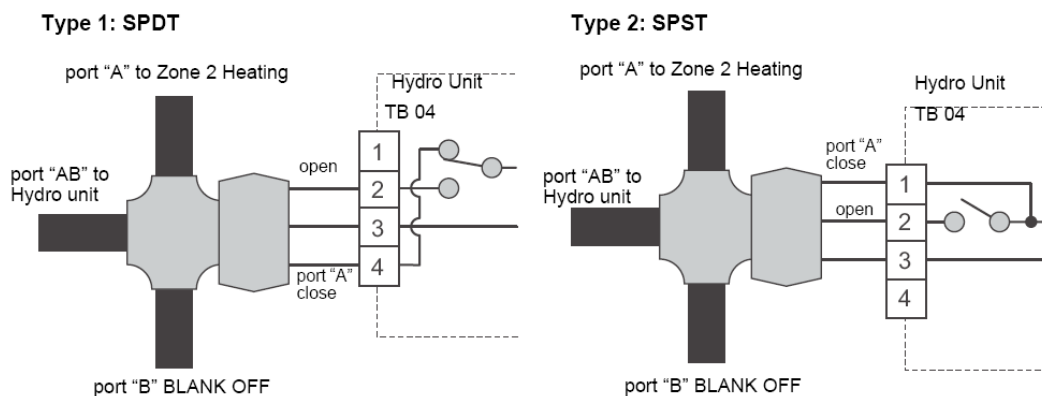
- The heat pump output capacity is represented by the red line
- The heat load for the installation / site is represented by the blue line
- The point where the 2 lines cross, point A, represents the equilibrium point of the system. This is where the capacity output from the heat pump is equal to the heat load requirements of the installation / site. On the example above the equilibrium point is reached when the outdoor air temperature (OAT) is approximately 1°C
- The area to the left of the equilibrium point and between the red and blue lines represents the area where an additional heat source is required to support the heat pump output
- From the graph it can be seen that when the outdoor air temperature is -4°C there is a requirement for an additional heat source (electric back up heaters, existing boiler etc.) to supply the installation with approximately 3.5kW of heating
- For the example above with FC23 set to 1°C then the boiler output will turn ON when the OAT decreases to 1°C. The boiler will support the output of the heat pump if the OAT is 1°C or less
- There is a 5K temperature differential between the boiler output ON / OFF temperatures. If the boiler output is set to turn ON when the OAT is 1 °C then the boiler output will not turn OFF until the OAT has reached 6°C
- It is possible to set FC23 lower than 1°C however this result in the electric back up heaters supplying some of the heating capacity required from the additional heat source.

## 5. 2 zone heating – mixing valve set up

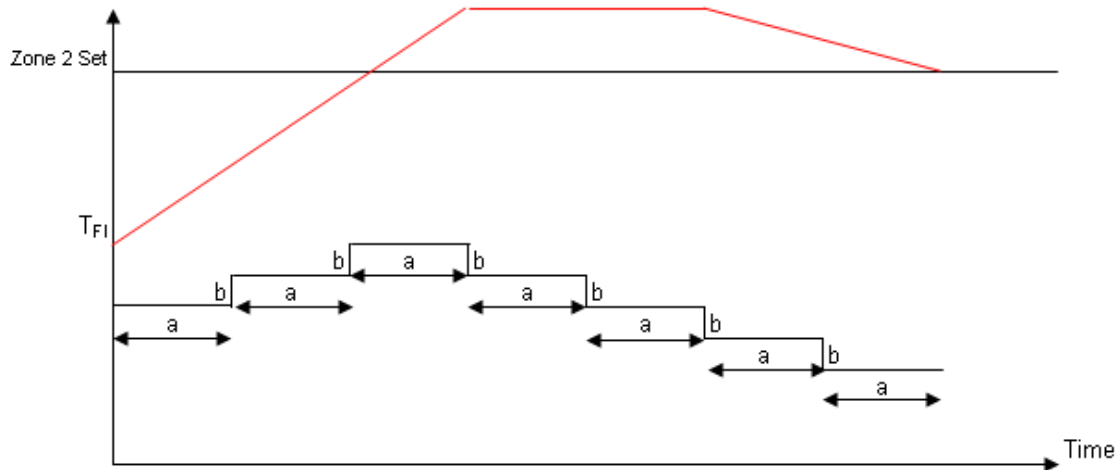
The ESTIA system has the ability to control the water temperature in 2 zones using different heating emitters (e.g. zone 1: radiators, zone 2: under floor heating circuits). This is achieved by installing a mixing valve to control the temperature of zone 2.

The mixing valve position is controlled by comparing the water set point temperature for zone 2 (entered on the ESTIA remote controller) and the actual water temperature in zone 2 (measured by the TFI sensor). Depending on the result of the comparison between the two temperatures the mixing valve will either OPEN or CLOSE (in steps) to control the temperature. The hydro unit software has been designed to drive the valve from CLOSED to OPEN in 12 steps (see the ESTIA service manual for a detailed description for the mixing valve control).

It is important that the settings for the mixing valve are set correctly using the hydro unit function codes to achieve accurate temperature control of zone 2.



- Connect the mixing valve as shown in the diagram above. The valve connection to TB04 (in the hydro unit) will depend on whether the valve is an SPST or SPDT type valve
- Set DPSW 12\_3 to ON. This enables 2 zone control and will allow the end user to enter a temperature set point (for zone 2) on the ESTIA remote controller
- Set the following function codes:
  - Set FC1C to the required setting. This will set the maximum target water temperature of the system when running in heating mode. This setting is particularly important – if the heating emitter used is under floor heating then damage may be caused to the floor surface if FC1A is set too high
  - Set FC1D to the required setting. This will set the minimum target water temperature of the system when running in heating mode
  - Set FC0C. This sets the specified drive time for the mixing valve. The drive time is the time measured to drive the valve through 90°. The drive time for the valve will be displayed in the valve specification data. It is important that this value is set correctly – this value sets the duration of the mixing valve drive time for each of the 12 steps.  
For example – if the specified drive time for the valve is 60 seconds then the drive time for each of the 12 steps will be 5 seconds ( $60/12 = 5$ ). For each step of the control power will be applied to the drive valve for a 5 second period.  
Setting the value of FC0C bigger or smaller than the actual specified drive time for the valve will result in poor position control of the mixing valve and therefore poor temperature control for zone 2
  - Set FC59 to the required setting. This sets the temperature measuring period (measured by the TFI sensor) or sampling period between each step drive of the mixing valve. The value of this function code will depend on a number of factors (thermal efficiency of the house, type of heating emitters, size of heating circuits etc.) and so the value set will depend on the knowledge of the installer / commissioning engineer



Zone 2 Set: Target water temperature for zone 2

TFI: Actual water temperature of zone 2 measured by the TFI sensor

a: 4 minute off time (sample period) between 230V~ pulses (sample period set using FC59)

b: AC230V pulse duration determined by dividing the valve opening time (from valve specification) by 12 (the maximum number of pulses available from the hydro unit software)


Example: for a valve with a drive time specification of 60 seconds:

$$b = 60 / 12 = 5 \text{ seconds pulse duration}$$

- On initial power up the mixing valve drives to the fully CLOSED position and then back to the mid position. This gives the mixing valve a reference position to start the temperature control for zone 2
- Once the valve has reached the mid-point reference position there is a 4 minute OFF delay (sampling period) before the valve drive to the next position. During this time the hydro unit software measures the value of TFI and compares the measured temperature to the target water temperature, for zone 2, set on the ESTIA remote controller
- If the temperature, measured by the TFI sensor, is lower than the target water temperature setpoint, then the mixing valve will OPEN by one step and then the software will recalculate the required operation during the next 4 minute OFF period
- If the temperature, measured by the TFI sensor, is higher than the target water temperature setpoint, then the mixing valve will CLOSE by one step and then the software will recalculate the required operation during the next 4 minute OFF period

## 6. Anti bacteria control (hot water mode)


The anti-bacteria control on ESTIA is used to prevent Legionella bacteria in the hot water system.

- Set the following function codes:
  - Hydro unit function code – FC0A: Sets the water temperature, inside the hot water cylinder, during the anti-bacteria cycle
  - Hydro unit function code – FC0B: Sets the duration of the anti-bacteria function once the cylinder water temperature has reached the cycle start temperature set by FC0A
  - Remote controller function code – RCFC0C: Sets the anti-bacteria cycle start time
  - Remote controller function code – RCFC0D: Sets the anti-bacteria cycle operating frequency
- When the function codes have been set press the  button on the ESTIA remote controller. This will activate the anti-bacteria cycle set in the function codes above
- When the anti-bacteria cycle is activated the anti-bacteria symbol (shown below) will be shown on the ESTIA remote controller display



## 7. Hot water boost control (hot water mode)


The hot water boost function can be used when there is a high demand for hot water. The boost function will heat the cylinder water to the set point temperature quicker than the time taken during normal hot water production.



- Set the following function codes for the hot water boost function:
  - FC08: Sets the duration of the hot water boost function
  - FC09: Sets the set point temperature, of the water in the cylinder, to be achieved during the hot water boost function
- When the above function codes have been set then the hot water boost function is activated by pressing  on the ESTIA remote controller
- When the hot water boost function is active the following symbol is shown on the ESTIA remote controller display



## Test Run

Once you have completed the installation and system configuration conduct a test run (see below). Since the protection setting is disabled in the TEST mode, do not continue a test run longer than 10 minutes.


- Press the TEST  button on the remote controller. An indication “TEST” appears on the remote controller.

- Press the ZONE1, 2  button and select “heating” with the OPERATE MODE  button.

The pump is activated in 30 seconds.


If air is not released completely, the flow switch is activated to stop operation. Release air again according to the piping procedure. Little air bite is discharged from the purge valve.


- Check that the air bite sound disappears.
- Check that the hydraulic pressure has become the predetermined pressure 0.1 to 0.2 MPa (1 to 2 bar). If the hydraulic pressure is insufficient, replenish water.
- Heating operation starts. Check that the hydro unit starts heating.

- Press the ZONE1, 2  button to stop operation.

- Press the HOT WATER  button to start hot water supply operation.





- Check that there is no air bite.
- Check that hot water is present at the connection port of the hot water cylinder.

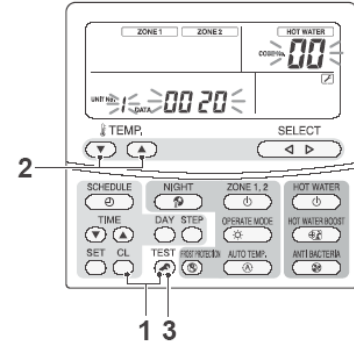
- Press the HOT WATER  button to stop the hot water supply operation.

- Press the TEST  button to exit the test mode.


# Sensor Temperature Monitoring Function

The sensor sensing temperature is displayed on the remote controller. This function allows you to make sure whether the sensor is installed properly.

- 1) Press  +  buttons for four seconds or more.
- 2) Select the Code No. with the TEMP.   buttons.



Code No.	Location	Indication	Unit
00	Hydro unit	Control Temperature (Hot water cylinder)	°C
01		Control Temperature (Zone1)	°C
02		Control Temperature (Zone2)	°C
03		Remote controller sensor temperature	°C
04		Condensed temperature (TC)	°C
06		Water inlet temperature (TWI)	°C
07		Water outlet temperature (TWO)	°C
08		Water heater outlet temperature (THO)	°C
09		Floor inlet temperature (TFI)	°C
0A		Hot water cylinder temperature sensor (TTW)	°C
0B		Motorized mixing valve position	step
0E		Lo pressure (Ps)	MPa
60		Outdoor unit	Heat exchanger temperature (TE)
61	Outside air temperature (TO)		°C
62	Refrigerant discharge temperature (TD)		°C
63	Refrigerant suction temperature (TS)		°C
65	Heat sink temperature (THS)		°C
6A	Current value (in the inverter)		A
6D	Heat exchanger coil temperature (TL)		°C
70	Compressor operating frequency		Hz
72	Number of revolutions of outdoor fan (lower)		rpm
73	Number of revolutions of outdoor fan (upper)	rpm	
74	Outdoor PMV position x1/10	pls	
F0	Service Data	Micro computer energized accumulation time	x100hrs
F1		Hot water compressor ON accumulation time	x100hrs
F3		Heating compressor ON accumulation time	x100hrs
F4		Hydro unit AC pump operation accumulation time	x100hrs
F5		Hot water cylinder heater operation accumulation time	x100hrs
F6		Hydro unit heater operation accumulation time	x100hrs
F7		Booster heater operation accumulation time	x100hrs

- 3) Press  button to exit the test mode.

**Non-defective operation (program operation).....No Check code displayed**

In order to control the heat pump unit, there are the following operations as the built-in program operations in the microcomputer. If a claim occurs about the operation, please confirm whether it falls under any of the contents in the following table.

If it does, please understand that the symptom is not a defect of the equipment, and it is an operation necessary for the control and maintenance of the heat pump unit.

No.	Operation of the heat pump system	Explanation
1	The compressor sometimes does not operate even within the range of compressor "ON".	The compressor does not operate during the operation of the compressor reboot timer (3 min). Even after the power activation, the compressor reboot timer continues to be active.
2	During the hot water supply or heating operation, without reaching the set temperature, the compressor operation frequency stays at a frequency of less than the maximum Hz or lowers down.	It may be caused by the high temperature release control (release protection control by the temperature of the water heat exchanger) or the current release control.
3	The "Stop" operation on the remote control will not stop the circulating pump. (The same for hot water supply and heating.)	In order to deal with the temperature increase in the heat exchanger after stopping, the operation continues for 1 min after the compressor is stopped.
4	"ON" on the remote control will not operate the compressor. (It will not operate even after the reboot delay timer elapsed)	When the outdoor temperature (TO sensor detection temperature) is -20°C or lower, the heat pump will not operate in order to protect the compressor, and the heater will operate instead.
5	When the power is turned ON it starts operation without operating the remote controller	<ul style="list-style-type: none"> <li>The auto restart operation may be working.</li> <li>The antifreeze operation may be working. If the TWI, TWO or THO sensor detects a temperature below 4°C, the operation changes from circulating pump ---&gt;&gt; circulating pump + heater.)</li> </ul>

**Defective operation check codes**

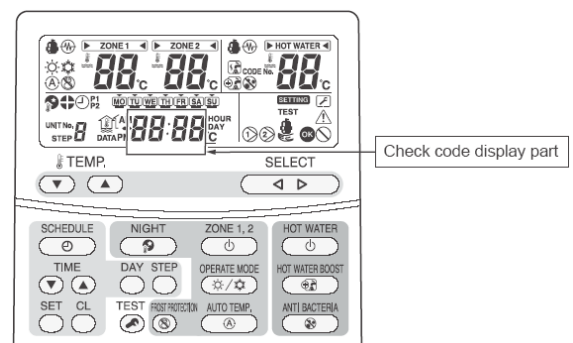
**How to determine from the check code on the remote control**

If the defect is limited by the check code displayed on the remote control, please repair the defect based on the table on the next page.




The check codes are separated into two groups: software and hardware errors.

Since a hardware error cannot be cancelled without a part replacement etc., please perform a repair.

If its abnormality is determined, the abnormality is noticed by indicating the check code on the remote control check code display part while letting off a buzzer.



**How to cancel a check code on the remote controller**

- (1) Press  or  button (on the operation side) to clear the check code.
- (2) Press  to stop a buzzer for an abnormality only.

Although the above procedure cancels the check code, the hardware error will be displayed again until the hardware repair is completed.



## Hydro Unit check codes

o..... Possible  
x.... Not possible

Check code	Diagnostic functional operation			Determination and action	Defect frequency confirmation
	Operational cause	Backup present	Automatic reset		
A01	<b>Pump or flowing quantity error</b> 1) Detected by TC sensor TC 63°C is detected in the heating or hot water supply heat pump operation (except for defrosting).	x	x	1. Almost no or little water flow. • Not enough vent air • Dirt clogging in the water piping system. • The water piping is too long. • Installation of buffer tank and secondary pump	4
	2) Detected by flow switch abnormality When no signal of the flow switch is showing 2 min after the built-in pump operation started.				2
	3) Detection of chattering abnormality in the flow switch input Chattering detection: Detects input changes (OFF⇔ON) 4 times within 10 seconds during operation.				4
	4) Disconnection of the flow switch connector When the stopped built-in pump starts its operation, the flow switch status is detecting "water flow".				2 1. Disconnection of the flow switch connector. 2. Defect of the flow switch.
A02	<b>Temperature increase error (heating)</b> When one of the TWI, TWO and THO sensors exceeds 70°C.	Heating O Hot water x	O	1. Check the water inlet, water outlet and heater outlet (TWI, TWO, THO) sensors. 2. Defect of the backup heater (defect automatic reset thermostat).	1
A03	<b>Temperature increase error (hot water supply)</b> When the TTW sensor exceeds 85°C.	Heating O Hot water x	O	1. Check the hot water cylinder sensor (TTW). 2. Check the hot water cylinder thermal cut-out.	1
A04	<b>Antifreeze operation (1)</b> 1)TWO>20°C condition: 2xTC+TWO < -12°C is detected. 2)TWO 20°C condition: TC+TWO < 4°C is detected. 3)TWI 10°C is detected during defrosting.	O	x	1. Almost no or little water flow. • Dirt clogging in the water piping system. • The water piping is too long. 2. Check the heater power circuit. • Power supply voltage, breaker, power supply connection 3. Set the presence of the backup heater. 4. Check the water inlet, water outlet and heat exchange (TWI, TWO, TC) sensors.	Heating 8 Hot water 8
A05	<b>Piping antifreeze operation</b> Activating the heater under the condition of TWO<4orTWI<4orTHO<4 does not achieve TWO,TWI,THO 5°C after 30 min elapsed.	O	O	1. Check the heater power circuit. • Power supply voltage, breaker, power supply connection 2. Check the water inlet, water outlet and heater outlet sensors (TWI, TWO, THO). 3. Disconnection of the backup heater.	1
A07	<b>Pressure switch operation</b> The pressure switch operates for 300 sec continuously during the heat pump operation.	O	x	1. Almost no or little water flow. 2. Defect of the flow switch. 3. On-load operation under the above conditions. 4. Defect in the pressure switch.	1
A08	<b>Low pressure sensor operation error</b> The low pressure sensor detected 0.2 MPa or less.	O	x	1. Almost no or little water flow. 2. Defect of the flow switch. 3. Prolonged defrosting (a lot of frost formation) under the above conditions.	8
				4. Defect in the low pressure sensor.	8

Check code	Diagnostic functional operation			Determination and action	Defect frequency confirmation
	Operational cause	Backup present	Automatic reset		
A09	<b>Overheat protection operation</b> When the thermostat of the backup heater activates during the operation of the heat pump or backup heater. When the thermostat operation is activated while it has been stopped.	O	x	1. No water (heating without water) or no water flow. 2. Defect of the flow switch.	2
				3. Defect of the backup heater (poor automatic reset thermostat).	1
A10	<b>Antifreeze operation (2)</b> When $TC + TWO < -15^{\circ}C$	x	x	1. Almost no water flow 2. Defect of the flow switch 3. Low refrigerant charge	10
A11	<b>Operation of the release protection</b> When the TWO release counts to 10.			1. Almost no water flow. 2. Defect of the flow switch. 3. Check the water outlet temperature sensor (TWO).	10
A12	<b>Heating, hot water heater</b> The antifreeze control is detected under the condition of $TWI < 20^{\circ}C$ while $TWI > 15^{\circ}C$ , $TTW > 20^{\circ}C$ is not detected after the heater backup.	O	O	1. Activated by a large load of heating or hot water supply. 2. Check the heater power circuit (backup or hot water cylinder heater). • Power supply voltage, breaker, power supply connection	1
E03	<b>Regular communication error between hydro unit and remote controller</b> When there is no regular communication from the remote control for 3 min, or when no remote control is equipped.	x	O	1. Check remote control connection. 2. Defect in the remote control.	1
E04	<b>Regular communication error between hydro unit and outdoor unit</b> The serial signal cannot be received from outdoor.	O	O	1. Check the serial circuit. • Miswiring of the crossover between the water heat exchanger and the outdoor unit	1
F03	<b>TC sensor error</b> Open or short circuit in the heat exchange temperature sensor.	O	O	1. Check the resistance value and connection of the heat exchange temperature sensor (TC).	1
F10	<b>TWI sensor error</b> Open or short circuit in the water inlet temperature sensor.	O	O	1. Check the resistance value and connection of the water inlet temperature sensor (TWI).	1
F11	<b>TWO sensor error</b> Open or short circuit in the water outlet temperature sensor.	x	O	1. Check the resistance value and connection of the water outlet temperature sensor (TWO).	1
F14	<b>TTW sensor error</b> Open or short circuit in the hot water cylinder sensor.	x	O	1. Check the resistance value and connection of the hot water cylinder sensor (TTW).	1
F17	<b>TFI sensor error</b> Open or short circuit in the floor temperature sensor.	x	O	1. Check the resistance value and connection of the floor-inlet temperature sensor (TFI).	1
F18	<b>THO sensor error</b> Open or short circuit in the heater outlet temperature sensor.	x	O	1. Check the resistance value and connection of the heater outlet temperature sensor (THO).	1
F19	<b>Detection of THO disconnection error</b> When $TWO - THO > 15K$ is detected and 30 sec elapsed.	x	x	1. Check for any disconnection of the heater outlet temperature sensor (THO).	1
F20	<b>TFI sensor error</b> When $TWO - TFI > 30K$ is detected and $TFI < TWI - 5K$ is detected.	x	x	1. Check the connection of the floor-inlet temperature sensor (TFI).	1

Check code	Diagnostic functional operation			Determination and action	Defect frequency confirmation
	Operational cause	Backup present	Automatic reset		
F23	<b>Low pressure sensor error</b> When PS<0.07 MPa is detected for 90 sec or more (defrosting) When PS<0.07 MPa is detected for 10 minutes or more (hot water supply, heating)	O	O	1. Check the connection (body or connection wiring) of the low pressure sensor.  2. Check the resistance value of the low pressure sensor.	1
F29	<b>EEROM error</b> Inconsistency is detected once without verify ACK after writing to EEPROM.	x	x	1. Replace the water heat exchange control board.	1
F30	<b>Extended IC error</b> When the extended IC is abnormal.	x	x	1. Replace the water heat exchange control board.	1
L07	<b>Communication error</b> Individual hydro units have a group line.	x	x	1. Replace the water heat exchange control board.	1
L09	<b>Communication error</b> The capability of the hydro unit has not been set.	x	x	1. Check the setting of the FC01 capability specifications. HWS-803xx-E = 0012 HWS-1403xx-E = 0017	1
L16	<b>Setting error</b> When ZONE1 has not been set, while ZONE2 has been set.	x	x	1. Check the body DP-SW12_2,3.	1

### Outdoor Unit check codes

o..... Possible  
x.....Not Possible

Check code	Diagnostic functional operation			Determination and action	Defect frequency confirmation
	Operational cause	Backup present	Automatic reset		
F04	<b>TD sensor error</b> Open or short circuit in the discharge temperature sensor.	O	x	1. Check the resistance value and connection of the discharge sensor (TD).	1
F06	<b>TE sensor error</b> Open or short circuit in the heat exchange temperature sensor.	O	x	1. Check the resistance value and connection of the heat exchange temperature sensor (TE).	1
F07	<b>TL sensor error</b> Open or short circuit in the heat exchange temperature sensor.	O	x	1. Check the resistance value and connection of the heat exchange temperature sensor (TL).	1
F08	<b>TO sensor error</b> Open or short circuit in the outdoor temperature sensor.	O	x	1. Check the resistance value and connection of the outdoor temperature sensor (TO).	1
F12	<b>TS sensor error</b> Open or short circuit in the suction temperature sensor.	O	x	1. Check the resistance value and connection of the suction temperature sensor (TS).	1
F13	<b>TH sensor error</b> Open or short circuit in the heat-sink temperature sensor.	O	x	1. Check the resistance value and connection of the heat-sink temperature sensor (TH).	1
F15	<b>TE, TS sensors error</b> Open or short circuit in the temperature sensors.	O	x	1. Check for any wrong installation of the heat exchange temperature sensor (TE) and the suction temperature sensor (TS).	1
F31	<b>EEPROM error</b>	O	x		1

Check code	Diagnostic functional operation			Determination and action	Defect frequency confirmation
	Operational cause	Backup present	Automatic reset		
H01	<b>Compressor breakdown</b> 1 When the operation frequency lowers due to the current release 40 sec or later after the compressor activation and it stops by under running the minimum frequency. 2 When the operation frequency lowers due to the current limit control and it stops by under running the minimum frequency. 3 When an excess current is detected 0.8 sec or later after the compressor activation.	O	×	1. Check the power supply voltage (AC220 -230 V±10% single phase type). (AC380 – 400V ± 10% 3 phase type) 2. Over-loaded condition of the refrigeration cycle. 3. Check that the service valve is fully open.	8
H02	<b>Compressor lock</b> When the input current is more than zero 20 sec or later after the compressor activation and the activation has not been completed.	O	×	1. Defect of compressor (lock) – Replace the compressor. 2. Defect of compressor wiring (open phase).	8
H03	<b>Defect in the current detection circuit</b>	O	×	1. Replace the outdoor inverter control board.	8
H04	<b>Operation of case thermostat</b> When the case thermostat exceeds 125°C.	O	×	1. Check the refrigeration cycle (gas leak). 2. Check the case thermostat and connector. 3. Check that the service valve is fully open. 4. Defect of the pulse motor valve. 5. Check for kinked piping.	4
L10	<b>Unset service PC board jumper</b> Jumpers J800-J803 have not been cut.	O	×	1. Cut J800-J803.	1
L29	<b>The communication between the outdoor PC board MUCs error</b> No communication signal between IPDU and CDB.	O	×	1. Replace the outdoor control board.	1
P03	<b>The outlet temperature error</b> When the discharge temperature sensor (TD) exceeds 111°C.	O	×	1. Check the refrigeration cycle (gas leak). 2. Defect of the pulse motor valve. 3. Check the resistance value of the discharge temperature sensor (TD).	4
P04	<b>The high pressure switch error</b>	O	×		10
P05	<b>The power supply voltage error</b> When the power supply voltage is extremely high or low.	O	×	1. Check the power supply voltage. (AC230 V±23 V)	4
P07	<b>Overheating of heat-sink error</b> When the heat-sink exceeds 105°C.	O	×	1. Check the thread fastening and heat-sink grease between the outdoor control board and the heat-sink. 2. Check the heat-sink fan duct. 3. Check the resistance value of the heat-sink temperature sensor (TH).	4
P15	<b>Detection of gas leak</b> When the discharge temperature sensor (TD) exceeds 106°C for consecutive 10 min. When the suction temperature sensor (TS) exceeds 40°C for heating for 10 consecutive min.	O	×	1. Check the refrigeration cycle (gas leak). 2. Check that the service valve is fully open. 3. Defect of the pulse motor valve. 4. Check for kinked piping. 5. Check the resistance value of the discharge temperature sensor (TD) and the suction temperature sensor (TS).	4

Check code	Diagnostic functional operation			Determination and action	Defect frequency confirmation
	Operational cause	Backup present	Automatic reset		
P19	<p><b>The 4-way valve inversion error</b> When the heat exchange temperature sensor (TE) exceeds 30°C or the suction temperature sensor (TS) exceeds 50°C during the heat pump operation.</p>	O	×	<p>1. Check the operation of the 4-way valve unit or the coil characteristics. 2. Defect of the pulse motor valve. 3. Check the resistance value of the heat exchange temperature sensor (TE) and the suction temperature sensor (TS).</p>	4
P20	<p><b>High pressure protection operation</b> When an abnormal stop occurs due to the high pressure release control. When the water outlet sensor (TWO) detects 60°C during the heating or hot water supply operation.</p>	O	×	<p>1. Check that the service valve is fully open. 2. Defect of the pulse motor valve. 3. Check the outdoor fan system (including clogging). 4. Over-filling of refrigerant. 5. Check the resistance value of the heat exchange temperature sensor (TL) and the water outlet temperature sensor (TWO).</p>	10
P22	<p><b>Outdoor fan system error</b> When a DC fan rotor position detection NG, element short circuit, loss of synchronization, or abnormal motor current occurs.</p>	O	×	<p>1. Check the lock status of the motor fan. 2. Check the connection of the fan motor cable connector. 3. Check the power supply voltage (AC230 V±23 V).</p>	1-4
P26	<p><b>Short circuit of the compressor driver element error</b> When an abnormal short circuit of IGBT is detected.</p>	O	×	<p>1. P26 abnormality occurs when operating with the compressor wiring disconnected ... Check the control board. 2. No abnormality occurs when operating with the compressor wiring disconnected ... Compressor rare short.</p>	8
P29	<p><b>Compressor rotor position error</b> The rotor position in the compressor cannot be detected.</p>	O	×	<p>1. Even if the connection lead wire of the compressor is disconnected, it stops due to an abnormality in the position detection ... Replace the inverter control board. 2. Check the wire wound resistor of the compressor. Short circuit ... Replace the compressor.</p>	8

## Remote controller check codes

Check code	Diagnostic functional operation			Determination and action
	Operational cause	Status of air-conditioning	Condition	
Not displaying at all (cannot operate by the remote control)	<b>No communication between hydro unit and remote controller</b> <ul style="list-style-type: none"> <li>The remote control wiring is not connected correctly.</li> <li>The hydro unit has not been turned on.</li> </ul>	Stop	–	Defect in the remote control power supply <ol style="list-style-type: none"> <li>1. Check the remote controller wiring.</li> <li>2. Check the remote controller.</li> <li>3. Check the hydro unit power supply wiring.</li> <li>4. Check the water heat exchange control board.</li> </ol>
E01	<b>No communication between hydro unit and remote controller</b> <ul style="list-style-type: none"> <li>Disconnection of the crossover between the remote control and the base unit of the indoor unit (detected on the remote control side).</li> </ul>	Stop (Automatic reset)	Displayed when the abnormality is detected.	Defect in the reception of the remote control <ol style="list-style-type: none"> <li>1. Check the remote control crossover.</li> <li>2. Check the remote control.</li> <li>3. Check the hydro power supply wiring.</li> <li>4. Check the water heat exchanger board.</li> </ol>
E02	<b>Defect in the signal transmission to the hydro unit.</b> (Detected on the remote control side)	Stop (Automatic reset)	Displayed when the abnormality is detected.	Defect in the transmission of the remote control <ol style="list-style-type: none"> <li>1. Check the transmitter circuit inside the remote control.</li> <li>... Replace the remote control.</li> </ol>
E09	<b>Several remote control base units</b> (Detected on the remote control side)	Stop (The handset continues)	Displayed when the abnormality is detected.	1.2 Check several base units with the remote control <ul style="list-style-type: none"> <li>... The base unit is only one, and others are handsets.</li> </ul>

## Outdoor Fault Diagnosis

You can perform fault diagnosis of the outdoor unit with the LED's on the P.C. board of the outdoor unit in addition

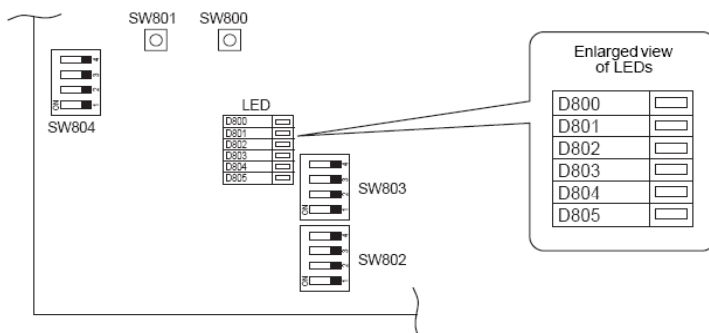
to check codes displayed on the wired remote controller of the hydro unit.

Use the LED's and check codes for various checks.

### Check of the current abnormal status

1. Check that DIP switch SW803 is set to all OFF.
2. Jot down the states of LED800 to LED804. (Display mode 1)
3. Press SW800 for at least one second. The LED status changes to display mode 2.
4. Check the code whose display mode 1 equals the jotted LED status and display mode 2 equals the current flashing status of LED800 to LED804 from the following table to identify the cause.

\* The LEDs and DIP switches are located at the lower left of the P.C. board of the outdoor unit.



### Check of the abnormal status in the past although the abnormal status is not occurred now.

1. Set bit 1 of DIP switch SW803 to ON.
2. Jot down the states of LED800 to LED804. (Display mode 1)
3. Press SW800 for at least one second. The LED status changes to display mode 2.
4. Find an error whose display mode 1 equals the jotted LED status and display mode 2 equals the current flashing status of LED800 to LED804 from the following table to identify the error.
  - An outside **air temperature (TO) sensor error** can be checked only while an error occurs.

No.	Cause	DISPLAY MODE 1					DISPLAY MODE 2				
		D800	D801	D802	D803	D804	D800	D801	D802	D803	D804
1	Normal	●	●	●	●	●	●	●	●	●	●
2	Discharge sensor (TD) error	○	○	●	●	○	●	●	◎	●	●
3	Heat exchanger sensor (TE) error	○	○	●	●	○	●	◎	◎	●	●
4	Heat exchanger sensor (TL) error	○	○	●	●	○	◎	◎	◎	●	●
5	Outside air temperature sensor (TO) error	○	○	●	●	○	●	●	●	◎	●
6	Suction sensor (TS) error	○	○	●	●	○	●	●	◎	◎	●
7	Heat sink sensor (TH) error	○	○	●	●	○	◎	●	◎	◎	●
8	Outdoor temperature sensor (TE/TS) connection error	○	○	●	●	○	◎	◎	◎	◎	●
9	Outdoor EEPROM error	○	○	●	●	○	◎	◎	◎	◎	◎
10	Compressor lock	●	●	○	●	○	◎	●	●	●	●
11	Compressor lock	●	●	○	●	○	●	◎	●	●	●
12	Current detect circuit error	●	●	○	●	○	◎	◎	●	●	●
13	Thermostat for compressor activated	●	●	○	●	○	●	●	◎	●	●
14	Model data not set (on the service P.C. board)	●	○	○	●	○	●	◎	●	◎	●
15	MCU-MCU communication error	●	○	○	●	○	◎	●	◎	◎	◎
16	Discharge temperature error	○	○	○	●	○	◎	◎	●	●	●
17	Abnormal power (open phase detected or abnormal voltage)	○	○	○	●	○	◎	●	◎	●	●
18	Heat sink overheat	○	○	○	●	○	◎	◎	◎	●	●
19	refrigerant leak detected	○	○	○	●	○	◎	◎	◎	◎	●
20	4-way valve reverse error	○	○	○	●	○	◎	◎	●	●	◎
21	High pressure release operation	○	○	○	●	○	●	●	◎	●	◎
22	Outdoor fan motor error	○	○	○	●	○	●	◎	◎	●	◎
23	Compressor driver short circuit protection	○	○	○	●	○	●	◎	●	◎	◎
24	Position detect circuit error in one-line display	○	○	○	●	○	◎	●	◎	◎	◎

○ : ON                      ● : OFF                      ◎ : FLASHING

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