HITACHI

SERVICE MANUAL

YUTAKI
R32 / R410A SERIES



MODELS

SPLIT SYSTEM
YUTAKI S: RWM-(2.0-10.0)(N/R)1E
YUTAKI S COMBI: RWD-(2.0-6.0)(N/R)W1E-220S(-K)
OUTDOOR UNITS: RAS-(2-3)WHVRP1 / RAS-(4-10)WH(V)NPE

Cooling & Heating

air

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HITACHI

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1. General information

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1.1 General information

1.1.1 General notes

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As a result, some of the images or data used to illustrate this document may not refer to specific models. No claims will be accepted based on the data, illustrations and descriptions included in this manual.

No type of modification must be made to the equipment without prior, written authorization from the manufacturer.

NOTE

This air conditioner has been designed for standard air conditioning for human beings. For use in other applications, please contact your Hitachi dealer or service contractor.

1.1.2 Introduction

Hitachi proudly announces the newest air-to-water heat pumps in its award-winning YUTAKI range.

YUTAKI units produce heating and domestic hot water like any oil or gas boiler, but transforming renewable energy from the outside air into heat. Air to water heat pumps extract the free energy present in the air, which is enough to heat a home up to a comfortable temperature, even on the coldest winter day. Every kW of electricity used to power the heat pump can yield up to more than 5 kW of energy for heating; this provides savings of up to 80% on heating expenses compared to a traditional fossil fuel boiler.

The new YUTAKI series, based on state-of-the-art technology, does not only achieve an outstanding performance in space heating but also provides domestic hot water with high efficiency. Additionally, cooling operation for summer can also be provided installing the dedicated “Cooling kit” accessory of Hitachi.

The system is simple to control; its new user controller (PC-ARFH2E) improves the acclaimed and successful design used with the existing LCD controller and provides a great deal of new functions like: live view, energy consumption data, fan coils control, weekly timer, wizard to set timer, override function, etc.

1.1.2.1 Overview of YUTAKI system

◆ Split system - YUTAKI S, YUTAKI S COMBI

It consists of one outdoor unit and one indoor unit. The outdoor unit extracts the heat present in the air, increases its refrigerant temperature and transmits it to the water circuit using the plate heat exchanger of the indoor unit, where the heat is taken to radiators (fan-coils), underfloor heating components or both (2nd temperature area).

Two types of indoor unit can be used in heating split systems:

YUTAKI S

The indoor unit of YUTAKI S is designed for space heating, in wall-mounted installation. It is convenient for new installations with low capacity requirements (Well insulated installations, high efficiency radiators...).

YUTAKI S COMBI

The indoor unit of YUTAKI S COMBI is conceived as a floor standing unit. It is prepared for heating operation as well as for domestic hot water production. For this purpose, it has a built-in domestic hot water 220 L tank. In line with YUTAKI S units, it meets the needs of installations with low capacity requirements.

Furthermore, new YUTAKI S COMBI models have been designed for the UK market that meet the UK requirements referred in the UK Building Regulations.

1.1.2.2 Summary of operations

Space heating

YUTAKI units are factory-supplied ready for space heating operation. Different heating installation configurations can be selected, providing a comfortable atmosphere all year long, even in the coldest climates:

- ***Mono-valent system***
  The air to water heat pump is sized to provide 100% of the heating requirements on the coldest day the year.
- ***Mono-energy system***
  This is the most popular configuration. The air to water heat pump is sized to provide 80% of the heating requirements on the coldest days of the year. An auxiliary electric heater is used to provide the additional heating required on cold days. This option usually results in an ideal balance between installation costs and future energy consumption, as proven by its popularity in colder climates than ours, such as Sweden and Norway.
- ***Alternating Bi-valent system***
  For installations with an existing heating system by boiler and when is needed to heat the supplied water temperature to the circuit up to high temperatures (80ºC), the boiler can be configured to alternate with the air to water heat pump.

Selecting the different configuration types it is possible to adapt the system to all customer requirements, providing a wide application range from the simplest configuration to complete configuration: Radiator, heating floor or both (2nd temperature area).

Domestic hot water production

For YUTAKI S, the Hitachi accessory “DHWT-(200/300)S-3.0H2E” can be used for the production of DHW.

In case of YUTAKI S COMBI, the domestic hot water tank is built in the indoor unit.

An electric heater is incorporated inside both remote and integrated tanks in order to allow an immediate heating of the domestic hot water in accordance with the user’s needs.

Space cooling

YUTAKI units can also be operated in cooling operation. The dedicated “Cooling kit” accessory has been designed for this purpose. Combining the heating only models with these cooling kits, the reversible models become available. In this case, combination with fan-coils, refreshing floor or both (2nd temperature area) can be applied.

Combination with solar panels

YUTAKI system can be combined with solar panel. The solar combination enables to heat up the DHW by means of the sun. The solar combination is designed to transfer the heat from the solar panels (sun radiation) to the heat exchanger of DHW tank.

Swimming pool water heating operation

For summer session period, YUTAKI system can be used to heat up the water temperature of swimming pools up to a value between 24 and 33ºC.

1.2 Applied symbols

During normal air conditioning system design work or unit installation, greater attention must be paid in certain situations requiring particular care in order to avoid damage to the unit, the installation or the building or property.

Situations that pose a risk to the safety of those in the surrounding area or to the unit itself are clearly indicated in this manual.

A series of special symbols are used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it.

⚠ DANGER

- ***The text following this symbol contains information and instructions relating directly to your safety.***
- ***Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others.***

In the texts following the danger symbol you can also find information on safety procedures during unit installation.

⚠ CAUTION

- *The text following this symbol contains information and instructions relating directly to your safety.*
- *Not taking these instructions into account could lead to minor injuries to you and others.*
- *Not taking these instructions into account could lead to unit damage.*

In the texts following the caution symbol you can also find information on safety procedures during unit installation.

NOTE

- *The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.*
- *Instructions regarding inspections to be made on unit parts or systems may also be included.*

1.3 Norms and Regulations

Following Regulation EU No. 517/2014 on Certain Fluorinated Greenhouse gases, it is mandatory to fill in the label attached to the unit with the total amount of refrigerant charged on the installation.

Do not vent R32 / R410A into the atmosphere: R32 / R410A are fluorinated greenhouse gases covered by the Kyoto protocol global warming potential (GWP) R32 = 675 / R410A = 2088.

Tn of CO_2 equivalent of fluorinated greenhouse gases contained is calculated by indicated GWP * Total Charge (in kg indicated in the product label and divided by 1000.

Appropriate refrigerant

The refrigerant used in each unit is identified on the specification label and manuals of the unit. Hitachi shall not be held liable for any failure, trouble, malfunction or accident caused by units illegally charged with refrigerants other than the specified one.

Consequences of charging non-specified refrigerant

It may cause mechanical failure, malfunction and other accidents. It may cause operational failure of protection and safety devices of air conditioners. It may also cause lubrication failure of the sliding part of the compressor due to deterioration of refrigerant oil.

In particular, hydrocarbon refrigerants (such as propane, R441A, R443A, GF-08, etc.) are not allowed, since these are combustible and may cause major accidents such as fire and explosion in case of improper handling.

Once a non-specified refrigerant has been charged, no further servicing (including draining of refrigerant) shall be performed, even in case of malfunction. Improper handling of refrigerant may be a cause of fire and explosion, and servicing in such cases may be considered an illegal act.

End clients and costumers shall be informed that servicing is not approved, and the installer who charged the nonspecified refrigerant shall be asked to fix the unit.

Hitachi will accept no responsibility for units that have been charged with non-specified refrigerant once.

1.4 Product guide

1.4.1 Classification of the units

1.4.1.1 Split system - Outdoor unit

Unit type: Outdoor unit (Split air system)									
	Position-separating hyphen (fixed)								
		Compressor power (HP): 2, 2.5, 3, 4, 5, 6, 8, 10							
			For water combination						
				Heat pump					
					V: Single phase unit (1~ 230V 50Hz) —: Three phase unit (3N~ 400V 50Hz)				
						N: R410A refrigerant R: R32 refrigerant			
							Premium series		
								Serie 1	
									Made in Europe
RAS	-	X	W	H	(V)	(X)	P	(1)	(E)

1.4.1.2 Split system - Indoor unit

◆ YUTAKI S

Unit type: YUTAKI S (Split system - Single water module (Indoor unit) - Medium/Low temperature)					
	Position-separating hyphen (fixed)				
		Compressor power of the combined outdoor unit (HP): 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0			
			N: R410A refrigerant R: R32 refrigerant		
				Serie 1	
					Made in Europe
RWM	-	X.X	(X)	1	E

◆ YUTAKI S COMBI

Unit type: YUTAKI S COMBI (Split system - Dual water module (Indoor unit + Domestic hot water tank) - Medium/Low temperature)											
	Position-separating hyphen (fixed)										
		Compressor power of the combined outdoor unit (HP): 2.0, 2.5, 3.0, 4.0, 5.0, 6.0									
			N: R410A refrigerant R: R32 refrigerant								
				Water-to-water DHW heat exchanger							
					Serie 1						
						Made in Europe					
							Position-separating hyphen (fixed)				
								Tank model: 220 L			
									Tank material: Stainless steel		
										-K: Model for UK market	
RWD	-	X.X	(X)	W	1	E	-	220	S	(-K)	

1.4.2 Product guide

1.4.2.1 Split system - Outdoor unit

1~ 230V 50Hz			
Unit	Code	Unit	Code
RAS-2WHVRP1	60289258	RAS-4WHVNPE	7E350007
RAS-2.5WHVRP1	60289259	RAS-5WHVNPE	7E350008
RAS-3WHVRP1	60289260	RAS-6WHVNPE	7E350009
			

3N~ 400V 50Hz	
Unit	Code
RAS-4WHNPE	7E350107
RAS-5WHNPE	7E350108
RAS-6WHNPE	7E350109
RAS-8WHNPE	7E350110
RAS-10WHNPE	7E350111
	

1.4.2.2 Split system - Indoor unit

◆ YUTAKI S

NOTE

Icons between brackets mean possible extra operations to the factory-supplied operations. For cooling operation, refer to the Cooling kit accessory for YUTAKI S units.

(☀) (▦) (◔) (◒) (▭) (❄)			
1~ 230V 50Hz			
Unit	Code	Unit	Code
RWM-2.0R1E	7E475216	RWM-4.0N1E	7E475020
RWM-2.5R1E	7E475217	RWM-5.0N1E	7E475021
RWM-3.0R1E	7E475218	RWM-6.0N1E	7E475022
			

3N~ 400V 50Hz					
Unit	Code	Unit	Code	Unit	Code
RWM-2.0R1E	7E475216	RWM-4.0N1E	7E475020	RWM-8.0N1E	7E475023
RWM-2.5R1E	7E475217	RWM-5.0N1E	7E475021	RWM-10.0N1E	7E475024
RWM-3.0R1E	7E475218	RWM-6.0N1E	7E475022		





◆ YUTAKI S COMBI

NOTE

Icons between brackets mean possible extra operations to the factory-supplied operations. For cooling operation, refer to the Cooling kit accessory for YUTAKI S COMBI units.

Standard model

1~ 230V 50Hz 3N~ 400V 50Hz	
Unit	Code
RWD-2.0RW1E-220S	7E483503
RWD-2.5RW1E-220S	7E483504
RWD-3.0RW1E-220S	7E483505
RWD-4.0NW1E-220S	7E483507
RWD-5.0NW1E-220S	7E483508
RWD-6.0NW1E-220S	7E483509



Model for UK market

1~ 230V 50Hz 3N~ 400V 50Hz	
Unit	**Code**
RWD-2.0RW1E-220S-K	7E483516
RWD-2.5RW1E-220S-K	7E483517
RWD-3.0RW1E-220S-K	7E483518
RWD-4.0NW1E-220S-K	7E483520
RWD-5.0NW1E-220S-K	7E483521
RWD-6.0NW1E-220S-K	7E483522



1.4.3 Accessory code list

Model	Ref.
For YUTAKI S units (RWM-(2.0-10.0)(N/R)1E)	S
For YUTAKI S COMBI units (RWD-(2.0-6.0)(N/R)W1E-220S(-K))	SC

◆ Cooling kit accessories

Accessory	Ref.	Name	Code	Figure
ATW-CKS-01	S	Cooling operation kit for YUTAKI S (For 2.0-3.0HP)	7E549927	
ATW-CKS-02	S	Cooling operation kit for YUTAKI S (For 4.0-6.0HP)	7E549928	
ATW-CKS-03	S	Cooling operation kit for YUTAKI S (For 8.0-10.0HP)	7E549929	
NEW ATW-CKSC-02	SC	Cooling operation kit for YUTAKI S COMBI - Insulations + Jumper	7E549959	
NEW ATW-CKSC-03	SC	Cooling operation kit for YUTAKI S COMBI - Insulations + Jumper + Drain Pump	7E549960	

◆ Control accessories

Accessory	Ref.	Name	Code	Figure
NEW PC-ARFH2E	S SC	Unit controller Wired room thermostat	7E543016	
ATW-RTU-04	S SC	Wireless ON/OFF thermostat (Receiver + Room thermostat)	7E543003	
ATW-RTU-06	S SC	Wireless Intelligent thermostat for 2nd circuit (Only Room thermostat. For Intelligent thermostat application)	7E543005	
ATW-RTU-07	S SC	Wireless Intelligent thermostat (Receiver + Room thermostat)	7E543015	

Accessory	Ref.	Name	Code	Figure
AHP-SMB-01	S SC	SmartBox (Hi-Box)	70549919	
ATW-KNX-02	S SC	KNX interface for YUTAKI units	7E549925	
ATW-TAG-02	S SC	Home automation gateway for YUTAKI units	70549926	
ATW-AOS-02	S SC	Auxiliary output signal box (Relay board for additional output signals)	7E549935	
HC-A16MB	S SC	MODBUS gateway for multi YUTAKI systems (up to 8 YUTAKI units max., with or without CASCADE CONTROLLER)	7E513210	
ATW-MBS-02	S SC	MODBUS gateway for single YUTAKI system	7E549924	
NEW ATW-YCC-03	S SC	YUTAKI CASCADE CONTROLLER (New controller generation (26 languages))	7E549963	

◆ Temperature sensor accessories

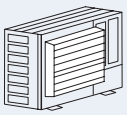
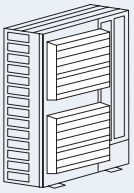
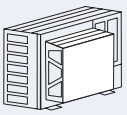
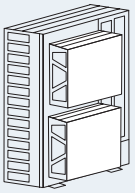
Accessory	Ref.	Name	Code	Figure
ATW-2OS-02	S SC	2nd outdoor temperature sensor	9E500017	
ATW-ITS-01	S SC	Indoor wired room temperature sensor	7E549932	
ATW-WTS-02Y	S SC	Universal water temperature sensor	9E500004	

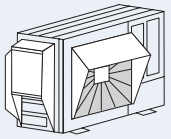
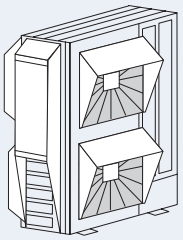
◆ Water circuit accessories

Accessory	Ref.	Name	Code	Figure
ATW-HSK-01	S SC	Hydraulic separator	7E549905	
NEW ATW-CP-05	SC	Active Anode (Impressed current)	70549954	
ATW-2TK-07	S SC	2nd temperature kit (Wall mounted model)	7E549952	
NEW ATW-2TK-08	SC	2nd temperature kit (Integrable in YUTAKI S COMBI 220 L model)	7E549965	
DHWT-200S-3.0H2E	S	Domestic hot water tank (200 L)	70544002	
DHWT-300S-3.0H2E		Domestic hot water tank (300 L)	70544003	
ATW-AQT-01	S SC	Aquastat security	7E549907	
ATW-3WV-01	S SC	3-way valve (Internal thread and spring return)	7E549906	
ATW-WCV-01	S SC	Water check valve	9E500014	
ATW-DPOV-01	S SC	Differential pressure overflow valve	7E549916	

1.4.4 Outdoor unit accessories code list

Model	Ref.
RAS-(2.0-3.0)WHVRP1	A
RAS-(4.0-10.0)WH(V)NPE	B

Accessory	OU reference	Description	Code	Figure
DH-SP63A	A	Drain heater	60292335	-
DBS-12L	A	Drain discharge connection	60291491	
DBS-26	B		60299192	
AG-264	A	Air flow guide	60209100	
AG-335A	B		60291432	
WSP-264	A	Wind guard	60291831	
WSP-160A	B		60291753	

Snow protection hood				
Accessory	**OU reference**	**Description**	**Code**	**Figure**
ZINC PLATE				 
ASG-SP10FTB (Half)	A	Air outlet	60292336	
ASG-SP11FTB (Full)			60292339	
ASG-NP335F1 (Half)	B		60291771	
ASG-SP11FC (Full)			60291783	
ASG-SP10BTB	A	Air inlet of rear side	60292337	
ASG-NP160B (Half)	B		60291777	
ASG-SP11BA (Full)			60291785	
ASG-SP10LTB	A	Air inlet of side face	60292338	
ASG-NP160L (Half)	B		60291779	
ASG-SP11LA (Full)			60291787	
STAINLESS PLATE				
ASG-SP10FTBS (Half)	A	Air outlet	60292352	
ASG-SP11FTBS (Full)			60292355	
ASG-NP335FS4 (Half)	B		60291940	
ASG-SP11FCS2 (Full)			60291948	
ASG-SP10BTBS (Half)	A	Air inlet of rear side	60292353	
ASG-NP280BS4 (Half)	B		60291945	
ASG-SP11BAS2 (Full)			60291949	
ASG-SP10LTBS (Half)	A	Air inlet of side face	60292354	
ASG-NP280LS4 (Half)	B		60291946	
ASG-SP11LAS2 (Full)			60291950	

2. Control configuration

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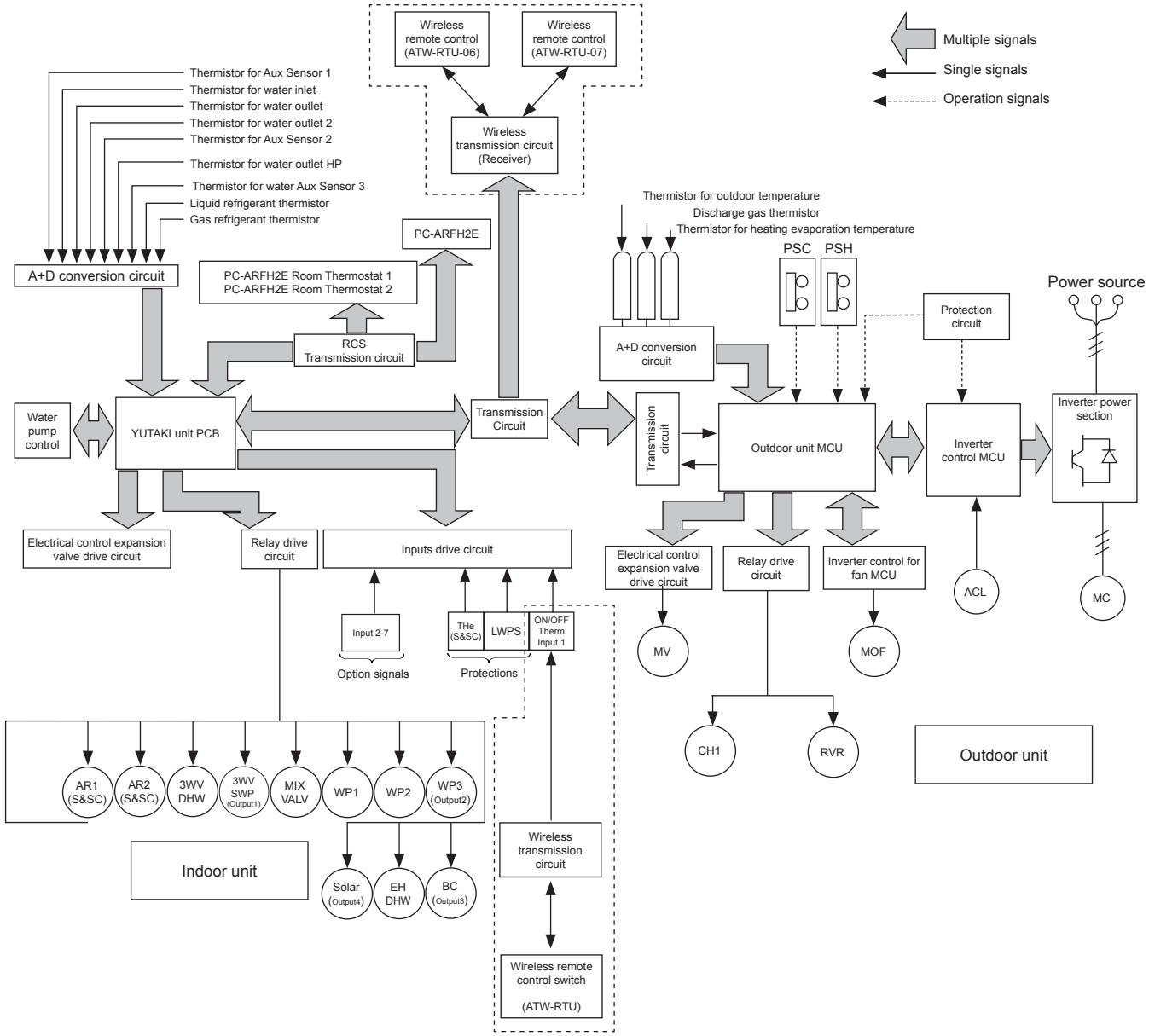
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2.1 Device control system

The figure below shows the outline of the control system.

2.1.1 YUTAKI units



Symbol	Name
AR1,2	Heater steps control
3WV DHW	3-way valve for Domestic Hot Water Tank output
3WV SWP	3-way valve for swimming pool output
MIX VALV	Mixing valve for second temperature control
WP1,2,3	Water pumps (primary, secondary, buffer tank)
Solar	Solar output (accessory)
EH DHW	Electrical heater Domestic Hot Water tank output
BC	Boiler combination output
PSH	High pressure switch
THe	Electrical heater thermostat protection
Input 1~7	Optional inputs
Output 1~4	Optional outputs
LWPS	Low water pressure switch
ON/OFF THERM	ON / OFF Room thermostat input (accessory)
CH1	Crankcase heater

Symbol	Name
MOF	Motor (for outdoor fan)
RVR	4-way valve
ACL	Reactor
MC	Motor for compressor
PSC	Low pressure switch for control
PSH	High pressure switch

2.2 Safety protection and control device

2.2.1 Split system - Outdoor unit

MODEL				RAS-2-3WHVRP1
For compressor	Pressure switches			Automatic reset, non-adjustable (Each one for each compressor)
	High	Cut-out	MPa	$4.15^{-0.05}_{-0.15}$
		Cut-in		3.20±0.15
	Low (For control)	Cut-out	MPa	2.85±0.1
		Cut-in		3.85±0.15
	Fuse capacity on PCB (PF1)	1~ 230V 50Hz	A	25
	CCP timer		-	Non adjustable
	Setting time		min	3
For fan motor Fuse capacity on PCB (PF4)			A	15
For control circuit Fuse capacity on PCB (EFR1)			A	3

MODEL				RAS-(4-6)WHVNPE	RAS-(4-6)WHNPE	RAS-(8/10)WHNPE
For compressor	Pressure switches			Automatic reset, non-adjustable (Each one for each compressor)		
	High	Cut-out	MPa	$4.15^{-0.05}_{-0.15}$		
		Cut-in		3.20±0.15		
	Low (For control)	Cut-out	MPa	0.30		
		Cut-in		0.20		
For control	Fuse	1~ 230V 50Hz	A	50	-	-
		3N~ 400V 50Hz		-	2 x 20	2 x 40
	CCP timer		-	Non adjustable		
	Setting time		min	3		
For condenser fan motor Internal thermostat			A	Automatic reset, non-adjustable (each one for each motor)		
For control circuit Fuse capacity on PCB			A	5		

Compressor protection

Device	Protection
High pressure switch	This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
Oil heater	This band heater protects against the oil carry-over during the cold starting, as the band heater is energized while the compressor is stopped.
Fan motor protection	Internal thermostat that is embedded in the fan motor winding: this internal thermostat cuts out the operation of the fan motor when the temperature of the fan motor winding exceeds the settings.

2.2.2 Split system - Indoor unit

2.2.2.1 YUTAKI S

MODEL			RWM-2.0-3.0R1E	RWM-4.0-6.0N1E	RWM-8.0/10N1E
For electric heater	Safety thermostat		Manual reset, non-adjustable (One per unit) 75ºC ±5%		
	Fuse capacity	A	6	12	16
For water circulation	Low water pressure switch		Automatic Reset		
	Open		0.5 bar		
	Close		0.9 bar		
	Low water flow control		Water flow control by Water pump feedback (Reset manual by Alarm)		
	Activation		0.5 m^3/h	0.8 m^3/h	1.2 m^3/h
	Water pump control		Water Pump status by feedback control		
For water temperature	High temperature protection		+5ºC of Maximum water temperature (Heating mode)		
	Freeze temperature protection		-3ºC of minimum water temperature (Cooling mode)		
For refrigerant temperature	Freeze temperature protection				
	Condition 1		Tl<-20ºC (for 30 seconds) Tg<-20ºC (for 30 seconds)		
	Condition 2		Tl<-10 and Two<6 (for 30 seconds) Tin or Two < 2ºC (for 30 seconds)		
For the control circuit	Fuse capacity		5A (Inside PCB)		

2.2.2.2 YUTAKI S COMBI

Standard model

MODEL			RWD-(2.0-3.0)RW1E-220S	RWD-4.0-6.0NW1E-220S
For electric heater	Safety thermostat		Manual reset, non-adjustable (One per unit) 75ºC ±5%	
	Fuse capacity		6A	12A
For water circulation	Low water pressure switch		Automatic Reset	
		Open	0.5 bar	
		Close	0.9 bar	
	Low water flow control		Water flow control by Water pump feedback (Reset manual by Alarm)	
	Activation		0.5 m^3/h	0.8 m^3/h
	Water pump control		Water Pump status by feedback control	
For water temperature	High temperature protection		+5ºC of Maximum water temperature (Heating mode)	
	Freeze temperature protection		-3ºC of minimum water temperature (Cooling mode)	
For refrigerant temperature	Freeze temperature protection			
		Condition 1	TI<-20ºC (for 30 seconds) Tg<-20ºC (for 30 seconds)	
		Condition 2	TI<-10 and Two<6 (for 30 seconds) Tin or Two < 2ºC (for 30 seconds)	
For the control circuit	Fuse capacity		5A (Inside PCB)	
For DHW electric heater	Safety thermostat		Manual reset, regulation adjustable, cut-out non-adjustable 85ºC ±5%	
	Fuse capacity		16A	

For UK models

MODEL			RWD-(2.0-3.0)RW1E-220S(-K)	RWD-4.0-6.0NWE-(200/260)-K
For electric heater	Safety thermostat		Manual reset, non-adjustable (One per unit) 75ºC ±5%	
	Fuse capacity		6 A	12 A
For water circulation	Low water pressure switch		Automatic Reset	
		Open	0.5 bar	
		Close	0.9 bar	
	Low water flow control		Water flow control by Water pump feedback (Reset manual by Alarm)	
	Activation		0.5 m^3/h	0.8 m^3/h
	Water pump control		Water Pump status by feedback control	
For water temperature	High temperature protection		+5ºC of Maximum water temperature (Heating mode)	
	Freeze temperature protection		-3ºC of minimum water temperature (Cooling mode)	
For refrigerant temperature	Freeze temperature protection			
		Condition 1	Tl<-20ºC (for 30 seconds) Tg<-20ºC (for 30 seconds)	
		Condition 2	Tl < -10 and Two < 6 (for 30 seconds) Tin or Two < 2ºC (for 30 seconds)	
For the control circuit	Fuse capacity		5A (Inside PCB)	
For DHW	Electric heater	Safety thermostat	Manual reset, regulation adjustable, cut-out non-adjustable 85ºC ±5%	
		Fuse capacity	16 A	
	DHW Thermostat		90ºC Manual reset, regulation adjustable, cut-out non-adjustable	
	Pressure and temperature safety valve		Pressure: 7bar & Temperature: 96ºC	

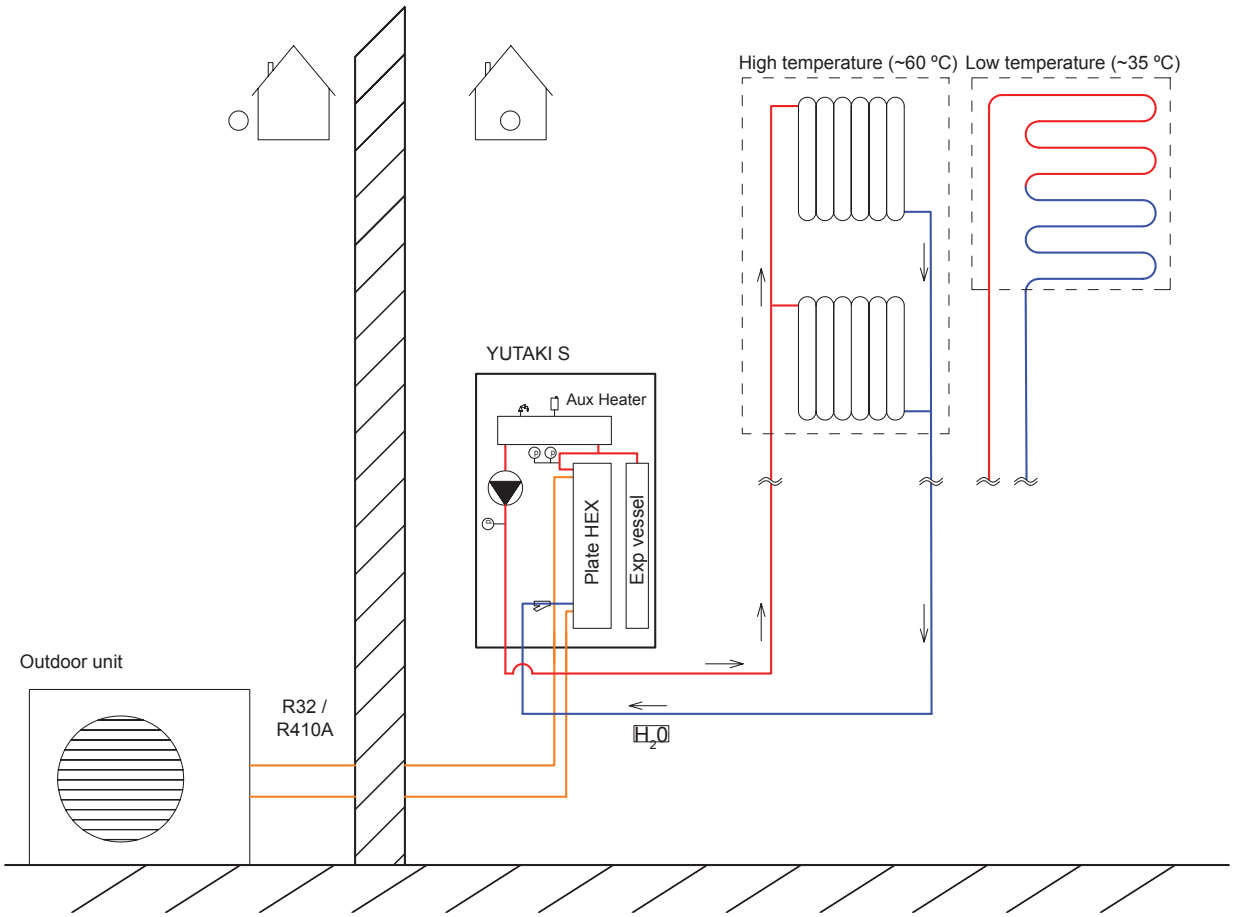
2.3 Space water temperature control

2.3.1 Space heating

◆ Main heating configuration

Available system configuration is as follows:

Configuration 1: Direct Circuit (Example for illustrative purpose of YUTAKI S)



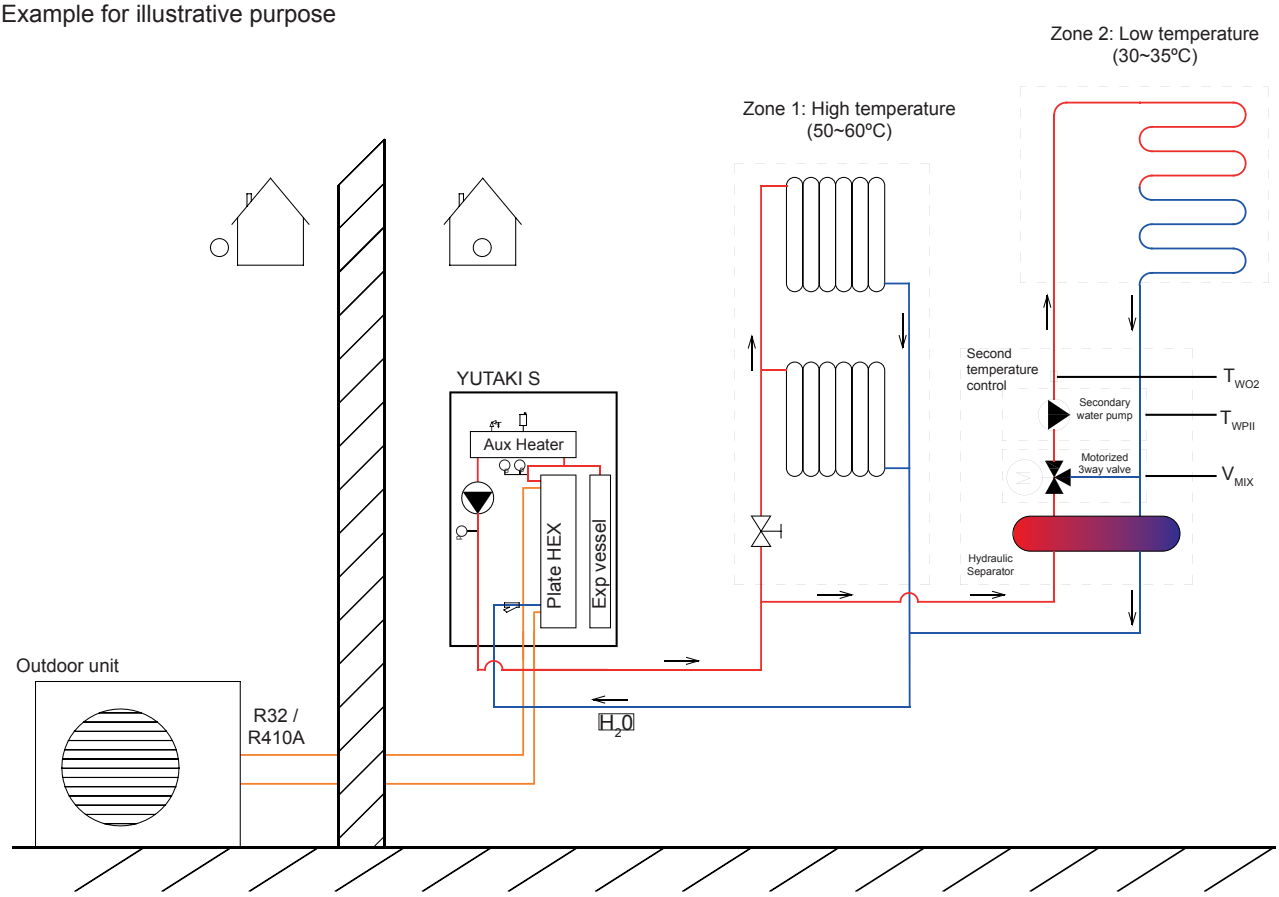
The unit is connectable to only one circuit demand, either high temperature (i.e., radiator or fan coils) or low temperature (radiant floor).

In addition, the unit can be combined with Sanitary tank (with solar kit extension) and with swimming pool.

Water temperature target depends on actual water outlet temperature and calculations by the selected setting mode.

Configuration 2: Direct and mixing circuit (two levels of water outlet temperature) (Example for illustrative purpose of YUTAKI S)

Example for illustrative purpose



When the YUTAKI range is connected to two different heating circuits, circuit 1 will be direct (high temperature for radiator operation) and circuit 2 will be a mixing circuit in order to have a second temperature control using mixing valve (low temperature for floor heating operation). Additionally, a motorized valve can be added in order to close direct circuit when not in use (see *"3. Optional functions"* chapter). The floor heating loops (circuit 2) require a lower temperature than with fan coils (circuit 1). To get these two water temperature levels, a mixing station is required. This mixing station is controlled using the indoor unit by means of a mixing valve and additional water sensor.

The unit can always be combined with Sanitary tank (with solar kit extension) and with swimming pool.

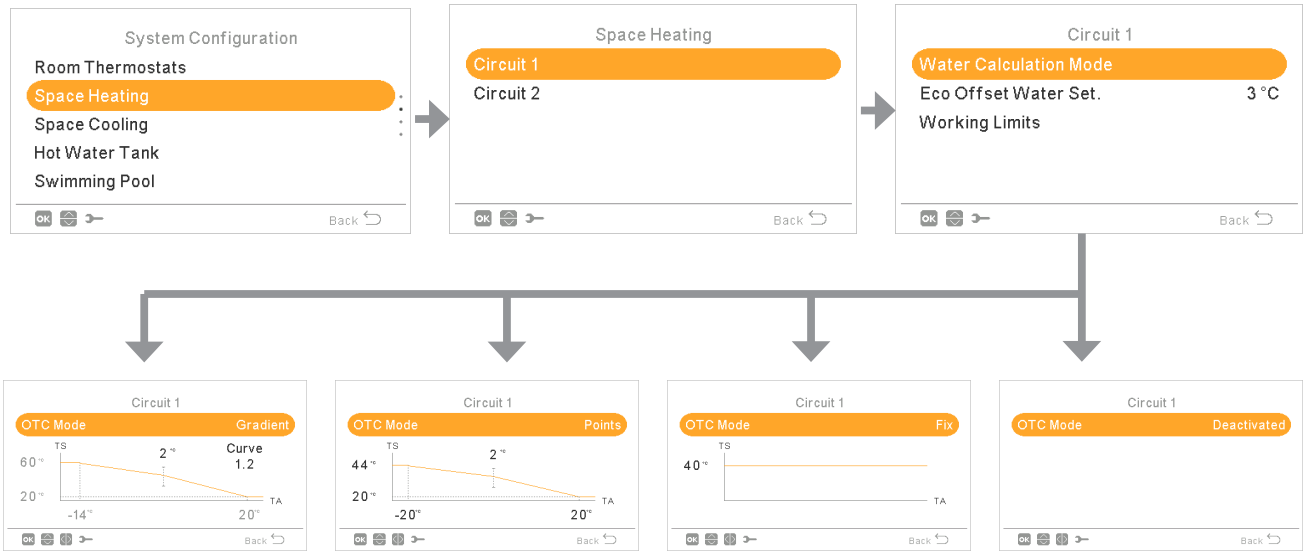
Water temperature target depends on the maximum heating supply set-points (Target area 1, target area 2).

2.3.1.1 Selecting space heating configuration

System configuration set according to water type is available from the system configuration menu at unit controller:

System configuration - Space heating - Circuit 1 / Circuit 2

Description	Default value	Range
Water calculation mode	Gradient (Circuit 1) Deactivated (Circuit 2)	Deactivated Points Gradient Fix



◆ Space heating activation conditions

If "Water type heating" is disabled then full space control heating is disabled.

- Space heating mode is activated by any of following events:
  - Space Heating mode selected by user (User interface RUN/STOP button) and
    - Space Heating mode Demand ON by external input (demand ON/OFF), or
    - Space Heating mode Demand ON by intelligent thermostat (demand ON/OFF), or
    - Space Heating mode Demand ON by unit controller timer, or
    - Space Heating mode Demand ON by central operation, or
    - Screed drying.
- Space heating mode is disabled if:
  - Domestic Hot Water operation mode is in DHW priority and in load condition.
  - No-load condition is active (all of the activation events are inactive).
  - Unit controller timer or central blocked
  - Tariff function blocked

NOTE

When space heating is not active the YUTAKI unit will not request compressor frequency for space heating and, if no other operation mode is active, outdoor unit will receive a Thermo OFF situation.

◆ Water Calculation mode (Water temperature set-point)

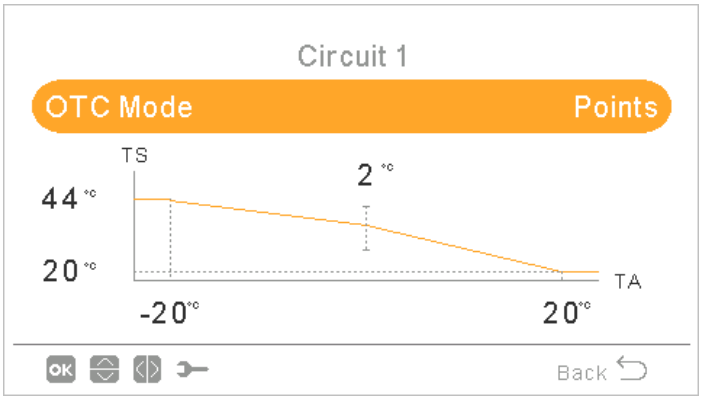
Each of the 2 water circuits will have an independent water set-point.

Water circuit set-point configuration can be set as follows:

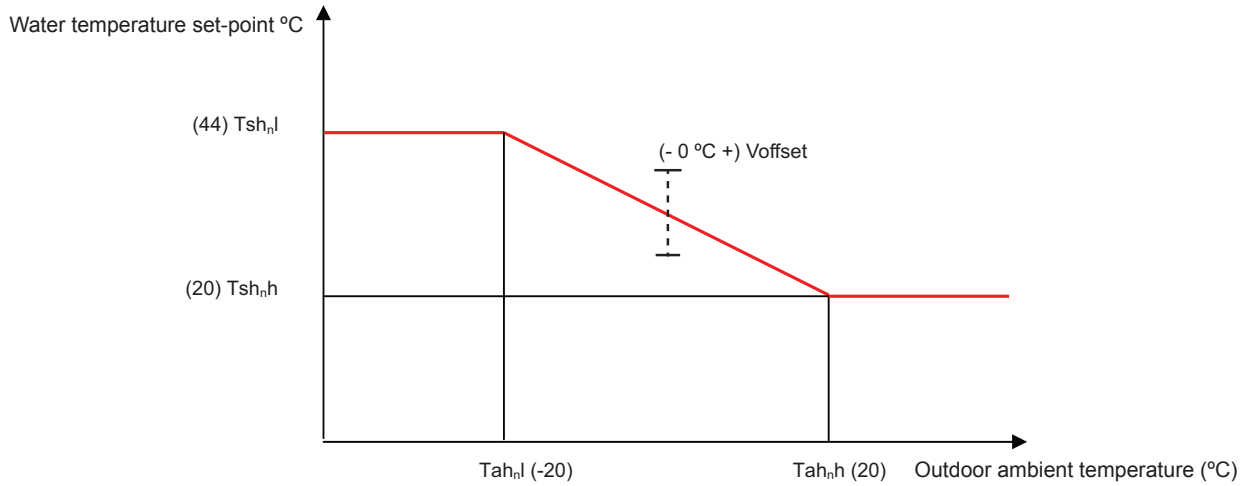
- Deactivated
  - Heating circuit is disabled
- OTC Points
  - Water target is selected by an Outside Temperature Compensated (OTC) control that is defined by 4 different points to create a line representing the function that the air to water heat pump will use to give the temperature setting according to the current ambient temperature. Moreover, an additional control allows user to compensate nonlinear relationship between temperature inside radiators and the provided energy to the room. This non linear relationship exists in case heat emitting source is radiator. This radiator compensation curve is selected by means vertex offset parameter. The higher the vertex offset parameter, in greater measure the line defined by 4 points is turned into a curve.
- OTC Gradient
  - Water target is selected by an Outside Temperature compensated (OTC) control that is defined by a different gradient of the curve. The initial point of the curve is always 20ºC-20ºC (Water outlet target 20ºC at outdoor ambient temperature of 20ºC). User can edit the gradient variable and the vertex offset and it will automatically set the values for the other 4 variables on the chart.
- Fix
  - Water target value is defined by a fixed temperature set by the user.

OTC Points: Outside temperature compensated (OTC) control by points

OTC Points system will use average outdoor ambient temperature in order to get the water temperature set-point.



Water set-point will be determined using the following rule:



Where:

Tsh$_n$L: Temperature setting at low ambient temperature

Tsh$_n$H: Temperature setting at high ambient temperature

Tah$_n$L: Low ambient temperature

Tah_nH: High ambient temperature

Voffset: Vertex offset

n: water circuit number (n= 1 or 2)

Description	Default Value	Range	Units
Low ambient temperature C1 / C2	-20	-20~6	ºC
High ambient temperature C1 / C2	20	7~25	ºC
Set-point at low ambient temperature C1 / C2	44	$Tmaxh_1$~$Tminh_1$ (*)	ºC
Set-point at high ambient temperature C1 / C2	20	$Tmaxh_1$~$Tminh_1$ (*)	ºC
Vertex offset C1	0	-10 ~ 10	ºC

NOTE

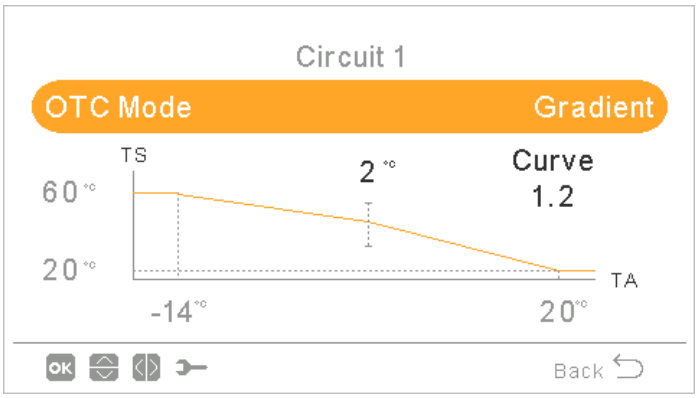
- *Default value corresponds to Water Rule = 0.6 (Radiant Floor).*
- *(*): Values ($Tmaxh_{1/2}$~$Tminh_{1/2}$) are set by installer in maximum temperature setting configuration.*

CAUTION

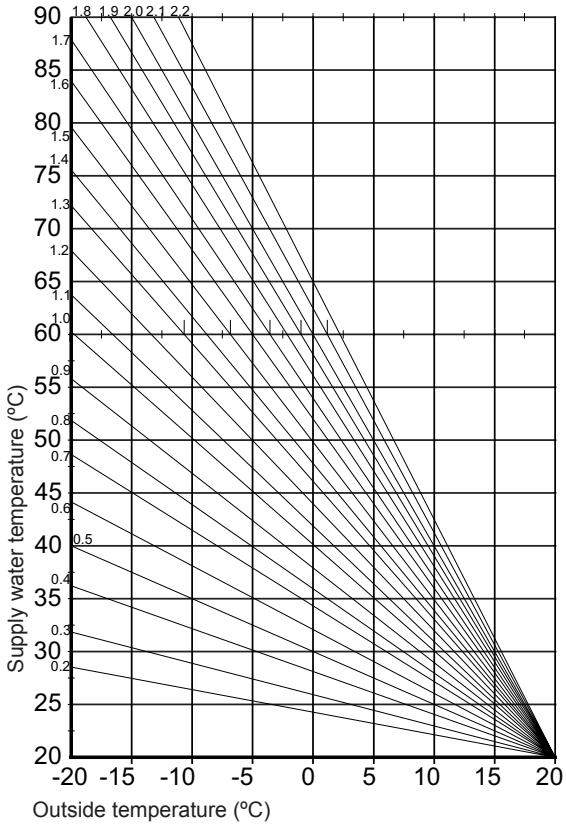
- *It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too high into floor heating).*
- *When only circuit 1 is heating, circuit 2 will be fed with water at temperature equal to the target water of circuit 1.*

OTC Gradient: Outside temperature compensated (OTC) control by gradient

Water target is selected by an Outside Temperature compensated (OTC) control that is defined by a different gradient of the curve. The initial point of the curve is always 20ºC-20ºC (Water outlet target 20ºC at outdoor ambient temperature of 20ºC). User can edit the gradient variable and the vertex offset and it will automatically set the values for the other 4 variables on the chart.



The gradient of the heating curve describes the relation between the change in the supply temperature and the change in outside temperature.



Gradient	Water Outlet Target
0.2	-0,2 x Text + 24
0.3	-0,3 x Text + 26
0.4	-0,4 x Text + 28
0.5	-0,5 x Text + 30
0.6	-0,6 x Text + 32
0.7	-0,7 x Text + 34
0.8	-0,8 x Text + 36
0.9	-0,9 x Text + 38
1.0	-1,0 x Text + 40
1.1	-1,1 x Text + 42
1.2	-1,2 x Text + 44
1.3	-1,3 x Text + 46
1.4	-1,4 x Text + 48
1.5	-1,5 x Text + 50
1.6	-1,6 x Text + 52
1.7	-1,7 x Text + 54
1.8	-1,8 x Text + 56
1.9	-1,9 x Text + 58
2.0	-2,0 x Text + 60
2.1	-2.1 x Text + 62
2.2	-2.2 x Text + 64

System Configuration –Space Heating - Circuit 1 / Circuit 2 – Gradient

Description	Default Value	Range	Units
Gradient Curve	0.6	0.2~2.2	-
Vertex offset C1 / C2	0	-10 ~10	ºC

⚠ CAUTION

- *It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too high into floor heating)*
- *When only circuit 1 is heating, circuit 2 will be fed with water at temperature equal to the target water of circuit 1.*

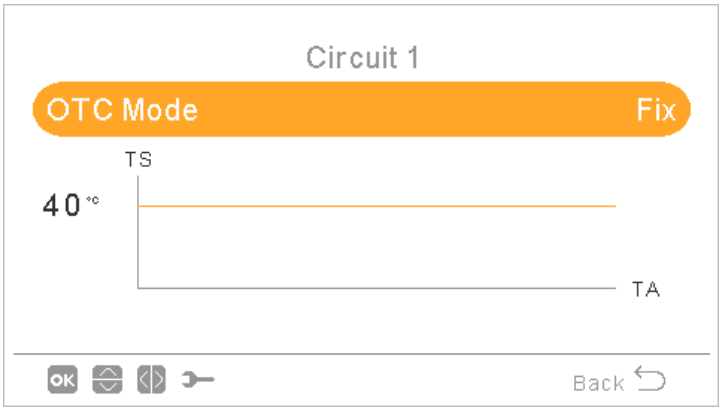
Example:

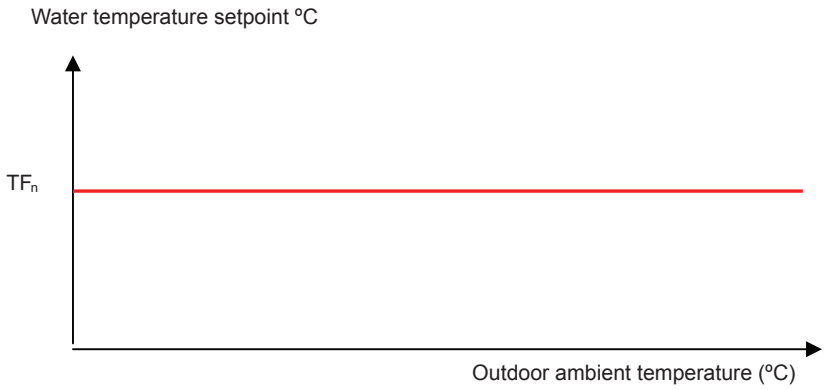
*OTCh1= **1.1***

Text (Outdoor temperature) = 0ºC → *water outlet target = -1.1x 0 +42* = **42ºC**

Fixed water temperature set-point

Outdoor ambient temperature has no effect on this setting. The user will select a fixed water outlet temperature setpoint.





Where:

TF_n: Fixed temperature setting

n: heating circuit number (n= 1 or 2)

System Configuration –Space Heating - Circuit 1 / Circuit 2 – Fix

Description	Default Value	Range	Units
Fixed temperature C1 / C2	40	$Tmax_1$~$Tmin_1$ (*)	ºC

NOTE

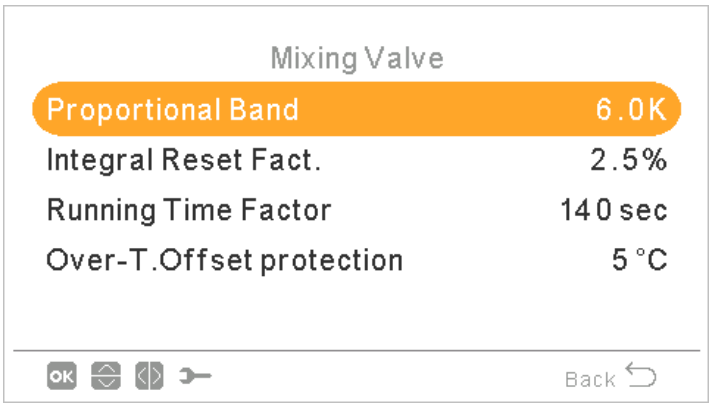
(*): Values ($Tmaxh_{1/2}$~$Tminh_{1/2}$) are set by installer.

CAUTION

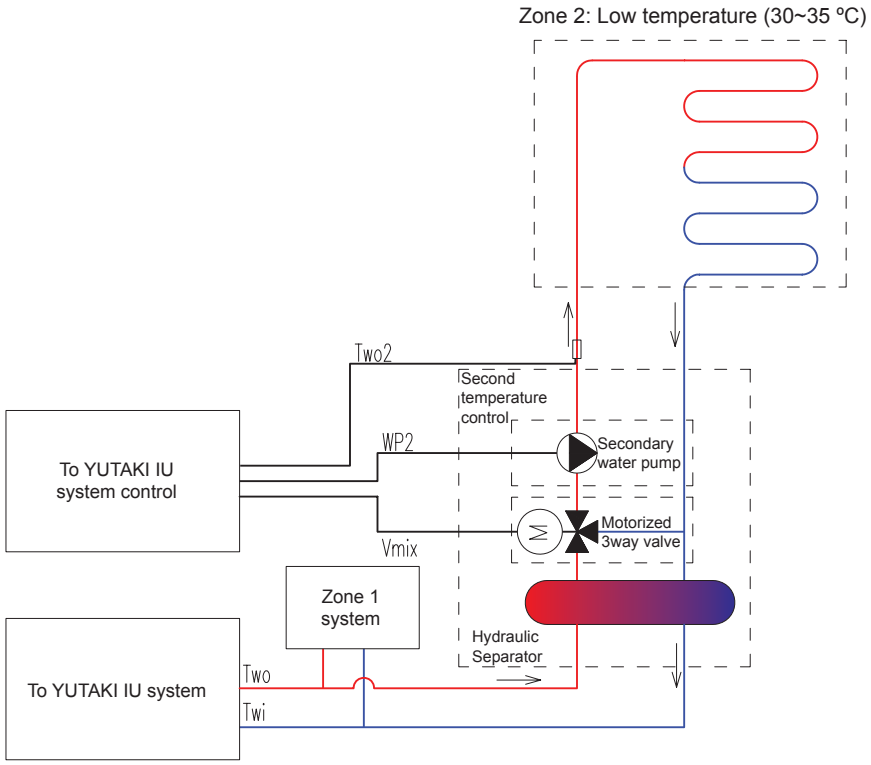
- *It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too high into floor heating).*
- *When only circuit 1 is heating, circuit 2 will be fed with water at temperature equal to the target water of circuit 1.*

◆ Mixing valve - Second water temperature control

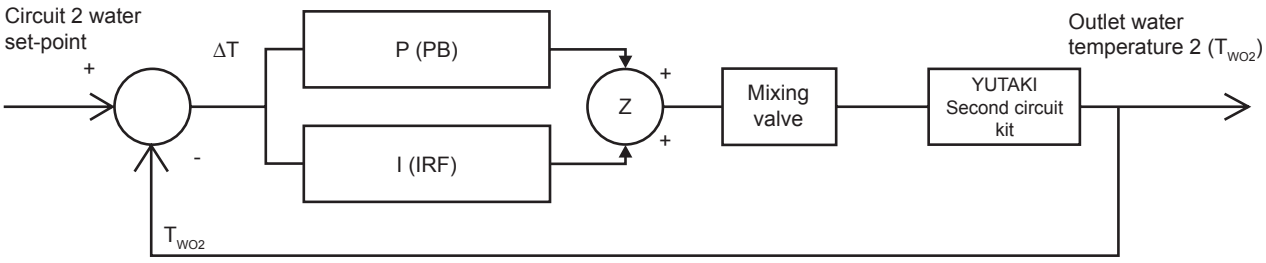
The mixing valve is controlled to maintain the second heating supply temperature at the second heating temperature set-point. The mixing valve position is calculated with a proportional integral action (P+I) control algorithm based on the difference between the heating supply set-point and the heating supply temperature.



Example for illustrative purpose only.



The system control then decides how much to open or close the mixing valve to achieve the desired position for the valve.



Where:

PB: Proportional band of mixing valve.

IRF: Integral reset factor of mixing valve

RTV: Running time factor of mixing valve

Water set-point priority

When system is in direct + mixed mode and both are active, resultant set-point is always circuit 1 water set-point (direct mode).

NOTE

In theory it should be done as the bigger of the two but in the case of circuit 2 (mixed) being higher than circuit 1 (direct) there would be problems in the circuit 1 (direct). This situation can only result from a bad configuration from installer and must be avoided.

In case of not demand in one of the two circuits, the water target of the circuit with demand has priority, and water target will be calculated for this circuit.

In case of Circuit 1 Demand OFF or OFF, Thermo OFF of Circuit 2 must be done by Two.

System Configuration –Space Heating - Circuit 2 – Mixing valve

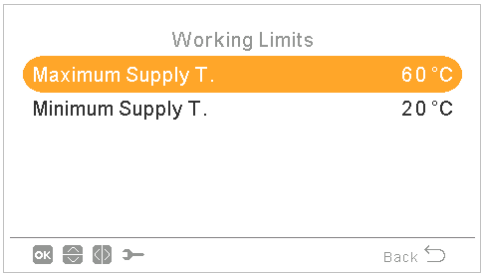
Description	Default Value	Range	Units
Proportional Band	6.0	0~20	K
Integral Reset Fact.	2.5	0.0~20	%
Mixing valve Run Time Factor	140	10~250	sec
Over-T offset protection	5	OFF, 3~10	ºC

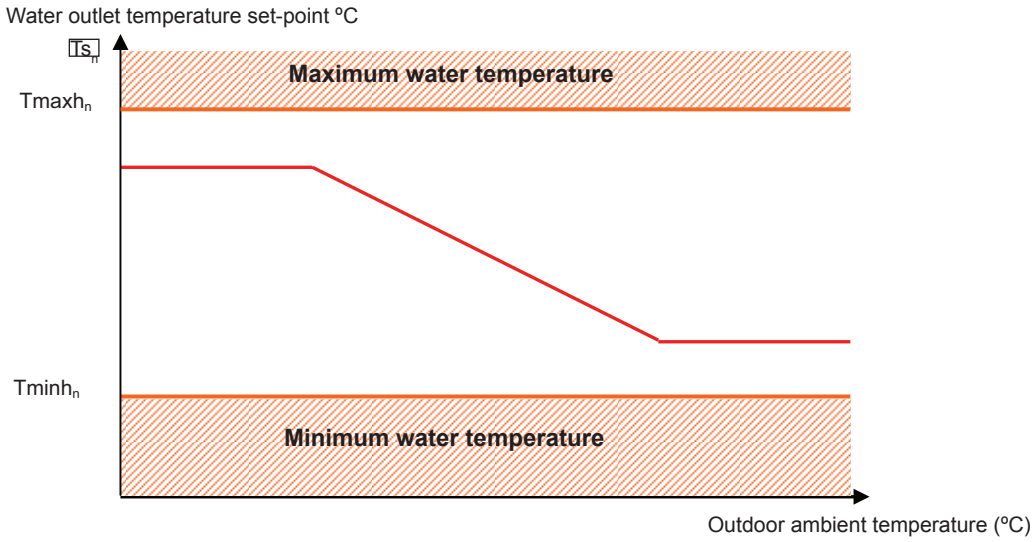
Values are adjusted for the use with the 2nd zone mixing kit accessories ATW-2TK-06 and ATW-2TK-07. It is highly recommended not to change these values.

Over-T offset protection is used in case of a mixing valve malfunction (i.e.: blocked). The protection has no effect in case it is set to OFF. For more information, refer to alarm 73 condition.

◆ Working limits - Selection of heating circuit minimum/maximum temperature limits by Installer

The installer will limit the Space Heating Temperature Set-point in order to prevent excessively high or low temperatures in the space heating.





Temperature Limit values:

System Configuration –Space Heating - Circuit 1 / Circuit 2 - Working Limits

Description	Default Value	Range	Units
Maximum supply temperature	60	35~60(*)	ºC
Minimum supply temperature	20	20~34	ºC

NOTE

- *(*): In case of Boiler combination complementary heating activation (Boiler or Boiler + Heater) maximum supply temperature range can be set up to 80ºC.*
- *Temperature limits have priority over all other temperature set-point modifications (Room Thermostat, User Selection, etc.), and maximum water temperature is limited by unit's operational range.*

CAUTION

Due to the thermal inertia of the system, the real temperature could get up to 5ºC above the maximum set temperature.

2.3.2 Space cooling

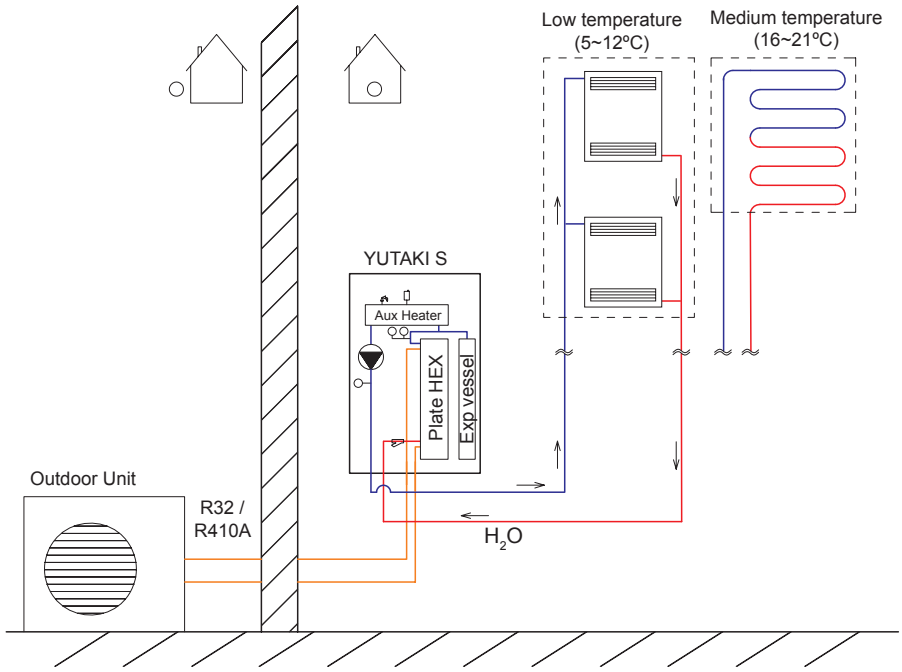
2.3.2.1 Main cooling configuration

NOTE

- *The air to water heat pump is pre-configurated to work only in heating mode. In order to allow the cooling mode, it is necessary to use the drain pan kit accessory and perform a dip-switch setting (DSW1, PIN4: ON) + Jumper into CN8. In the case, all the cooling mode uses for the unit will be permitted and the Unit controller user's interface cooling configuration will appear. In case of heating installation working also in cooling operation, the responsibility of correct system functioning will be of the installer.*
- *The configuration examples given below are only for illustration purposes.*

In case of using a fan coil not managed by YUTAKI unit, it is a mandatory to use a Fan coil feedback control connected to the unit (Demand ON/OFF, Input 1, Terminals 13 and 14 of the Terminal Board 2 of the PCB) in order to stop chilling operation in case the fan coil stops and to avoid a freeze condition into the indoor unit Plate Heat Exchanger.

Configuration 1: Direct Circuit (Example for illustrative purpose of YUTAKI S)

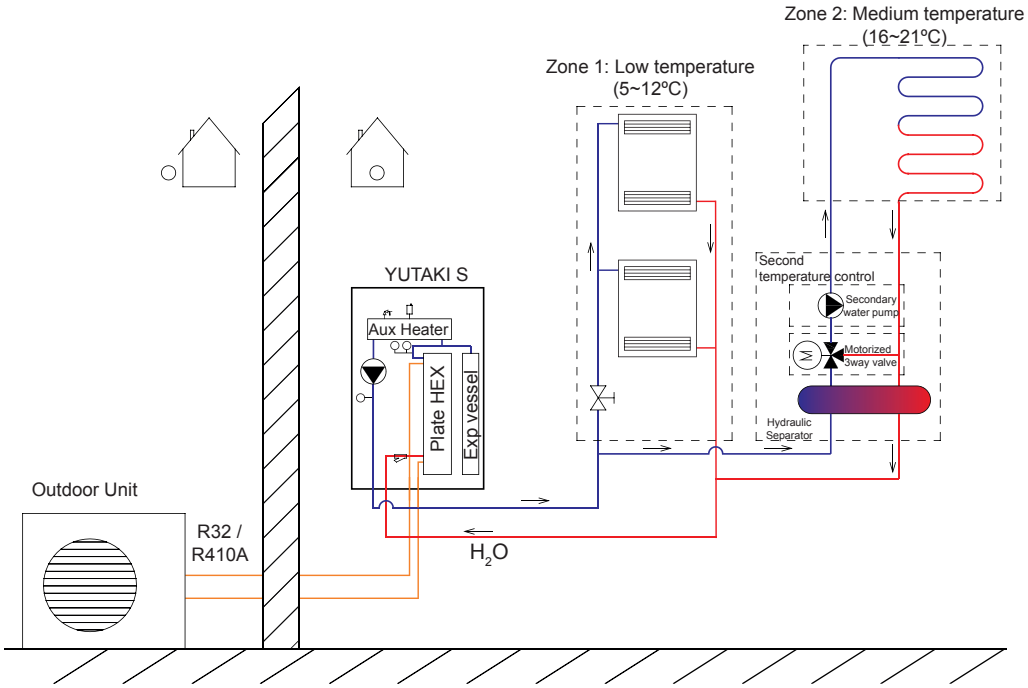


The unit is connectable to only one circuit demand, either low temperature (i.e., fan coils) or medium temperature (refreshing floor).

In addition, the unit can be combined with sanitary tank (with solar kit extension) and with swimming pool.

Water temperature target depends on actual water outlet temperature and calculations by outside temperature compensation (for refreshing floor application) or a fixed water temperature setting (fan coils cooling).

Configuration 2: Direct and mixing circuit (two levels of water outlet temperature) (Example for illustrative purpose of YUTAKI S)



When the YUTAKI is connected to two different cooling circuits, circuit 1 is direct (low temperature for fan coils operation (5~12ºC)) and circuit 2 is a mixing circuit in order to have a second temperature control using mixing valve (medium temperature for floor refreshing operation (16~21ºC)). Additionally, a motorized valve can be added in order to close direct circuit when not in use (see *"3. Optional functions"* chapter).

The unit can always be combined with Sanitary tank (with solar kit extension) and with swimming pool.

Water temperature target depends on the maximum cooling supply set-points (Target area 1, target area 2).

NOTE

In case of Radiator and Refreshing floor installation, Radiators valve should be closed and disabled by user and the system only works for refreshing floor.

◆ Space cooling activation conditions

If "Water Type heating" reads "None" (disabled), then all space control cooling is disabled.

Space Cooling mode is activated by any of the following events:

- Space Cooling mode selected ON Operation, and
  - Space Cooling mode Demand ON by external input (Demand ON/OFF), or
  - Space Cooling mode Demand ON by Intelligent thermostat (Demand ON/OFF), or
  - Space Cooling mode Demand ON by central operation, or
  - Space Cooling mode Demand ON by unit controller timer

Space Cooling mode is disabled if:

- DHW operation mode is in DHW priority and DHW is in load condition, or
- No-load condition is active (all of the activation events are inactive), or
- Cooling Timer or central blocked, or
- Tariff function blocked, or
- Alarm in the unit

◆ Water temperature set-point

Each of the 2 water circuits will have an independent water set-point.

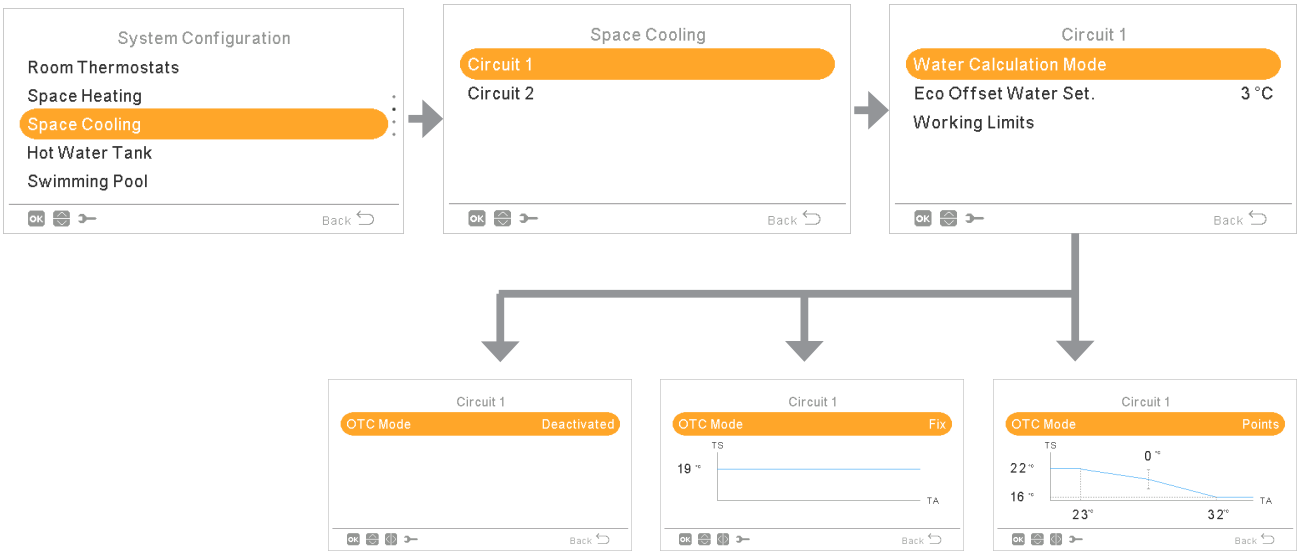
Water circuit set-point configuration can be set as follows:

System Configuration –Space Cooling - Circuit 1 / Circuit 2

Description	Default Value	Range
Water calculation mode	Fix (Circuit 1) Deactivated (Circuit 2)	Deactivated Points Fix

NOTE

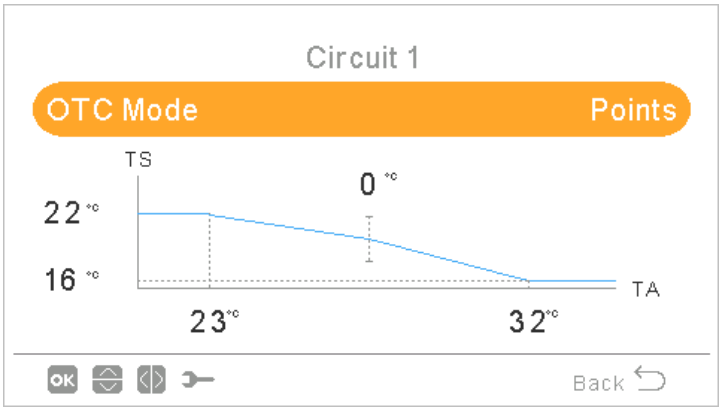
By default, YUTAKI is configured for only one circuit (Direct circuit) and fixed water temperature setting.

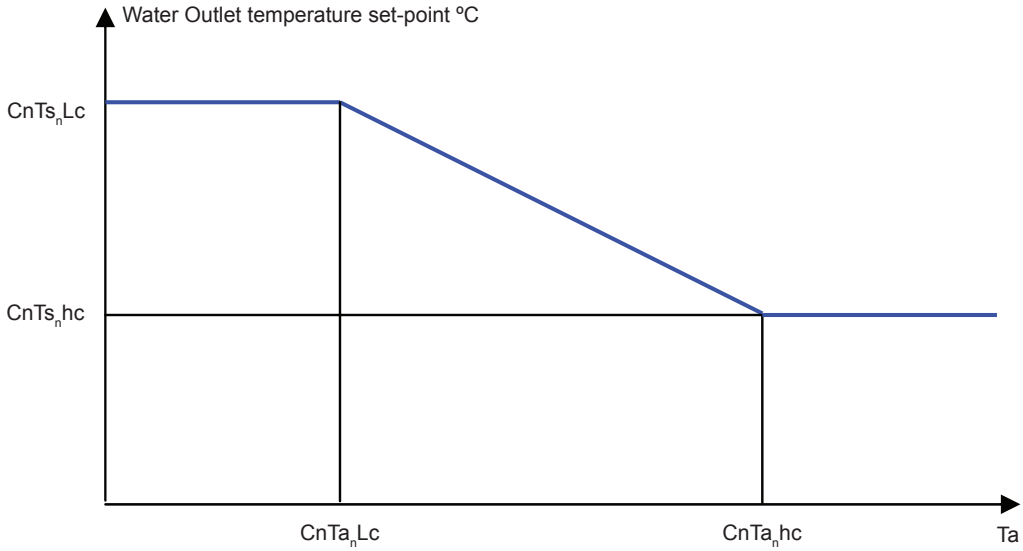


- None: Cooling circuit is disabled.
- OTC Points: Water target is selected by an Outside Temperature Compensated (OTC) control that is defined by 4 different points (Minimum and maximum water outlet temperatures vs. Minimum and maximum outdoor ambient temperatures).
- Fix: Water target value is defined by a fixed temperature set by the user.

OTC Points: Outside temperature compensated (OTC) control by points

The weather-dependent set-point field settings define the parameters for weather-dependent operation of the unit. When weather-dependent operation is active the water temperature is determined automatically depending on the outdoor temperature: higher outdoor temperatures will result in colder water and vice versa.





Where:

CnTs$_n$Lc: Temperature setting for max. water temperature at low ambient temperature cooling

CnTs$_n$hc: Temperature setting for min water temperature at high ambient temperature cooling

CnTa$_n$Lc: Low ambient temperature setting for max water temperature cooling

CnTa$_n$hc: High ambient temperature setting for min water temperature cooling

n: water circuit number (n= 1 or 2)

Settings should be done through the unit controller:
System Configuration –Space Cooling - Circuit 1 / Circuit 2 – Points

Description	Default Value	Range	Units
Low ambient Tº	23	17~30	ºC
High ambient Tº	32	31~45	ºC
Set-point at low ambient Tº	22	Tmaxh$_1$~Tminh$_1$ (*)	ºC
Set-point at high ambient Tº	16	Tmaxh$_1$~Tminh$_1$ (*)	ºC

NOTE

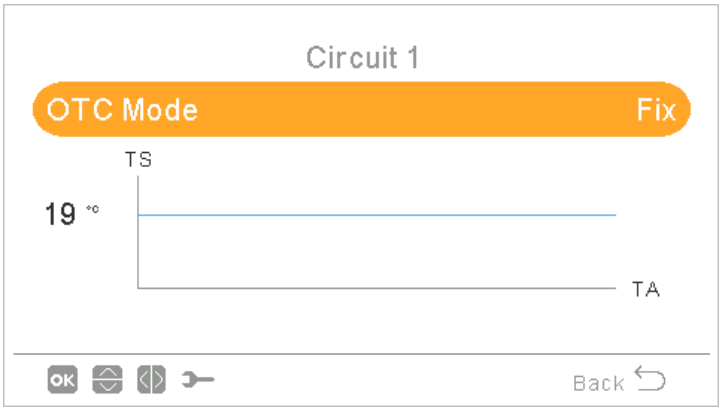
- *(*): Values in maximum and minimum conditions are set by installer.*
- *Default values are the same for both circuits in order to prevent low temperatures in the Refreshing floor circuit.*

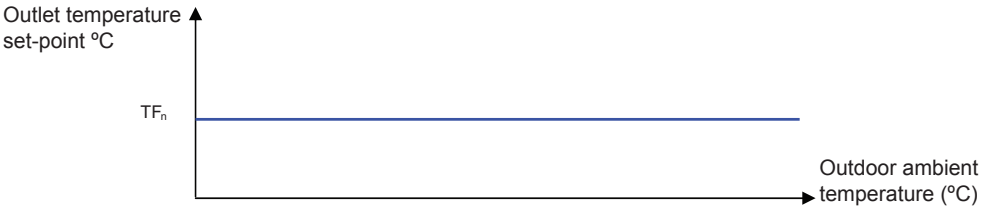
CAUTION

It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too low into floor refreshing).

Fixed water temperature setting

OTC has no effect on this setting. The user will select a fixed water outlet temperature between 5ºC and 21ºC using the user interface (Unit controller).





Where:

TF_n: Fixed water temperature setting.

n: heating circuit number (n= 1 or 2).

Setting should be done through the unit controller:

System Configuration –Space Cooling - Circuit 1/ Circuit 2 – Fix

Description	Default Value	Range	Units
Fixed temperature C1 / C2	19	$Tmaxh_1$~$Tminh_1$ (*)	ºC

NOTE

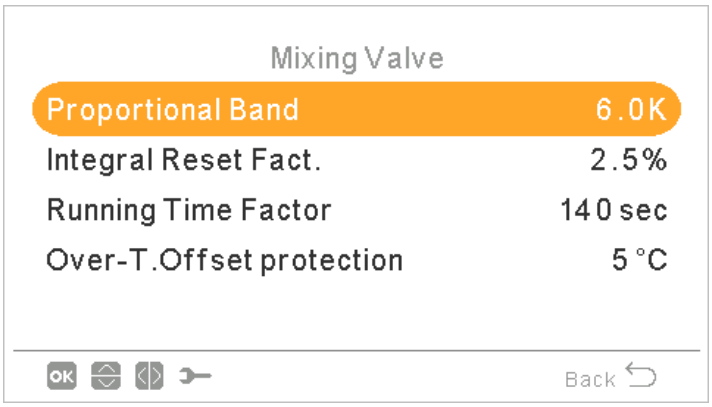
- *(*): Values ($Tmaxh_{1/2}$~$Tminh_{1/2}$) are set by installer.*
- *Default values are the same for both circuits in order to prevent low temperatures in the Refreshing floor circuit.*

CAUTION

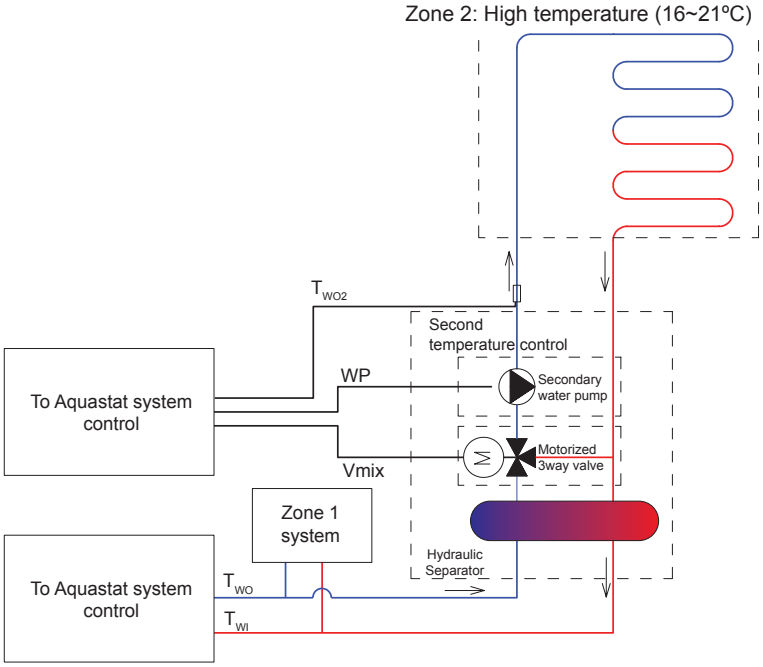
It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too low into floor refreshing).

◆ Mixing valve - Second water temperature control

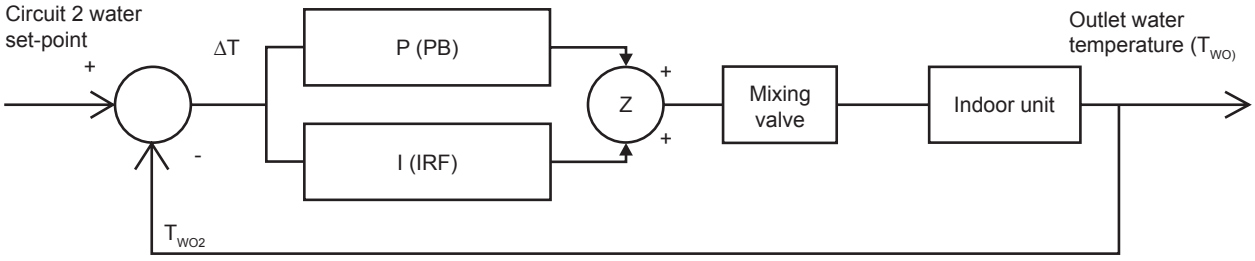
The mixing valve is controlled to maintain the second cooling supply temperature at the second cooling temperature set-point. The mixing valve position is calculated with a proportional integral action (P+I) control algorithm based on the difference between the cooling supply set-point and the cooling supply temperature.



Example for illustrative purpose.



Circuit 2 mixing valve position



Where:

PB: Proportional bandof mixing valve.

IRF: Integral reet factor of mixing valve.

RTV: running time factor of mixing valve.

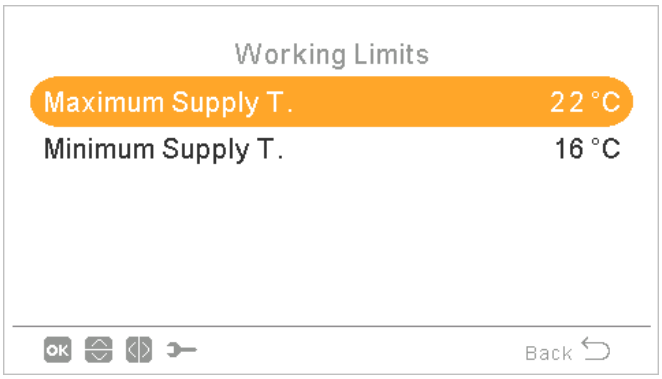
Description	Default Value	Range	Units
Proportional Band (K)	6.0	0~20	ºC
Integral Reset Fact (%)	2.5	0.0~20	%
Mixing valve Run Time Factor (sec)	140	10~250	sec
Over-T offset protection	5	OFF, 3~10	ºC

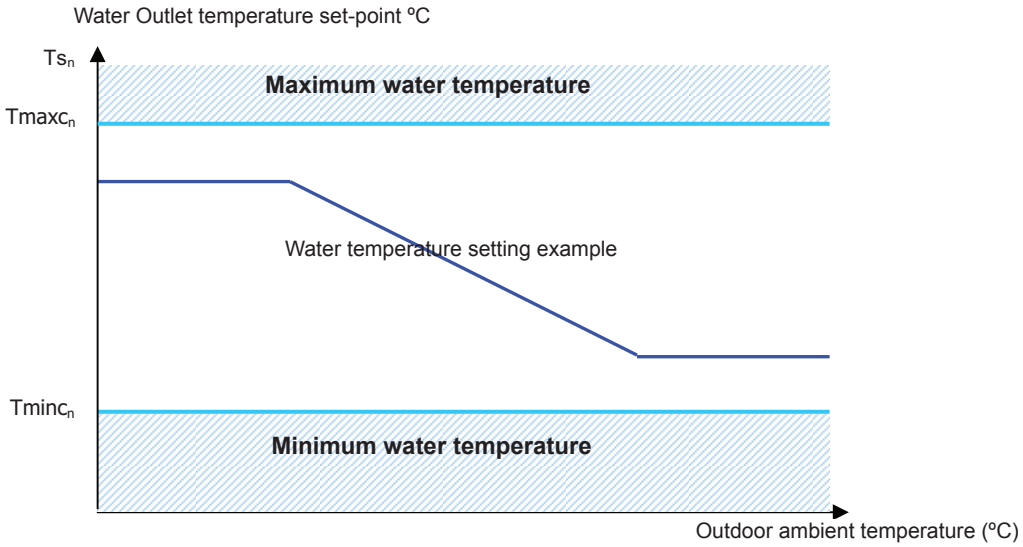
Values are adjusted for the use with the 2nd zone mixing kit accessories ATW-2TK-06 and ATW-2TK-07. It is highly recommended not to change these values.

Over-T offset protection is used in case of a mixing valve malfunction (i.e.: blocked). The protection has no effect in case it is set to OFF. For more information, refer to alarm 73 condition.

◆ Working limits - Selection of cooling circuit minimum/maximum temperature limits by Installer

Space cooling minimum temperature limit is used, for example, to prevent low temperatures from reaching floor refreshing systems. The maximum temperature limit is used when a minimum level of cooling in the cooling circuit is desired.





System Configuration –Space Cooling - Circuit 1 / Circuit 2 - Working Limits

Description	Default Value	Range	Units
Maximum supply temperature	22	19~22	ºC
Minimum supply temperature	16	5~18	ºC

⚠ CAUTION

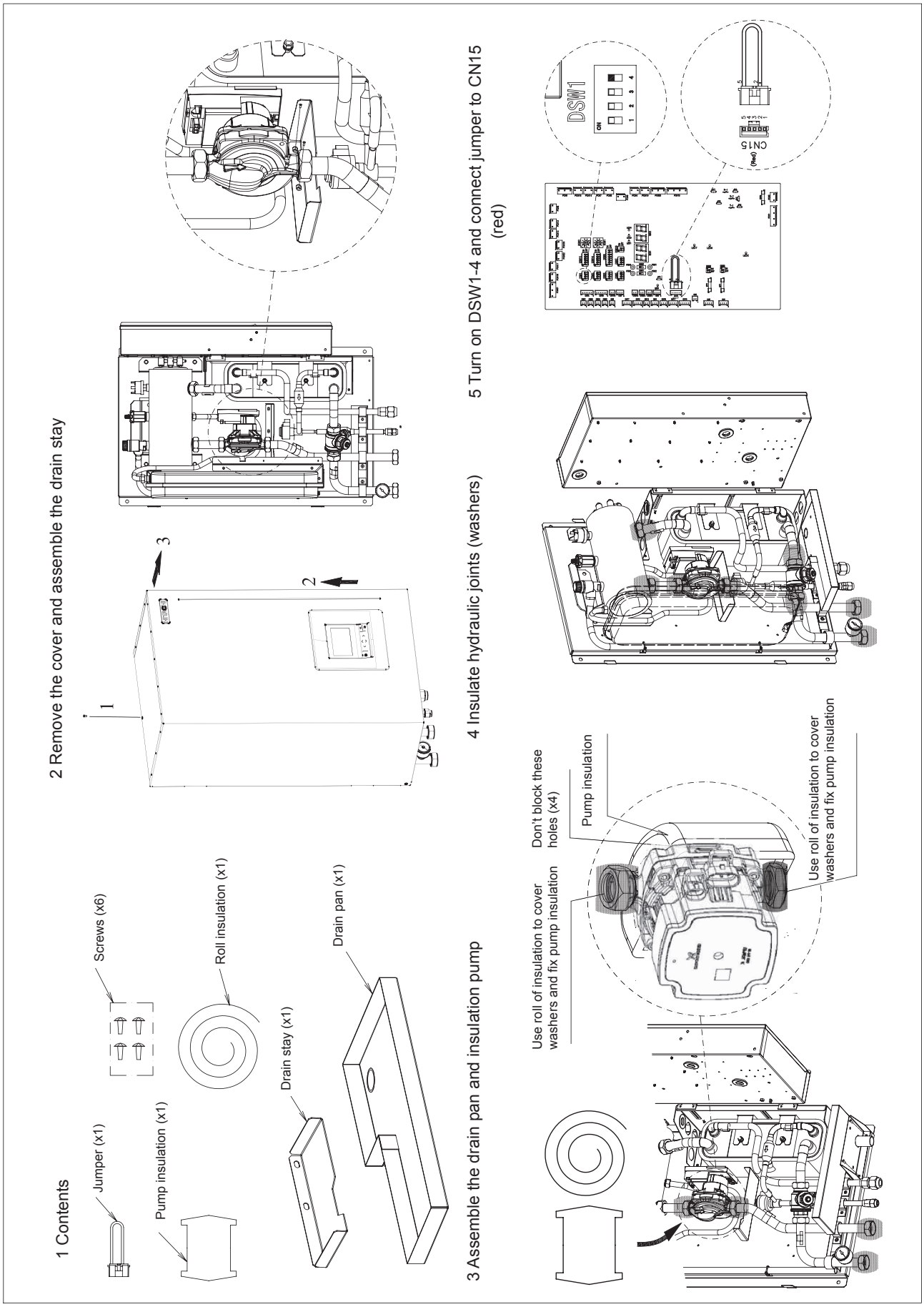
- *Temperature limits have priority over all other temperature set-point modifications (Room Thermostat, User Selection, etc.), and minimum water temp is limited by YUTAKI models operational range.*
- *Due to the thermal inertia of the system, the real temperature could get up to 5ºC above the maximum set temperature.*

◆ Cooling operation kit accessory

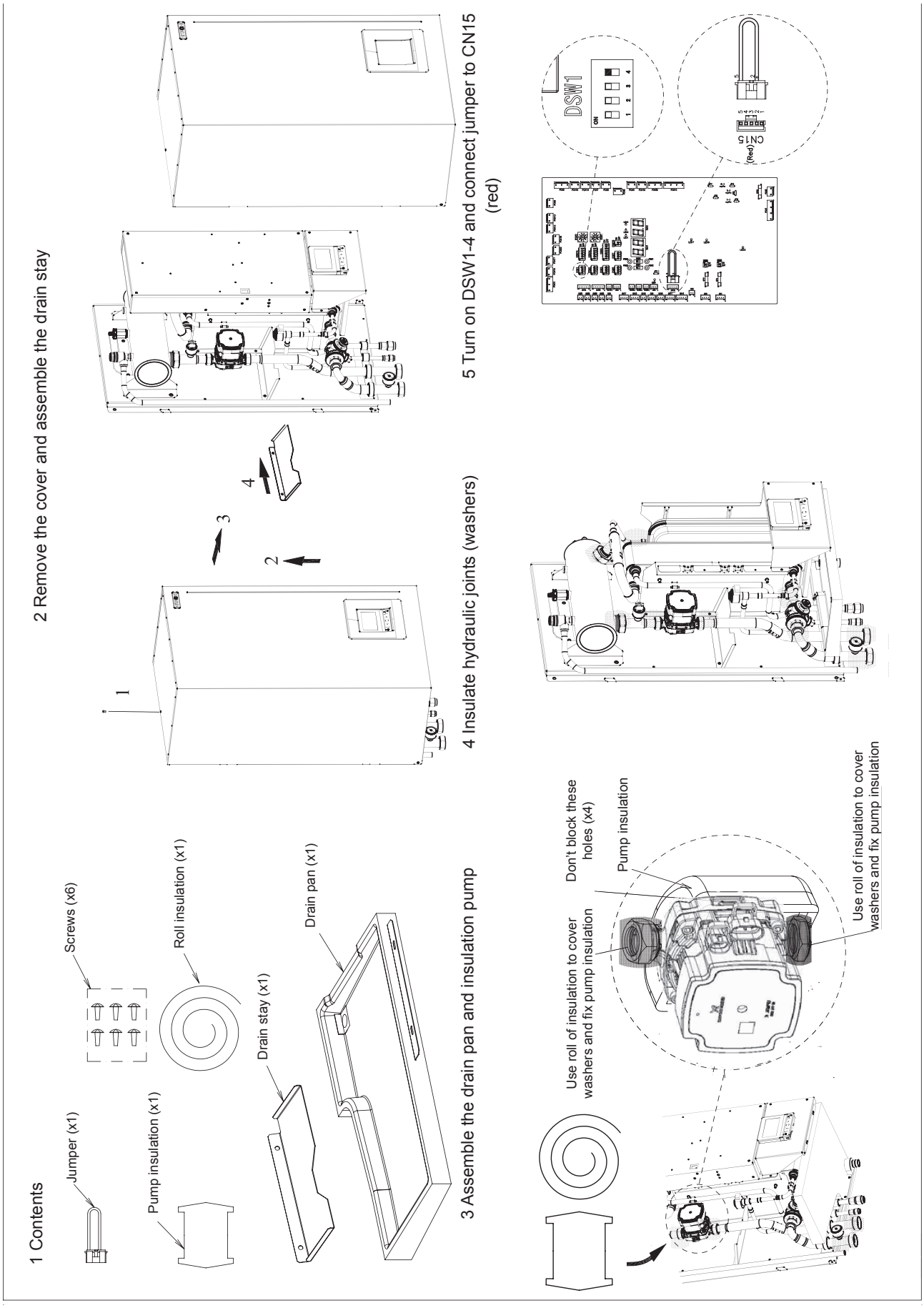
The air to water heat pump is pre-configured to work only in heating mode. In order to allow the cooling mode, it is necessary to use the cooling operation kit accessory and perform a dip-switch setting (DSW1, PIN4: ON) + Jumper into CN8. In the case, all the cooling mode uses for the unit will be permitted and the Unit controller user's interface cooling configuration will appear.

Cooling operation kit accessory for YUTAKI S

RWM-(2.0-3.0)R1E

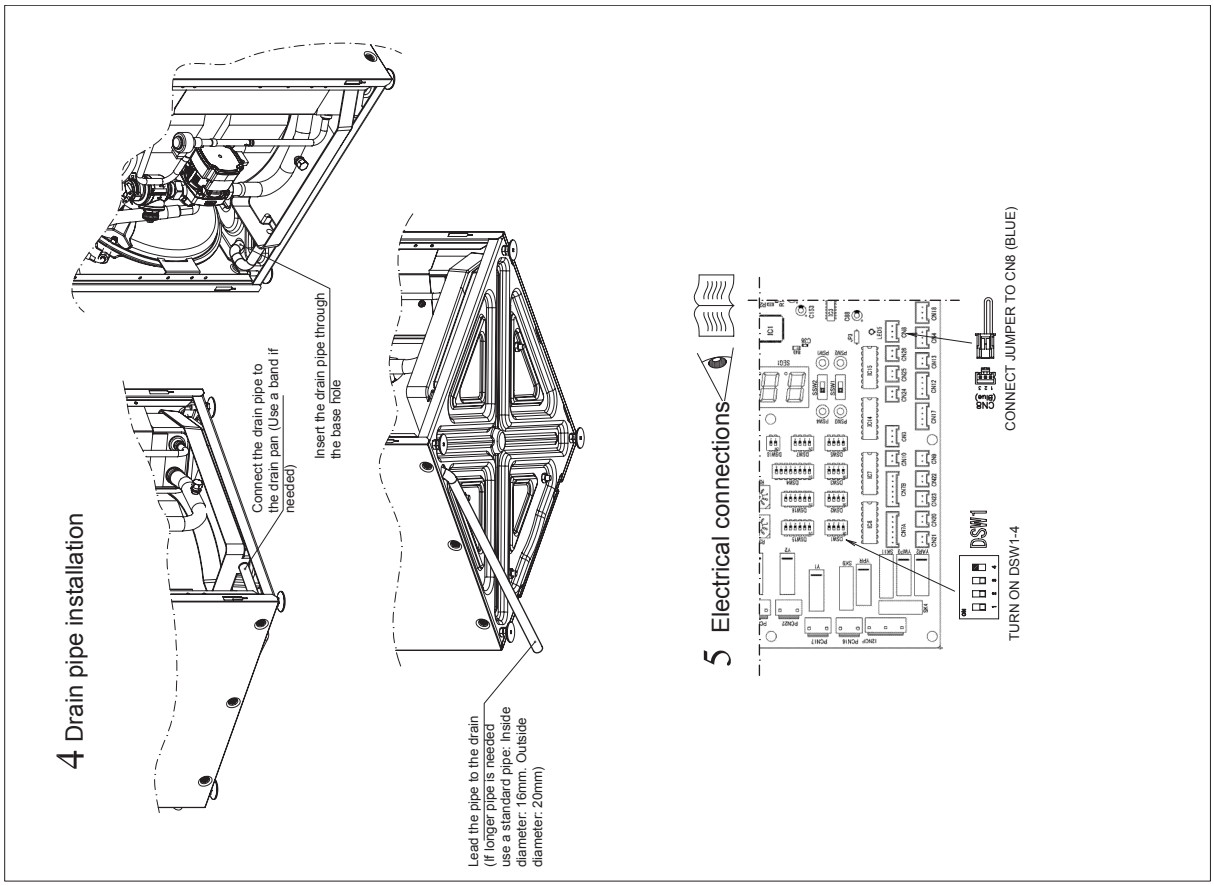


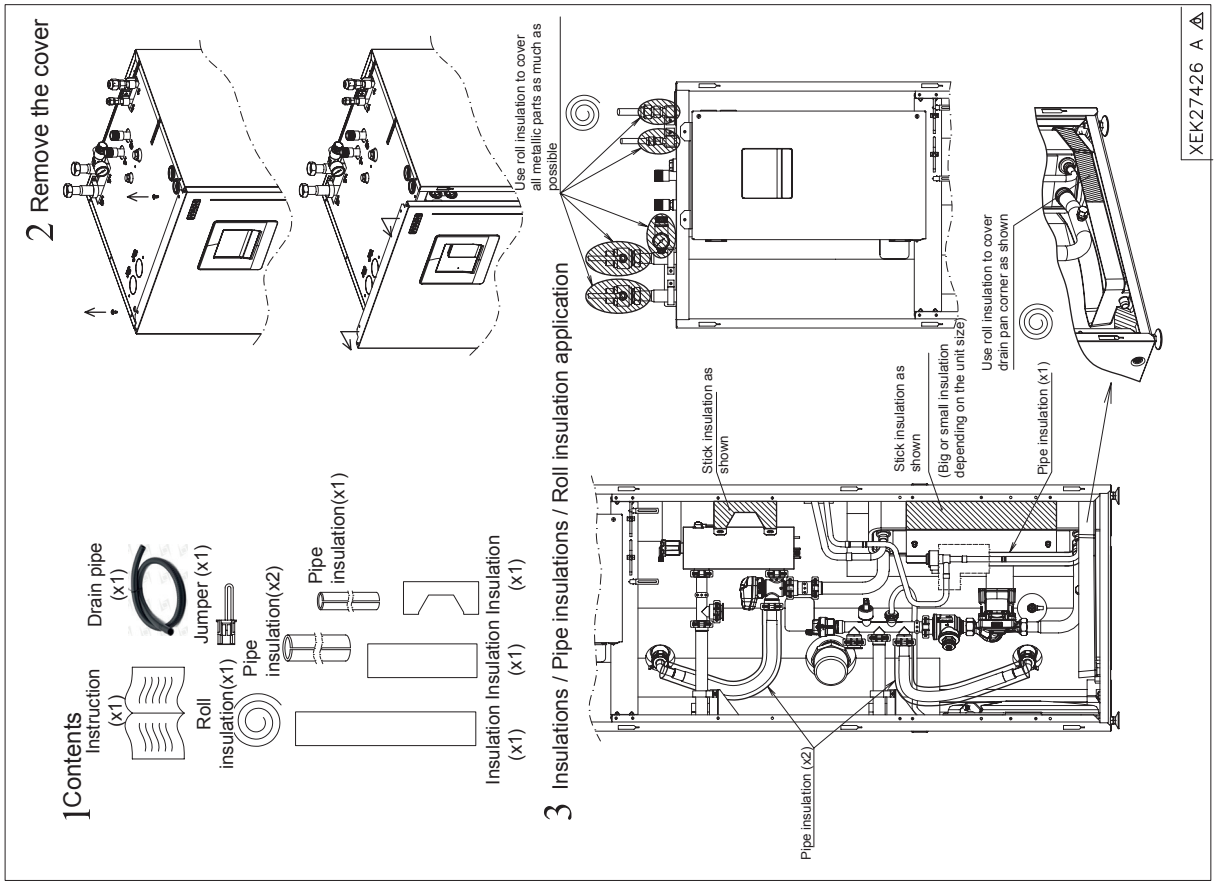
RWM-(4.0-10.0)N1E



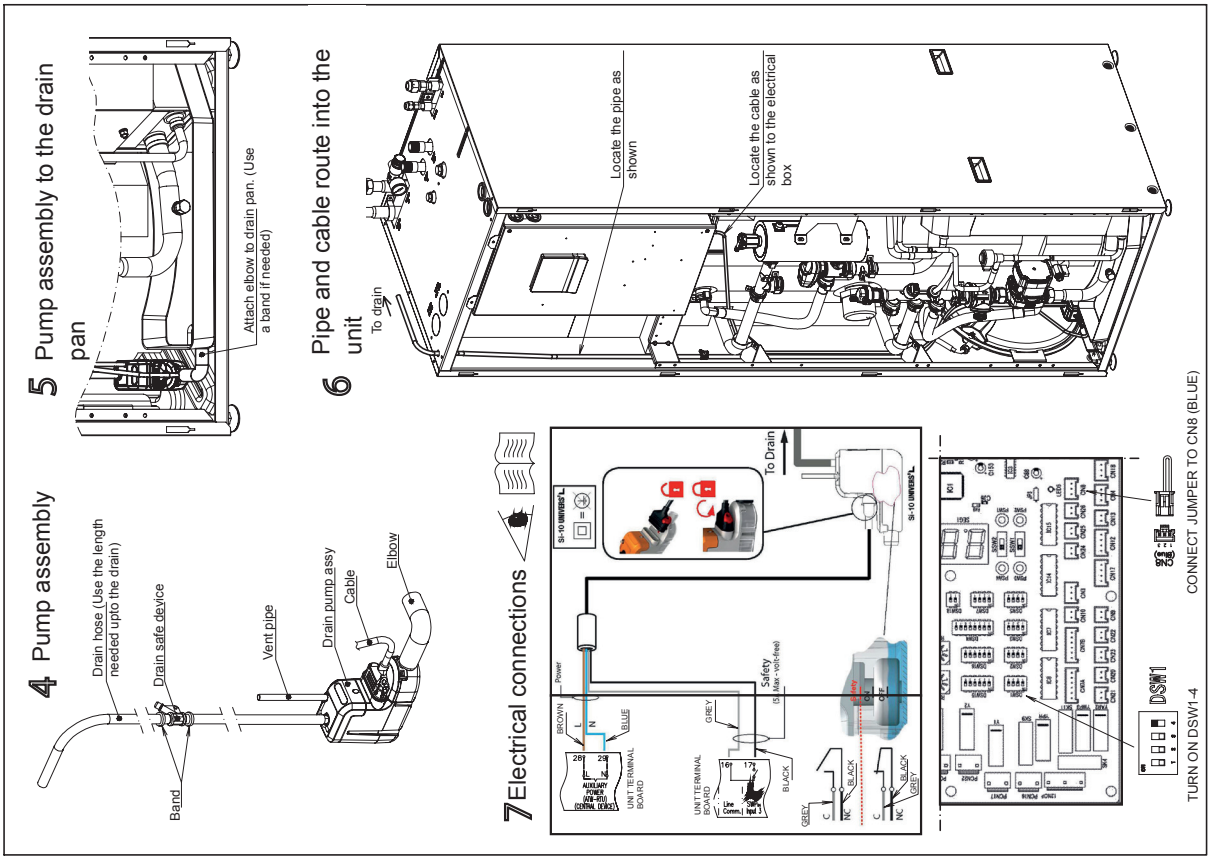
Cooling operation kit accessory for YUTAKI S COMBI

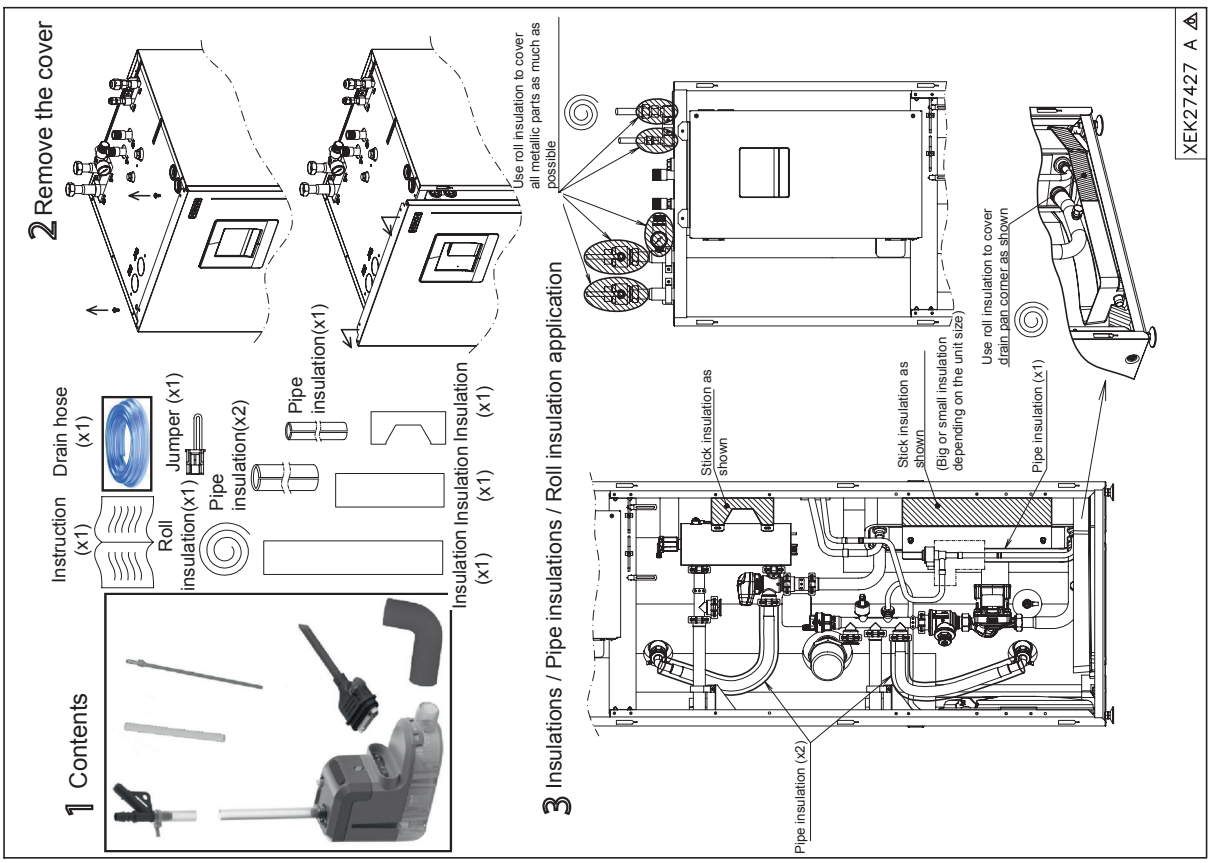
ATW-CKSC-02 Assembly instructions





ATW-CKSC-03 Assembly instructions





2.3.3 Compressor thermo ON/OFF control for space heating & DHW & Swimming Pool

◆ Forced compressor STOP (Thermo-OFF)

Compressor is forced to stop by thermo-OFF when:

There is a Demand OFF operation or when any of the following conditions is fulfilled:

a. The measured outlet temperature value ≥ Ttwo + 5ºC
b. The outlet water temperature is higher than the maximum range temperature (A)
c. Outlet water temperature is higher than the maximum temperature set by installer (Only in case of space heating).
d. Inlet water temperature ≥ B
e. By an abnormal condition

◆ Compressor re-operation (Thermo-ON)

Re-operation of the compressor (Thermo-ON) is activated when:

There is a demand ON operation, and

i. Compressor has stopped for 3 or more minutes
ii. Measured outlet water temperature is less than the target temperature (Ttwo)
iii. Measured inlet water temperature is less than D

NOTE

When the temperature setting is changed during Thermo-Off, the new temperature setting is apllied for i. and iii.

Model	YUTAKI S & S COMBI							
Unit capacity (HP)	2	2.5	3	4	5	6	8	10
A	60	60	60	60	60	60	60	60
B	57	57	57	57	57	57	57	57
D	57	57	57	57	57	57	57	57

2.3.4 Compressor thermo ON/OFF control for space cooling

◆ **Forced compressor STOP (Thermo-OFF)**

Compressor is forced to stop by thermo-OFF when:

There is a Demand OFF operation or when any of the following conditions is fulfilled:

a. The measured outlet temperature value ≤ Ttwo - 4ºC
b. The outlet water temperature is less than the maximum water range temperature
c. The water outlet temperature is less than 5ºC
d. There is a Space cooling Demand OFF
e. By an abnormal condition

◆ **Compressor re-operation (Thermo-ON)**

i. Compressor has stopped for 3 or more minutes
ii. Measured outlet water temperature is less than the target temperature (Ttwo)

2.3.5 Initial Start-up at Low outdoor ambient temperatures

NOTE

Only for YUTAKI S and YUTAKI S COMBI when Heater forced OFF by DSW setting & DHW Operation.

During commissioning and when water temperature is very low, it is important for water to be heated gradually.

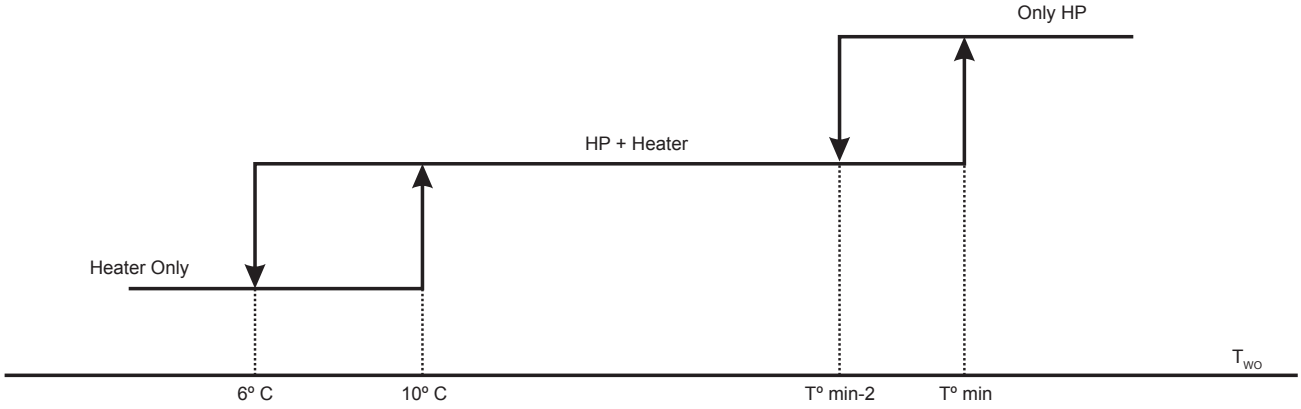
In those conditions, additional function should be used for starting at low water temperature conditions:

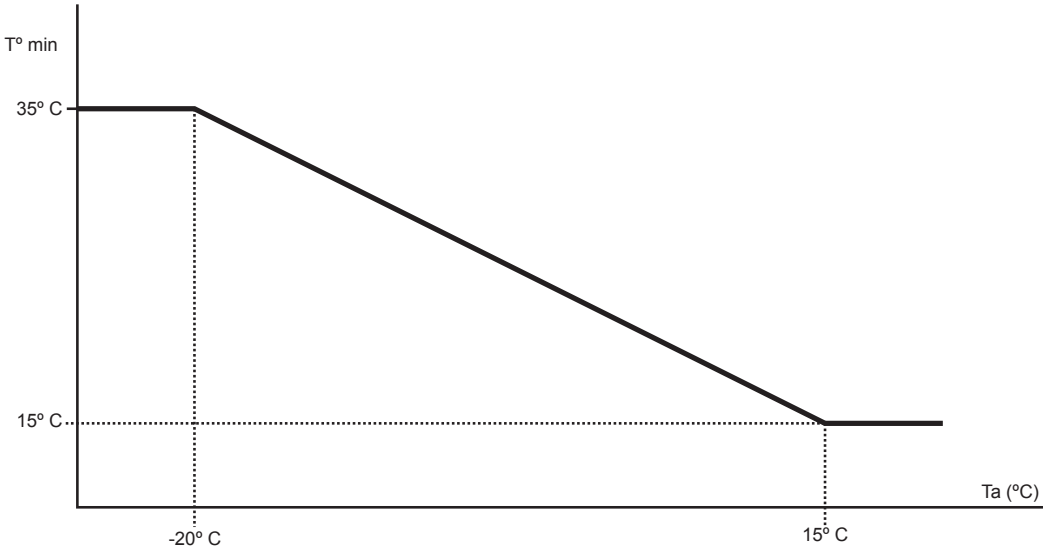
Space Heating at lower water temperatures (approximately 10ºC to 20ºC) and lower outdoor ambient temperatures (<10ºC) can damage the heat pump when defrosting.

As a result, Heating up to 15ºC when outdoor temperature is lower than 6ºC is performed by the Electrical Heater.

If ambient Tº (instant) > 6ºC → Heating by Heat Pump Only

If ambient Tº (instant) ≤ 6ºC → see graphic below:





NOTE

This condition is not applied if Heater forced OFF by DSW setting & DHW Operation.

CAUTION

In case of Heater Forced OFF (by optional dip switch setting) these condition is not performed and heating is performed by Heat Pump. Hitachi is not responsible for its operation.

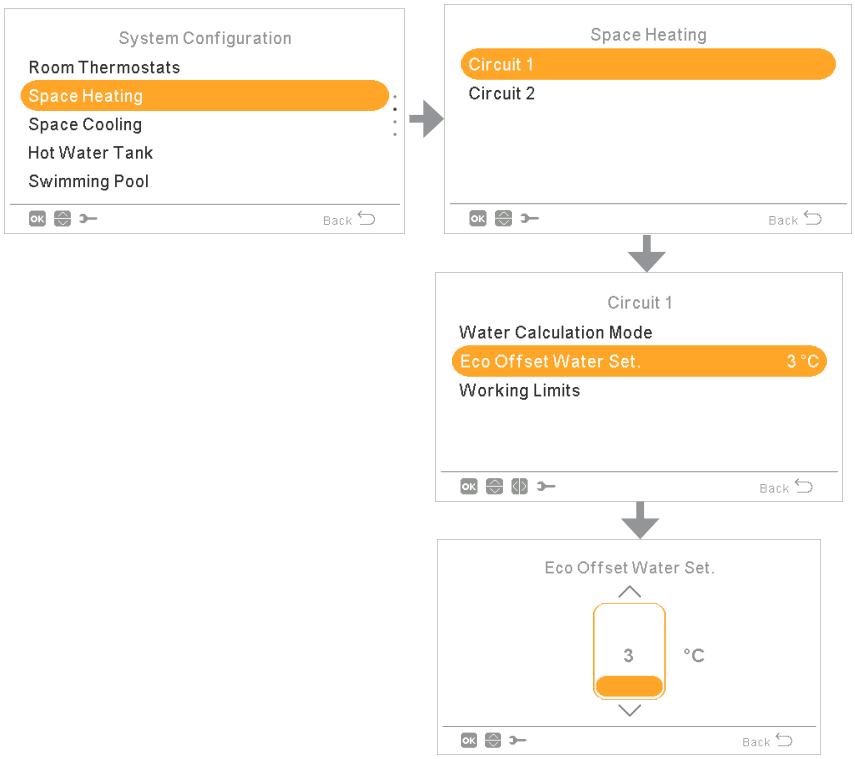
2.3.6 Water ECO offset

◆ Function

YUTAKI allows the use of a reduced offset for water temperature setting. By using this function, current water temperature setting is reduced by the indicated parameter (configurable by unit controller (PC-ARFH2E).

System Configuration → Space heating / Space Cooling → Circuit 1 / Circuit 2

Description	Default Value	Range	Units
ECO offset Water Set.	3	1~10	ºC



◆ Function activation

ECO offset function is active for each circuit by differents options:

- External configurable input (See optional functions chapter)
- Schedule or simple timer in Unit controller (PC-ARFH2E)
- Central device actions

◆ Function control

Heating

The heating control of the Water offset function is done by the following means

TtwofCn = TtwoOTCn - CnECO

Cooling

TtwofCn = TtwoOTCn + CnECO

Where:

- *TtwofCn: Final water temperature setting (ºC)*
- *TtwoOTCn: Water temperature setting fixed OTC Control (ºC)*
- *CnECO: Water ECO offset for heating (ºC)*
- *Cn: Circuit numer (n=1; n=2)*

NOTE

Only available for water space heating or cooling.

2.3.7 Outdoor temperature compensation control

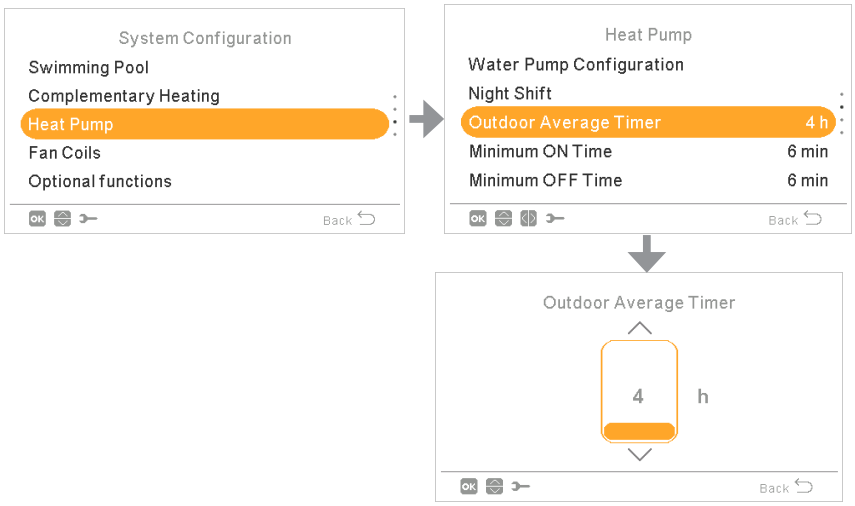
◆ OTC average timer

Average timer corrects the influence of the ambient temperature variations. The weather dependant set point calculation is done on the average outdoor temperature.

The outdoor temperature is averaged over the selected time period. This configuration should be done through the Unit controller (PC-ARFH2E).

System Configuration → Heat pump

Description	Default Value	Range	Units
Outdoor average timer	4	0~24	hour



NOTE

- *When the value is set to 0, there is no outdoor average temperature. The value is a direct value from sensor.*
- *The outdoor temperature average have the same timer both for Circuit 1 and Circuit 2.*

◆ Secondary outdoor sensor accessory

Optional outdoor temperature sensor accessory (ATW-2OS-02) can be directly connected to the controller in case that the heat pump is located in a non-suitable position for this measurement.

YUTAKI can use the two outdoor temperature sensors (Outdoor unit ambient temperature and an Auxiliary ambient temperature for both space heating/cooling circuits).

Sensor is selected as auxiliary sensor configuration, as explained later in this chapter.

◆ Configuration of the Outdoor temperature compensation control

Source temperature for average calculation is selectable by DSW5, Pin1 & 2 at start up with the following values:

DSW5		Action
PIN1	PIN2	
OFF	OFF	C1: Outdoor sensor average; C2: Outdor sensor average
OFF	ON	C1: Outdoor sensor average; C2: Auxiliary ambient sensor average
ON	OFF	C1: Auxiliary ambient sensor average; C2: Outdoor sensor average
ON	ON	C1: Auxiliary ambient sensor average; C2: Auxiliary ambient sensor average

Select auxiliary sensor (1, 2 or 3) for second outdoor ambient function.

2.3.8 Hydraulic separator

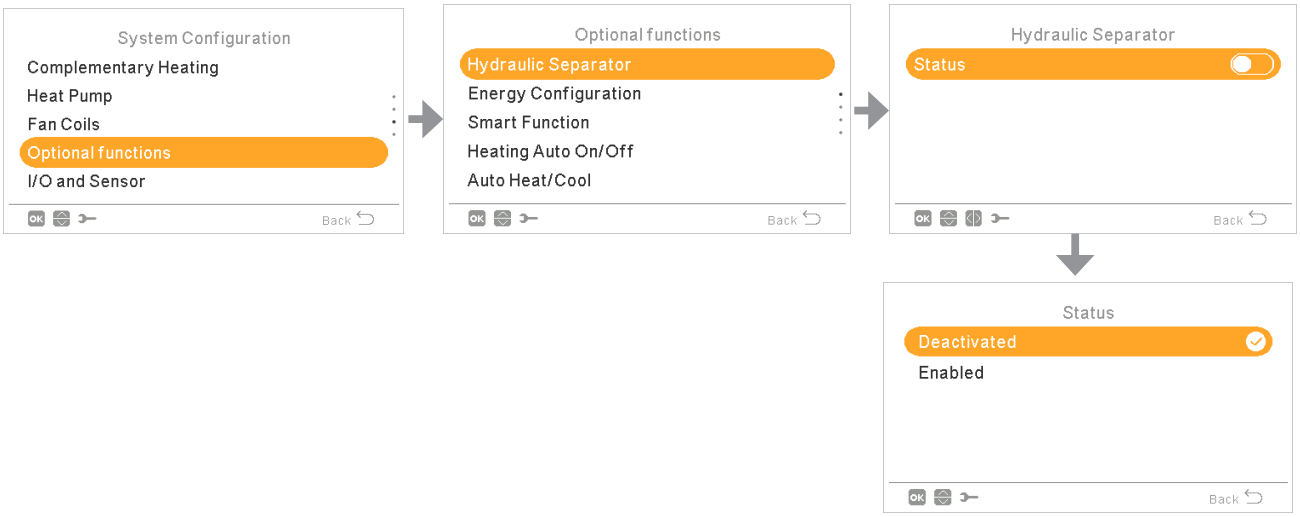
In some installations, water pump of the YUTAKI unit is not sized for big heating installations (small water pump). In those cases, a hydraulic separator or buffer tank, as a secondary water pump, has to be used to ensure a proper water pump dimensioning.

The boiler is configured in parallel with the heat pump. A hydraulic separator or buffer tank has to be used to ensure a proper hydraulic balancing. Additional water pump (WP3)and water sensor (Two3) is needed for the boiler combination control (automatically added when Boiler combination is enabled).

This settings should be done through the Unit controller (PC-ARFH2E) as explained below:

System Configuration → Optional functions → Hydraulic Separator

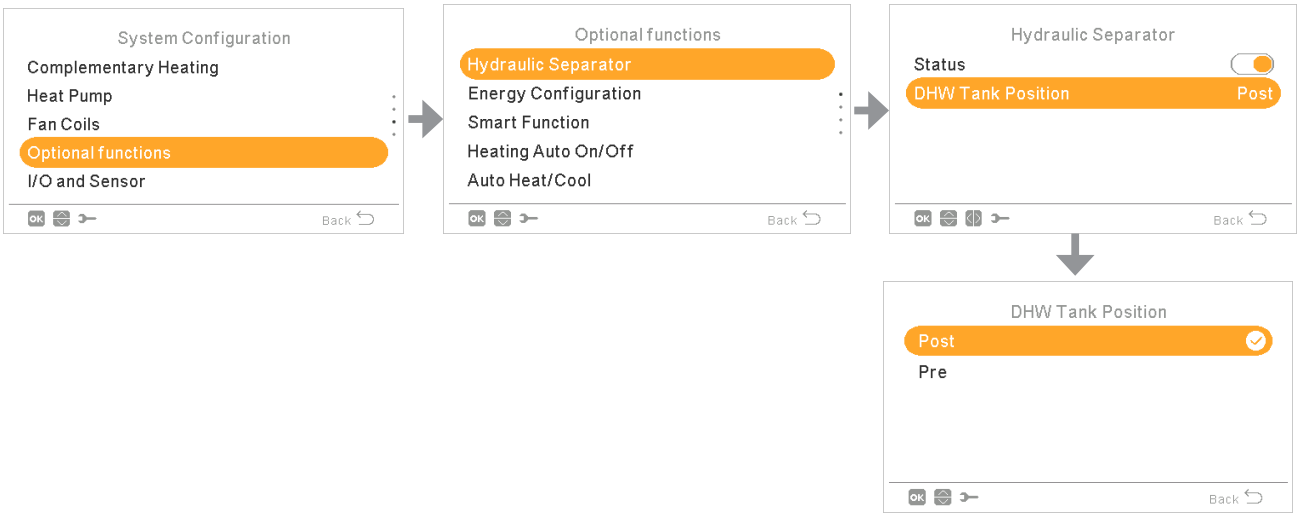
Description	Default Value	Range
Hydraulic separator status	Deactivated	Deactivated/Enabled



2.3.8.1 DHW Tank Position (for YUTAKI S only)

When enabling “Hydraulic Separator” the new function DHW Tank Position is shown and allows to select between:

- Post: The 3-way valve for diverting to DHW tank is placed after the hydraulic separator
- Pre: The 3-way valve for diverting to DHW tank is placed before the hydraulic separator

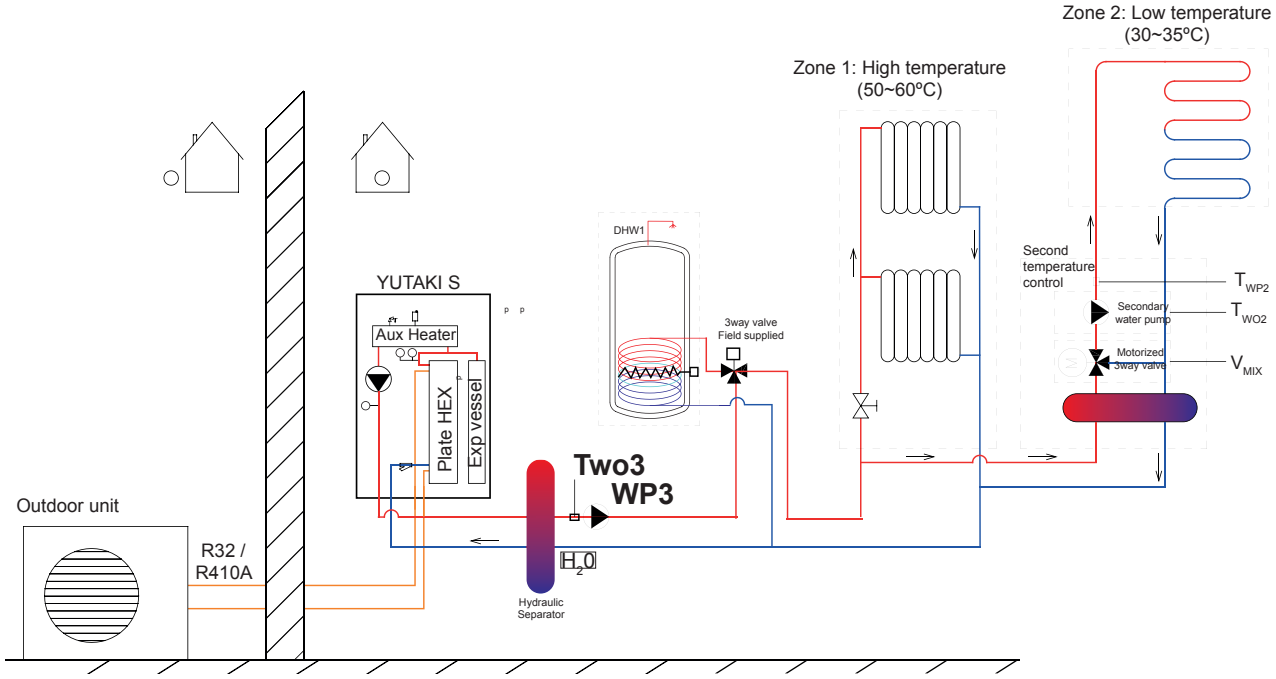


This setting will change the way thermistor Two3 and water pump WP3 react according to the hydraulic layout

This selection is not available for YUTAKI S COMBI because 3-way valve and tank are already integrated in the unit. Due to this reason YUTAKI S COMBI is internally fixed to “Pre”.

◆ Example 1: DHW tank after hydraulic separator

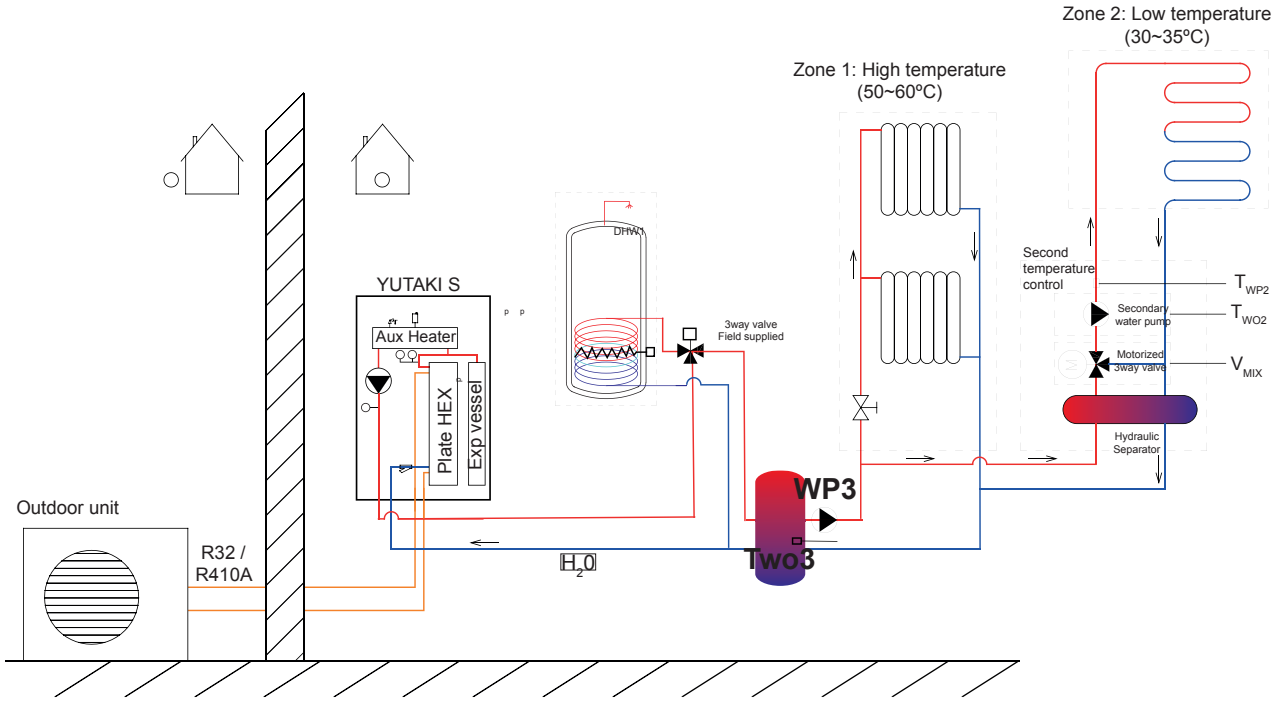
- DHW Tank Position: Post
- WP1: Can be stopped when when buffer reaches thermo OFF conditions in case Two3 is used, DSW5#4 = ON and Stop pump by thermo OFF option is enabled
- WP3: Can not be set to stop during DHW operation



This installation forces that whenever there is DHW operation, hydraulic separator or buffer tank shall be heated until tank coil's temperature becoming a waste of energy and becoming a problem when operation switches to Space Heating again where water at hydraulic separator may be outside from Space heating circuit temperature limits.

◆ Example 2: DHW tank before hydraulic separator

- DHW Tank Position: Pre
- Two3 thermistor is not used to control water temperature delivered to tank coil during DHW operation
- WP3: Can be set to stop during DHW operation



Whenever this configuration is made, YUTAKI S unit treats tank as YUTAKI S COMBI from the point of view it is located before the buffer tank.

This configuration avoids heating the buffer tank or the hydraulic separation up to the tanks coils temperature and avoid over temperature problems when operation switches from DHW to Space Heating.

NOTE

- *Note that whenever this configuration is done, DHW tank cannot be heated by external boiler.*
- *In case there is no need to stop WP1 when system reaches thermo OFF, Two3 sensor is not required and DSW5#4 is not required to be set to 1. In this case, it becomes possible to locate DHW tank previously to the buffer tank with a YUTAKI S unit without performing any additional configuration.*

2.3.8.2 Pumps during DHW

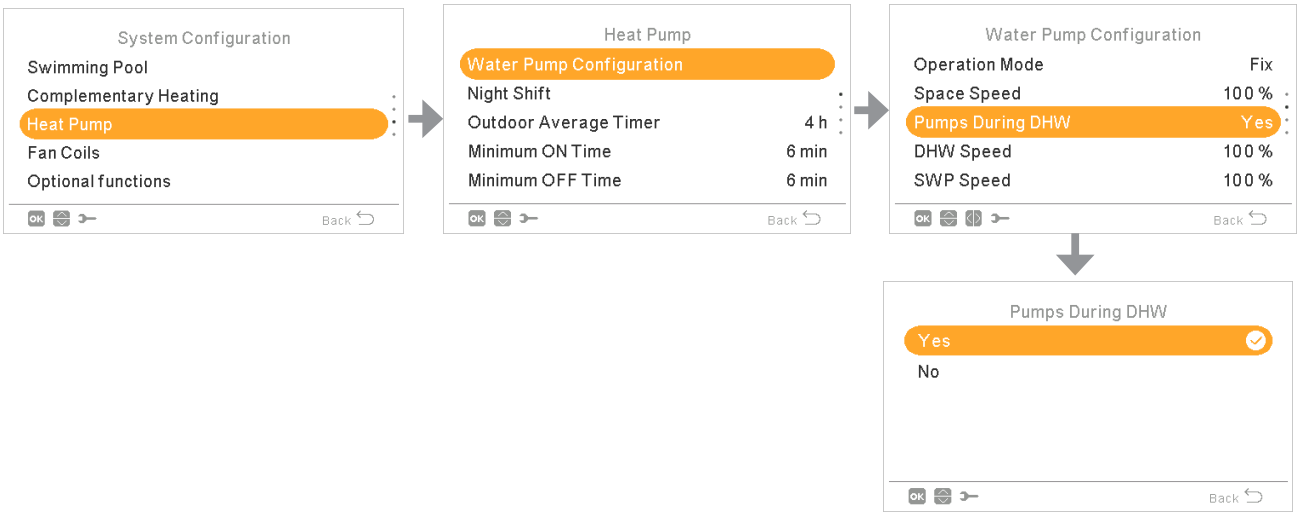
Depending on the hydraulic layout, it may be useless to keep other pumps in operation during DHW production.

Pumps during DHW allow to select if we want to keep the pumps not related to DHW running or prefer to stop them.

YUTAKI's own pump (WP1) is always kept ON because is necessary for the heat generation.

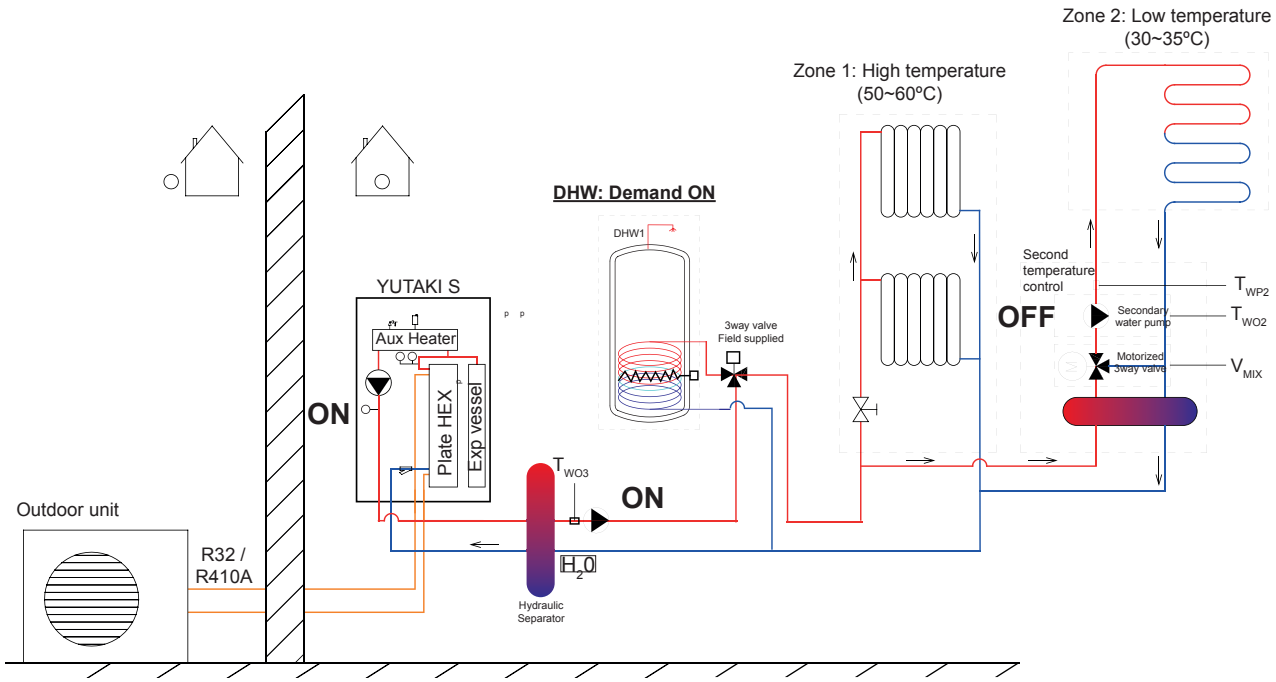
System Configuration – Heat Pump – Water Pump Configuration

Description	Default Value	Range
Pumps during DHW	Yes	Yes / No



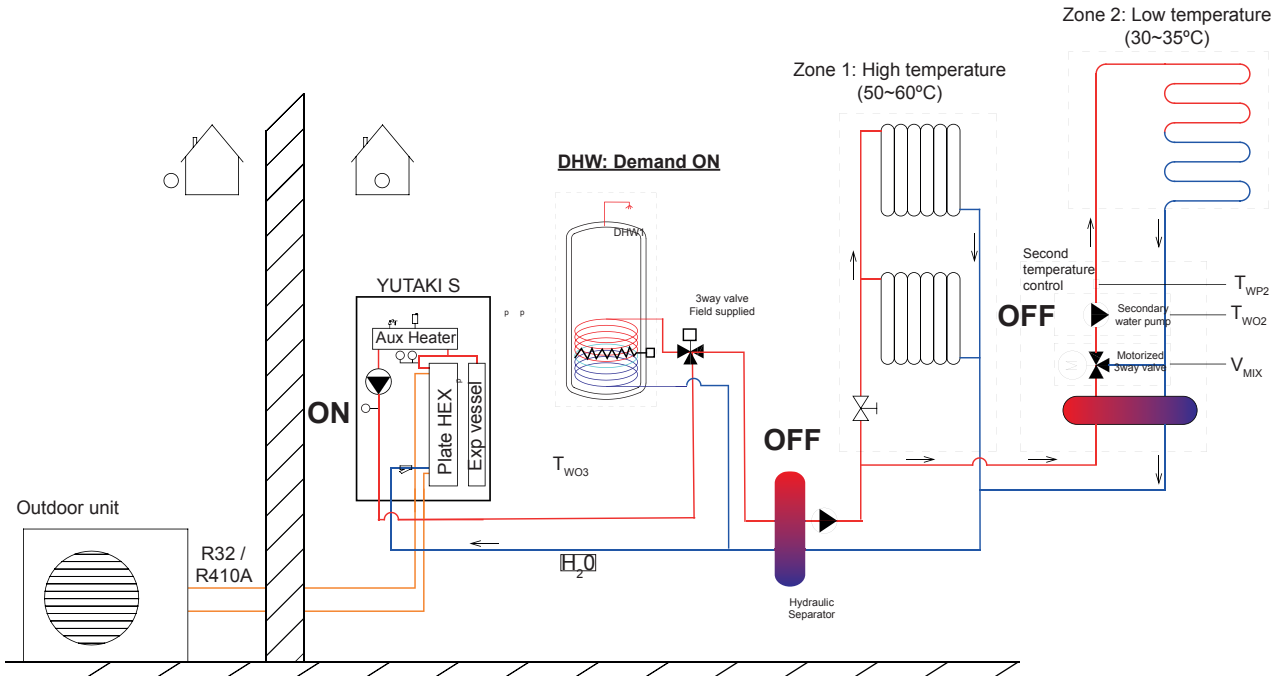
◆ **Example 1: DHW tank after hydraulic separator ("Post" setting)**

- Pumps during DHW: No
- DHW: Demand On
- WP1 and WP3: On
- WP2: Off



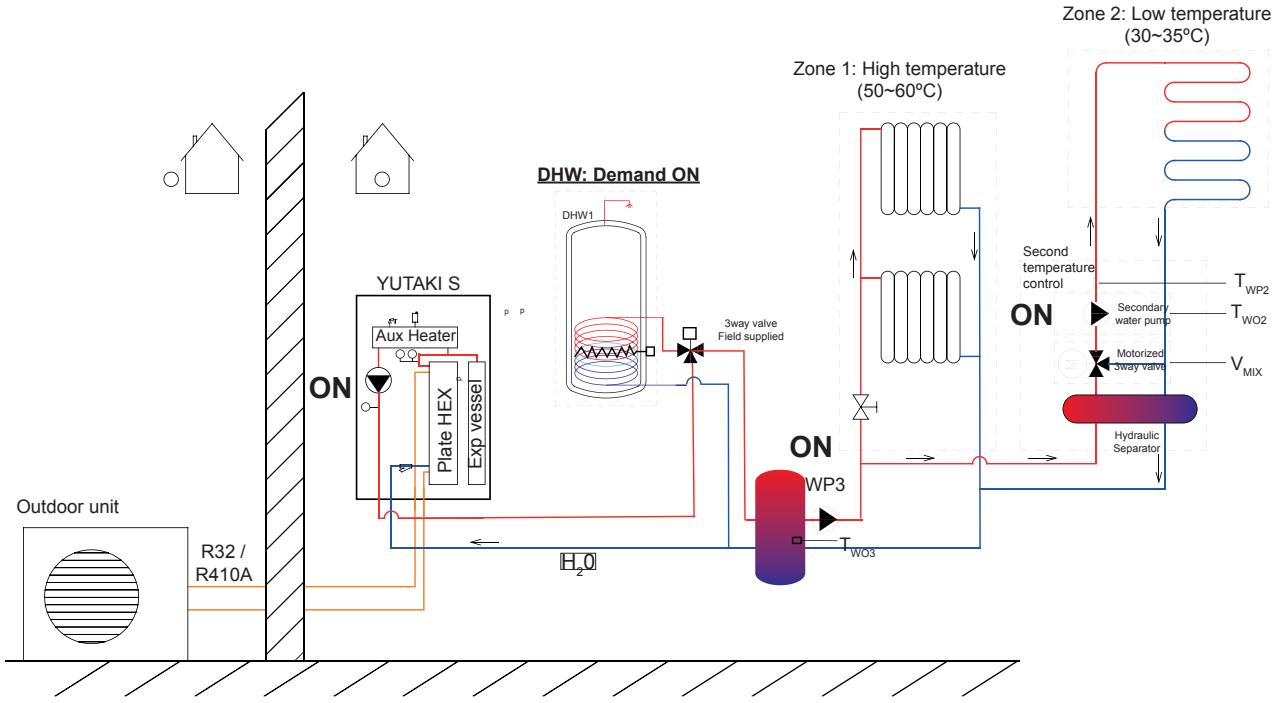
◆ Example 2: DHW tank before hydraulic separator (“Pre” setting)

- Pumps during DHW: No
- DHW: Demand On
- WP1: On
- WP2 and WP3: Off



◆ Example 3: DHW before buffer tank (“Pre” setting)

- Pumps during DHW: Yes
- DHW: Demand On
- WP1, WP2 and WP3: On

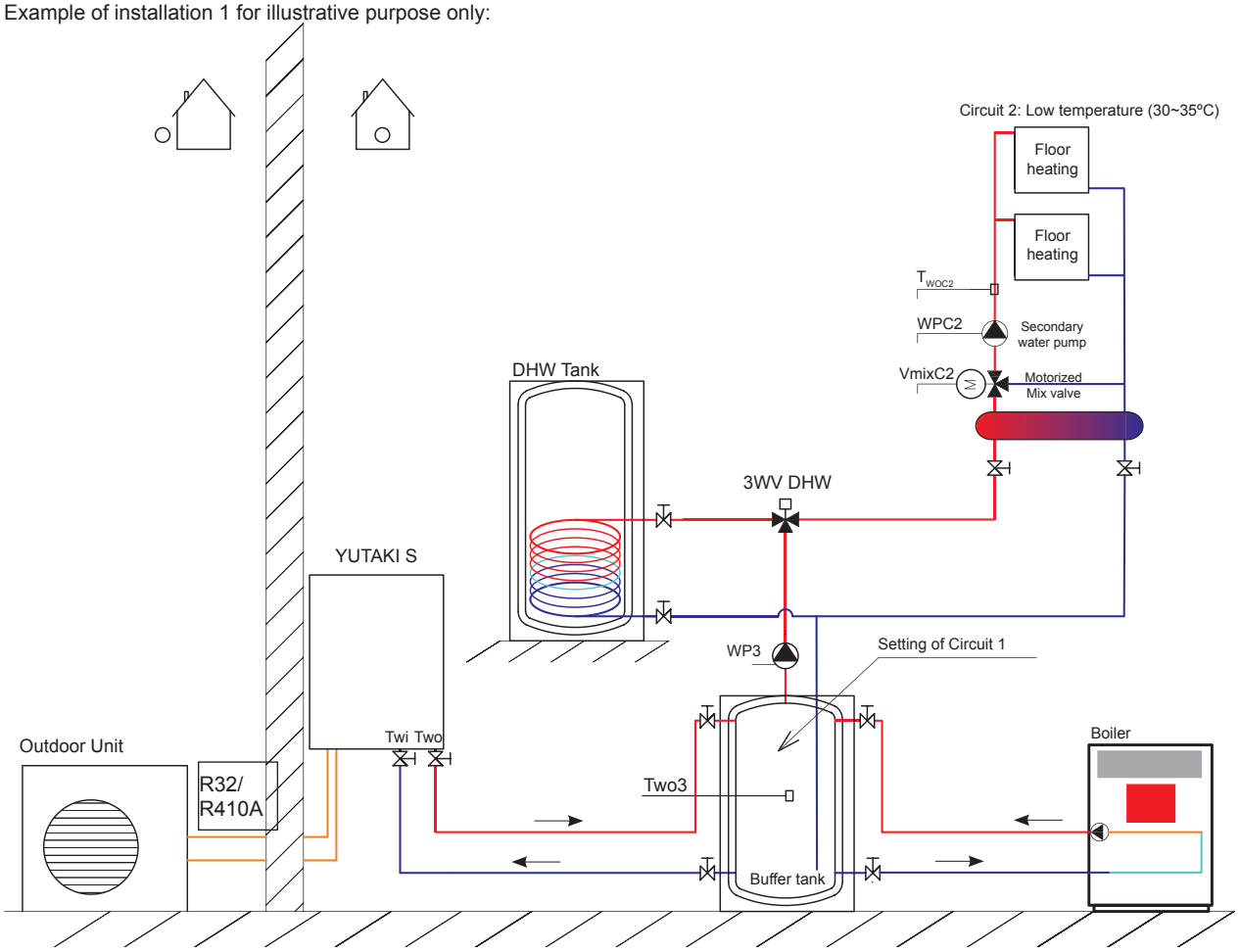


2.3.9 Installation with big buffer tank

Some installations need a big buffer tank in combination with an auxiliary heating system (boiler, pellets, solar panels, etc.). In those cases, the control of the water temperature can be done by an external temperature sensor (Two3) to heat the water of that tank.

This functionality is also used in combination with SG Ready smart function (refer to *"3. Optional functions"*).

Example of installation 1 for illustrative purpose only:



In the example, the system works for only one zone application.

Using the buffer tank in combination with a boiler, Circuit 1 is working as Circuit 2 in a mixing loop. With this system, the configuration of the Unit controller is like for two circuits:

- Circuit 1: Buffer tank working as Circuit 1
- Circuit 2: Mixing circuit for space heating

NOTE

- *Settings for Circuit 1 must be always higher than for Circuit 2.*
- *User can configure only one thermostat only for circuit 2.*
- *Circuit 1 only works as a buffer tank (ThermoON/OFF mode) .*

Also, it is possible to switch OFF the YUTAKI water pump when Thermo OFF condition is active (i.e.: when the buffer tank temperature is reached).

◆ Configuration and parameters for an installation with buffer tank

New YUTAKI unit offers the possibility to select among 2 different water pumps distribution for C1 and C2 called Standard and Parallel.

NOTE

Not applicable to YUTAKI CASCADE CONTROLLER.

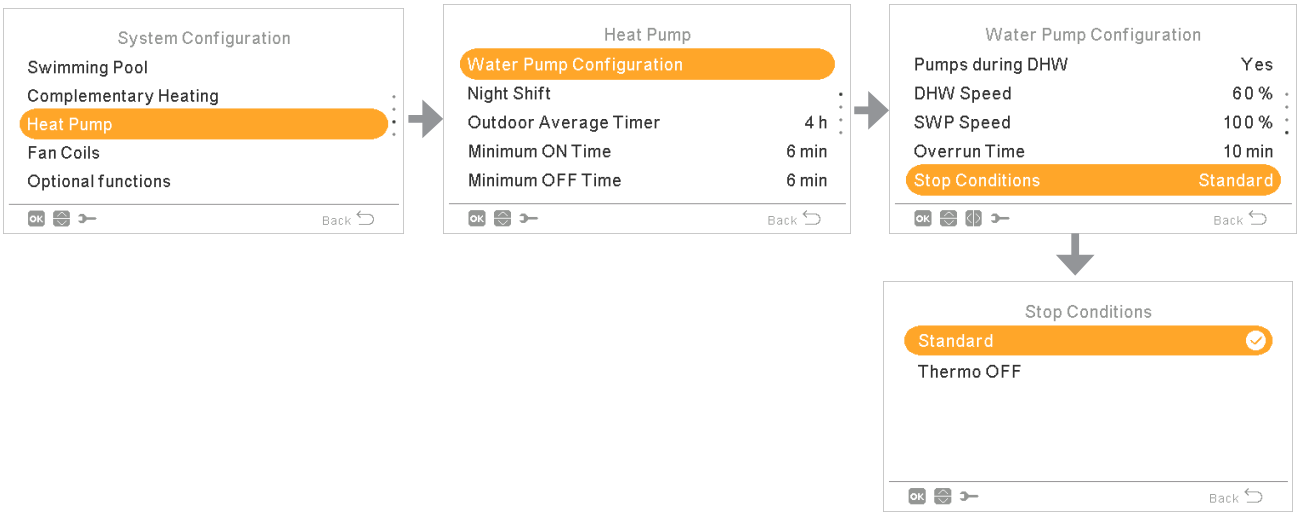
For an installation to work with a buffer tank the following configuration must be done:

- DSW settings: DSW5, PIN 4: ON is required to enable this function
- Auxiliary sensor: Auxiliary sensor 1, 2 or 3 is needed to be set to Two3
- Output signals: Output signal 1 or 2 should be set to WP3

Additionally, this function should be set through the Unit controller (PC-ARFH2E)

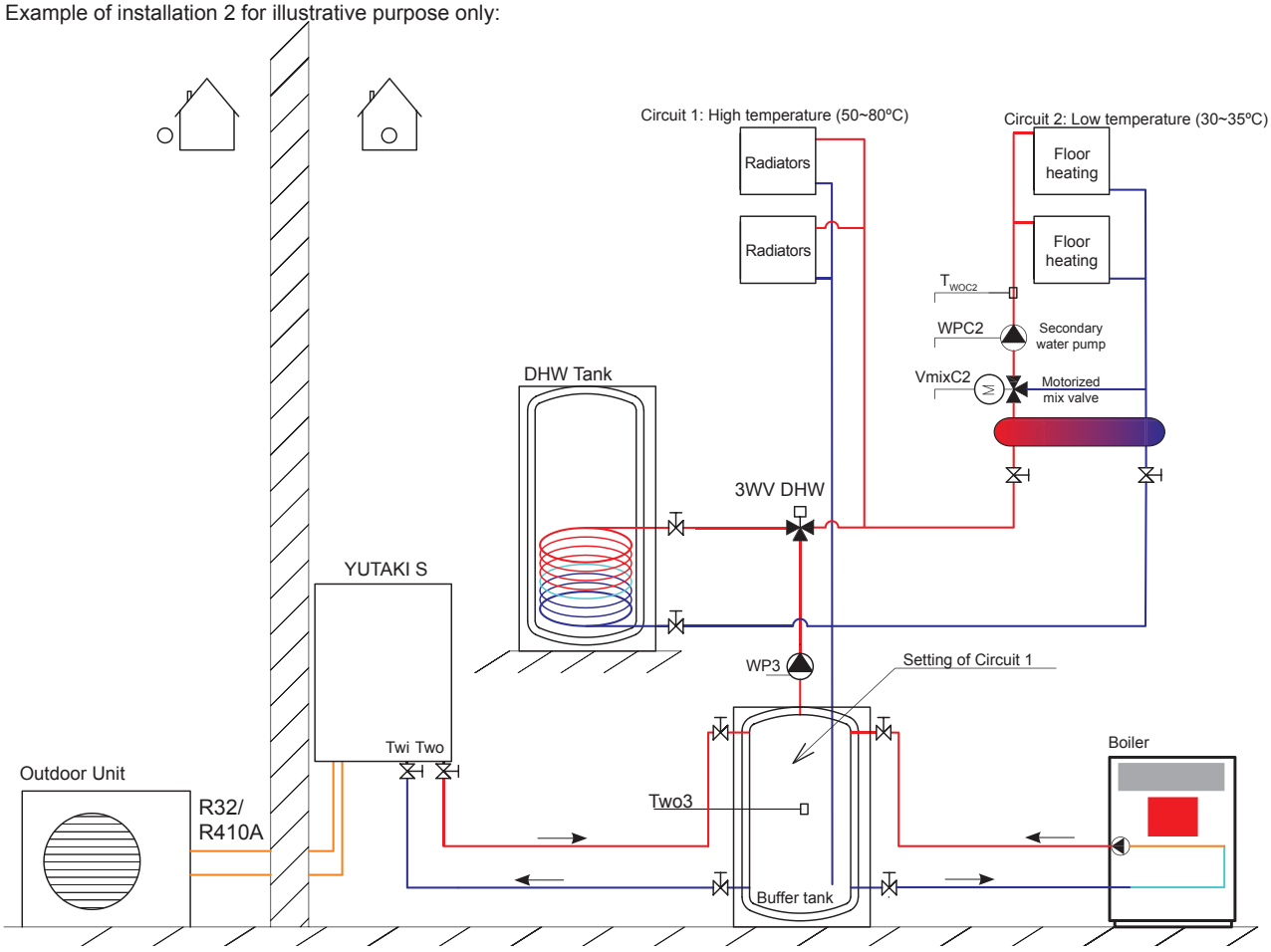
System Configuration – Heat Pump – Water Pump Configuration

Description	Default Value	Range
Stop conditions	Standard	Standard / Thermo OFF



If water pump changes to Thermo-OFF, water pump 1 is switched off after the buffer tank temperature is achieved. Water pump 3 is always running (except when switch OFF condition).

Example of installation 2 for illustrative purpose only:



In this example, the system works for 2 zone application: with the buffer tank in combination with a boiler, the Circuit 1 works as a direct circuit (temperature of buffer tank must be the same as for Circuit 1); and circuit 2, using a mixing loop.

According to this example, the Unit controller should be configured as for 2 circuits:

- Circuit 1: Direct circuit for space heating Zone 1
- Circuit 2: Mixing circuit for space heating Zone 2

NOTE

- *Setting of Circuit 1 must be always higher than the setting for circuit 2.*
- *User can configure 2 thermostats for each circuit.*
- *Circuit 1 works as a Direct circuit.*

◆ Main control

The water temperature control is based on:

Water temperature data from circuit 1 and circuit 2 (THM_{WO} and THM_{WO3}).

Example:

- If water temperature settings (Ttwo)= 50ºC, and
- Water outlet temperature (THMwo)= 40ºC, and
- Water outlet temperature (THMwo3)= 35ºC

Unit frequency water temperature control will be done by THMwo

Thermo ON/OFF will occur when THMwo3 gets the set temperature for in Circuit 1

If Circuit 1 is in Demand OFF, unit setting changes to Circuit 2, but mixing valve is used to reduce the temperature stored in the buffer tank..

2.3.10 Screed drying function

YUTAKI series has a special optional function exclusively used for the process of drying screed that has been newly applied to floor heating systems. This process is based on EN1264 part 4.

The water temperature set-point follows a predetermined schedule upon activation of the floor screed drying function.

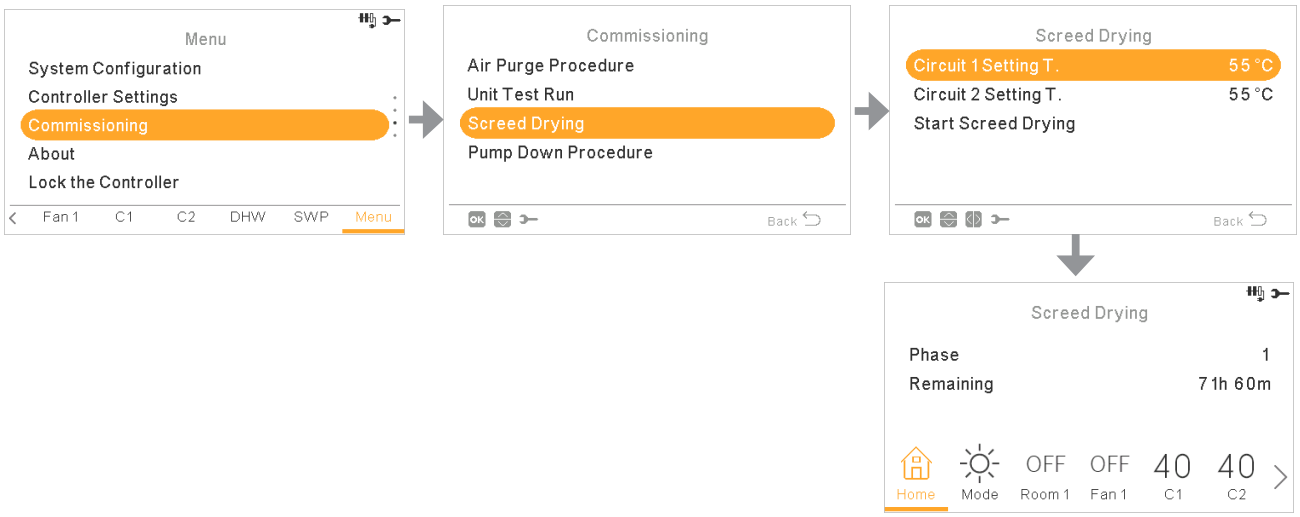
Upon completion of the above sequence, the controller returns to normal operation. Circuit 1 and Circuit 2 are forced to ON and mode is forced to heating.

All the other heating modes are overdriven except for hot sanitary water. The room thermostat is disabled during this function.

The configuration of this option is settled from the Unit controller (PC-ARFH2E):

Commissioning → Screed drying

Description	Default Value	Range	Units
Screed drying setting temperature C1	55	Limits installer	ºC
Screed drying setting temperature C2	55	Limits installer	ºC
Start Screed Drying	-	-	-



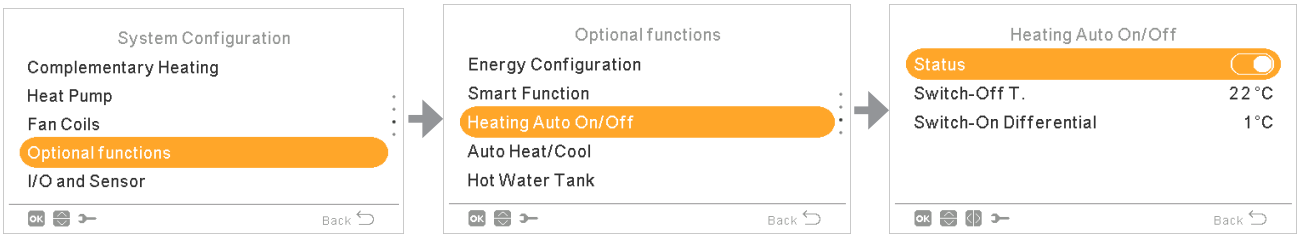
2.3.11 Heating auto ON/OFF

When outside temperature rises, it is not necessary to keep the installation in heating mode. YUTAKI system switches the heat to OFF when the daile average outdoor temperature of the previous day rises above the Switch-OFF Temperature.

The variables that the system uses are configured though the Unit controller (PC-ARFH2E):

System configuration → Optional functions → Heating Auto ON/OFF

Description	Default Value	Range	Units
Status	Deactivated	Deactivated/Enable	-
Switch-OFF T	22	10~25	ºC
Switch-ON Differential	1	1~3	ºC



The system calculates the average temperature of the last 24 hours.

The system will not check anything until the first 24 hours have passed. After that time, the system will adjust the average with a new sample every 5 minutes and checking the new conditions.

2.3.12 Auto HEAT/COOL (Only for units with cooling kit installed)

This feature is only available for those heating and cooling models and when cooling is enabled. Using the Autosummer Switch-OFF average, the auto HEAT/COOL mode can be used by users.

The end-user set the desired operation mode on the user's interface. Heating, Cooling or Automatic.

When Automatic is selected, the change of the operation is based on the following conditions:

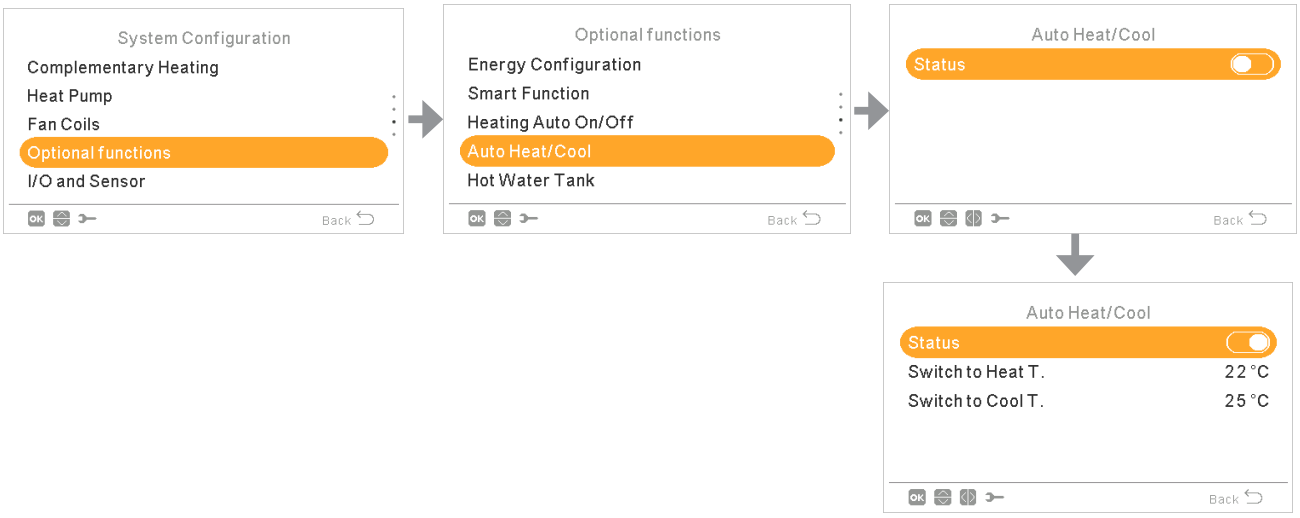
Averaged outdoor temperature: The operation mode will be changed in order to remain within the range determined by the space heating OFF temperature for heating, and the space cooling ON temperature for cooling.

As long the outdoor temperature changes, the system changes to match the system requirements. If outdoor temperature drops, the operation mode switches to heating, and vice versa.

This functions should be configured through the unit controller (PC-ARFH2E):

System configuration → Optional functions → Auto Heat/Cool.

Description	Default Value	Range	Units
Auto HEAT/COOL status	Deactivated	Deactivated/Enable	-
Switch to Heat T	22	10~23	ºC
Switch to Cool T	25	24~35	ºC



NOTE

- *The system calculates the average temperature of the last 24 hours taking samples every 5 minutes.*
- *On the first 24 hours, the system keep the previous mode before being set to Auto mode.*
- *After the first 24 hours the system will check the function with the new average temperature when it is updated each 5 minutes.*

The checking conditions are:

CONDITION	AUTOMATIC
Average < (Heating Auto T)	Heating
Average > (Cooling Auto T)	Cooling

2.3.13 Demand ON/OFF

The space heating or cooling demand of the YUTAKI unit can be done by different ways:

- Demand ON/OFF by an external input signal (by using the ATW-RTU-04 ON/OFF thermostat).
  - Option 1: Input 1 for both circuit (Circuit 1 & Circuit 2)
  - Option 2: Input n for Circuit 1 and Input n2 for Circuit 2, independently
- Demand ON/OFF operation between Room ambient and Room setting temperature in case of using PC-ARFH2E as Room thermostat or by the wireless intelligent thermostat (ATW-RTU-06/7).
- Demand ON/OFF operation by a Central Device.

NOTE

- *"n" is the number according the input (Input1, Input2...etc).*
- *The options for the configuration should be done through the unit controller (PC-ARFH2E).*

2.3.13.1 Demand ON/OFF by an external input signal

When the system has the ON/OFF thermostat (ATW-RTU-04) connected to the terminals 13/14 of the Terminal board (input 1, Demand ON/OFF):

- When a closed signal is active in Input 1 there is a Demand ON condition.
- When an Open signal is active in Input 1, there is a Demand OFF condition.

NOTE

The options for the configuration should be done through the unit controller (PC-ARFH2E).

2.3.13.2 Demand ON/OFF by a room thermostat

This function is available with the following possible combinations:

- PC-ARFH2E (Unit controller) is used as a room thermostat, or
- Wireles intelligent thermostat (ATW-RTU-06/07)
- Central device is used as Air control device
- When the system uses Room temperature sensors + PC-ARFH2E (Working as a Unit controller) + Room thermostat

In case of Room thermostat overheat or over cool, the system can switch to Demand OFF (Compressor OFF, Heater OFF) if the Room thermostat temperature (Roff) is higher than the Room temperature set point. In case of ECO pump selected, the water pump also switches to OFF after over-run time.

The parameters used by the system for the control of this function are described below:

Heating:

- If $RT_{Cn} > RS_{Cn} + Roffh_{Cn}$ → Demand OFF condition
- If $RT_{Cn} \leq RS_{Cn}$ → Demand ON condition

Cooling:

- If $RT_{Cn} < RS_{Cn} - Roffc_{Cn}$ → Demand OFF condition
- If $RT_{Cn} \geq RS_{Cn}$ → Demand ON condition

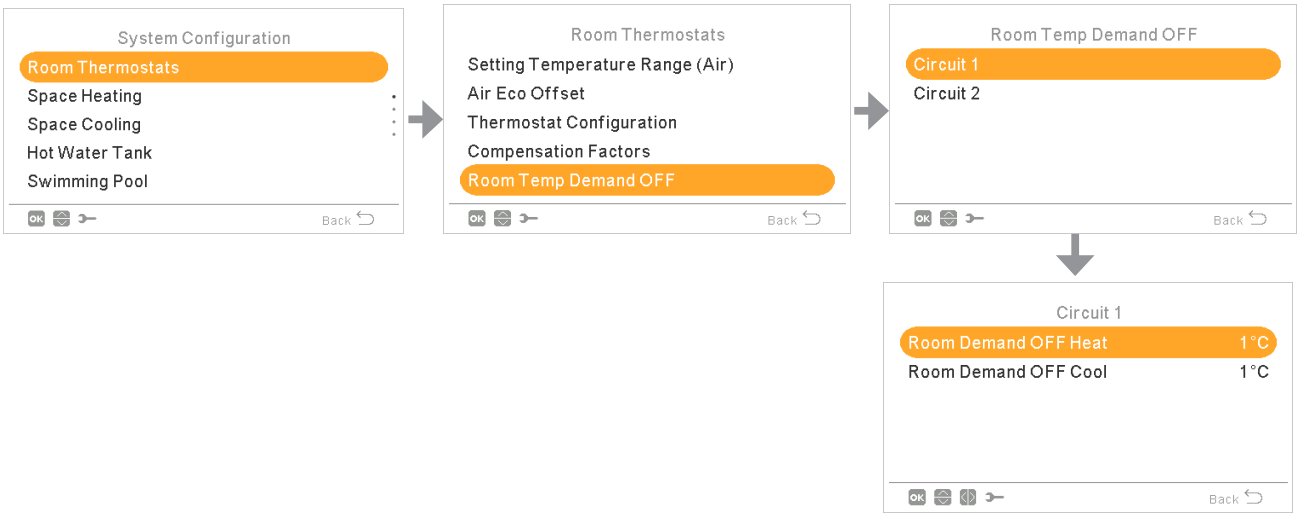
Where:

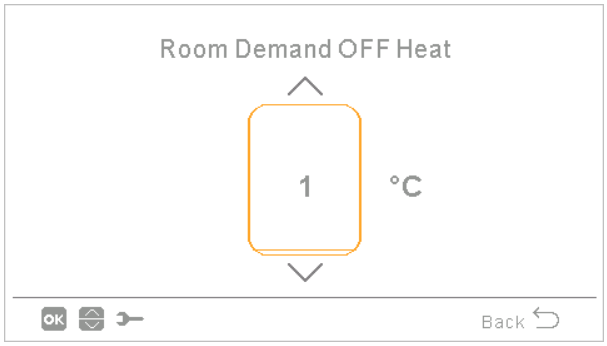
- *RT_{Cn}: Room temperature (ºC)*
- *RS_{Cn}: Room temperature set point (ºC)*
- *$Roffh_{Cn}$: Hysteresis in Heating (ºC)*
- *$Roffc_{Cn}$: Hysteresis in Cooling (ºC)*
- *Cn: Circuit number (n=1: Circuit 1; n=2: Circuit 2)*

The configuration of this function should be done through the Unit controller (PC-ARFH2E):

System Configuration → Room Thermostats → Room Temp Demand OFF → Circuit 1 / Circuit 2

Description	Default Value	Range	Units
Room demand OFF Heat	1	OFF 1~5	ºC
Room demand OFF Cool	1	OFF 1~5	ºC





NOTE

To disable the Room demand ON/OFF function, just set to OFF, then system is in constant Demand ON and HP is stopped in case Thermo OFF is reached. Room temperature and Room temperature setpoint are still used to adjust water temperature by means room temperature compensation function.

2.3.13.3 Minimum ON/OFF time between Demand ON/OFF operation

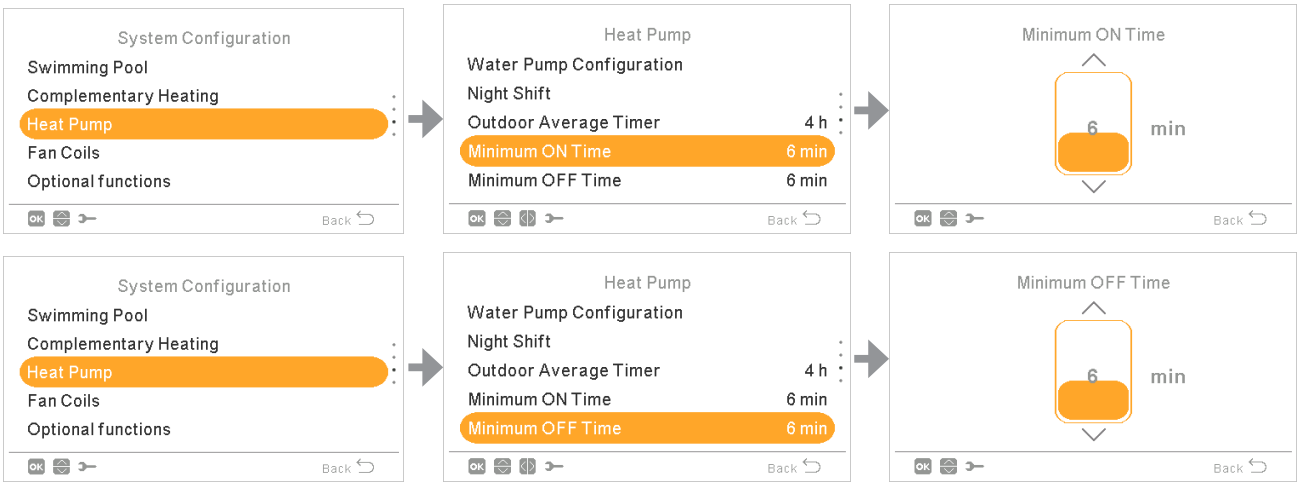
In order to reduce a possible compressor damage, demand ON/OFF cycles can be reduced by the following conditions

- Minimum ON Time: When a Demand ON is enabled, this function applies a minimum of time to be ON.
- Minimum OFF time: This function determines the time that must pass after a Demand OFF.

This function can be set through the Unit controller (PC-ARFH2E):

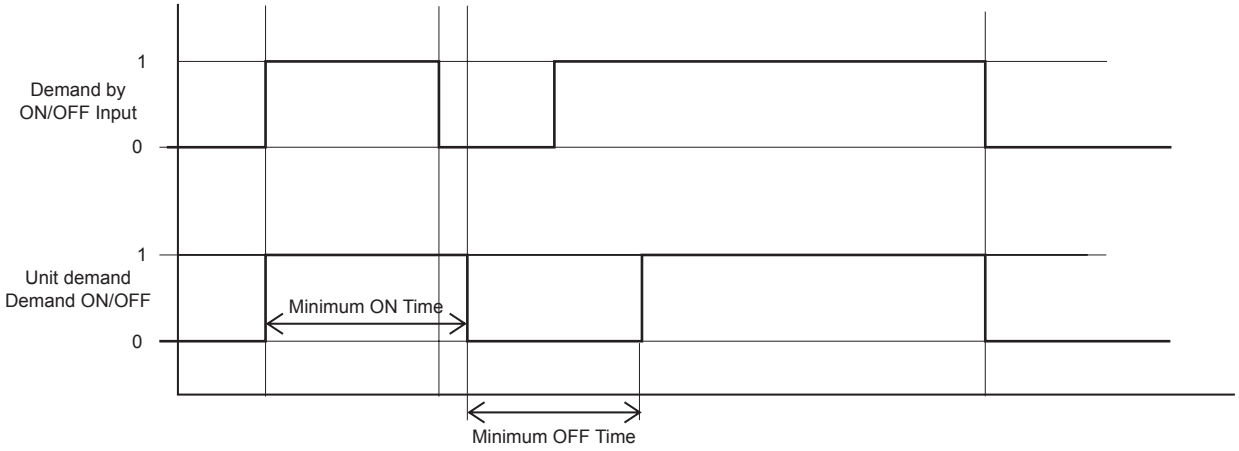
System Configuration → Heat pump

Description	Default Value	Range	Units
Minimum ON Time (Rton)	6	0 ~ 15	min
Minimum OFF Time (Rtoff)	6	0 ~ 15	min



NOTE

- *Time starts counting when a signal is received from an ON/OFF input.*
- *If both parameters are set to 0, this function has no effect.*



NOTE

- *It is applied for 2 circuits (same parameters).*
- *Not considering in compressor start.*

2.3.14 Room temperature compensation control

YUTAKI allows the use of room temperatures and room temperature settings for both of the circuits (Circuit 1 & 2) in order to compensate the water temperature setting.

This function is available with the following possible combinations:

- PC-ARFH2E (Unit controller) is used as a Room thermostat, or
- Wireles intelligent thermostat (ATW-RTU-06/07)
- Central device is used as Air control device
- When the system uses Room temperature sensors + PC-ARFH2E (Working as a Unit controller) + Room thermostat
- When water calculation based on OTC Gradient or OTC points (Fix settings are not available for this function)

At different times of the day, according to the time programme in the Room Unit, the room temperature set point will cause a shift of the heating curve up or down to reflect the change in desired room temperature. The change in supply set point due to the room set point is dependent on the value of the outside temperature and the selected heating curve.

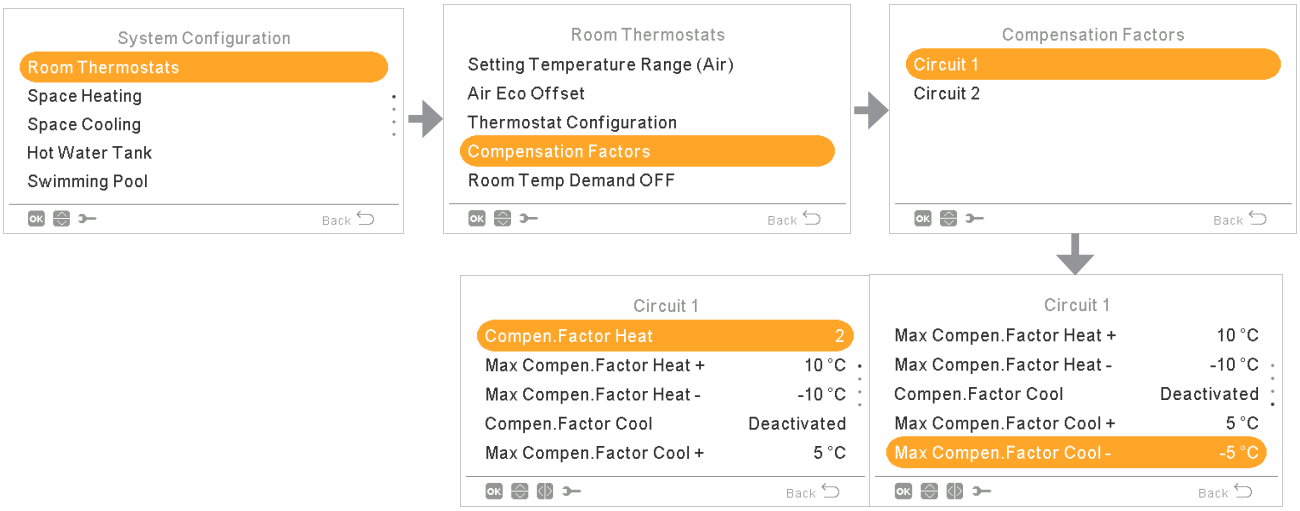
When Room compensation is enabled, the calculated supply set point is adjusted according on the difference between the Room temperature and the Room set point in order to reduce the room temperature error. The amount of room influence can be adjusted by the Room temperature compensation factor setting.

To increase or decrease the amount of room compensation, the room compensation factor should be adjusted. A higher value will give more priority to the room temperature error, and a lower value will lead the controller to follow more closely the selected heating curve.

The configuration of this parameter should be done through the Unit controller (PC-ARFH2E)

System Configuration → Room Thermostats→ Compensation Factors → Circuit 1 / Circuit 2

Description	Default Value	Range	Units
Compen.Factor Heat	2	OFF- 1~5	
Max Compen.Factor Heat +	10	0-10	ºC
Max Compen.Factor Heat -	-10	-10-0	ºC
Compen.Factor Cool	OFF	OFF- 1~5	
Max Compen.Factor Cool +	5	0-10	ºC
Max Compen.Factor Cool -	-5	-10-0	ºC



NOTE

- *To disable Room compensation function, set to OFF*
- *Max Compen Factor (Heat/Cool; +/-) sets the maximum value of compensation value (positive or negative) to be adjusted in OTC Setting Control.*

Water temperature set point is calculated as follow:

Heating

- TtwoCn: = Ttwo_OTCn + Rfacthn x (ΔTroom)
  - If Rfacthn x (ΔTroom2) > Maxfacthpn → Rfacthn x (ΔTroom) = Maxfacthpn
  - If Rfacthn x (ΔTroom2) < Maxfacthnn → Rfacthn x (ΔTroom) = Maxfacthnn

Cooling

- TtwoCn: = Ttwo_OTCn - Rfactcn x (ΔTroom)
  - If Rfactcn x (ΔTroom) < Maxfactcnn → Rfactcn x (ΔTroom) = Maxfactcnn
  - If Rfactcn x (ΔTroom) > Maxfactcpn → Rfactcn x (ΔTroom) = Maxfactcpn

Where:

- *TtwoCn: Result Water Set-Points for Cn Circuit (ºC);*
- *Ttwo_OTCn: Water Set-Points as calculated by OTC in Cn Circuit (ºC);*
- *ΔTroom: Room Temperature Offset = RSC - RTCn.*
- *RSCn = Room set point (ºC);*
- *RTCn = Room temperature (ºC);*
- *Cn: Circuit number (n= 1 Circuit 1; 2= Circuit 2)*

NOTE

- *When water calculation is fixed, Room set point influence has no effect.*
- *First 10 minutes after power on Room set point influence has no effect.*

2.3.15 Switch OFF space condition by room thermostat

YUTAKI allows the use of Room temperature and Room temperature setting in order to switch OFF the system

This is only available in the following cases:

- PC-ARFH2E as Room thermostat
- Wireless intelligent thermostat (ATW-RTU-06/07)
- Central device as Air control

In case of PC-ARFH2E as Room Thermostat: By pushing OFF button

In case of ATW-RTU-05/06: If Room Temperature setting (RS) is lower than 10ºC, it will be a switch OFF conditions for the heating or cooling space selected. In case of both user Thermostats (Circuit 1 & Circuit 2), it will be Unit OFF Condition for the global heating space / cooling space.

2.3.16 Determination of room temperature data

In order to apply for room temperature functions, different room temperature sensors can be used.

- Use from PC-ARFH2E Sensors.
- Use from unit Taux sensor as Room temperature sensor.
- Use from central application.

There is a priority of room temperature sensor application for room temperature compensation functions.

1 Use from unit Taux sensor.
2 Use from PC-ARFH2E Sensors.
3 Use from central application.

In case of room temperature setting, priority is as follow:

In case of a received data by central, the central setting value is applied in any case. After that, value is only changed if the value from the room thermostat (Wired or Wireless) is a different value than previous one (restored before change by central value).

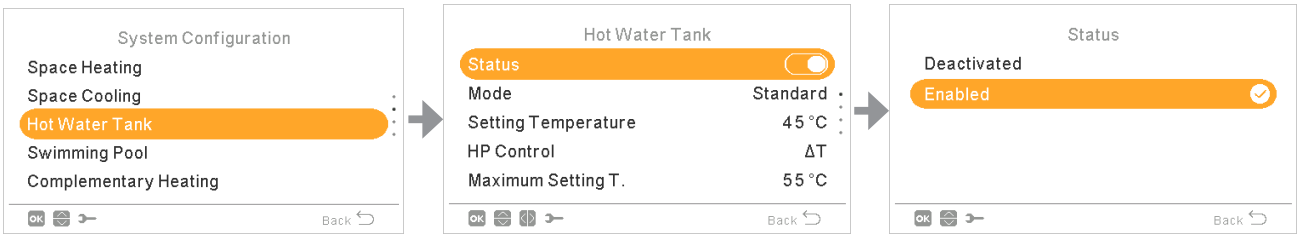
2.4 Sanitary Water Operation

2.4.1 Enabling operation

Sanitary water operation should be enabled from the Unit controller (PC-ARFH2E)

System Configuration → Hot Water Tank

Description	Default Value	Range
Status	Deactivated	Deactivated / Enabled



Sanitary Operation has priority above all other operation modes unless it is specifically stated.

Following constraints are applied:

- When Sanitary Water requires Heat Pump operation all other modes cannot require heat pump operation.
- If Sanitary Water does not require Heat Pump operation, it is stopped or is working with heater only, there is no restriction on the other operation modes.
- Solar application has priority if solar waiting time has not passed.

2.4.2 DHW Tank heater operation

The electric heater of the domestic tank is Deactivated factory setting. The configuration for this function should be enabled through the Dip switch of PCB.

Configuration: DSW4 PIN3: ON

2.4.3 DHW temperature setting

Sanitary water operation (both, Heater and Heat pump) is sttoped when:

- DHWT Demand OFF conditions:
  - If TDHW > TDHWS → DHWT Demand OFF Operation

Where:

TDHW: Domestic Hot Water Temperature (ºC)

TDHWS: Setting of Domestic Hot Water Temperature (ºC)

- DHWT Demand ON conditions
  - Operation Mode (High or Standard Demand)
  - Boost operation mode

NOTE

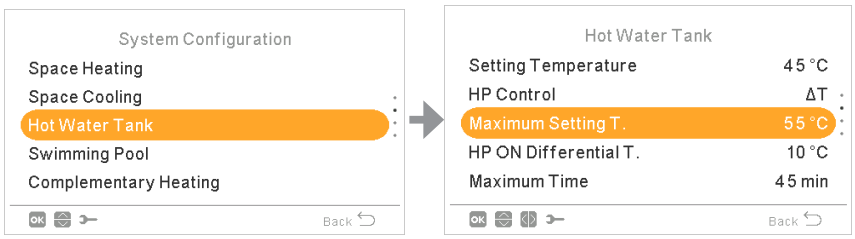
- *The heat pump can produce domestic hot water up to 55ºC as a maximum by itself, but Hitachi recommends to set the temperature of the tank by heat pump only up to 50º C and keep Thpoff default value. In case of higher setting, the tank's heater must be used to reach the setting temperature (enabled by optional function).*
- *In case of heating up the DHW tank with an outdoor ambient temperature lower than -5ºC and without using the DHW electrical heater, the setting temperature must not exceed the maximum value in the specified continuous working range.*

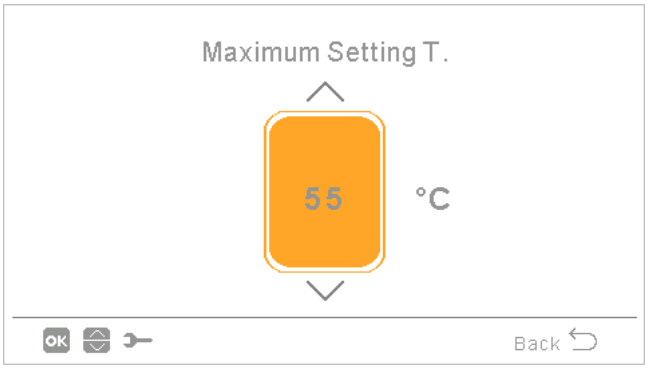
2.4.4 Maximum set point selected by installer

In order to prevent high hot water in the tank an additional function is added:

System Configuration → Hot Water Tank

Description	Default Value	Range	Units
Maximum Setting Tº	55	40~55(*)	ºC





NOTE

(*): 75ºC when tank heater is enabled by DSW4 PIN3: ON or Boiler combination mode is Parallel and DHW by boiler is Enabled.

2.4.5 DHW operation mode

DHW operation can work on 3 different modes: Economic, Standard and High Demand mode:

- Economic mode: (Only for YUTAKI S COMBI): DHW heating operation starts under same conditions as Standard Mode with the difference that water temperature measurement is done at higher tank position. Due to this fact number of DHW operations decrease and its duration becomes longer which becomes more efficiency.
- Standard mode: DHW heating operation starts when the temperature of the water in the tank is low enough to start up the heat pump. DHW is heated up with the heat pump or the electrical heater (if electrical heater is enabled).
- High Demand mode: DHW heating operation starts if water temperature and setting temperature difference is larger than differential temperature. DHW can be heated up using the heater, the heat pump or a combination of both.Only available when Hot Water Tank heater is activated (DSW4 pin 3 ON).

DHW operation mode should be selected from the Unit controller (PC-ARFH2E)

System configuration → DHW

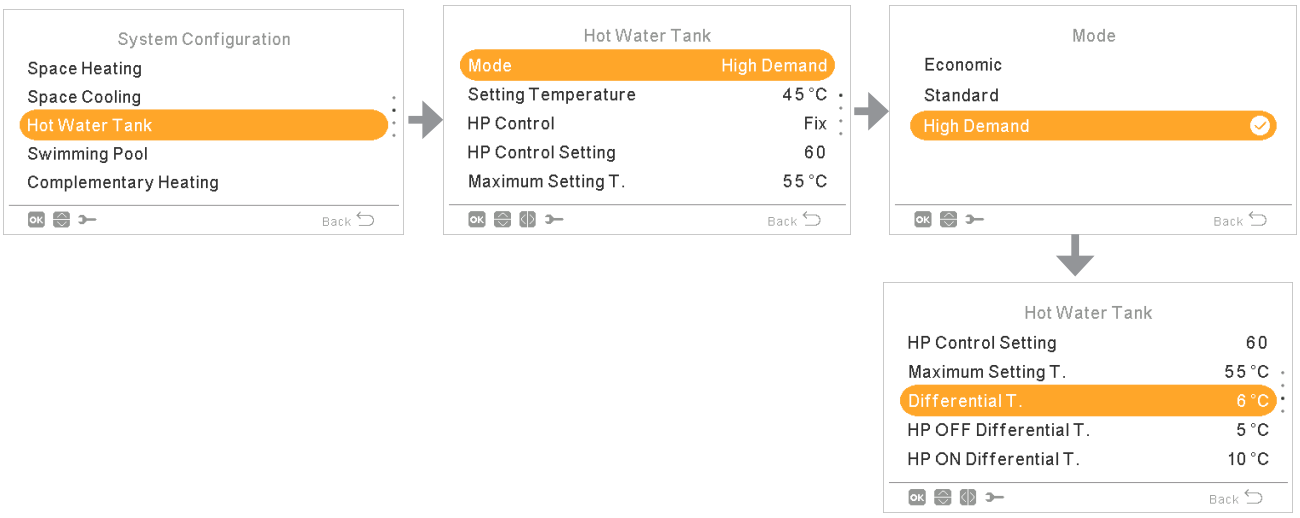
Description	Default Value	Range
Mode	Standard	Standard Economic High Demand

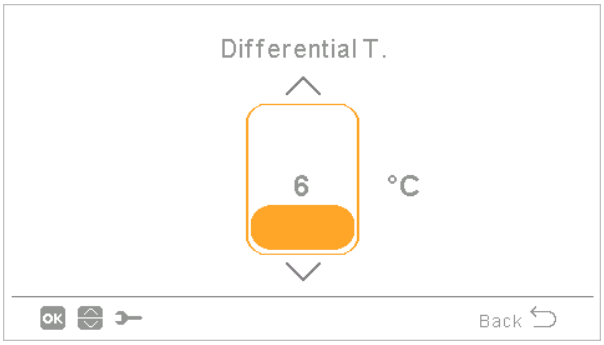
2.4.6 Differential temperature for DHW High Demand mode

The differential temperature can be settled through the Unit controller (PC-ARFH2E)

System configuration → Hot water tank

Description	Default Value	Range	Units
Differential T	6	2~15	°C



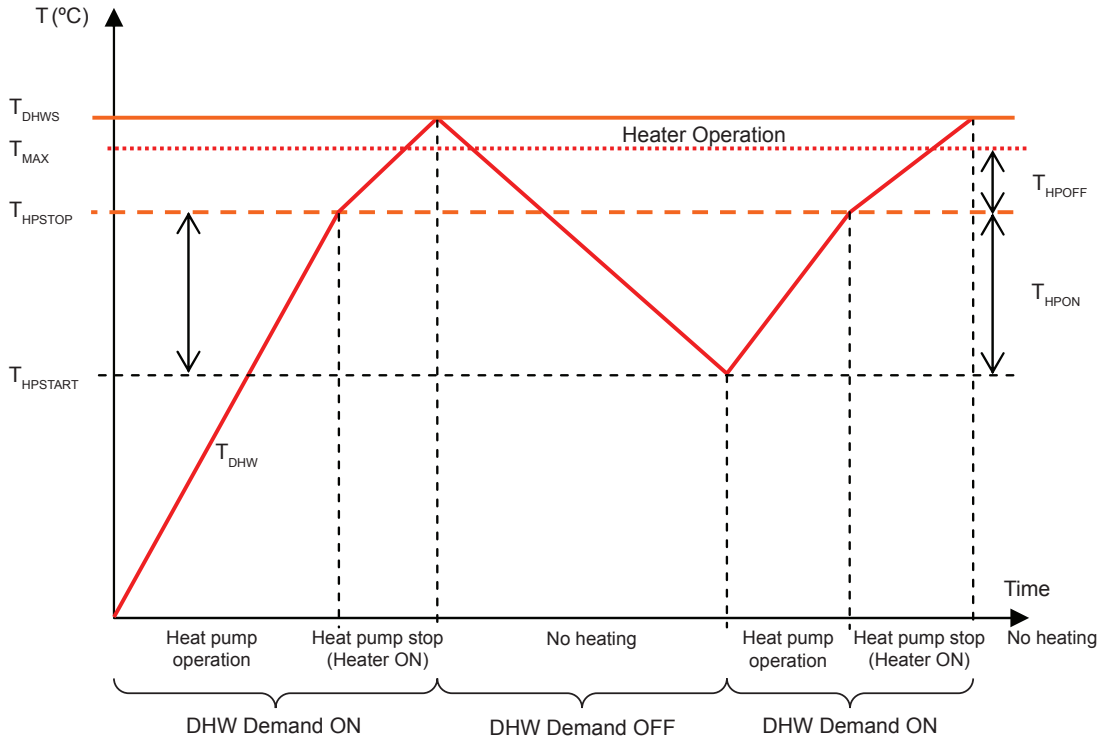


2.4.7 Heat pump operation for DHW. (T_{HPON} & T_{HPOFF})

Heat pump operation for sanitary water is started when T_{DHW} is lower than $T_{HPSTART}$.

Heat pump operation for sanitary water is stopped when T_{DHW} is bigger than T_{HPSTOP}. After this stoppage, unit should continue heating sanitary water tank (if enabled) by means of sanitary tank electric heater until stoppage conditions are met. If heater tank disable (default), tank heating is performed by Heat pump until T_{HPSTOP}.

Control



Where:

T_{DHWS}: DHWT Setting temperature (ºC)

T_{MAX}: Heat pump maximum temperature (defined by unit working range) (ºC)

T_{HPSTOP}: Temperature which the heat pump stop heat the tank

$T_{HPSTART}$: Temperature which the heat pump start to heat the tank

$T_{HPSTART}$ will be limited to equal or lower than 42ºC when ambient temperature (Tamb) > 25ºC

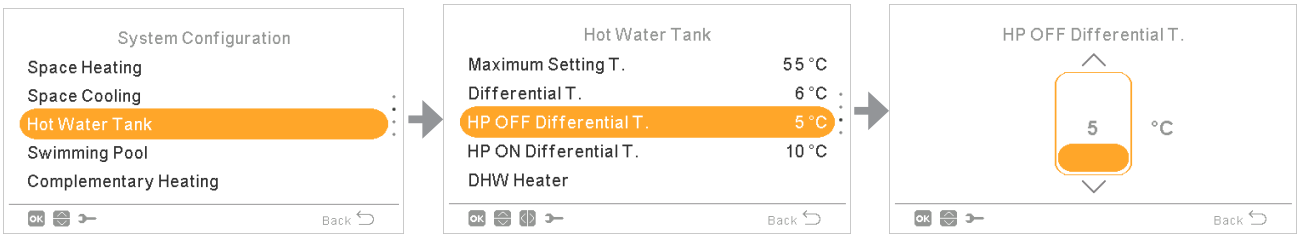
NOTE

The heat pump can produce domestic hot water up to 55ºC as a maximum by itself, but Hitachi recommends to set the temperature of the tank by heat pump only up to 50ºC and keep Thpoff default value. In case of higher setting, the tank's heater must be used to reach the setting temperature (enabled by optional function).

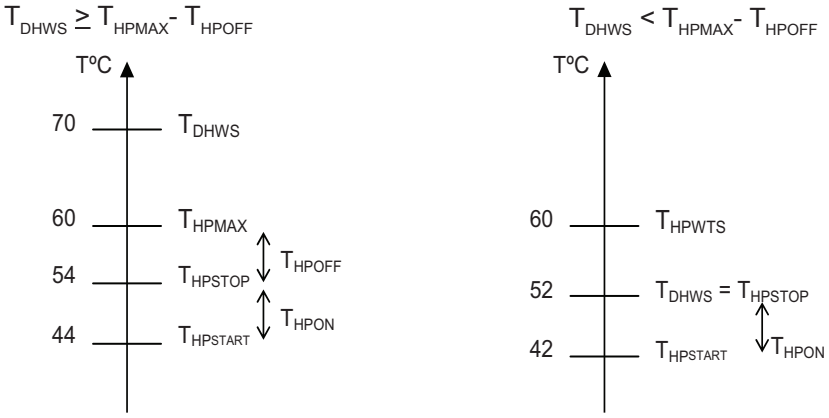
The configuration of this function should be done through the Unit controller (PC-ARFH2E)

System configuration → Hot water tank

Description	Default Value	Range	Units
HP OFF Differential T	5	3~10	ºC
HP ON Differential T	10	5~25	ºC



Example of temperature settings for YUTAKI S & S COMBI



2.4.8 Maximum DHW loading time (T_{DHWMAX})

This function controls the maximum time that Sanitary Water operation can work using Heat Pump mode. Heater operation is not affected by it.

Maximum DHW heating time can never be applied when DHW Second Cycle Waiting Time ($DHWC_{DHW}$) is disabled (set to 0).

Maximum DHW heating time is applied when DHW heater is allowed to start (DHW electric heater is enabled by means DSW and DHW electric heater waiting time is enabled)

Heat pump DHW Demand OFF if:

- Heat Pump Operation Time > T_{DHWMAX}

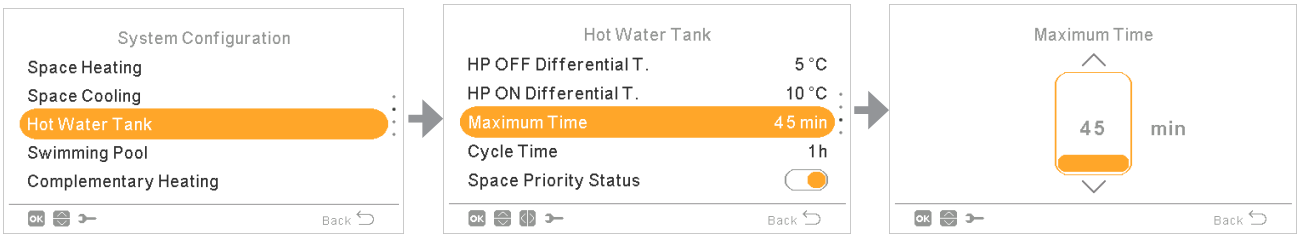
NOTE

When Heat Pump is stopped by this function, Sanitary Water is still heated by Heater when it is enabled, until other conditions request stoppage.

The configuration of this option should be done through the Unit controller (PC-ARFH2E)

System configuration → Hot water tank

Description	Default Value	Range	Units
Maximum Time	45	OFF 5~250	min



2.4.9 DHW second cycle waiting time

This function defines the minimum time between 2 heat pump cycles of domestic hot water.

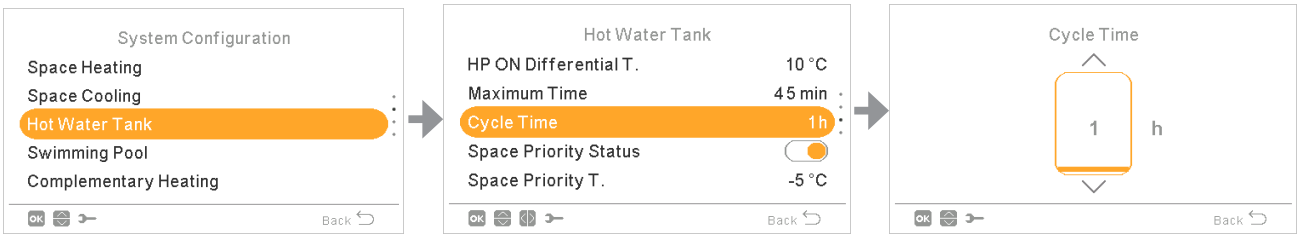
This function is active only when Standard mode or Economic mode is selected

Sanitary water is not active when: Sanitary water OFF Time < cycle time

This function can be configured through the Unit controller (PC-ARFH2E)

System configuration → Hot water tank

Description	Default Value	Range	Units
Cycle Time	1	0~24	hour

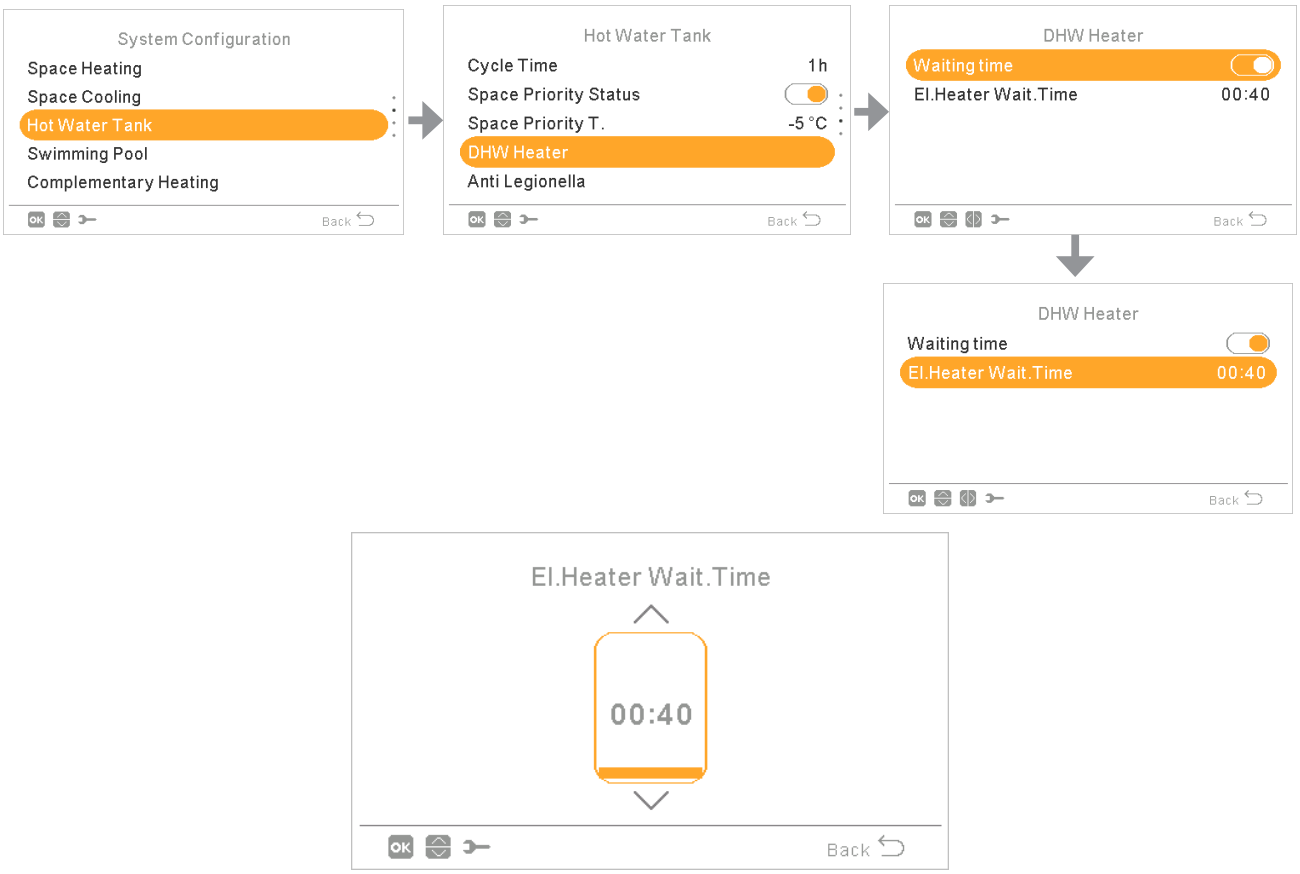


2.4.10 DHW Electric heater waiting time

If Heat Pump cannot give enough capacity it will be necessary to start Heater in order to supply additional capacity.

System configuration → Hot water tank →DHW Heater

Description	Default Value	Range
Waiting time (DHW_{EH})	Deactivated	Deactivated / Enabled
El.Heater Wait Time (DHW_{EH})	00:40	00:10 ~ 08:00



If DHW_{EH} is set to Deactivated, then it will be considered that heater only use after T_{HPSTOP}.

If DHW_{EH} is set to Enabled, system assumes that heater is always used when there is a DHW Demand Operation if condition above is applied.

Electrical Heater wait time (DHW_{EH}) defines the Waiting time for the beginning of electrical heater operation since compressor start-up.

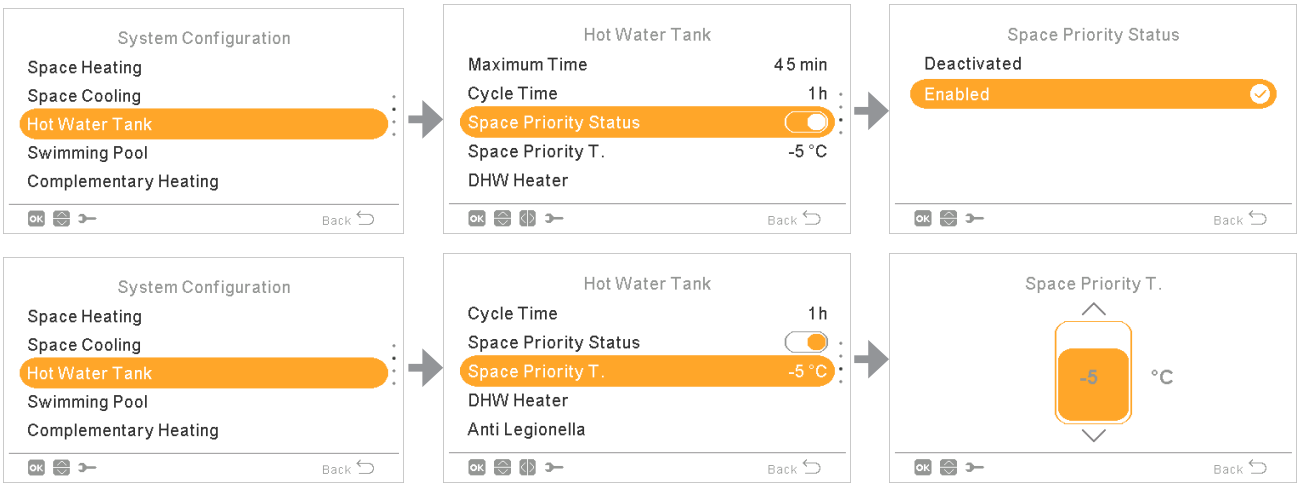
2.4.11 Space heating priority temperature

If Space Heating Priority function is enabled, Heat Pump operation by sanitary mode stops (and continue with heater, if necessary).

This function is only performed if Space Heating or Space Cooling can be done. If it is not possible, operation will continue in DHW normally.

System configuration → Hot water tank

Description	Default Value	Range	Units
Space Priority Status	Deactivated	Deactivated / Enabled	-
Space Priority T	-5	-20~0	°C



2.4.12 DHW compatibility overview

	Operation Mode		
Operation Control	**ECO(*)**	**Standard**	**High Demand**
HP Start	$THM_{DHWTH} < T_{HPSTART}$	$THM_{DHWTL} < T_{HPSTART}$	$THM_{DHWTL} < T_{HPSTART}$
HP Stop	$THM_{DHWTH} > T_{HPSTOP}$	$THM_{DHWTL} > T_{HPSTOP}$	$THM_{DHWTL} > T_{HPSTOP}$
EH Start	In case Electric heater waiting time is enabled, it starts after electric heater waiting time (DHW_{EH}) is passed. On the other hand in case $T_{DHWS} > 55ºC$, electric heater starts when HP stops.		$THM_{DHWTL} < (T_{DHWS} – T_{DHWON})$
EH Stop	$THM_{DHWTH} > T_{DHWS}$	$THM_{DHWTL} > T_{DHWS}$	$THM_{DHWTL} > T_{DHWS}$

	Anti-legionella	Boost	Emergency
HP Start	$THM_{DHWTL} < T_{HPSTART}$	$THM_{DHWTL} < T_{HPSTART}$	-
HP Stop	$THM_{DHWTL} > T_{HPSTOP}$	$THM_{DHWTL} > T_{HPSTOP}$	-
EH Start	$THM_{DHWTL} \leq ANTL_{SET} + 3ºC$	$THM_{DHWTL} < DHW_{bs}$	$THM_{DHWTL} < T_{DHWS} – 4ºC$
EH Stop	$THM_{DHWTL} \geq ANTL_{SET} + 5ºC$	$THM_{DHWTL} > DHW_{bs}$	$THM_{DHWTL} > T_{DHWS}$

NOTE

- *ECO mode is only available for YUTAKI S COMBI.*
- *THM_{DHWTL} = Water temperature inside tank read by the lower thermistor(ºC).*
- *THM_{DHWTH} = Water temperature inside tank read by the upper thermistor(ºC).*
- *$T_{HPSTART}$ = Temperature which the heat pump starts to heat the tank (ºC).*
- *T_{HPSTOP} = Temperature which the heat pump stops heat the tank (ºC).*
- *T_{DHWON} = 6ºC by default on RCS. Only editable in High Demand.*
- *T_{DHWS} = DHWT Setting temperature (ºC).*
- *DHW_{bs} = Boost setting temperature (ºC).*
- *$ANTL_{SET}$ = Anti-legionella setting temperature (ºC).*

2.4.13 DHW defrost

This function allows to perform the defrost operation at the DHW tank instead of at the indoor water installation. This configuration is done through dip switch of PCB.

Configuration:

DSW4 PIN8: OFF
When defrost signal is received from Outdoor Unit and DHW Mode is ON, 3-way valve of DHW is switched OFF in order to work for a long period of heating demand (space heating). This avoids excessive drop water of the Indoor Unit because of the small heat surface when in DHW Mode.

DSW4 PIN8: ON
When defrost signal is received from Outdoor Unit, the 3 way-valve of the DHW is set to ON in order to proceed to the defrost operation into the tank.

2.4.14 Optional function for DHW

2.4.14.1 DHW Antilegionella protection

In order to help prevent against Legionella in the domestic hot water system, the DHW set point can be raised to a higher than normal temperature. The Legionella protection only makes sense if there is a DHW electric heater to raise the DHW temperature to this high temperature.

NOTE

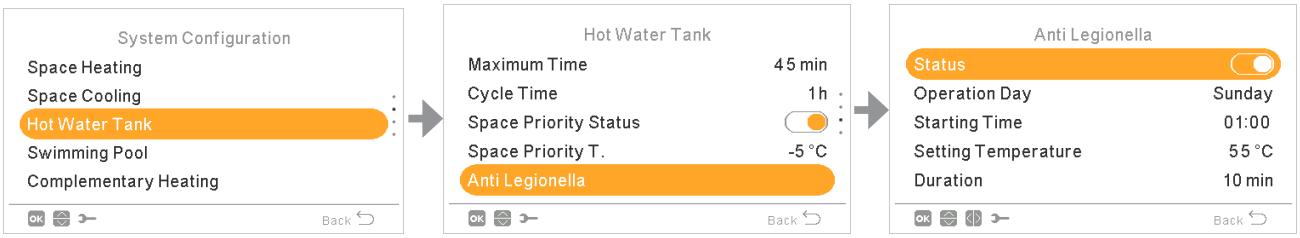
The installer, according to national regulation, must configure this disinfection function field setting.

Installers have the following configuration parameters that can be done through the Unit controller (PC-ARFH2E):

- Operation Day: day(s) of the week at which the domestic water should be heated.
- Status: defines whether the disinfection function is turned ON (1) or OFF (0).
- Starting time: time of the day at which the domestic water should be heated
- Setting temperature: high water temperature to be reached.
- Duration: time period defining how long the set point temperature should be maintained.

System configuration → Hot water tank → Antilegionella

Description	Default Value	Range	Units
Status	Deactivated	Deactivated / Enabled	-
Operation day	Sunday	Daily / Mon ~ Sun	day
Starting Time	01:00	(00:00~ 23:50)	time
Setting temperature	70(*)	40~55(*2)	ºC
Duration	10	10~60	min



NOTE

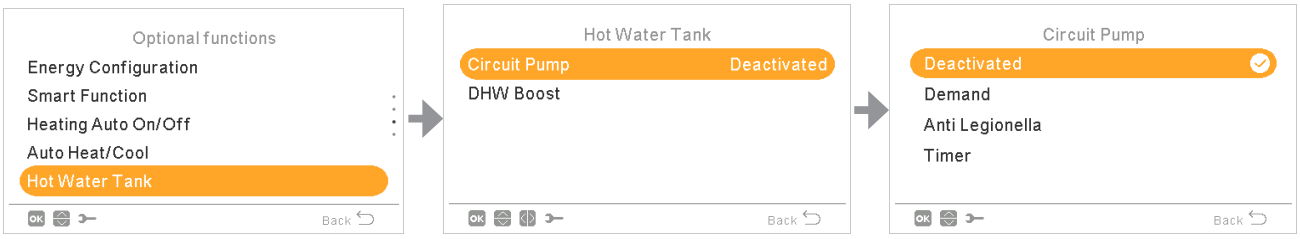
- *(*) The default temperature is 55 ºC for installations without electrical heater.*
- *(*2) The maximum setting temperature is 75 ºC when electrical heater is enabled (DSW4-3 ON)*
- *Antilegionella has priority when Smart activation (and configured as "Only DHW Enabled)" or Timer DHW.*
- *In case of OFF DHWT Operation, Antilegionela is not enabled.*
- *DHWset has an offset of 3ºC in order to get a keeping period.*

2.4.14.2 DHW re-circulation

YUTAKI units disposes an output for a Domestic Hot Water water pump re-circulation option. By using this output, user can heat all the water inside DHW system when heating DHW by Heat Pump. This output can also be used with Legionella and timer function.

System configuration → Optional functions → Hot water tank

Description	Default Value	Range
Circuit pump	Deactivated	Deactivated Demand Anti-Legionella Timer

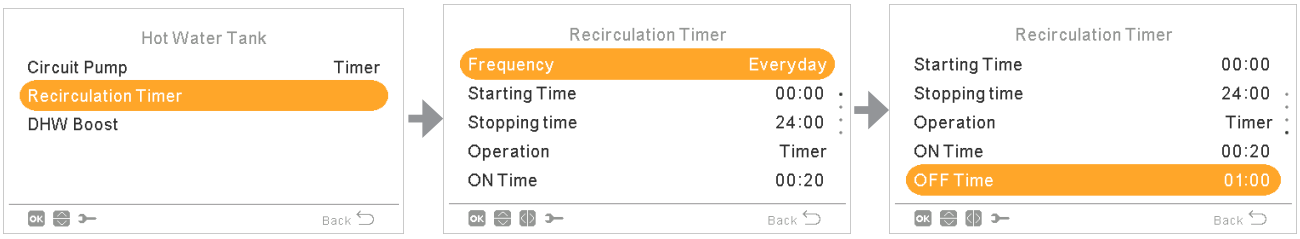


In Case of Deactivated, output is not used.

In case of Demand, the output is enabled when Domestic Hot Water heat operation (HP or Heater) is active.

In case of Anti-legionella, output must be enabled when Domestic Hot Water for legionella operation (HP or Heater) is enabled.

In case of Timer, timer can be programmed in order to start or stop the water recirculation.



2.4.14.3 DHW boost

It is possible to request a one-time heating up of the domestic hot water temperature up to domestic hot water Boost temperature setting.

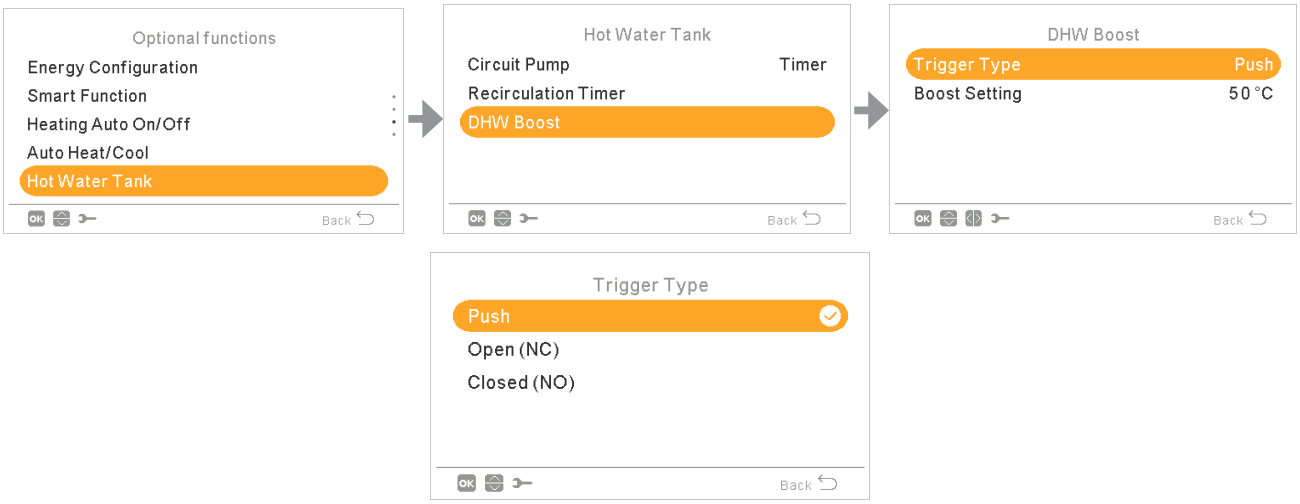
This can be useful when spontaneous DHWT Demand for one day.

The configuration of this option should be done through the Unit controller (PC-ARFH2E).

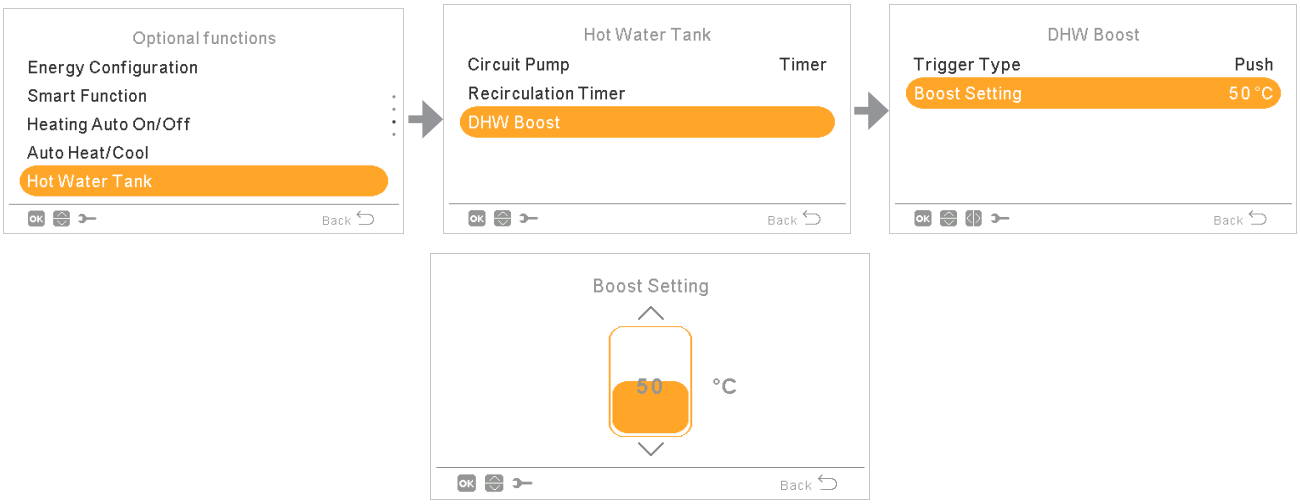
System configuration → Optional functions → Hot water tank → DHW Boost

Description	Default Value	Range
Trigger type	Push	Push Open Closed
Boost setting	50	30 ~ Max set by installer

To start a Boost operation check the specified input to be used for Boost and applied depending on the action selected.



Select the boost setting temperature:



NOTE

If boost is started, it might not be stopped until temperature is reached.

2.5 Auxiliary electric heater for space heating

All YUTAKI S and S COMBI units are delivered with an integrated electric heater for additional heating capacity during cold outdoor temperatures.

The electrical heater is available for a heating capacity of 3, 6 and 9 kW, depending on unit capacity selected.

Model	Heater Capacity	Heater steps	Electrical Heater nominal voltage
2.0 / 2.5 / 3.0 HP	3 kW	3 steps (1/2/3 kW)	1~ 230V 50Hz
4.0 / 5.0 / 6.0 HP	6 kW	3 steps (2/4/6 kW)	1~ 230V 50Hz / 3N~ 400V 50Hz
8.0 / 10.0 HP	9 kW	3 steps (3/6/9 kW)	1~ 230V 50Hz / 3N~ 400V 50Hz

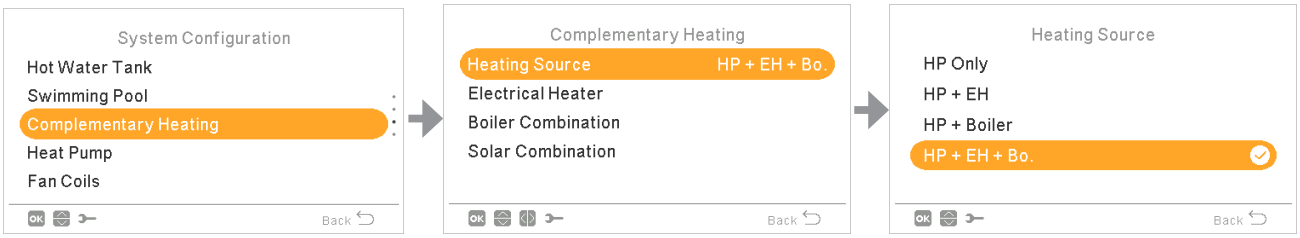
Electric Heater will only operate if unit is in Space Heating mode. It will always be disabled in any other mode (Hot Sanitary Water, Swimming Pool and Cooling mode).

Electric Heater will only operate when Heating Accessory is set to Heater or Heater + Boiler.

In the case of Heater + Boiler it will never operate both at the same time. The decision as to how to operate will be made considering ambient temperature.

System Configuration – Complementary Heating

Description	Default Value	Range
Heating source	HP only	HP only HP + Heater HP + Boiler HP + Heater + Boiler



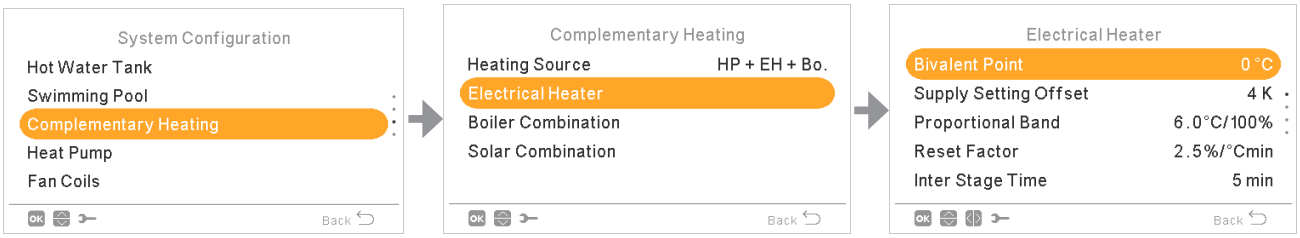
2.5.1 Electric Heater bivalent point

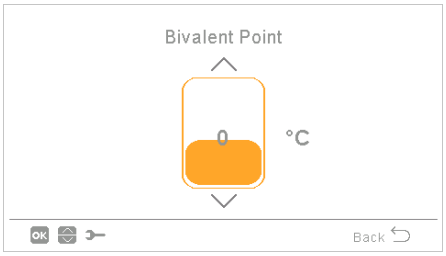
Electric Heater will only be enabled when:

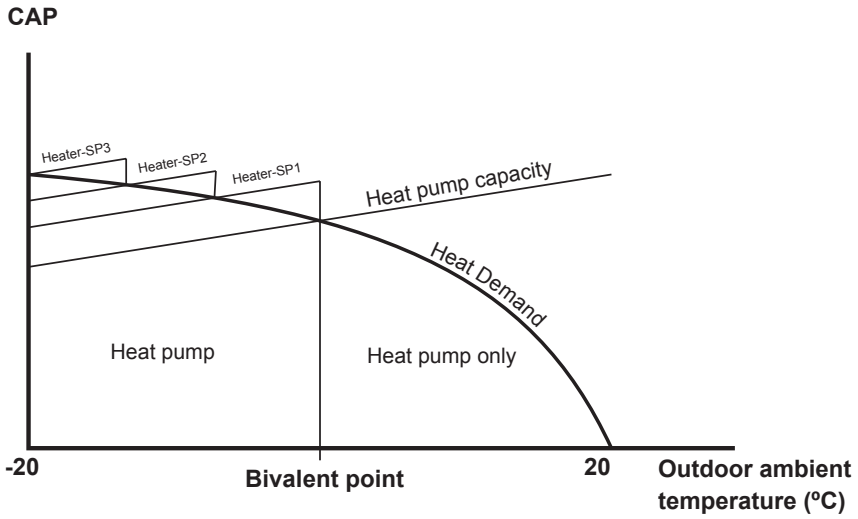
Outdoor Ambient Temperature > Bivalent Points for Electric Heater.

System Configuration – Complementary Heating – Electrical Heater

Description	Default Value	Range	Units
Bivalent Point	0	-20~20	°C





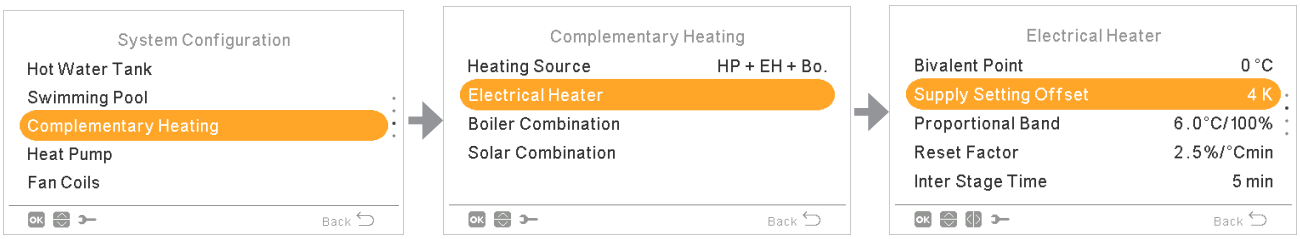


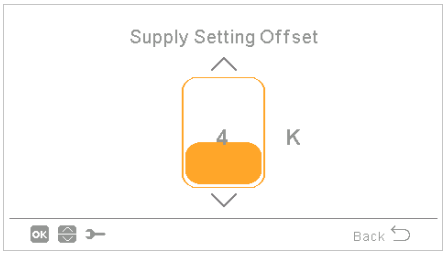
2.5.2 Target temperature

Electrical Heater operation is controlled by the heater set point.

System Configuration – Complementary Heating - Electrical Heater

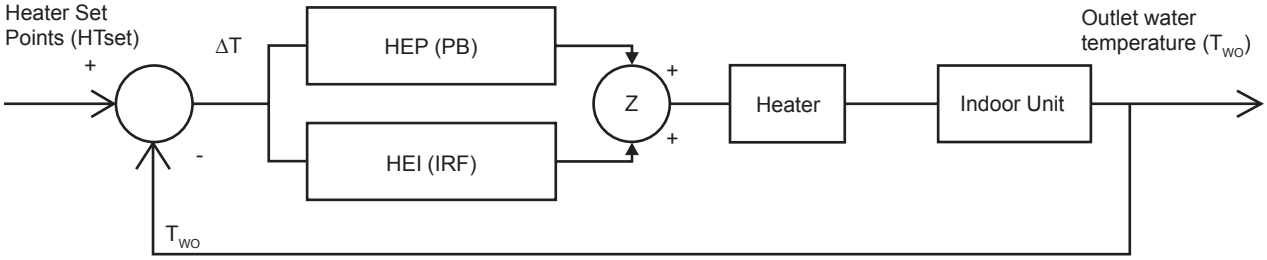
Description	Default Value	Range	Units
Supply setting offset	4	0~10	K





2.5.3 Load factor

Load Factor determines the desired heating supplied by heater. Load factor is calculated by a P+I function ranging from 0 to 100%. Actual heater output will be translated from percentage to a 3 step output using hysteresis system.



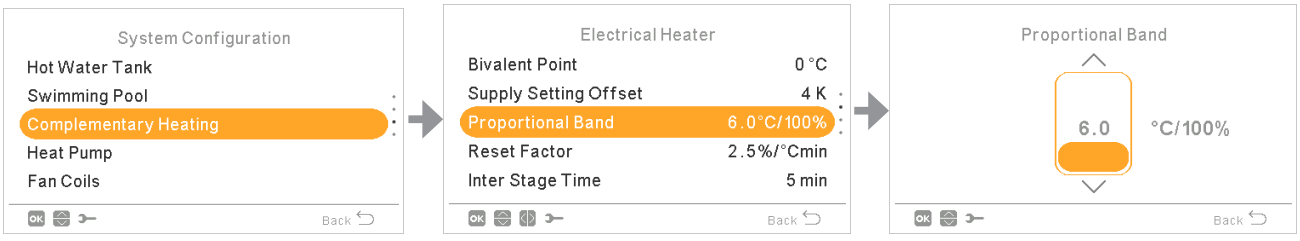
Where:

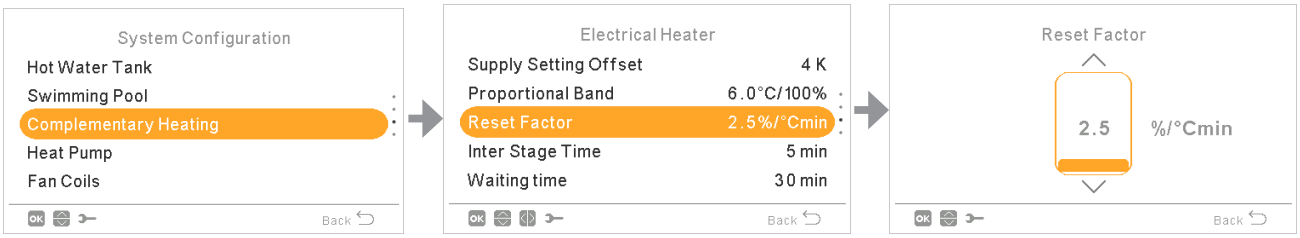
HEPB: Proportional band of electric heater.

HEIRF: Integral reset factor of electric heater.

System Configuration – Complementary Heating - Electrical Heater

Description	Default Value	Range	Units
Proportional band	6.0	0~20	°C/100%
Reset factor	2.5	0~20	%°C min





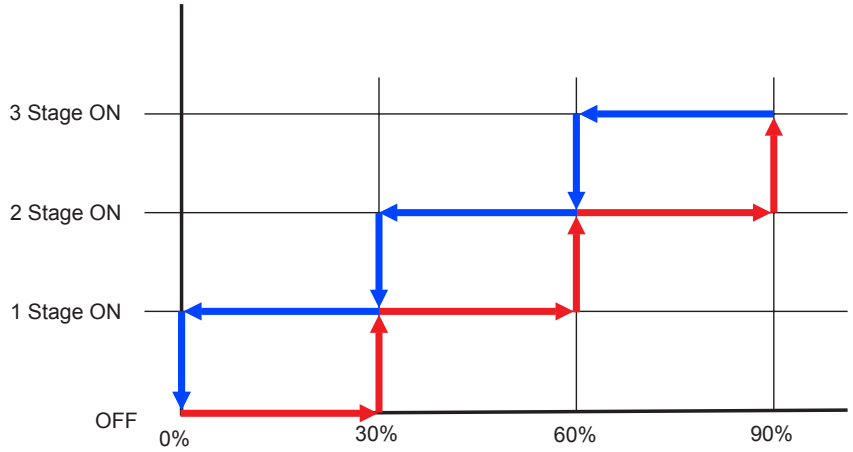
2.5.4 Heater step control

The desired heating supplied by heater is determined by the Load factor, which is calculated by a P+I function ranging from 0 to 100%. Actual heater output will be translated from percentage to a 3 step output using hysteresis system.

NOTE

Maximum heater step is limited by "Maximum step heater"

Steps	Power		
	(2/3) HP	(4-6) HP	(8/10) HP
1	1kW	2kW	3kW
2	2kW	4kW	6kW
3	3kW	6kW	9kW



Step increase conditions

Step increases from 0 (heater OFF) to 1 when Load factor is higher than 30%

Step increases from 1 to 2 when Load factor is higher than 60%

Step increases from 2 to 3 when Load factor is higher than 90%

Step decrease conditions

Step decreases from 3 to 2 when Load factor is lower than 30%

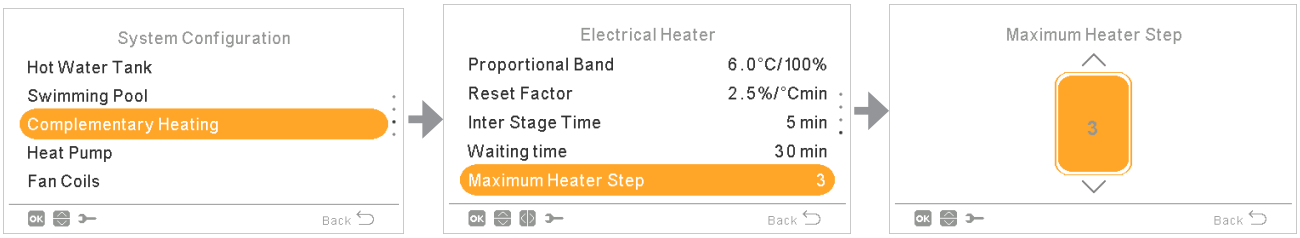
Step decreases from 2 to 1 when Load factor is lower than 60%

Step decreases from 1 to 0 (heater OFF) when Load factor is 0%

Normal operation will require a maximum increase or decrease of 1 step.

System Configuration – Complementary Heating - Electrical Heater

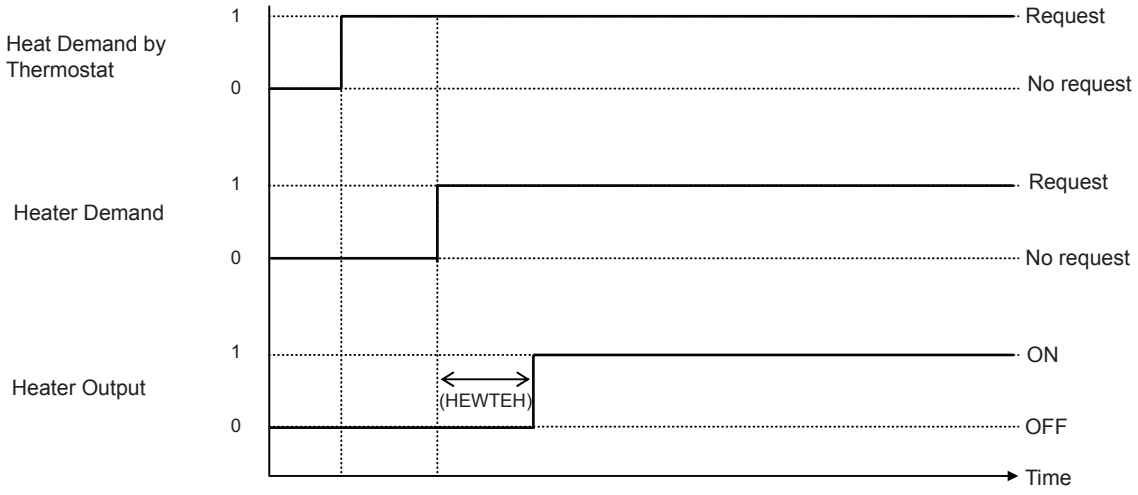
Description	Default Value	Range
Maxim Heater Step	3	1~3



◆ Heater waiting time

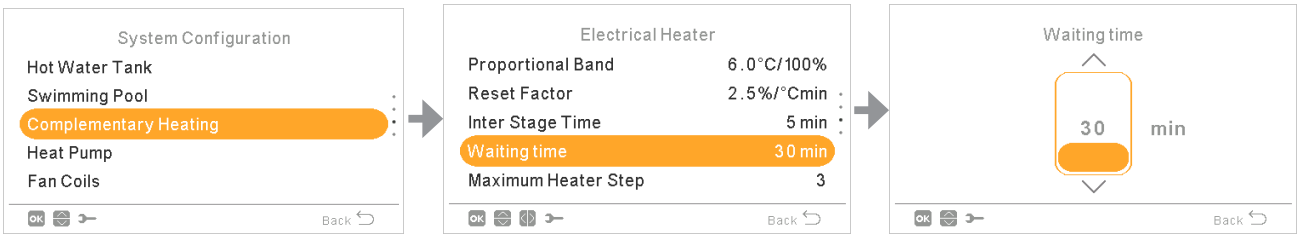
If Water set-point (Ttwo) ≤ Maximum Heat Pump Operation, Electric Heater is only allowed to operate when more than Waiting Time (HEWTEH) has passed since Heat Pump started.

When Water set-point (Ttwo) > Maximum Heat Pump Operation or when heater needs to operate in emergency mode, Electric Heater operates regardless of Waiting time.



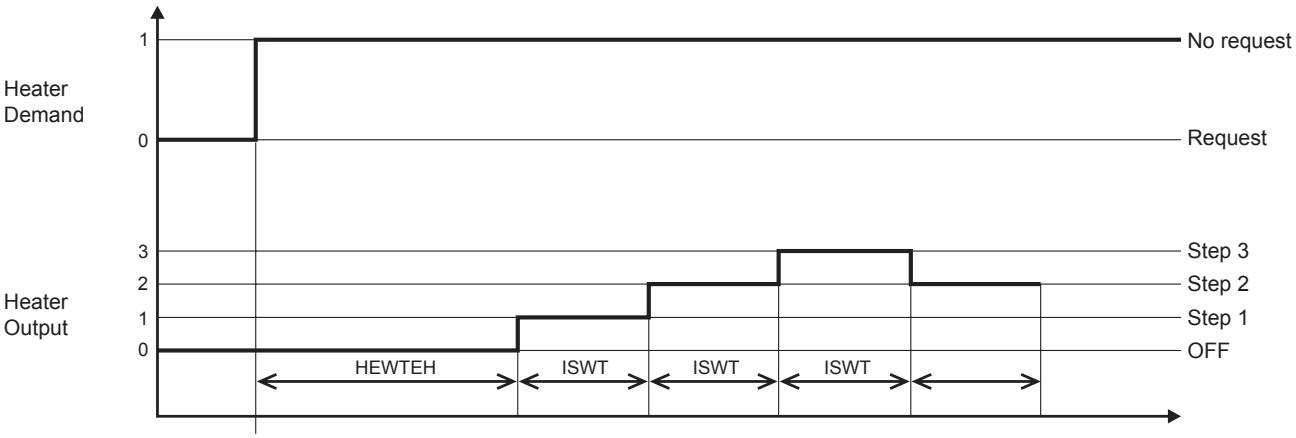
System Configuration – Complementary Heating - Electrical Heater

Description	Default Value	Range	Units
Waiting Time	30	5~90	min



2.5.5 Heater inter-stage steps control

After each step increase, further step increases are prohibited during the Inter-Stage Waiting Time (min) (ISWT) to avoid hunting. Step decrease does not have this limitation. Since sampling time is 1 minute, at least 1 minute needs to pass between any step changes.



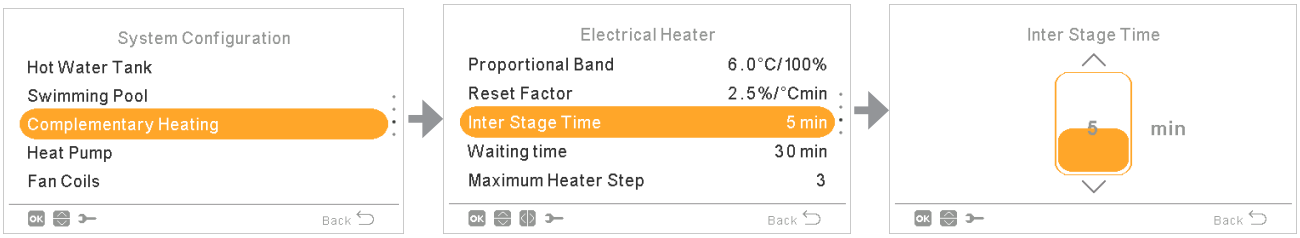
NOTE

ISWT: Inter Stage Time.

HEWTEH: Waiting time

System Configuration – Complementary Heating - Electrical Heater

Description	Default Value	Range	Units
Inter Stage Time	5	1~10	min



2.5.6 Optional functions of electric heater

- Electrical heater or boiler emergency mode:
  - When user allows emergency mode, heater operates in emergency mode. This configuration allows also DHW emergency operation.
- Heater forced OFF:
  - When user/installer allows heater forced OFF by DSW4-7 ON, All uses of the Heater are forbidden, the configuration by Unit controller has no effect and heater protections (heat at low water temperatures, emergency operation heater…) has no effect.
- One step heater for 3-phase imbalance option:
  - Optional function “One Step Heater for 3-phase unbalance option” explained in *“8. Electrical and control settings”* allows operation of all 3 heater steps to operate at same time.

NOTE

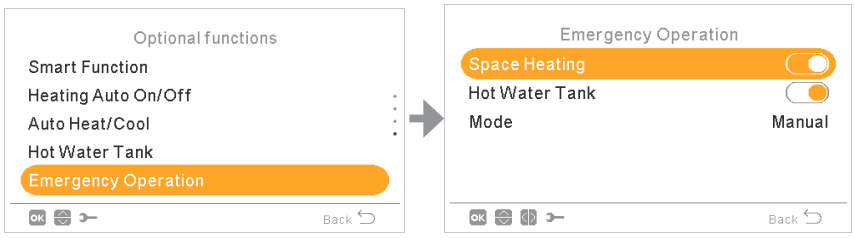
For more information refer to chapter “3. Optional functions”electrical heater or boiler emergency mode.

In the event of outdoor unit failure, the required heating can be provided by an electric heater or by a boiler. This configuration must be activated at the unit controller user’s interface and can be selected from two modes: Automatic mode or Manual mode.

The configuration of this function should be done through the Unit controller:

System Configuration→Optional functions→Emergency Operation

Description	Default value	Range
Space heating	Deactivated	Deactivated / Enabled
DHW	Deactivated	Deactivated / Enabled
Mode	Manual	Manual / Automatic



- Space heating:
  - Enable or disable emergency operation for space heating. Only available in case “Heating source” on “Complementary Heating configuration” contains “Electrical heater option”
- DHW:
  - Enable or disable emergency operation for DHW. Only available when electrical heater for DHW is enabled (by DSW).
- Mode:
  - Automatic mode: Emergency operation is performed when alarm occurs in the outdoor unit.
  - Manual mode: Emergency operation is performed by dip-switch setting.
  - DSW4-4: ON –> Heater/Boiler Emergency enabled
  - DSW4-4: OFF –> Heater/Boiler Emergency disabled

2.5.6.1 DHW electric heater operation in emergency mode

◆ Conditions for activation

- DHW is enabled.
- DHW Electric Heater is allowed by user selection.
- Tank temperature (THMDHWT) < DHW Setting temperature (TDHWS) – 4ºC Water temperature (Two/Two3) < Water Temperature target (Ttwo).

◆ Conditions for disabling

- Conditions for disabling. When any of the following conditions is fulfilled:
- Tank temperature (THMDHWT) < DHW Setting temperature (TDHWS)
- DSW4-4: OFF (in Manual mode).
- Tank heater disabled for emergency operation
- Indoor unit alarm.

2.5.6.2 Space Heating electric heater operation in emergency mode

◆ Conditions for activation

- Space heating is enabled.
- Electric Heater or Boiler is allowed by user selection.
- Water temperature (Two/Two3) < Water Temperature target (Ttwo).

◆ Conditions for disabling

When Emergency Heater or Boiler is enabled, water calculation is based on the difference between water outlet (Two) (for Heater) or Water outlet3 (Two3) (for Boiler) and water target (Ttwo).

Conditions for disabling. When any of the following conditions is fulfilled:

a. Measured water outlet temperature value (Two/Two3) ≥ Water outlet temperature target value (Ttwo) + 5ºC.
b. Outlet water temp higher than 2ºC above the maximum water range temperature by installer or higher.
c. Demand OFF.
d. Recovery of outdoor unit alarm (in Automatic mode).
e. DSW4-4: OFF (in Manual mode).
f. Space Heater disabled for emergency operation
g. Indoor unit alarm.

NOTE

- *Water pump1 (primary) will be activated with electric heater.*
- *Water pump3 will be activated with boiler.*
- *If Heater emergency mode is activated, the DHW heater is also activated for emergency mode.*
- *When emergency operation, the signal from outdoor units has no learned, the ambient temperature is considered at 10ºC (fixed) and water calculation (in case of Points or gradient) has calculated at 10ºC Outdoor temperature. It's recommended to change to fixed water calculation when emergency mode.*
- *In case of auxiliary outdoor ambient sensor enabled, the water calculation is based in this temperature.*
- *When emergency operation is enabled, faulty alarm of OU also keep in PC-ARFH2E (alarm number is shown and red button flashes).*

2.6 Boiler combination

2.6.1 Boiler operation

Boiler will only operate if unit is in Space Heating or Hot Sanitary Water modes. It will always be disabled in any other mode (Swimming Pool and Cooling mode).

YUTAKI range must combine with a boiler or an alternative energy supplier.

Operations with a boiler are shown in the following table:

Description	YUTAKI S	YUTAKI SCOMBI
Space Heating	○	○
Space Cooling	-	-
DHW Heating	○(*)	-
Swimming Pool	-	-

NOTE

- ○: *Operation possible.*
- *-: Operation not possible.*
- *(*) Not possible in case buffer tank used and tank is located previously to the buffer tank.*

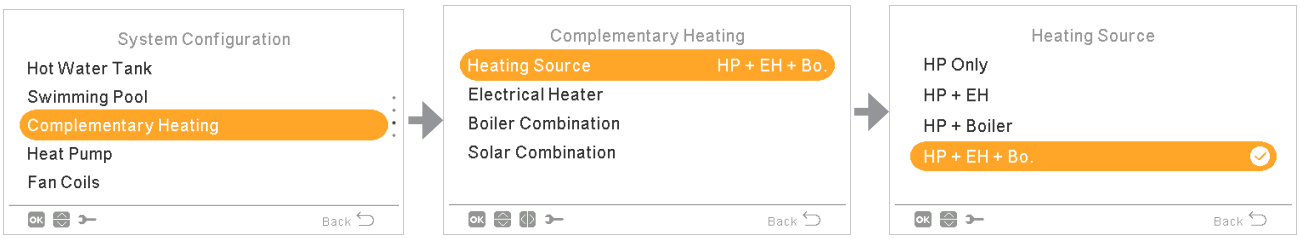
2.6.2 Boiler combination for space heating

Boiler will only operate when Heating Accessory is set to Boiler or Heater + Boiler. Boiler and Heater can never work at the same time. The decision as to how to operate is based on ambient temperature and is explained in *"2.6.4 Use of Boiler + Heater"*.

System protection will always have priority over boiler operation wherever it applies.

System Configuration – Complementary Heating:

Description	Default Value	Range
Heating source	HP Only	HP Only HP + Heater HP + Boiler HP + Heater + Boiler

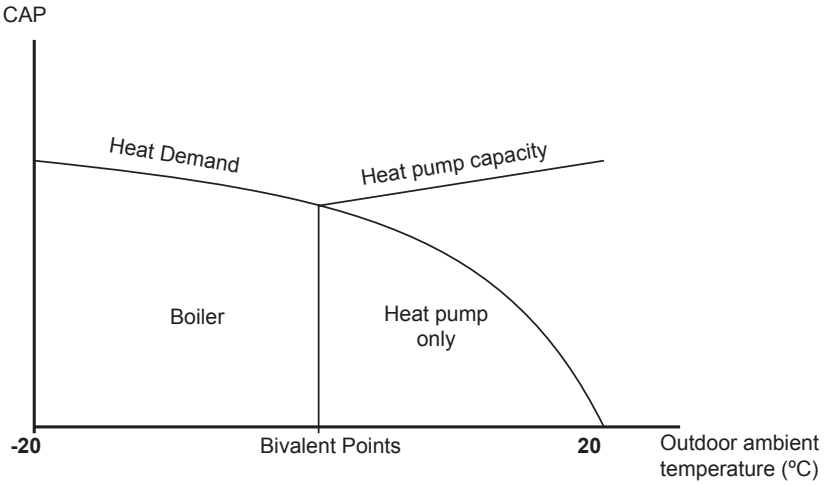


2.6.3 Bivalent point

Unit should be sized to operate mainly in heat pump mode. Given that capacity is reduced with temperature, it may be desirable for the unit to use boiler accessory only when ambient temperature is low.

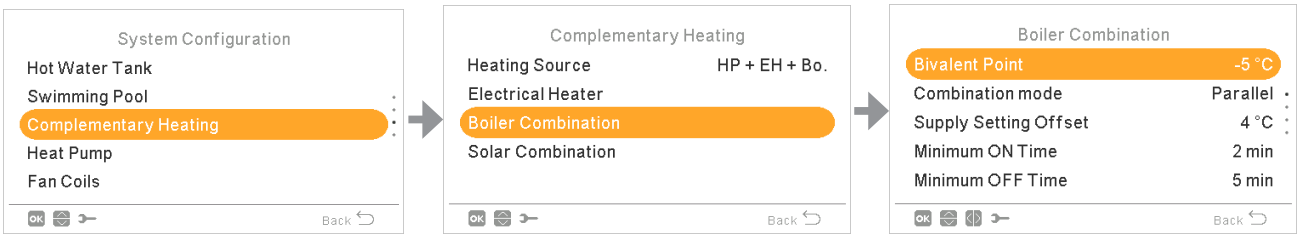
Boiler will only be enabled when:

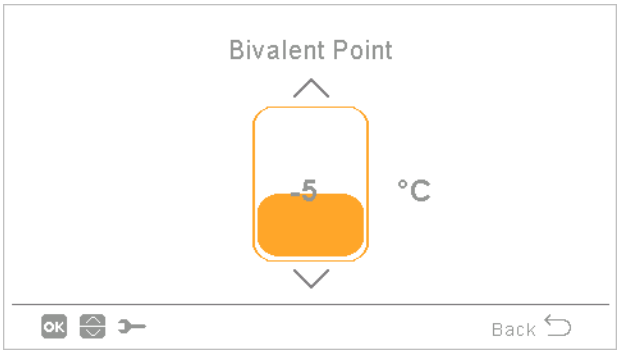
Outdoor Ambient Temperature < Bivalent outdoor temperature for boiler (BB)



System Configuration – Complementary Heating - Boiler Combination:

Description	Default Value	Range	Units
Bivalent Point	-5	-20~20	ºC





NOTE

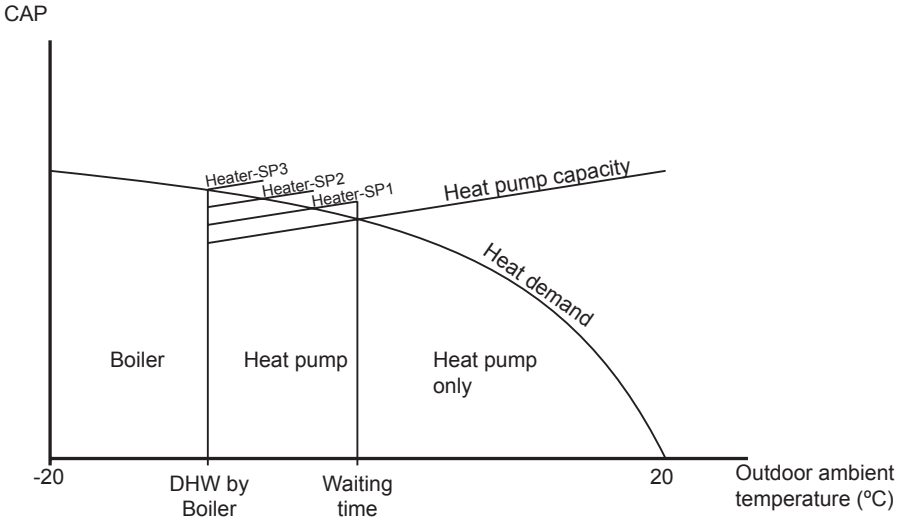
- *In case the Complementary heating source is set to "HP + Heater + Boiler, the Bivalent Points has a range of -20~15ºC.*
- *In case the Complementary heating source is set to "HP + Heater + Boiler, Controller must ensure that Bivalent Points of the heater* ≤ Bivalent Points of the boiler + *5ºC. For that reason the unit auto increases the Bivalent Points of the heater to keep the 5ºC difference.*

2.6.4 Use of Boiler + Heater

When Boiler + Heater configuration, unit will normally operate with the heat pump. When the systems requires an extra heating that is provided by the heater. Boiler only operates when the temperature is too low for the heat pump.

Boiler or heater are enabled if

- Ambient temperature < Bivalent Points (Heater)→ Heater Demand
- Ambient temperature < Bivalent Points (Boiler)→ Boiler Demand



NOTE

In case of Heater + Boiler configuration, default values are changed as above.

2.6.5 Boiler combination modes

YUTAKI range, in combination with boiler has two possible combinations

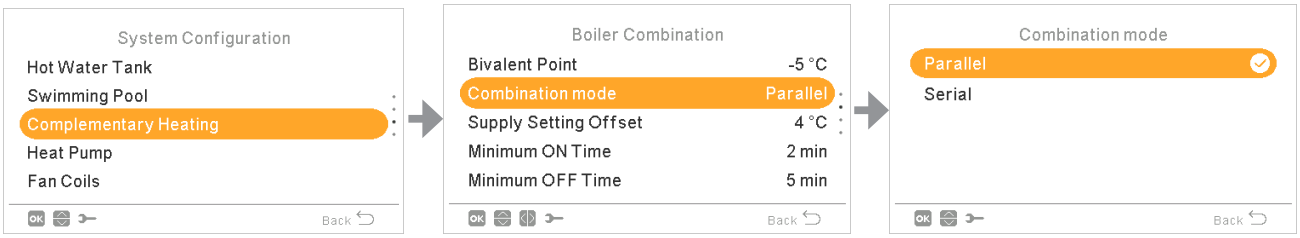
1 Bivalent Parallel (alternative) operation

2 Bivalent Serial (common) operation.

Configuration should be done through the unit controller:

System Configuration – Complementary Heating - Boiler Combination

Description	Default Value	Range
Combination mode	Parallel	Parallel/Serial

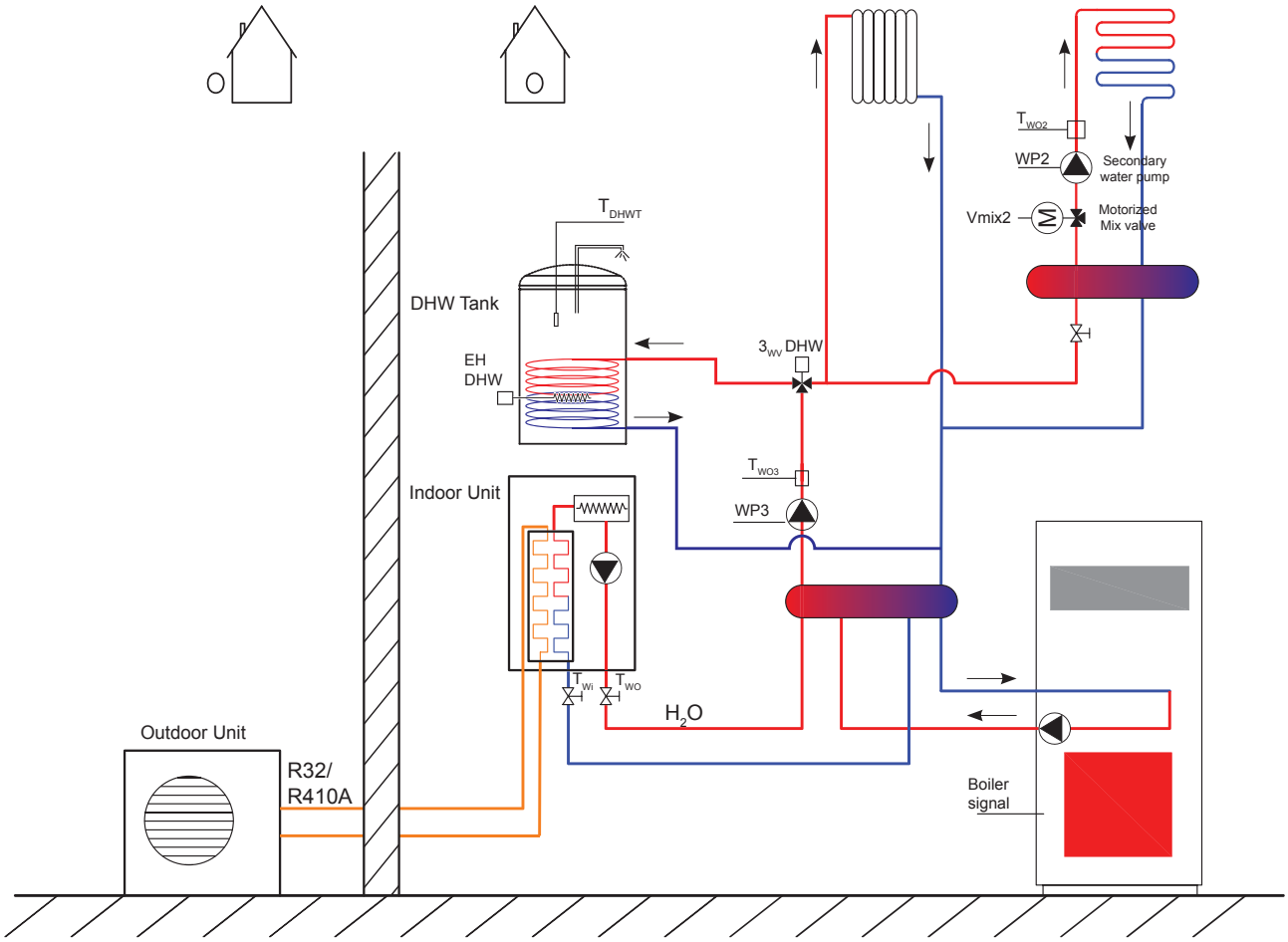


2.6.5.1 Boiler parallel mode combination

This is a bivalent system where the boiler is configured in parallel with the Heat Pump. A hydraulic separator or buffer tank should be used to ensure proper hydraulic balancing.

This system is recommended for retrofit (upgrade) applications where an existing gas/oil boiler is retained to provide the full heating requirements on the coldest days of the year.

Example for illustrative purpose only:



Space heating

Being a parallel system (either Heat Pump or Boiler), water setting will be the same as the water set-point for Heat pump without outdoor unit temperature restrictions but with restrictions of Maximum water temperature by installer.

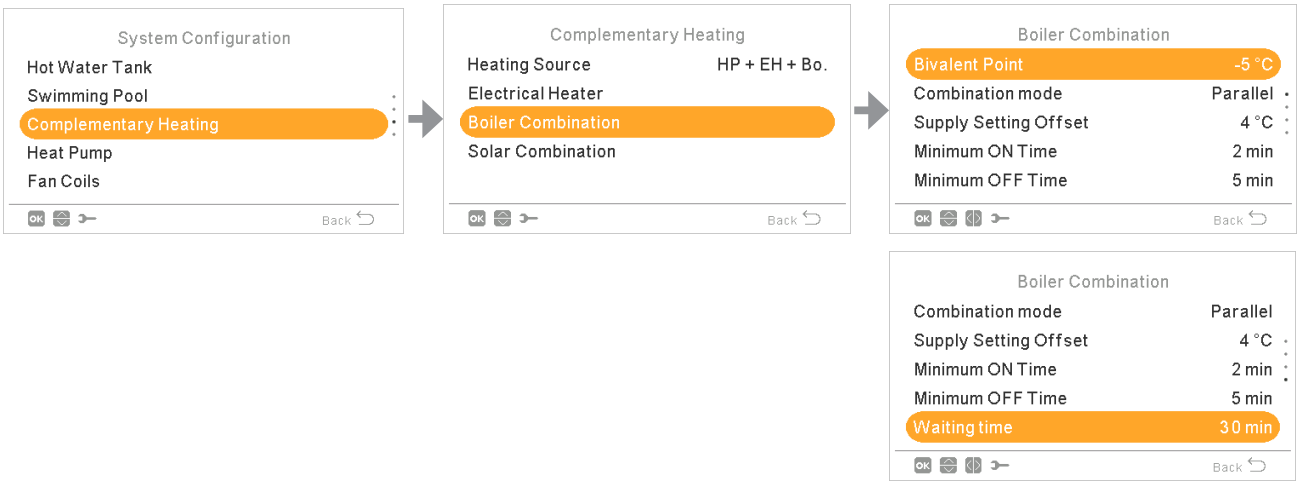
- Operation conditions to enable boiler:
  - Space Heating operation selected, and
  - Boiler or Boiler + Heater complementary heating selected, and
  - Boiler in parallel mode
  - Ambient temperature < Bivalent Points for Boiler more than Waiting time for boiler. Or, ambient temperature < Boiler bivalent point at unit start.
- Operation conditions to enable boiler operation for DHWT:
  - The Indoor unit is not a YUTAKI S COMBI and
  - There is a DHW operation request, and
  - $T_{DHW} < T_{HPSTOP,}$ and
  - Operation time < T_{DHWMAX}, and
  - Boiler operation for the DHW tank is enabled, and
  - Boiler or Boiler + Heater complementary heating is selected, and
  - Boiler is in parallel mode, and
  - Ambient temperature < Boiler Bivalent Points during more than Boiler operation Wait Time for DHW or Ambient temperature < BO Bivalent Points at start

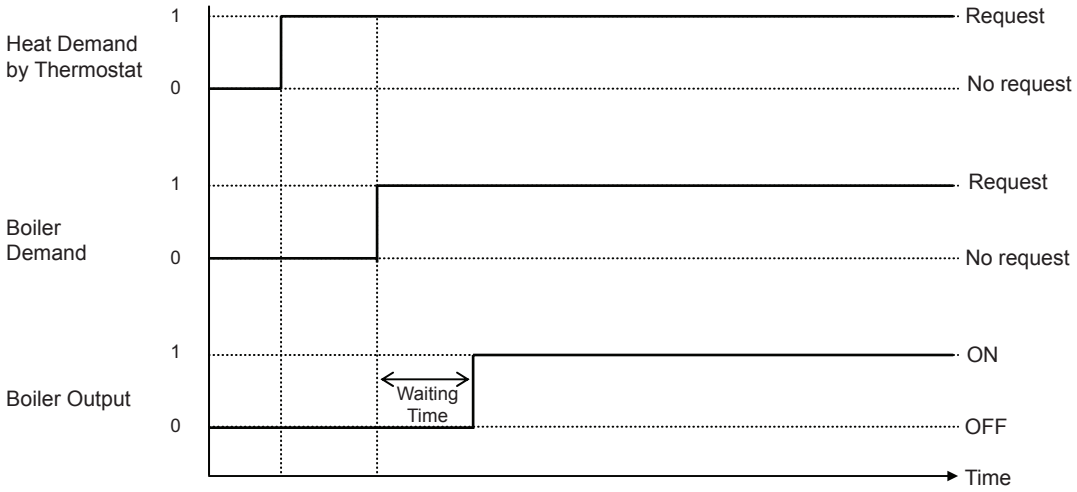
System Configuration – Complementary Heating - Boiler Combination

Description	Default Value	Range	Units
Bivalent Points	-5	-20~20	ºC
Combination Mode	Parallel	Parallel/Serial	-
Supply setting Offset	4	0~10	ºC
Minimum ON Time	2	1~30	min
Minimum OFF Time	5	1~30	min
Waiting Time	30	5~90	min
DHW by boiler(*)	Deactivated	Deactivated/Enabled	-
Waiting time for DHW(*)	45	OFF, 5~120	min

NOTE

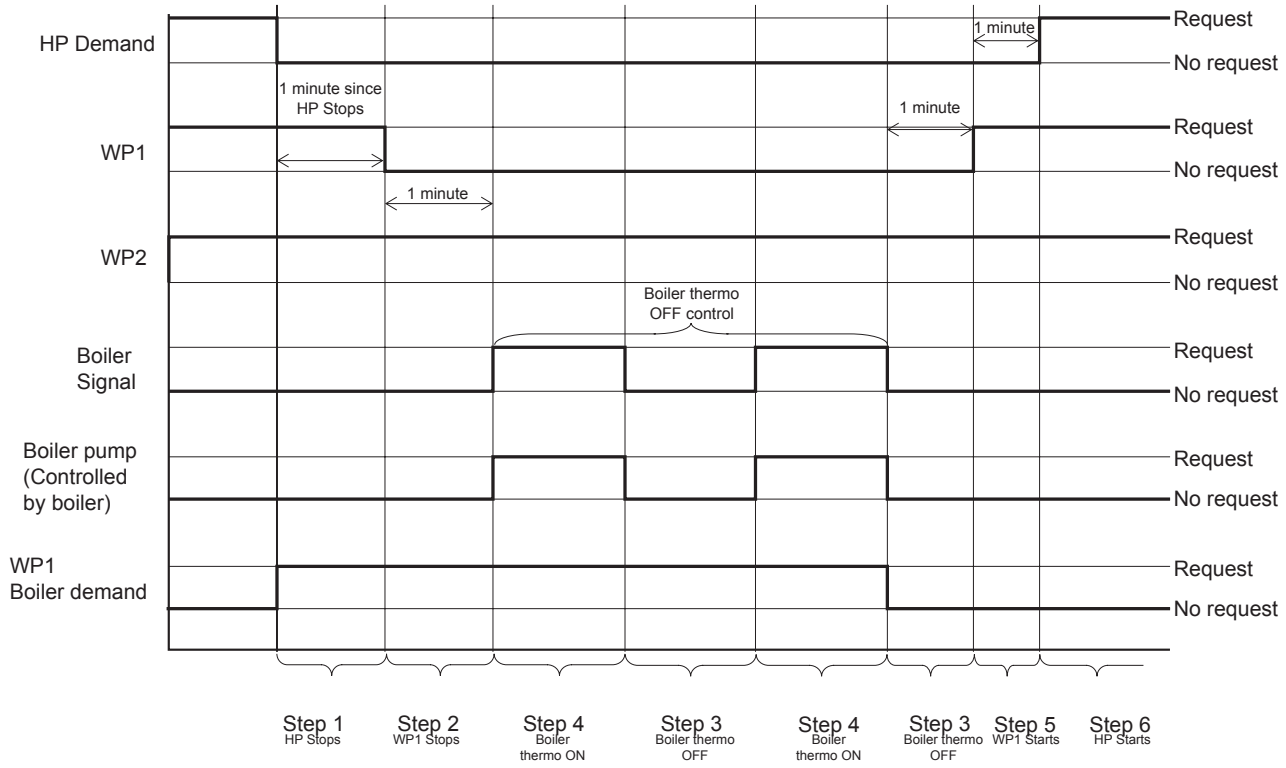
(*)Only for YUTAKI S





- Operation conditions under which boiler is not enabled:
  - Demand OFF by Room Thermostat
  - Ambient temperature > Bivalent Points for Boiler more than 10 minutes.

◆ Boiler time chart



DHW heating

Water set-point for DHW is defined to 80ºC.

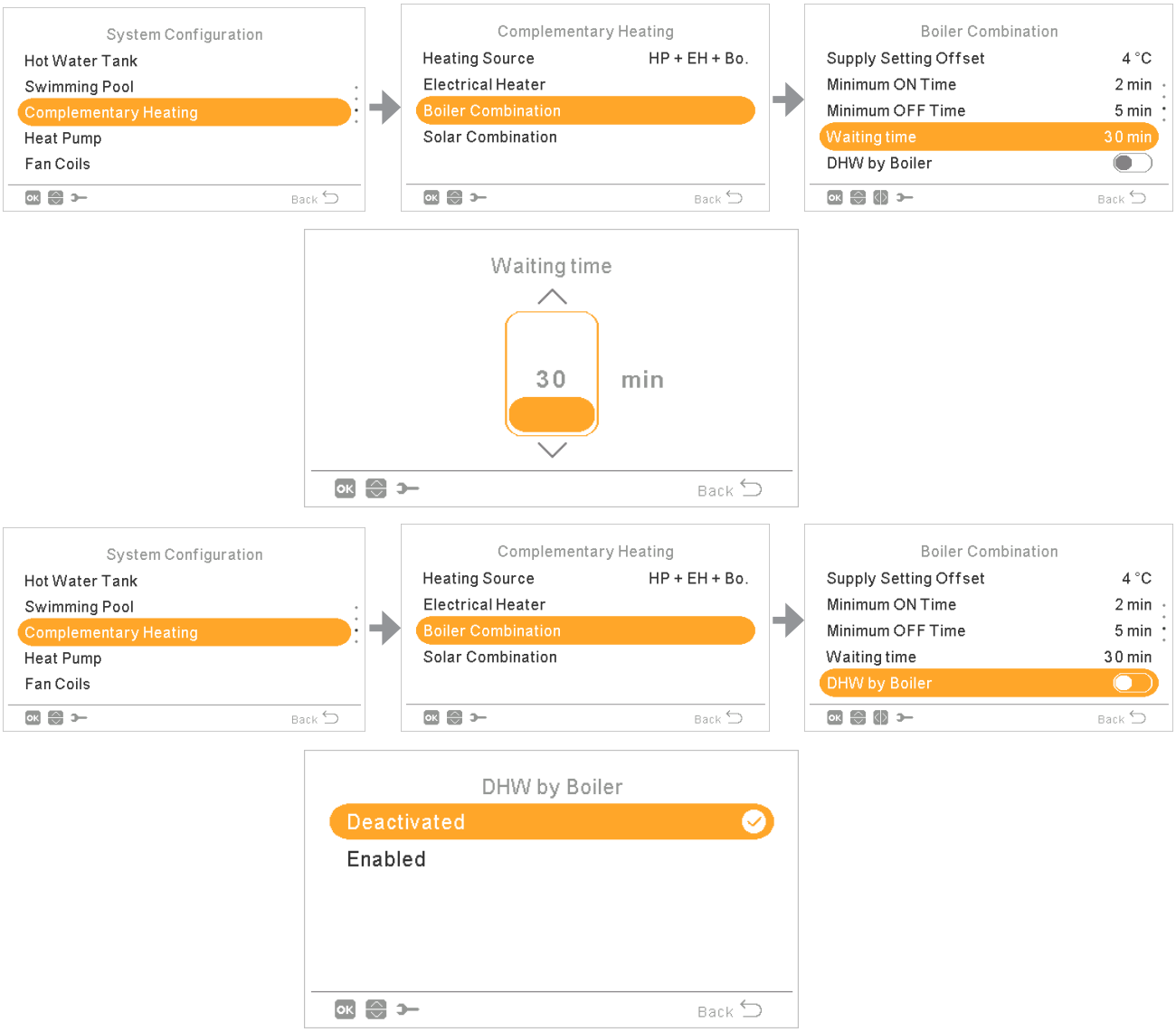
- Operation conditions to enable boiler:
  - DHW by boiler enable
  - Heat pump operation > Boiler waiting time for DHW.
  - The same conditions as heater enabled conditions.
- Operation conditions under boiler is not enabled:
  - The same conditions under which heater is not enabled.

System Configuration – Complementary Heating - Boiler Combination

Description	Default Value	Range	Units
DHW by boiler(*)	Deactivated	Deactivated/Enabled	-
Waiting Time for DHW (min)	30	OFF, 5~120	min

NOTE

(*)Only for YUTAKI S


System Configuration
Hot Water Tank
Swimming Pool
Complementary Heating
Heat Pump
Fan Coils
Back
Complementary Heating
Heating Source HP + EH + Bo.
Electrical Heater
Boiler Combination
Solar Combination
Back
Boiler Combination
Supply Setting Offset 4 °C
Minimum ON Time 2 min
Minimum OFF Time 5 min
Waiting time 30 min
DHW by Boiler
Back
Waiting time
30
min
Back
System Configuration
Hot Water Tank
Swimming Pool
Complementary Heating
Heat Pump
Fan Coils
Back
Complementary Heating
Heating Source HP + EH + Bo.
Electrical Heater
Boiler Combination
Solar Combination
Back
Boiler Combination
Supply Setting Offset 4 °C
Minimum ON Time 2 min
Minimum OFF Time 5 min
Waiting time 30 min
DHW by Boiler
Back
DHW by Boiler
Deactivated
Enabled
Back

◆ Boiler THERMO ON/OFF control

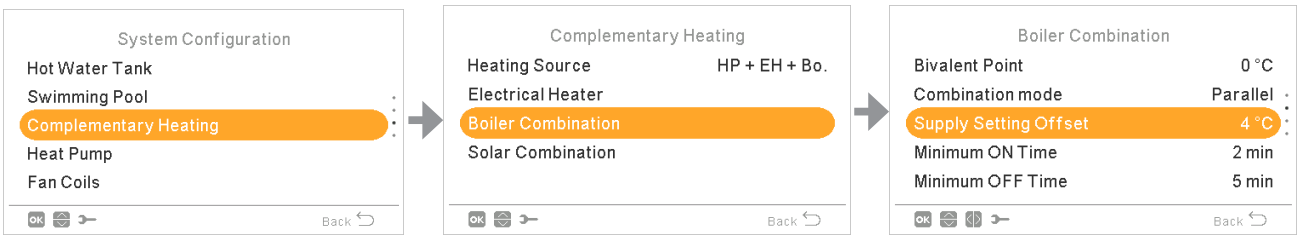
Conditions for Thermo ON

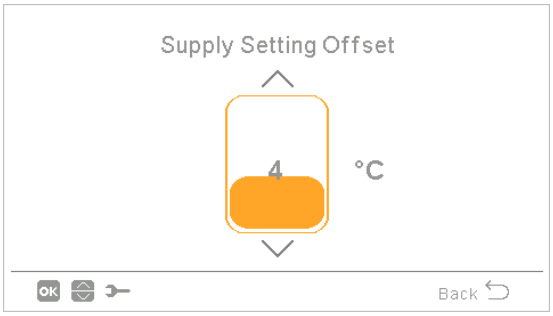
Bolier is ON at thermo ON conditions when any of the following conditions is fulfilled:

- Water temperature (T_{WO3}) < Boiler temperature setting (BTSET) - supply set point control offset.
- Space heating is in Demand ON

System Configuration – Complementary Heating - Boiler Combination

Description	Default Value	Range	Units
Supply setting offset	4	0~10	ºC





Conditions for Thermo OFF

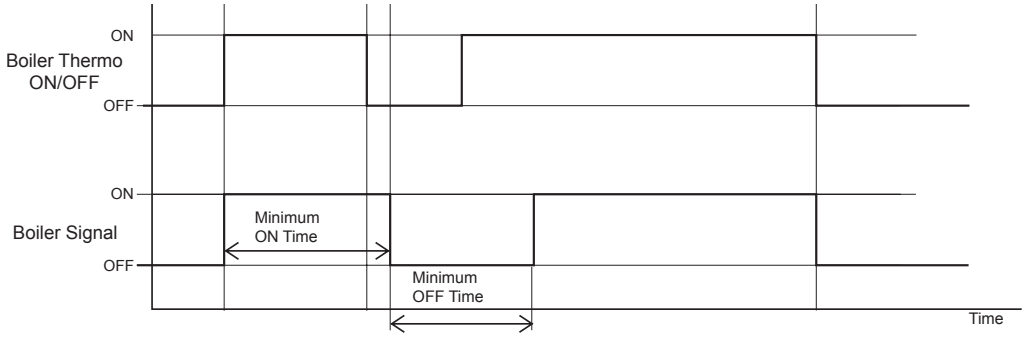
Boiler is OFF at Thermo OFF conditions when any of the following conditions is fulfilled:

- Measured outlet temperature value (T_{WO3}) ≥ Boiler temperature setting (BTSET) + 5ºC (this condition will stop regardless the minimum on time)
- Outlet water temperature = Maximum water range temperature set by the installer (Tmax) + 2ºC.
- Space heating is in Demand OFF.

When boiler is enabled, water calculation is based in the difference between water outlet temperature (T_{WO3}) and the water target temperature (T_{WO}).

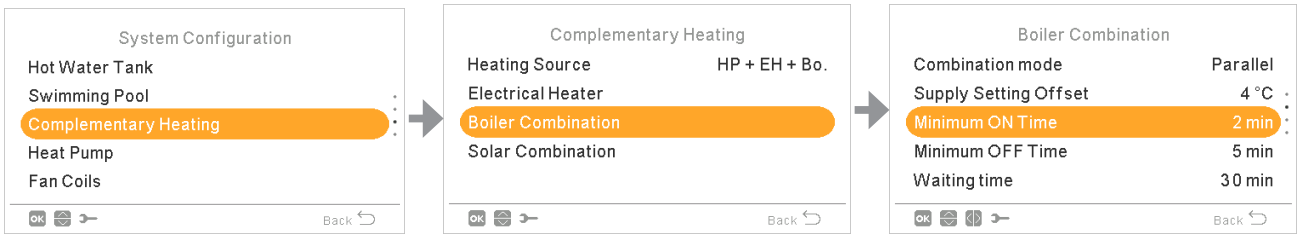
◆ Boiler minimum and maximum times

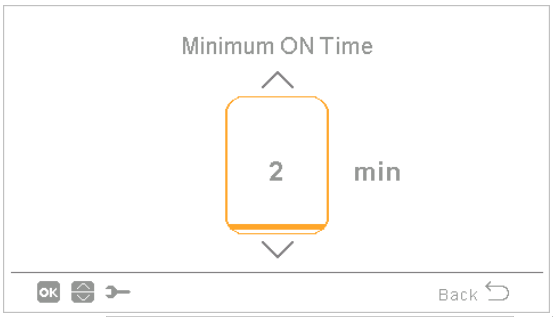
Boiler can only be stopped after minimum ON time has passed (BOon) and only can be started after minimum OFF time has passed (BOoff).

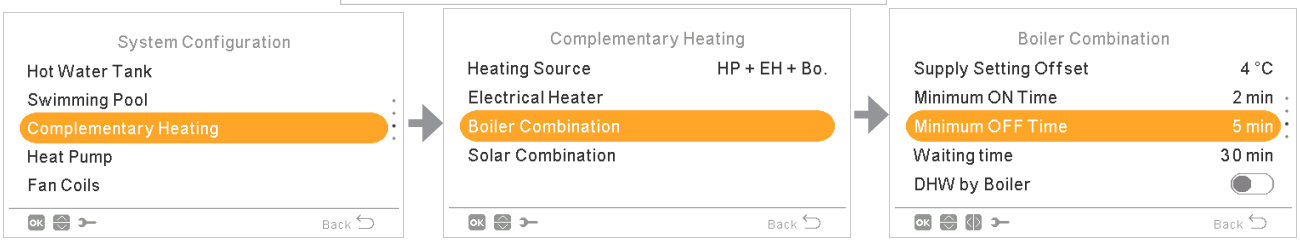


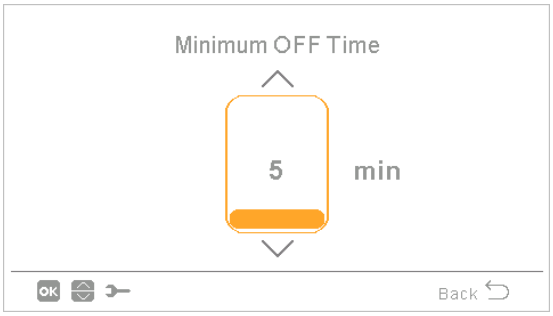
System Configuration – Complementary Heating - Boiler Combination

Description	Default Value	Range	Units
Minimum ON Time	2	1~30	min
Minimum OFF Time	5	1~30	min









NOTE

Unit protections (Tmax) have priority against "Boiler Minimum ON Time".

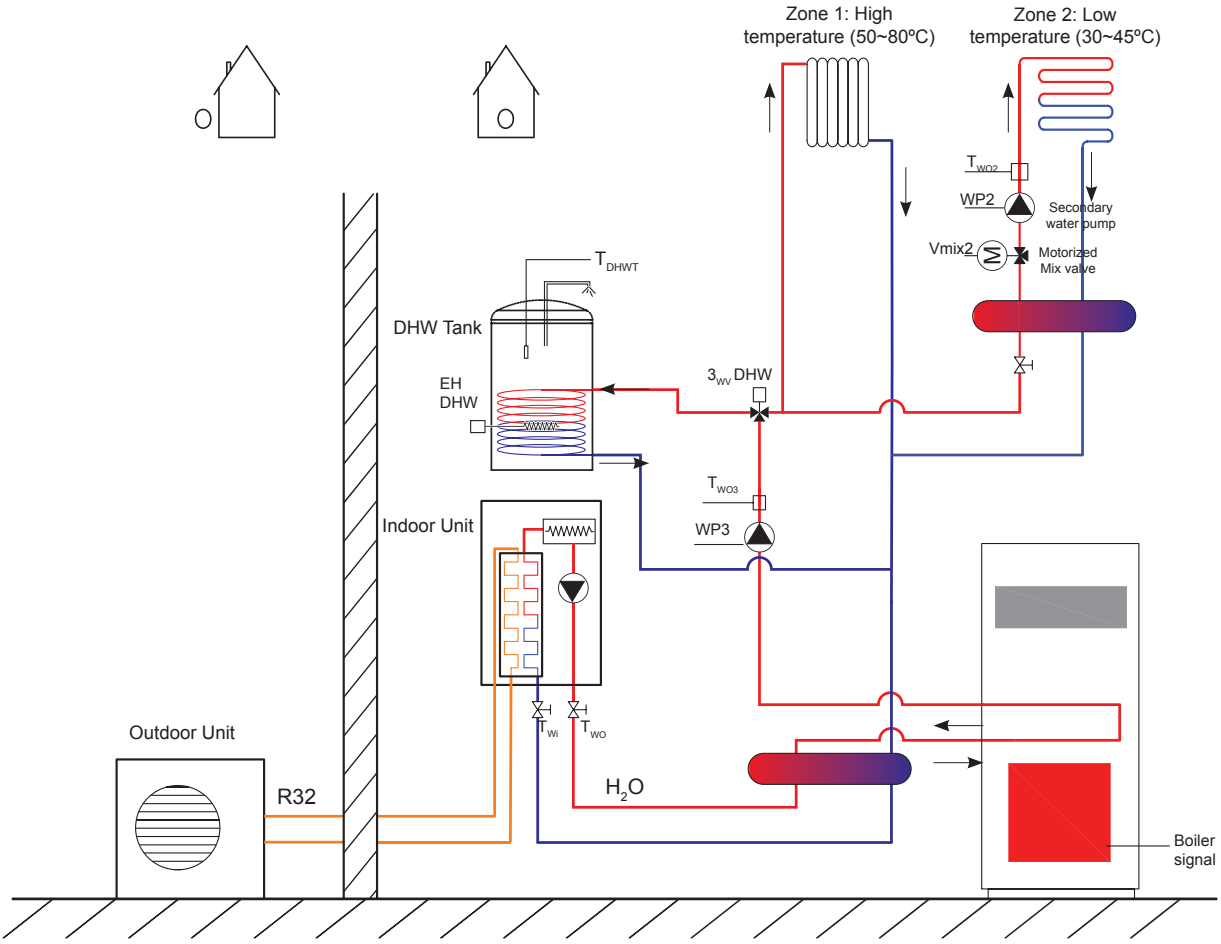
2.6.5.2 Boiler Serial mode combination

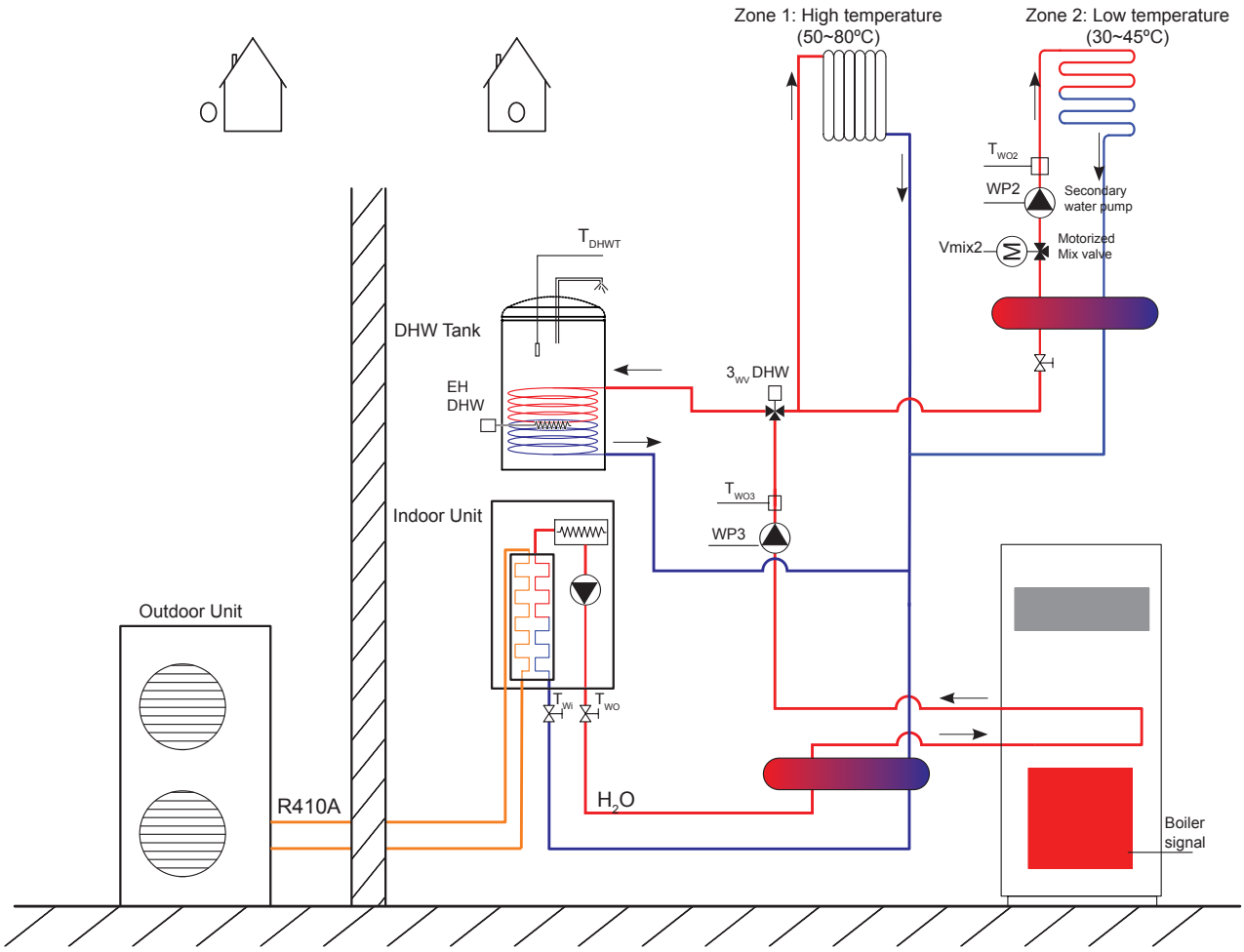
This is a bivalent system where the boiler is configured in serial with the Heat Pump. A hydraulic separator or buffer tank has to be used to ensure proper hydraulic balancing.

This system is also used for retrofit (upgrade) applications, but operates like the mono-energetic system using the gas/oil boiler, similarly to the electric heater, in serial with the heat-pump.

The boiler only needs to provide the additional peak load capacity.

Example for illustrative purpose only:





◆ Outputs

Serial boiler only actuates against Boiler output signal. It does not affects all other outputs and, therefore, must operate as normal operation.

◆ Emergency mode

When user allows emergency mode, boiler may operate in emergency mode.

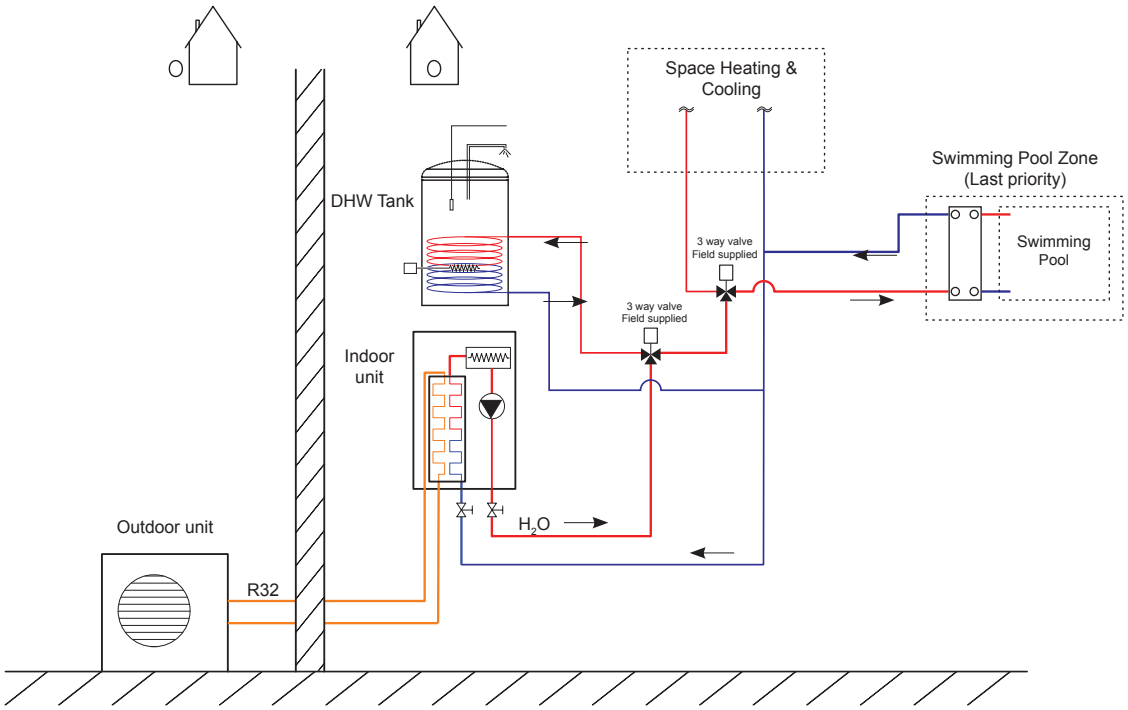
In case of Heater + Boiler combination, Boiler has priority.

2.7 Swimming pool

When the swimming pool operation is required, the swimming pool pump starts to operate given the swimming pool pump feedback. In this situation, the 3-way valve of the DHWT is not activated and the 3-way valve for the swimming pool changes its normal position diverting to the swimming pool heat exchanger, allowing to heat the swimming pool water temperature to a comfortable value.

The swimming pool operation has the lowest priority of the system and only will be possible when space heating and DHWT are not required.

Example for illustrative purpose only:



Swimming Pool Function will only be enabled if all the following conditions are fulfilled:

- Swimming pool operation enabled by Unit controller.
- Heat Pump is turned OFF (or Thermo OFF) by any other system (DHW for instance).
- Swimming pool is enabled by swimming pool water pump feedback.

Swimming Pool will start if:

- Swimming Pool Temperature is lower than Swimming Pool Set point Tº -1ºC

Swimming Pool will stop if:

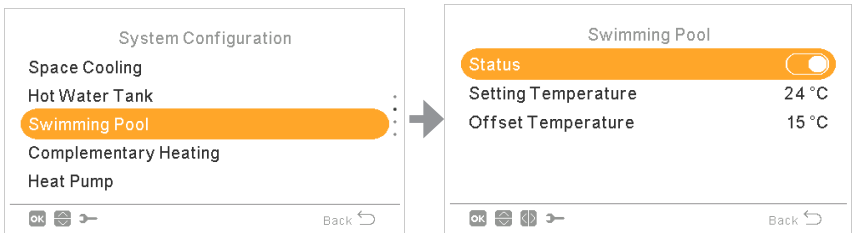
- Swimming Pool Temperature is higher than Swimming Pool Set point Tº +1ºC

NOTE

Unit cannot start in Swimming Pool mode if Swimming Pool Pump feedback is not active.

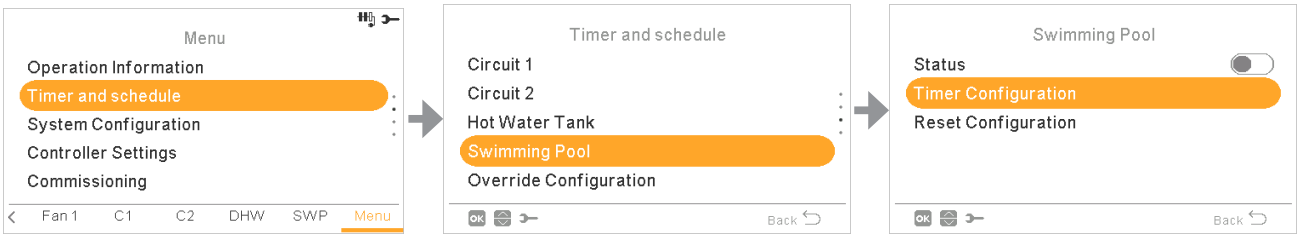
System Configuration – Swimming pool

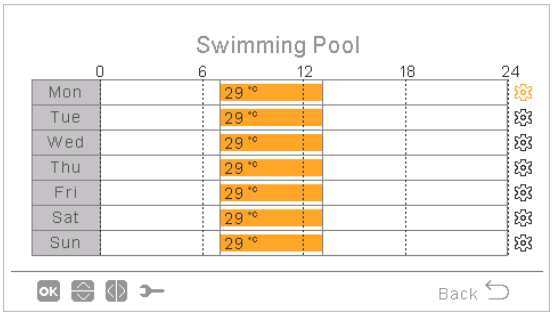
Description	Default Value	Range	Units
Status	Deactivated	Deactivated / Enabled	-
Setting temperature	24	24~33	ºC
Offset temperature	15	10~36	ºC



◆ Swimming pool heating by timer

Up to 7 scenes can be created with the entire unit configuration available. These scenes can be assigned to different parts of the day, creating a daily pattern. After that, this pattern can be assigned to each day of the week.





2.8 Solar combination

◆ Concept

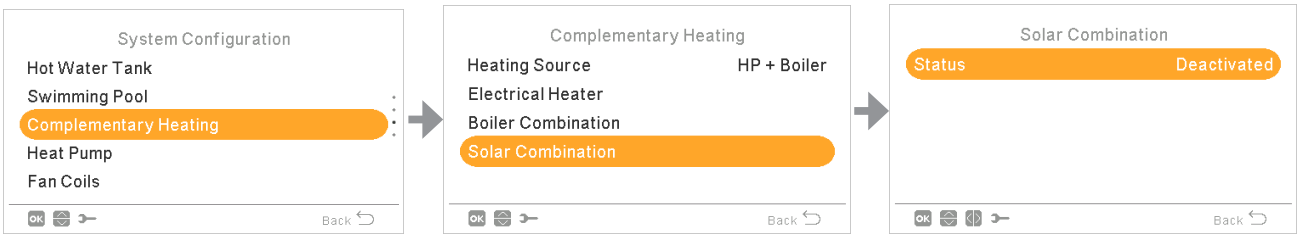
The solar combination will enable you to heat up your domestic water by means of the sun whenever the sun is available.

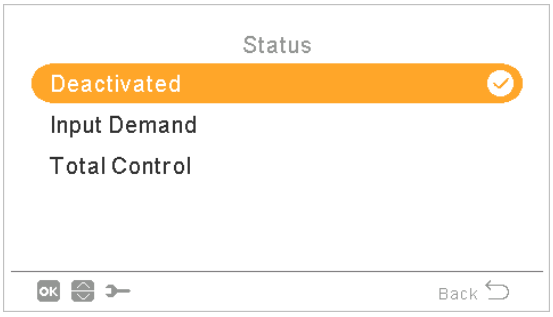
YUTAKI systems allow different configurations to work in combination with solar panels:

- Deactivated (default configuration): No solar Kit is installed with YUTAKI unit.
- Input demmand: Alternative DHW tank operation is done by solar system or YUTAKI unit. Solar input can disable DHW operations done by YUTAKI unit.
- Total control: YUTAKI unit operates as a Solar Control Station and takes the management of the whole system.

System Configuration – Complementary Heating

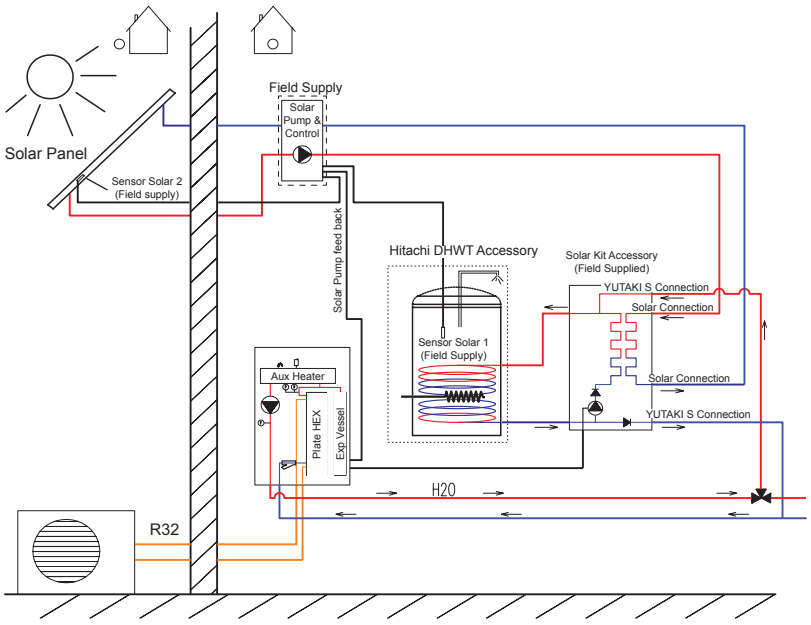
Description	Default Value	Range
Status	Deactivated	Deactivated Input Demand Total control

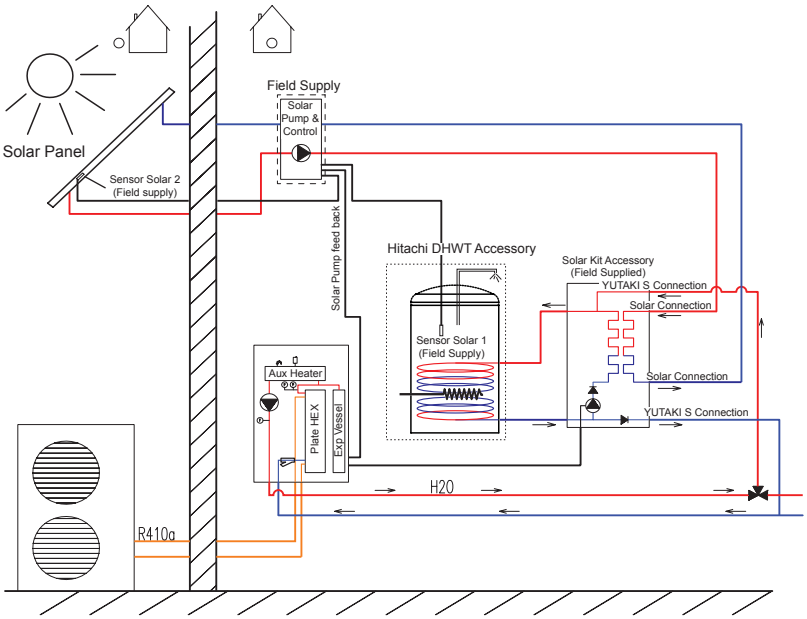




◆ Solar combination by Input demand

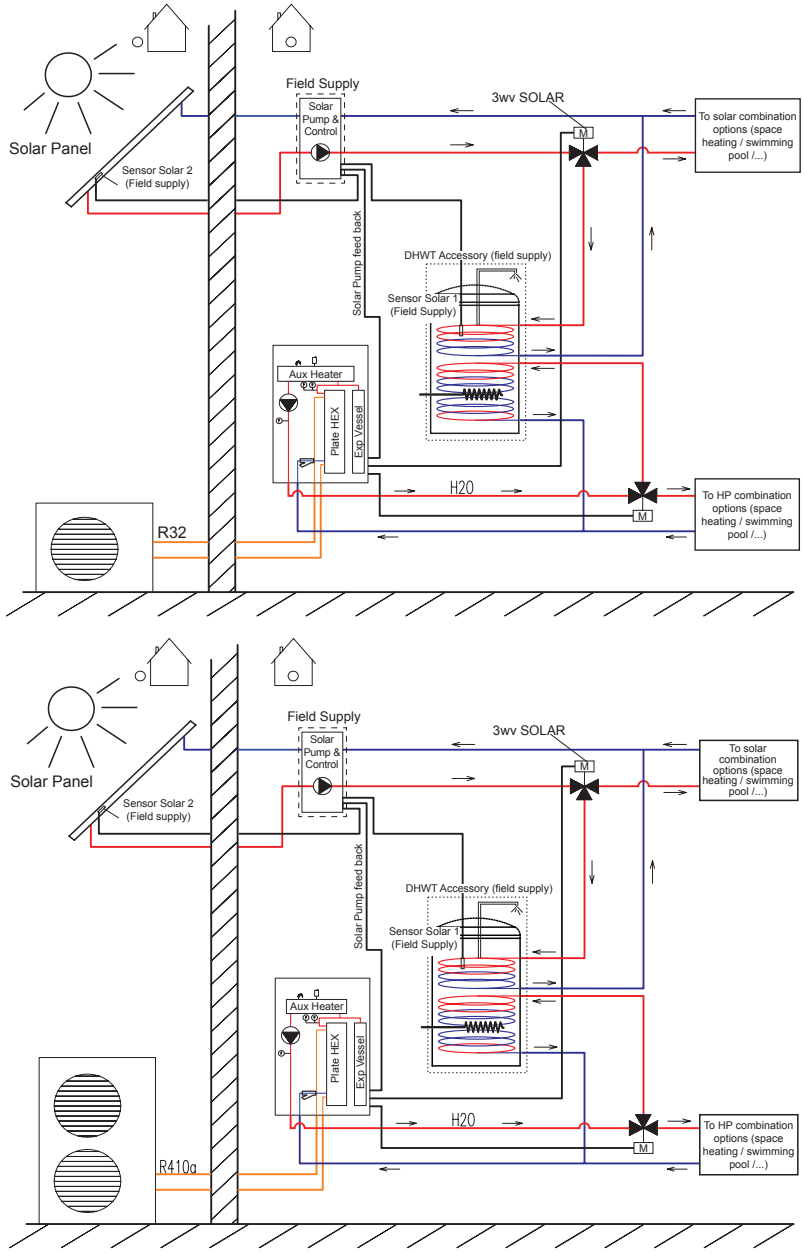
The solar kit is designed to transfer the heat from the solar panels to the domestic hot water tank's heat exchanger and is to be installed in the YUTAKI S system as shown in the scheme below:
Example for illustrative purpose only:





Option 1
The solar panels gather heat from the sun. When the temperature of the glycol solution in the solar panel rises above the water temperature in the domestic hot water tank, the pumps from the solar pump station and the solar kit begin operating in order to transfer the heat to the domestic hot water tank's heat exchanger

Example for illustrative purpose only:



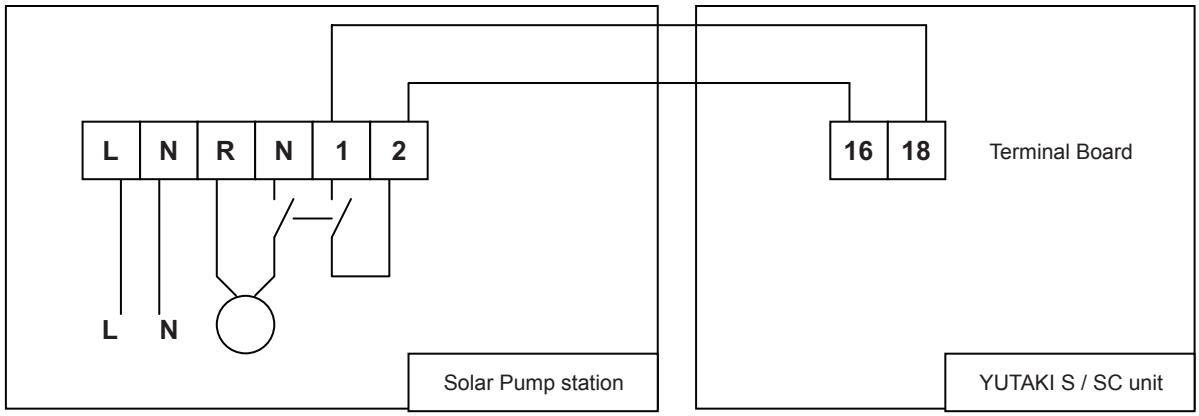
Option 2

The solar panels gather heat from the sun. When the temperature of the glycol solution in the solar panel rises above the water temperature in the domestic hot water tank, solar pump station's pump is switched ON and the solar kit's 3-way valve is diverted to the Sanitary Tank. At the same time the DHW's 3-way valve is switched OFF and the heat pump continues working to heat the space (if necessary).

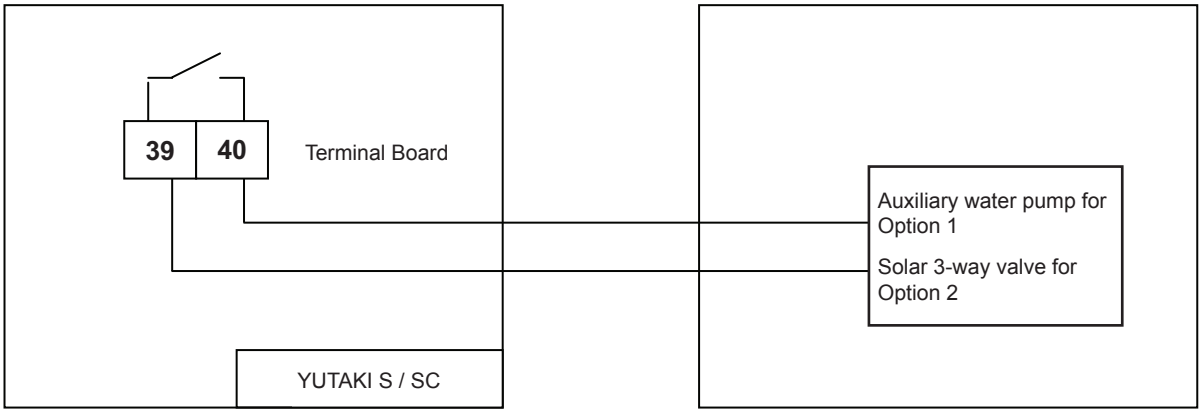
Solar installation requirements

Electrical connection

The solar pump station have an auxiliary contact that closes when the operation station it is working to heat the domestic hot water tank operated.



When solar mode is enabled by the heat pump and the temperature of the glycol solution in the solar panel has risen above the water temperature in the domestic hot water tank, one of the HP's outputs will be switched ON (terminals 39/40).



Solar station control

Solar module operations are performed by an external field supplied Solar Control Unit.

Communication with YUTAKI unit is done through the input/output located at the Terminal Board of the YUTAKI unit:

- Solar Input: It indicates that Solar Control Unit is ready to operate (there is no alarm, there is enough solar energy available, etc.).
- Solar output: Solar Pump: It indicates that YUTAKI unit is requesting Solar Control Unit to heat DHWT by Solar energy, it is expected for solar water pump to operate.

If the solar pump station has an ON/OFF/AUTO function, make sure to put it on the AUTO function. This means that the pump will switch ON automatically when the solar panel temperature rises enough higher than the domestic hot water tank temperature and switches OFF automatically when the difference between the solar panel and the domestic hot water tank temperature becomes too low.

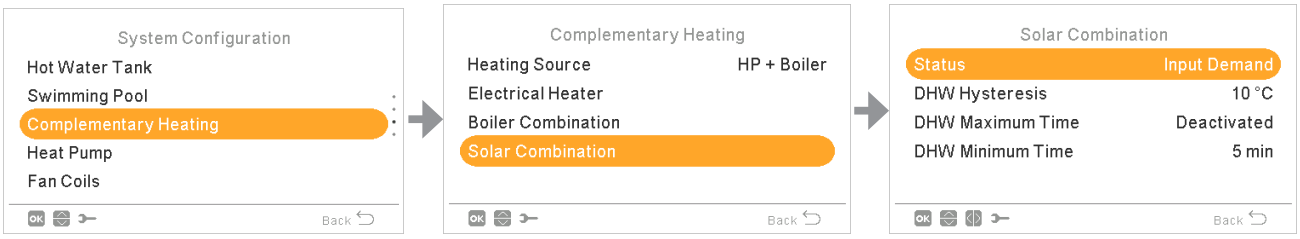
By default, when the temperature of the solar panel reaches 10°C higher than the domestic hot water tank temperature, the pump of the solar pump station and the pump of the solar kit will start operating.

When the temperature of the solar panel becomes lower than the domestic hot water tank temperature, the pumps from the solar pump station and the solar kit will stop operating.

Whenever the unit is not requesting solar operation, DHWT will operate in normal conditions.

System Configuration – Complementary Heating - Solar Combination

Description	Default Value	Range	Units
DHW Hysteresis	10	1 ~ 30	ºC
DHW Maximum Time	OFF	OFF, 35~240	min
DHW Minimum Time	5	5~240	min



Solar start conditions

YUTAKI unit starts requesting solar (activates solar pump output) when all of the following conditions are fulfilled:

a. DHWT operation is enabled (including timer).

b. Status is set as “Input demand”.

c. Solar input contact is closed (solar control unit is ready to operate).

d. More than DHW Minimum Time has passed since last solar request has finished.

e. $T_{DHWT} < T_{DHWTS}$ - DHW Hysteresis

Where:

- *T_{DHWT} = Domestic Hot Water Tank temperature (ºC)*
- *T_{DHWTS} = Domestic Hot Water Tank temperature setting (ºC) (Default 45ºC)*
- *$T_{DHWTMAX}$ = Domestic Hot Water tank maximum supply temperature (ºC) (Default 70ºC)*
- *DHW Minimum time = Minimum time solar operation cannot be performed once it has been stopped due to DHW Maximum time or due to open solar input contact.*

If conditions are fulfilled, heating DHW by Heat Pump will be switched OFF, and heating will be done by solar station through YUTAKI auxiliary output signal. If $T_{DHWT} > T_{DHWTMAX}$ solar station cannot heat DHW by tank at maximum allowed temperature and YUTAKI auxiliary output will be switched OFF.

Solar stop conditions

YUTAKI unit stops requesting solar (deactivates solar pump output) when all of the following conditions are fulfilled:

a. DHWT is not enabled (including timer).

b. Status is not set as “input demand“.

c. Configured DHW maximum time exceeded since solar request begun.

d. Solar input contact is open (solar unit control is not ready to operate).

e. $T_{DHWT} > T_{DHWTS}$

DHW Maximum time = Maximum time solar operation can be performed once it has been started due to input demand. (If OFF is selected, there is no time limitation).

NOTE

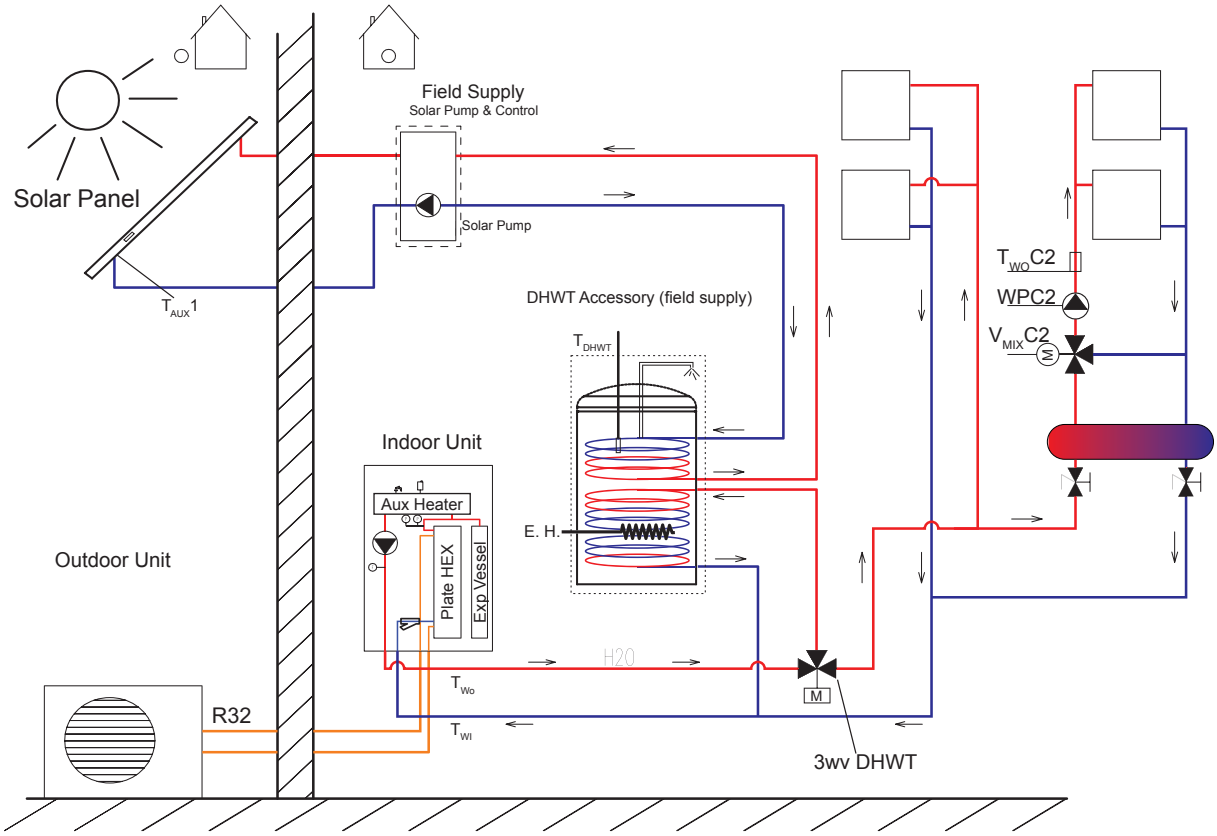
When heating DHW by solar power, DHW Timer has no effect.

◆ Total solar combination

With total solar combination, YUTAKI units controls the solar operation for the system, based on different temperatures:

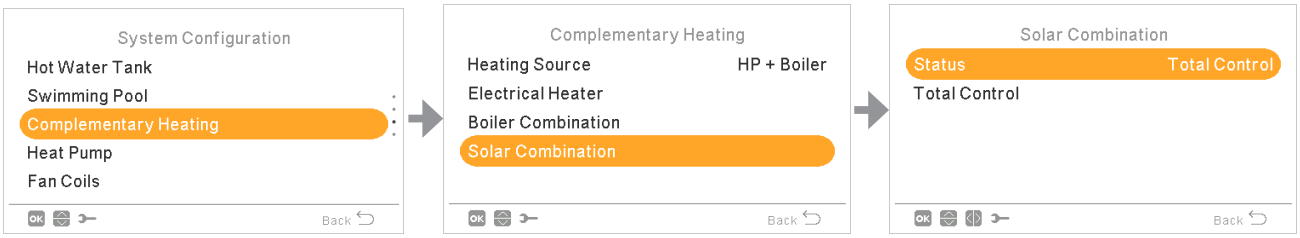
DHWT is heated by either the hot water that comes from the solar panels or the hot water that comes from the heat pump, depending on the solar temperature.

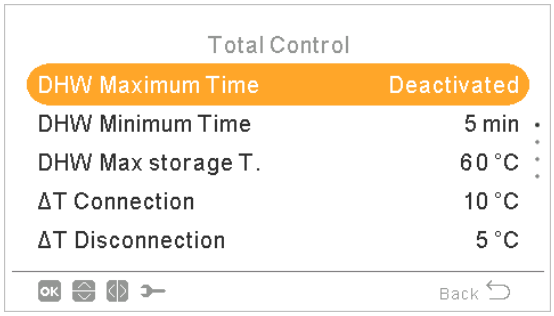
Example for illustrative purpose only:

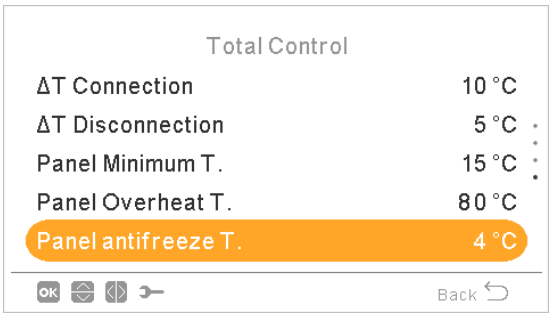


The configuration should be done through the unit controller according to the following variables:

Description	Default Value	Range	Units
DHW Maximum time	OFF	OFF, 35 ~ 240	min
DHW Minimum time	5	5~240	min
DHW Max storage T	60	30 ~ 90	°C
ΔT Connection	10	1 ~ 30	°C
ΔT Disconnection	5	1 ~ ΔT Connection	°C
Panel Minimum T	15	1 ~ 60	°C
Panel Overheat T	80	80 ~ 120	°C
Panel antifreeze T	4	-20 ~ 10	°C







Inputs and outputs

YUTAKI units use the following inputs and outputs located at the table board:

- Solar Pump Output: Unit performs solar operation and requires pump operation (this is selectable as “Optional Function”, explained in *“3. Optional functions”*).
- Analogical Input: Solar Panel Sensor. Gives an analogical signal about the temperature of the solar panels (Selectable as “Optional functions”, explained in *“3. Optional functions”*).

DHWT operation

Hot water from solar panels heat DHW tank. During this operation the solar pump output is ON and Heat pump does not heat DHW tank. YUTAKI units switches to other operations like space heating, cooling, etc.

Solar start conditions

YUTAKI unit starts requesting solar (activates solar pump output) when all of the following conditions are fulfilled:

a. DHWT operation is enabled (including timer).

b. Status is set as “Total Control”.

c. Configured DHW maximum time exceeded since las solar request has finished.

d. Solar panel sensor temperature>T_{DHWT} + ΔT Connection.

e. Solar panel sensor temperature>Panel minimum temperature.

f. T_{DWHT}<T_{DHWMAX} (DHW Maximum storage temperature) - 5ºC
   - Where: T_{DHWT}: Domestic Hot Water Tank Temperature (ºC)

g. solar panel sensor temperature < Panel overheat temperature.

DHW Minimum time = Minimum time solar operation cannot be performed once it has been stopped due to low temperature at solar panel.

Regardless of previous conditions, Solar DHWT starts operation if solar panel sensor temperature reads a lower temperature than the antifreeze panel temperature set through unit controller and the temperature of the DHWT is higher than 7ºC.

Solar stop conditions

YUTAKI unit stops requesting solar (deactivates solar pump output) when all of the following conditions are fulfilled:

a. DHWT is disabled (including timer).

b. Status is not set as “Total control“.

c. Configured DHW maximum time exceeded since last solar request begun.

d. Solar panel sensor temperature < T_{DHWT} + ΔT Disconnection.

e. Solar panel sensor temperature > Panel minimum temperature.

f. $T_{DHWT} \geq T_{DHWTMAX}$
   - Where: T_{DHWT}: Domestic Hot Water Tank Temperature (ºC)

g. Solar panel sensor temperature > Panel overheat temperature.

DHW Maximum time = Maximum time solar operation can be performed once it has been started due to solar temperature conditions (d,e,f,g). (If OFF is selected, there is no time)

Regardless of previous conditions, solar DHW can not stop if the Solar panel temperature is lower than the antifreeze temperature configured plus 2ºC and $T_{DHWT} \geq 5$ºC.

2.9 Water pump control

Water pump	Description
WP1	This Water pump is present inside YUTAKI S and YUTAKI S COMBI. It is responsible of water recirculation between plate exchanger and YUTAKI installation.
WP2	Water Pump used only in case a secondary circuit for space heating or space cooling is used in case of YUTAKI S and YUTAKI S COMBI. It ensures water circulation at Circuit 2.
WP3	Water Pump used in case YUTAKI S and YUTAKI S COMBI uses an hydraulic separator. It ensures water circulation from hydraulic separator to the distribution circuit.

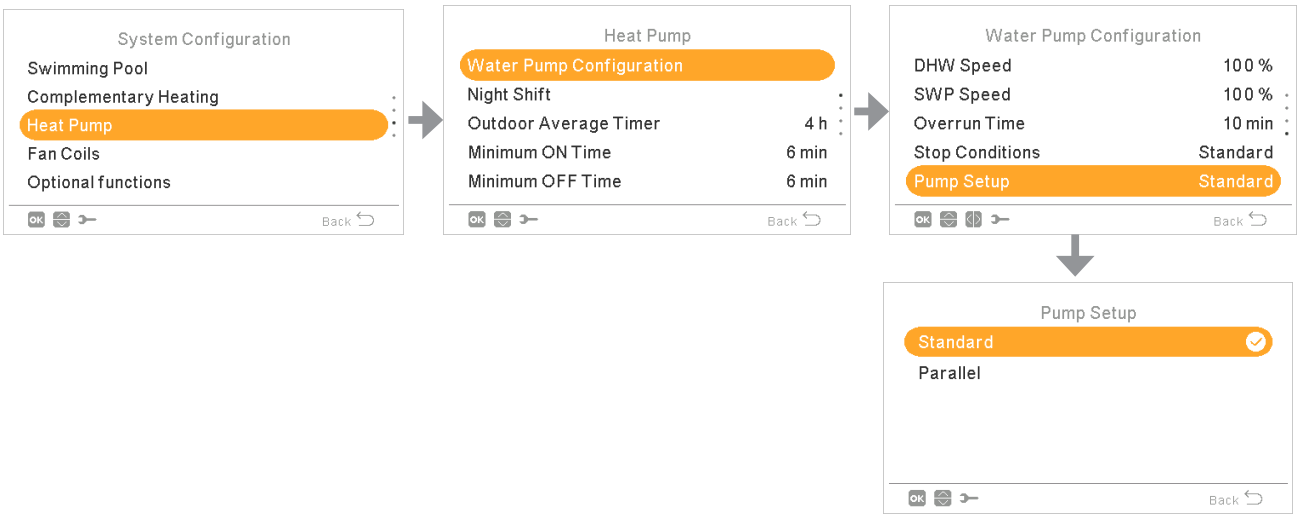
2.9.1 Pump setup

Pump Setup allow installer to choose the way to manage secondary side water pump WP3

- Standard: WP3 works as a secondary side pump and runs at the same time than primary side pump WP1
- Parallel: WP3 is dedicated to Circuit 1 operation and WP2 to Circuit 2 allowing individual pump stoppage by Demand-Off condition (“ECO Pumps” need to be set by DSW4-pin5 = ON for pump stoppage to happen)

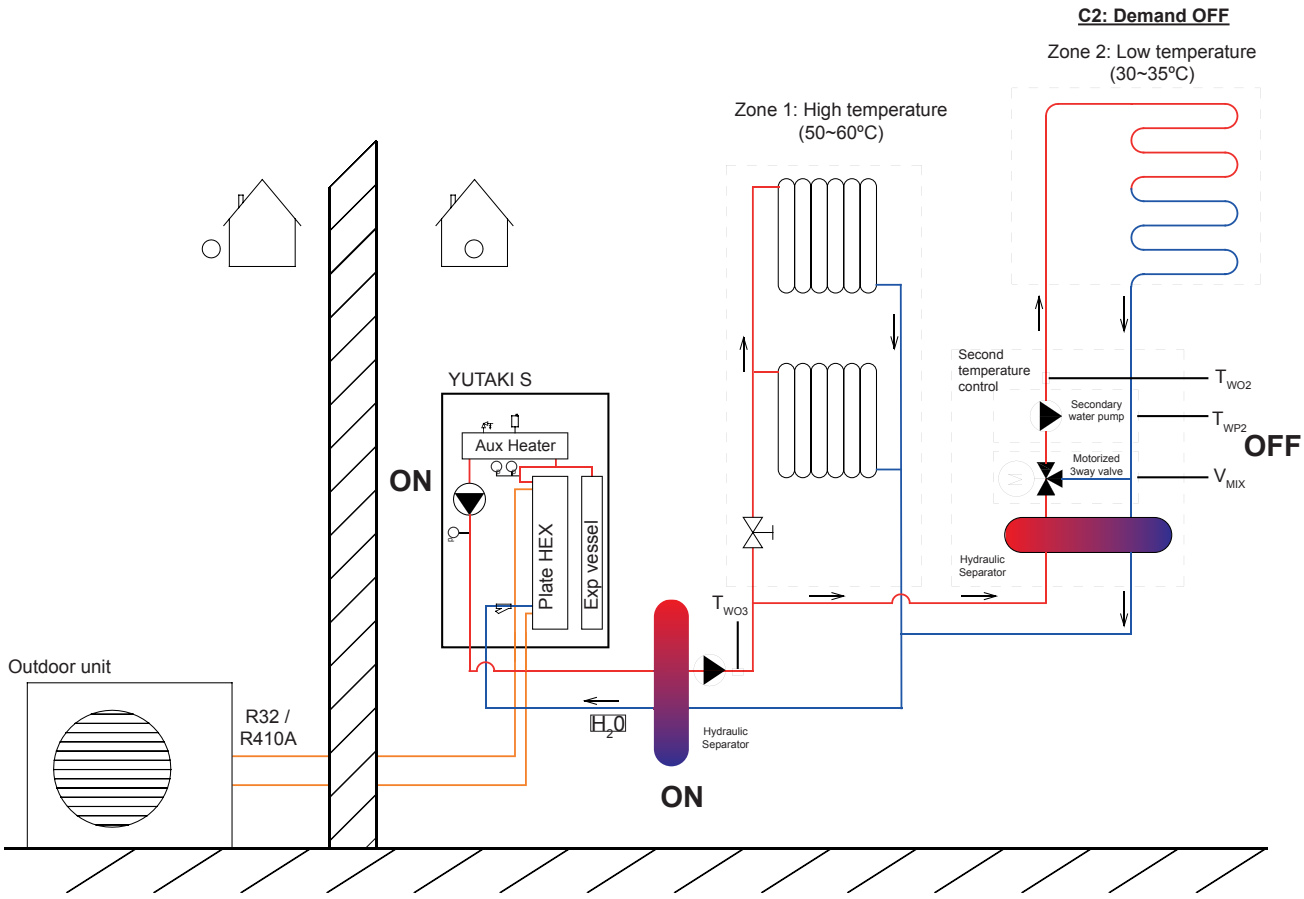
This function is available when Hydraulic Separator has been selected.
System Configuration → Heat Pump → Water Pump Configuration

Description	Default Value	Range
Pump Setup	Standard	Standard / Parallel



2.9.1.1 Example 1: YUTAKI standard hydraulic layout

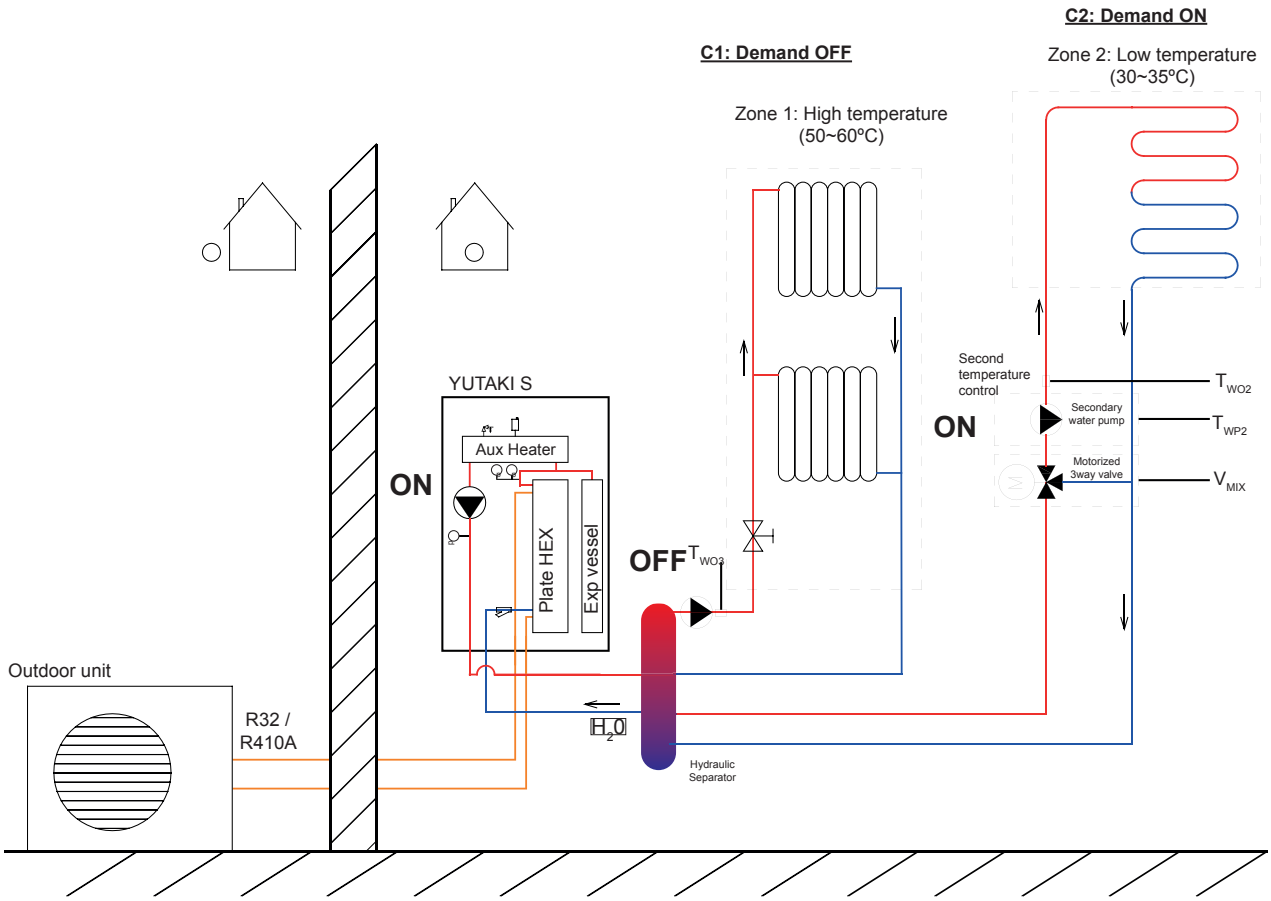
- Pump Setup: Standard
- WP1 and WP3 need to operate at the same time always, so the heat can be transferred to the secondary side
- WP2 operates independently for Circuit 2. If there is a Demand-Off and “ECO Pumps” is set, then WP2 can stop



Due to the nature of the pump set-up, WP3 shall be ON whenever there is Demand from Circuit 2 even configuring pumps in Economic mode. That makes C1 be heated up to C2 water setting temperature even though C1 is not in Demand. To avoid this scenario, it must be installed a closing valve managed by a YUTAKI output to isolate C1 when there is no demand from C1 but only on C2.

◆ Example 2: Dedicated pumps for Circuit 1 and Circuit 2 in parallel

- Pump Setup: Parallel
- WP1 need to operate for the heat generation
- WP3 and WP2 operates independently for Circuit 1 and 2
- If there is a Demand-Off and “ECO Pumps” is set, then WP3 and WP2 can stop according to individual demand



This parallel pump set-up does not require WP3 to be in operation whenever C2 is in demand conditions since both circuits are hydraulically independent. This means that whenever any circuit is switched OFF, pump related to that specific circuit will be stopped without interfering to the other circuit. Even more, in case of configuring Economic pumps, each pump will start and stop in function of the Demand on each zone.

NOTE

For this hydraulic layout Hitachi’s “2nd Temperature kit” cannot be used. Use a field supplied mixing kit

2.9.1.2 Pump operations summary

- DHW Tank Position: Post
- Pump Setup: Standard

DHW Tank Position: Post Pump Setup: Standard	C1 Demand	C2 Demand	DHW Demand	WP1	WP2	WP3
	ON	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	OFF	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	ON	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	OFF	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	ON	ON	OFF	ON	ON	ON
	OFF	ON	OFF	ON	ON	ON
	ON	OFF	OFF	ON	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON
	OFF	OFF	OFF	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)

- DHW Tank Position: Pre
- Pump Setup: Standard

DHW Tank Position: Pre Pump Setup: Standard	C1 Demand	C2 Demand	DHW Demand	WP1	WP2	WP3
	ON	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	OFF	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	ON	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	OFF	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	ON	ON	OFF	ON	ON	ON
	OFF	ON	OFF	ON	ON	ON
	ON	OFF	OFF	ON	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON
	OFF	OFF	OFF	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)

- DHW Tank Position: Post
- Pump Setup: Parallel

DHW Tank Position: Post Pump Setup: Parallel	C1 Demand	C2 Demand	DHW Demand	WP1	WP2	WP3
	ON	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	OFF	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	ON	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	OFF	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON
	ON	ON	OFF	ON	ON	ON
	OFF	ON	OFF	ON	ON	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)
	ON	OFF	OFF	ON	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON
	OFF	OFF	OFF	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)

- DHW Tank Position: Pre
- Pump Setup: Parallel

DHW Tank Position: Pre Pump Setup: Parallel	C1 Demand	C2 Demand	DHW Demand	WP1	WP2	WP3
	ON	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	OFF	ON	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	ON	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	OFF	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	ON	ON	OFF	ON	ON	ON
	OFF	ON	OFF	ON	ON	ON (Pumps during DHW: ON) OFF (Pumps during DHW: OFF)
	ON	OFF	OFF	ON	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON
	OFF	OFF	OFF	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)	ON (DSW4-pin5: OFF) OFF (ECO Pumps DSW4-pin5: ON)

2.9.2 Pumps configuration

Pumps control can be set to Standard or Economic mode. This configuration is set using DSW4 PIN5.

When PIN is OFF, pump is in Standard operation, pump is always in operation when space heating or cooling is enabled (Switch ON), so in case of disable space heating or cooling (Switch OFF), pump switches OFF and only switches to ON when Domestic Hot water is requested.

When PIN is ON, pump is in Economic operation. This allows the pump to stop when system is stopped (Demand OFF for space heating and cooling and no other operation required).

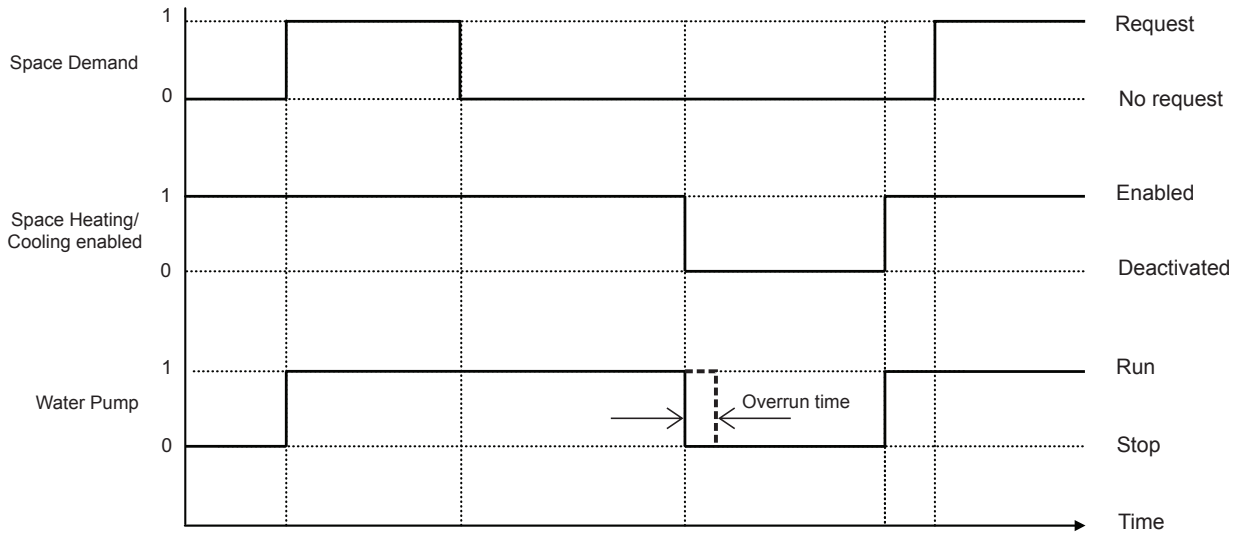
Pump stops when there is an alarm event.

2.9.2.1 Standard mode Water pump operation

NOTE

Applicable for WP1, WP2 and WP3.

When the system is configured in Standard mode (always in operation), water pump works as shown in the graphic below:

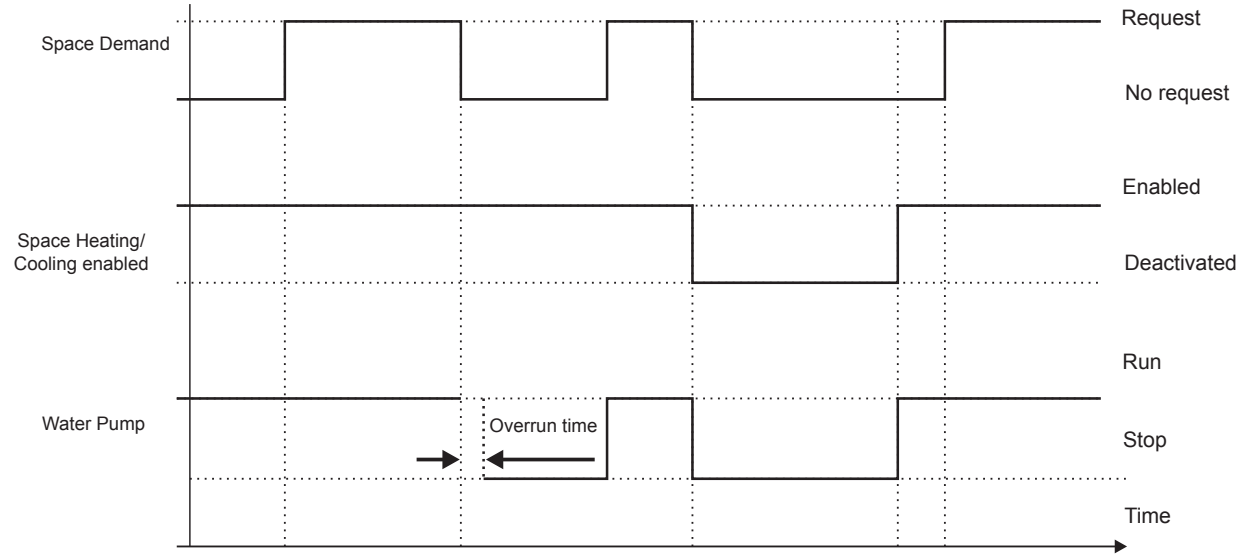

1
Space Demand
0
Request
No request
1
Space Heating/
Cooling enabled
0
Enabled
Deactivated
1
Water Pump
0
Overrun time
Run
Stop
Time

2.9.2.2 Economic mode Water pump operation

NOTE

Applicable for WP1, WP2 and WP3.

When the system is configured in Economic mode, water pump works as shown in the graphic below:



2.9.2.3 Recirculation option (Only in Economic mode)

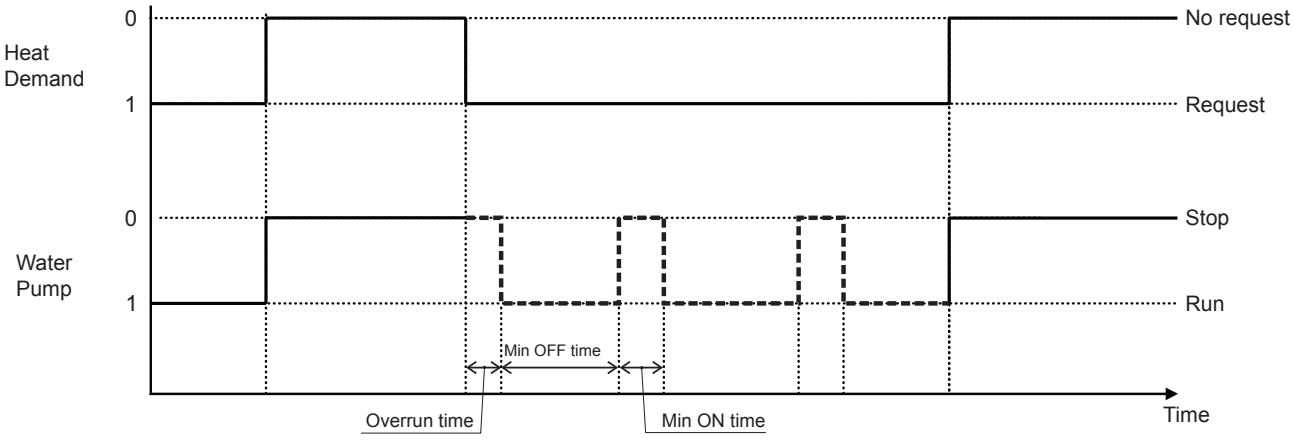
NOTE

Applicable for WP1, WP2 and WP3.

When recirculation option is enabled (see *"2.4.14.2 DHW re-circulation"*), pump (both main and sub) will be operated regularly when they are stopped.

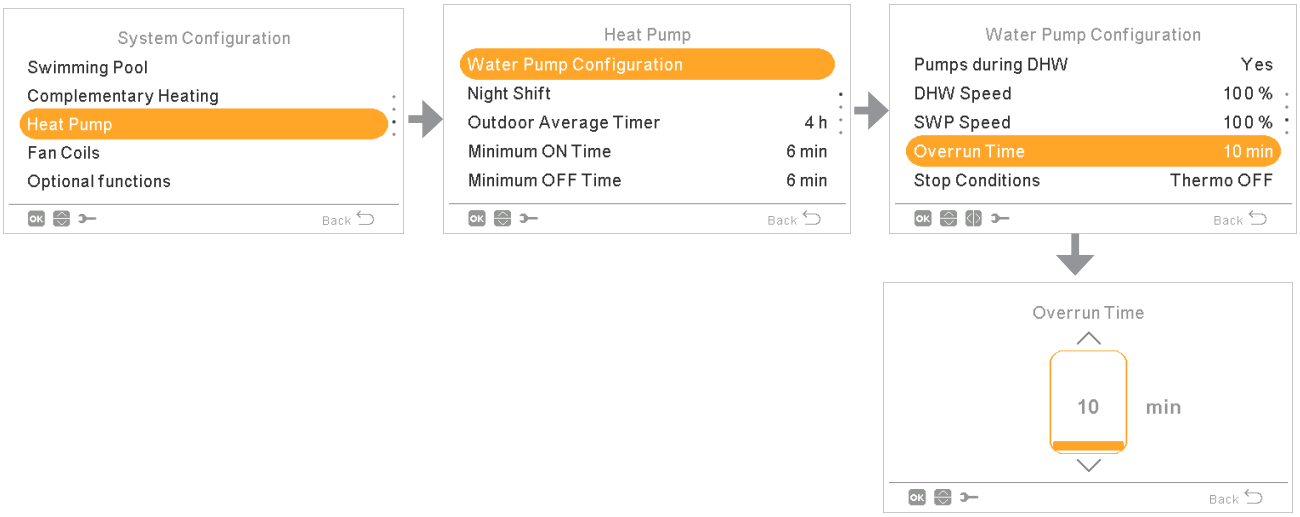
Once main pump is no longer required, it must continue operating during at least WPOvr time is passed since cease of requirement.

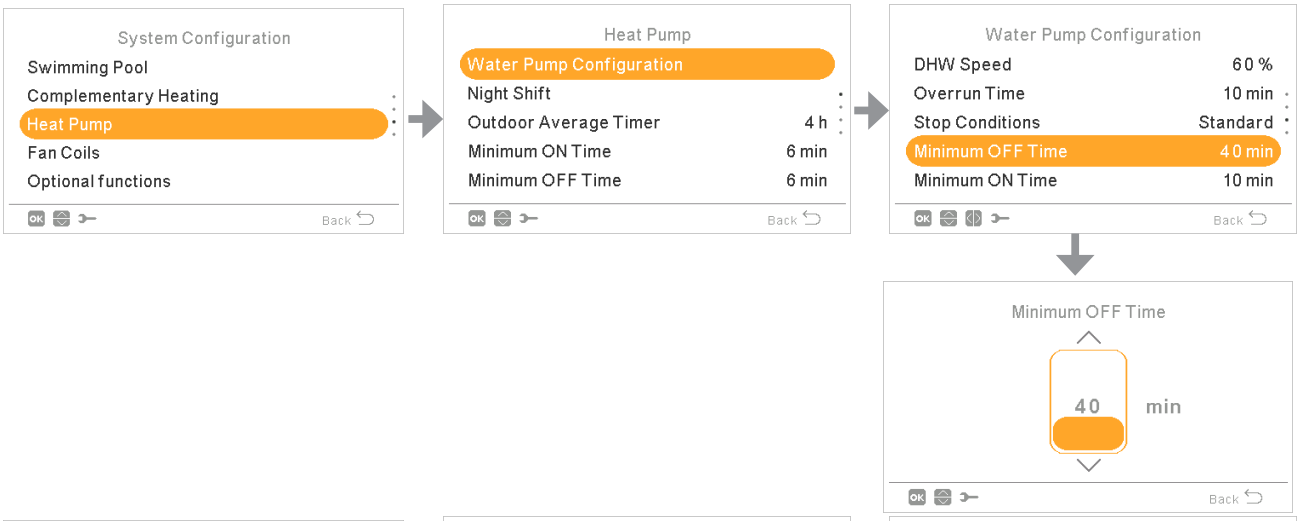
Each WPMinf minutes pump will be operated during WPMino minutes. Timer is independent for main and sub pumps

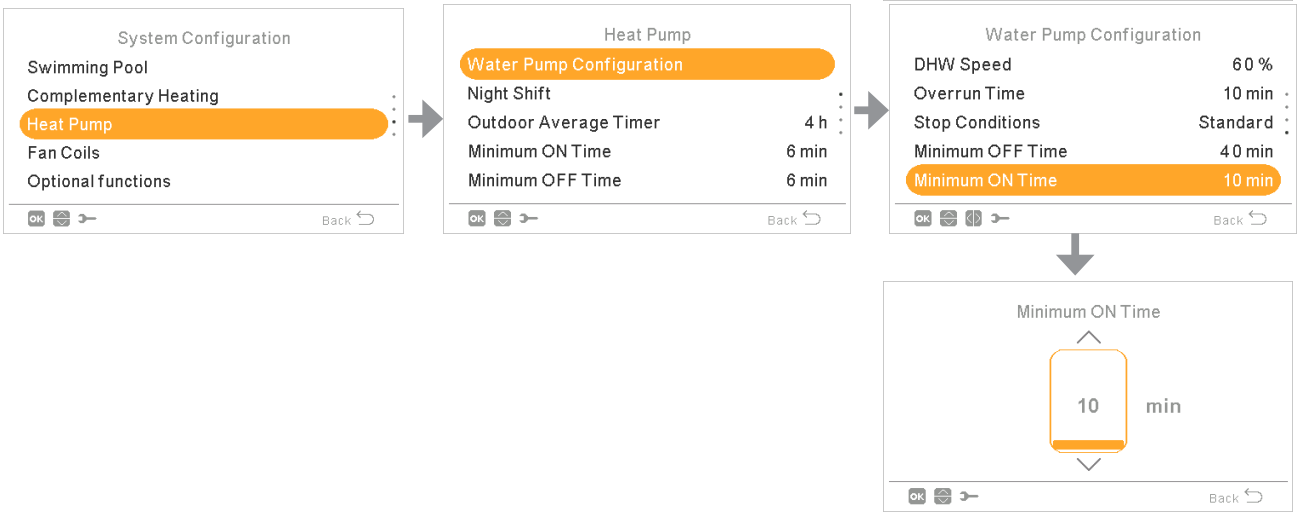


System Configuration → Heat Pump → Water Pump Configuration

Description	Default Value	Range	Units
Overrun time (WPOvr)	10	0~120	min
Minimum OFF Time (WPMinf)	40	0~120	min
Minimum ON Time (WPMino)	10	0~120	min







NOTE

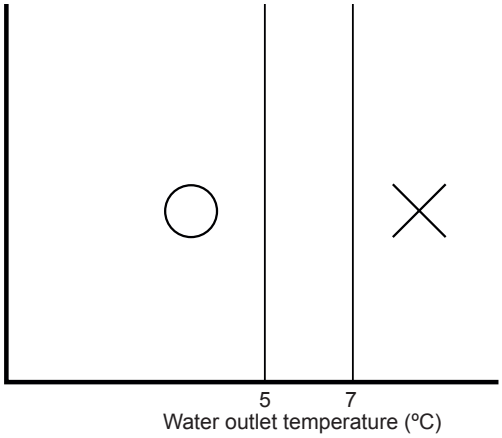
If WPMino or WPMinf are set to 0, recirculation option is disabled.

2.9.2.4 Anti Freeze Control (Winter Operation)

NOTE

Applicable for WP1, WP2 and WP3.

When in operation in winter if the outlet water temperature is 5ºC or lower, and unit remains in Demand OFF Operation (and water pump OFF), operates the water pump to protect the unit and pipes installation from freezing. This control is released when the water outlet temperature becomes 7ºC or higher.



O: Continuous pump operation

X: Pump stop

Configuration

When user allows anti-freeze control mode (DSW4 PIN6 ON), pump operates when conditions are fulfilled.

2.9.3 Water pump PWM control

NOTE

Applicable for WP1.

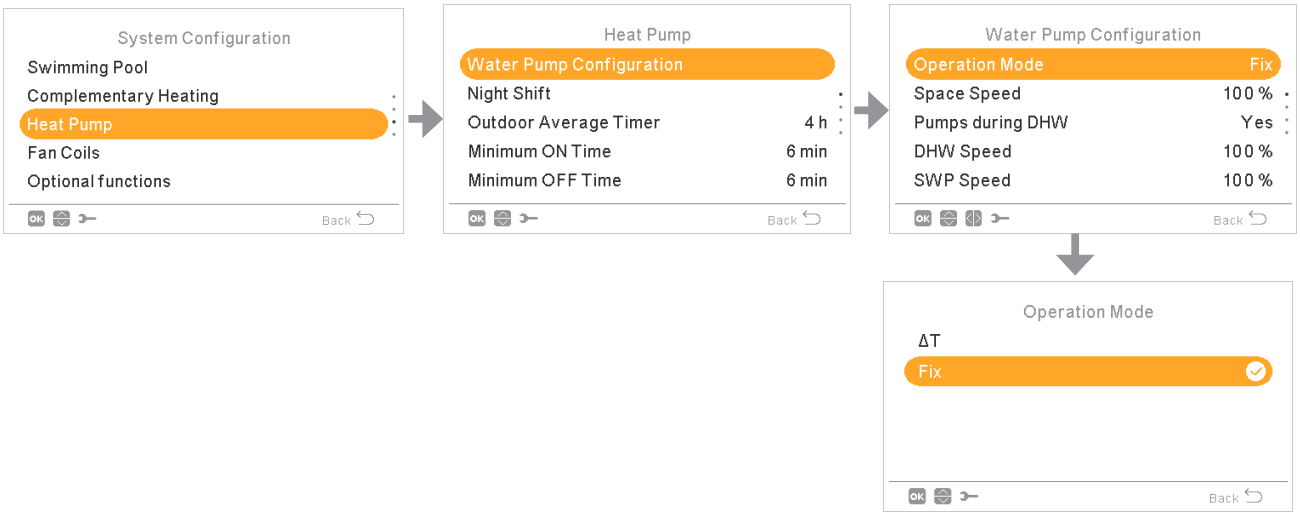
2.9.3.1 Water Pump Control Details

Water Pump can be controlled by PWM output signal (EC Water Pump). Setting of WP1 can be set in 2 optional modes:

- Fixed speed value selected by installer
- Control by ΔTº by Water Inlet and Water Outlet temperature.

System Configuration – Heat Pump – Water Pump Configuration

Description	Default Value	Range
Operation mode	Fix	Fix ΔT



2.9.3.2 ΔT Water pump PWM for space Heating/Cooling

The objective of the ΔT water pump PWM control is to maximize water pump operation by decreasing or increasing its rotational speed and guarantee the most efficient usage.

YUTAKI unit specifies the optimum temperature difference between return and leaving water depending on setting temperature. Water pump velocity is increased or decreased in order to achieve such temperature difference. This control only applies in case of space heating or space cooling.

◆ Space Heating

Setting temperature (Ttwo)	Desired ΔT = Two - Twi
Ttwo >60ºC	10ºC
55 < Ttwo <= 60ºC	8ºC
45 < Ttwo <= 55ºC	7ºC
25ºC < Ttwo <= 45ºC	5ºC
25ºC <= Ttwo	3ºC

◆ Space Cooling

Desired ΔT is 5ºC in any case

2.9.4 Fixed Water pump PWM speed for space Heating/Cooling

NOTE

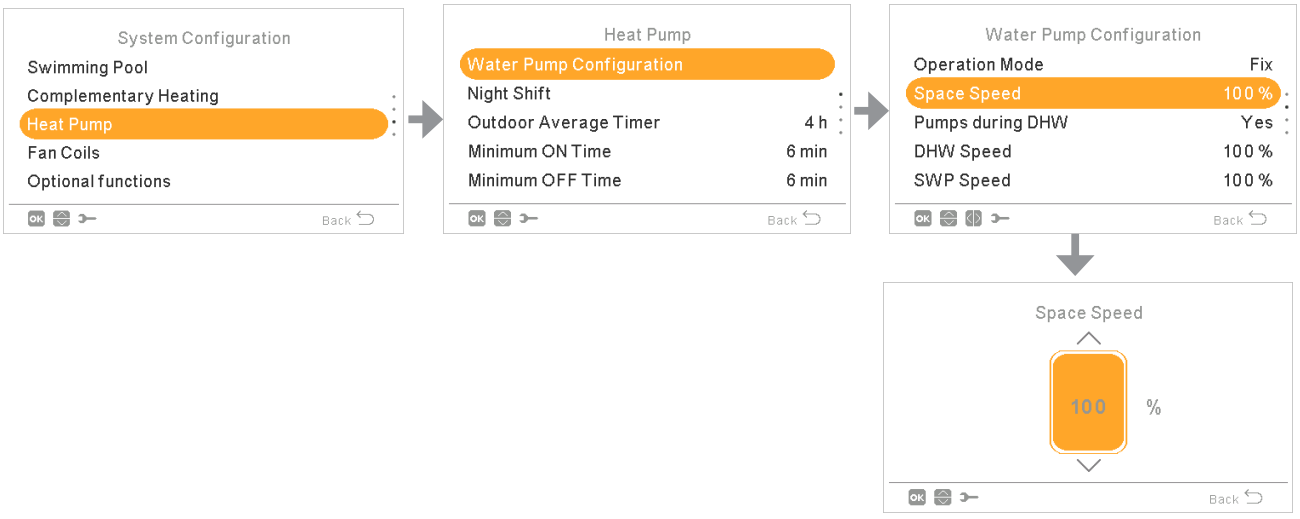
Applicable for WP1.

PWM output can be selected by user (See *Unit controller* chapter of the Installation and operation manual of YUTAKI units).

The configuration of this function should be done through the Unit controller (PC-ARFH2E)

System Configuration → Heat Pump → Water pump configuration

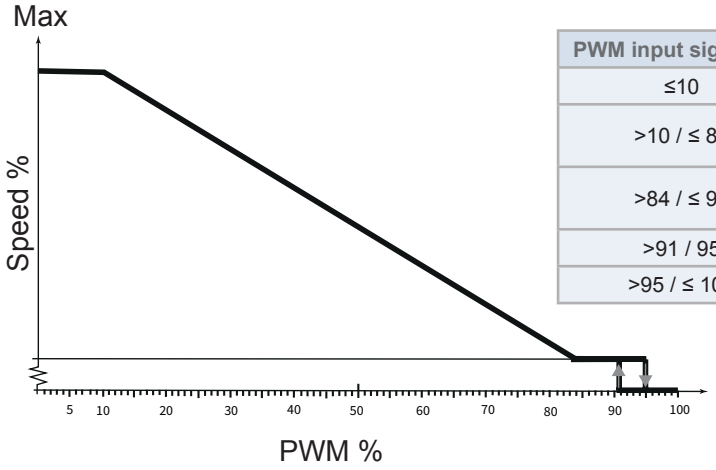
Description	Default Value	Range	Units
Space Speed (WPSS)	100	50~100	%



2.9.4.1 PWM Input signal

At high PWM signal percentages (duty cycles), a hysteresis prevents the pump from starting and stopping if the input signal fluctuates around the shifting point.

At low PWM signal percentages, the pump speed is high for safety reasons. In case of a cable breakage the pumps work at maximum speed to transfer heat from the primary heat exchanger.



PWM input signal (%)	Pump Action
≤10	The pump runs at maximum speed.
>10 / ≤ 84	The pump speed decreases linearly from maximum to minimum.
>84 / ≤ 91	The pump runs at minimum speed (Operation)
>91 / 95	Histeresis area: on/off
>95 / ≤ 100	Standby mode: off

2.9.4.2 PWM feedback signal

NOTE

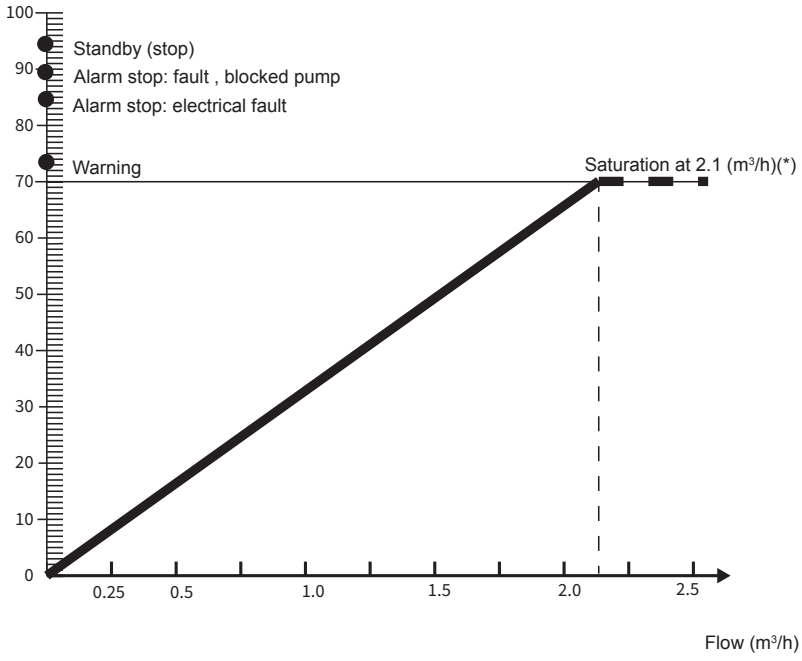
Applicable for WP1.

Tthe electronics integrated in the pump process direct measurements:

- Rotation speed: n
- Power: P

And is capable to feedback the pump controller with:

- Flow Q = F(n,P, Water Tº) (PWM DC from 5% to 75%) [Water flow will be calculated until PWM > 80%, after value will be 0 and alarm shown]
- Appliance status
- Pump status



NOTE

- *Applicable for WP1.*
- *For 4-6HP: 2.8* m³/h. *For 8-10HP: 4.0* m³/h

2.9.5 Water flow estimation control

NOTE

Applicable for WP1.

There is a correction value of estimated water flow due to correction function of temperature, pump housing type and duty point.

For a fixed real flow, pump feedback drops a higher estimated flow at lower temperatures:

- When calculations are performed for a low temperature reference, flow is higher than real when measured at higher temperatures.
- In the opposite way, when calculations are performed at high temperature reference, flow is lower than real when measured at lower water temperatures.

2.9.6 DHW Water Pump Speed

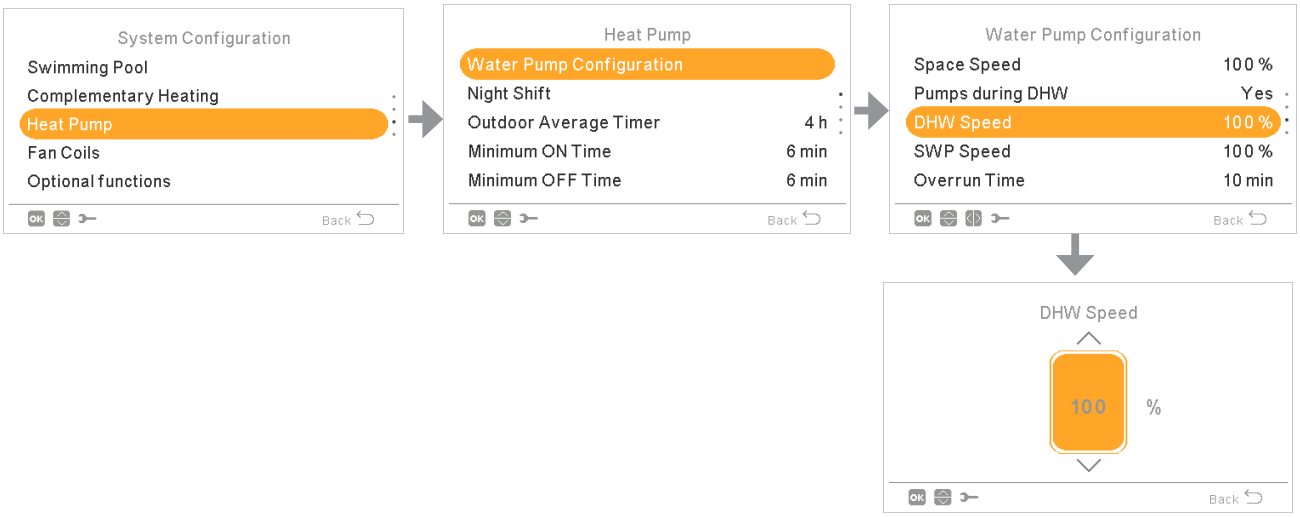
NOTE

Applicable for WP1.

This PWM output can be configured by the user (See *Unit controller* chapter of the Installation and operation manual of YUTAKI units)

System Configuration → Heat Pump → Water pump configuration

Description	Default Value	Range	Units
DHW Speed (WPDS)	100	50~100	%



2.9.7 SWP Water Pump Speed

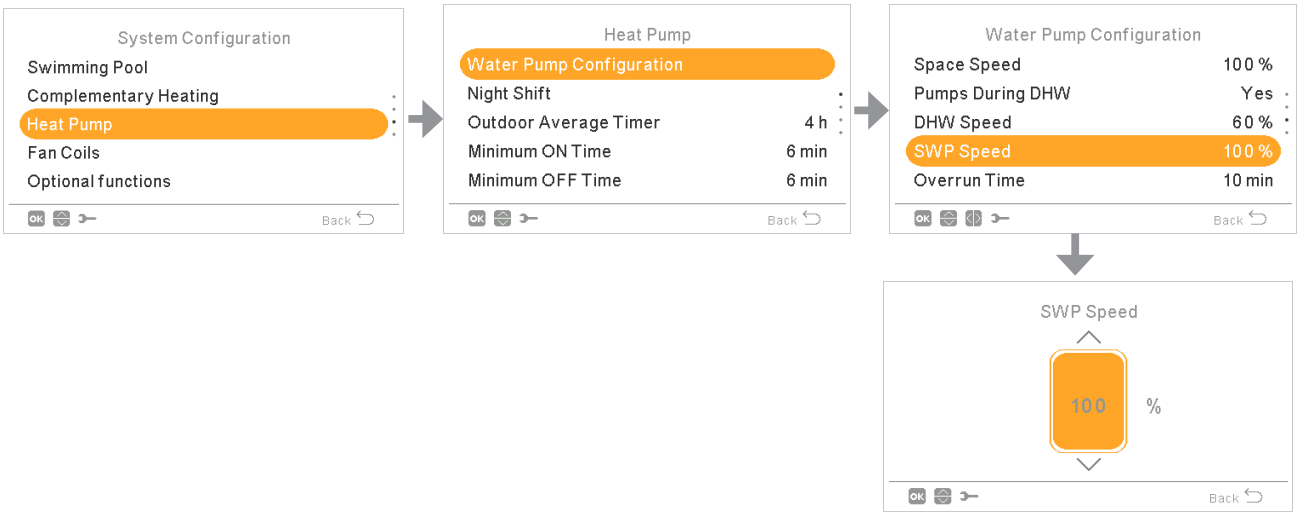
NOTE

Applicable for WP1.

This PWM output can be configured by the user (See *Unit controller* chapter of the Installation and operation manual of YUTAKI units).

System Configuration → Heat Pump → Water pump configuration

Description	Default Value	Range	Units
SWP Speed (WPWS)	100	50~100	%



2.9.8 Pump seizure protection

NOTE

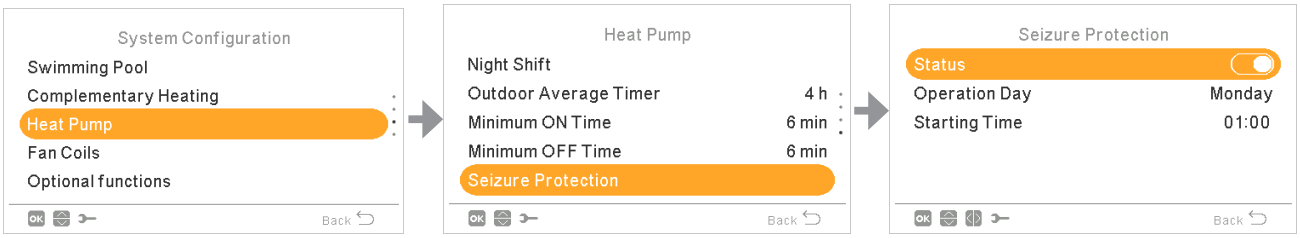
Applicable for WP1, WP2 and WP3.

The pump seizure protection function prevents sticking of components due to long periods of inactivity, by running the components during a short period every week. Mixing valves are fully opened and then fully closed (time depends on runtime parameter).

Pumps are switched-ON for 1 minute.

System Configuration – Heat Pump - Seizure Protection

Description	Default Value	Range	Units
Status	Deactivated	Deactivated/Enabled	-
Operation Day	Monday	Mon ~ Sun	day
Starting Time	01:00	(00:00~23:50)	time



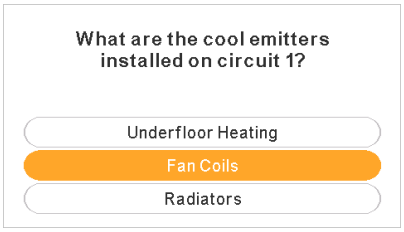
NOTE

- *For AC water pump (WP2 and WP3) switch ON the seizure protection for 10 minutes.*
- *For DC water pump (WP1)switch ON the seizure protection at Fixed speed for 10 minutes.*
- *DHW and SWP valve are not included in the seizure protection.*

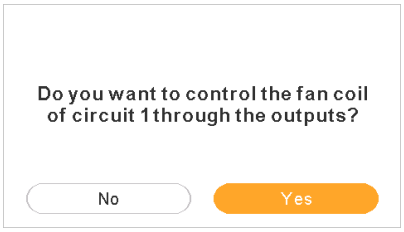
2.10 Fan coils control

Fan Coil control is only possible in case using YUTAKI LCD as a wired Room Thermostat.

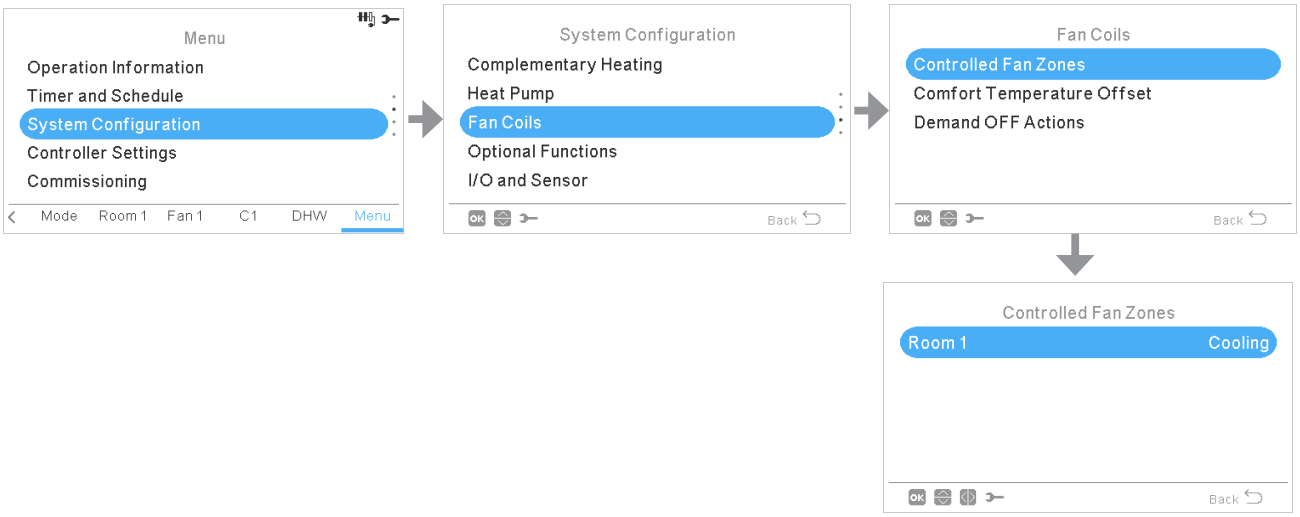
In order to enable fan coil outputs and fan configuration icon on main screen, fan coil has to be selected as an emitter in the wizard menu or inside LCD menu.



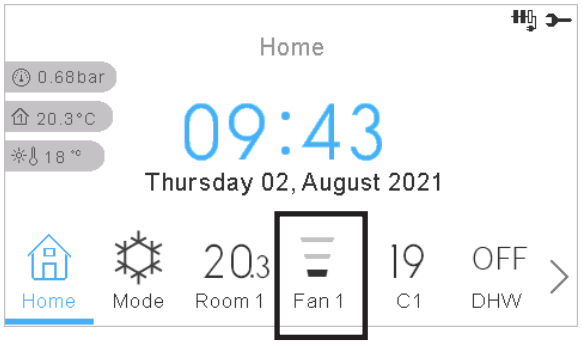
In case selected emitter is fan coil, wizard menu asks to control Fan coil from YUTAKI LCD.



Alternatively this configuration can be also done inside System configuration, as follows:



When emitter declared is fan coil and Fan coil is declared to be controlled from YUTAKI LCD, it is displayed Fan velocity icon on Room thermostat screen of each zone.



Example when LCD is Unit + Room 1

When selecting a velocity, software sets an output to high state. Also, in case ON/OFF button is pressed, zone is set in Demand OFF and Fan Coil's Fan stops.

2.10.1 Wiring to the fan coil motor

◆ YUTAKI S COMBI

- The configurable outputs in a YUTAKI S COMBI are of 2 different types:

Output 1, Output 2 and Output 9:

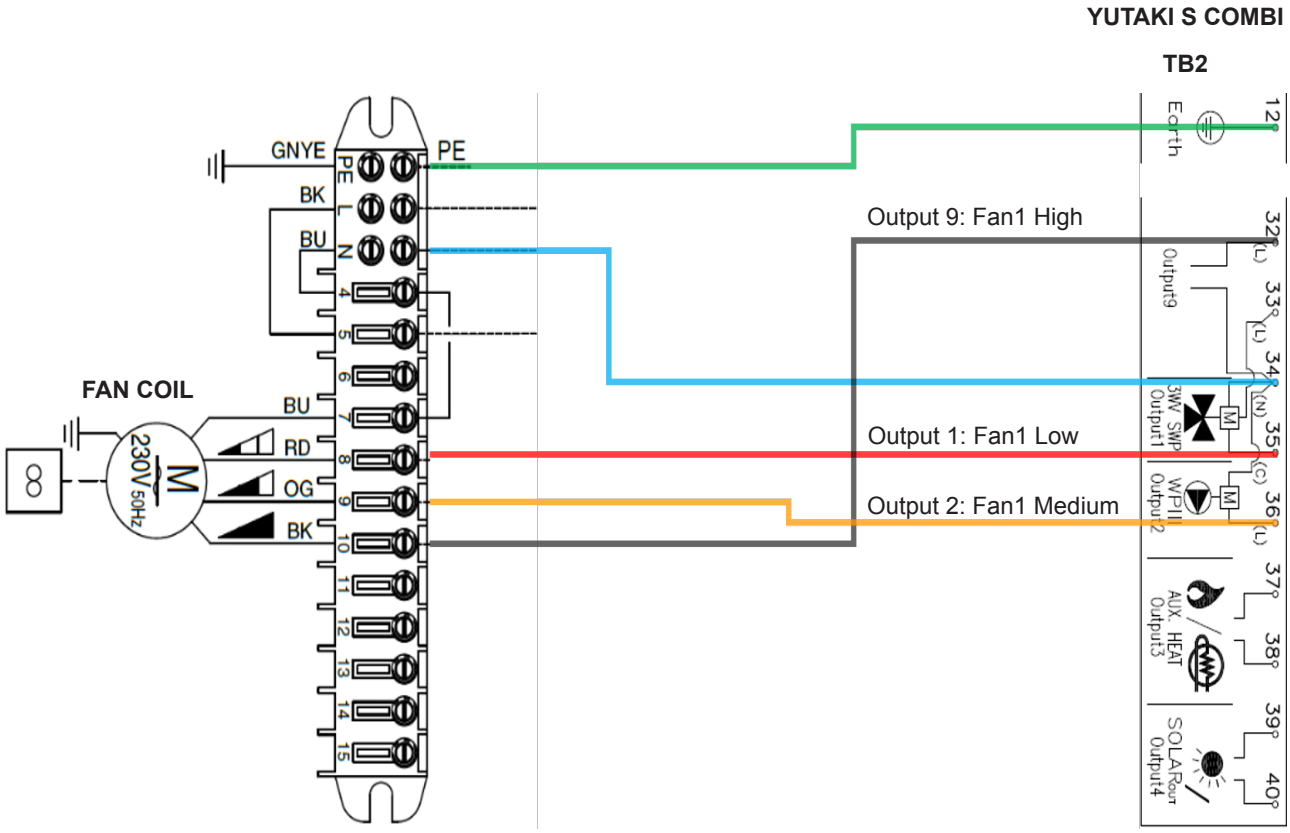
- Live 230Vac
- Maximum 2.0 A for all 3 outputs at the same time

Outputs 3 and 4:

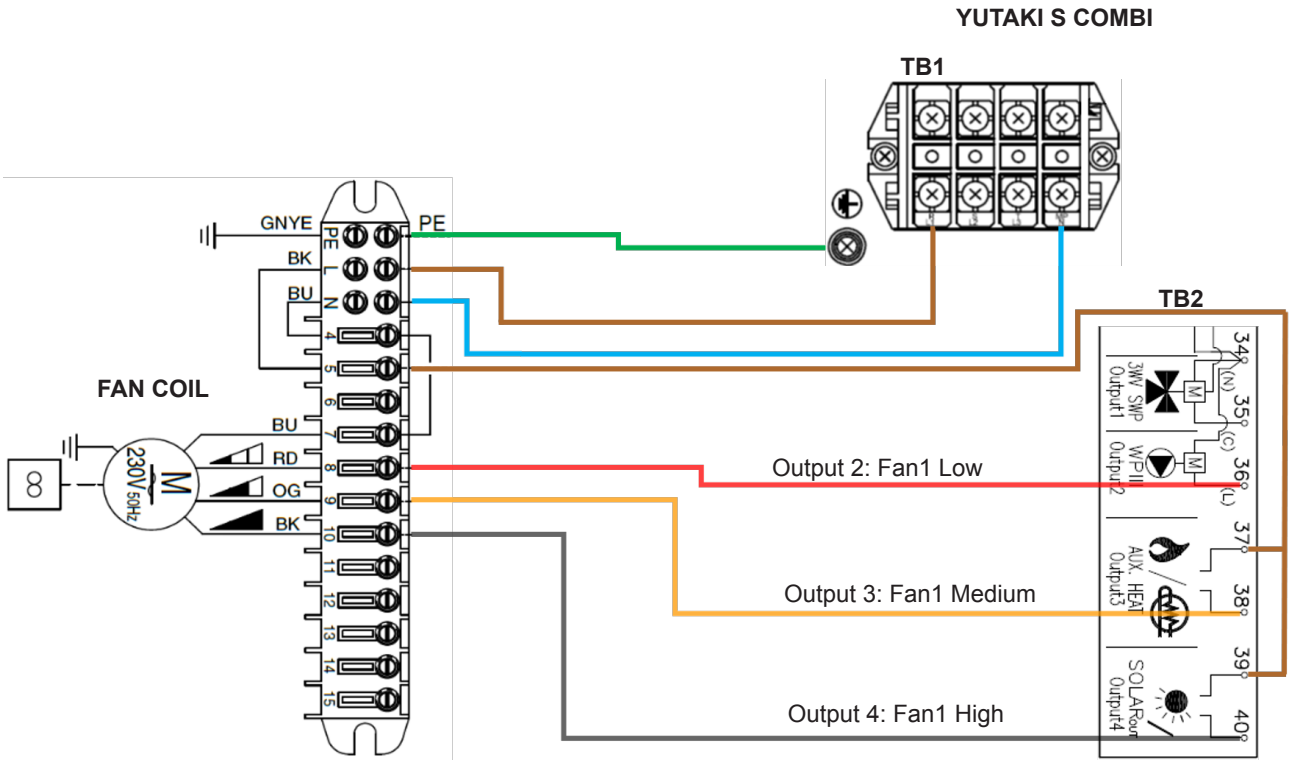
- Dry contact relay for 230Vac
- Maximum 2.5 A for every output

- The 3-speed fan motor control is using just 1 output at every time.
- When using Outputs 1, 2 and 9 for the 3 speed: maximum fan-coil input current < 2.0 A
- When Outputs 1, 2 and/or 9 are used to control other devices, the sum of the fan motor current and the other devices has to be considered. This includes devices connected to Auxiliary Power 28-29 terminals. Total maximum current applied < 2.0 A
- Outputs 3/4 may be used for the High or High and Medium speed: maximum fan-coil input current < 2.5 A

Fan coil connexion example 1: Fan coil by Outputs 1, 2 and 9



Fan coil connexion example 2: Fan coil by Outputs 2, 3 and 4



◆ YUTAKI S

- The configurable outputs in a YUTAKI S are of 2 different types:

Output 1 and Output 2:

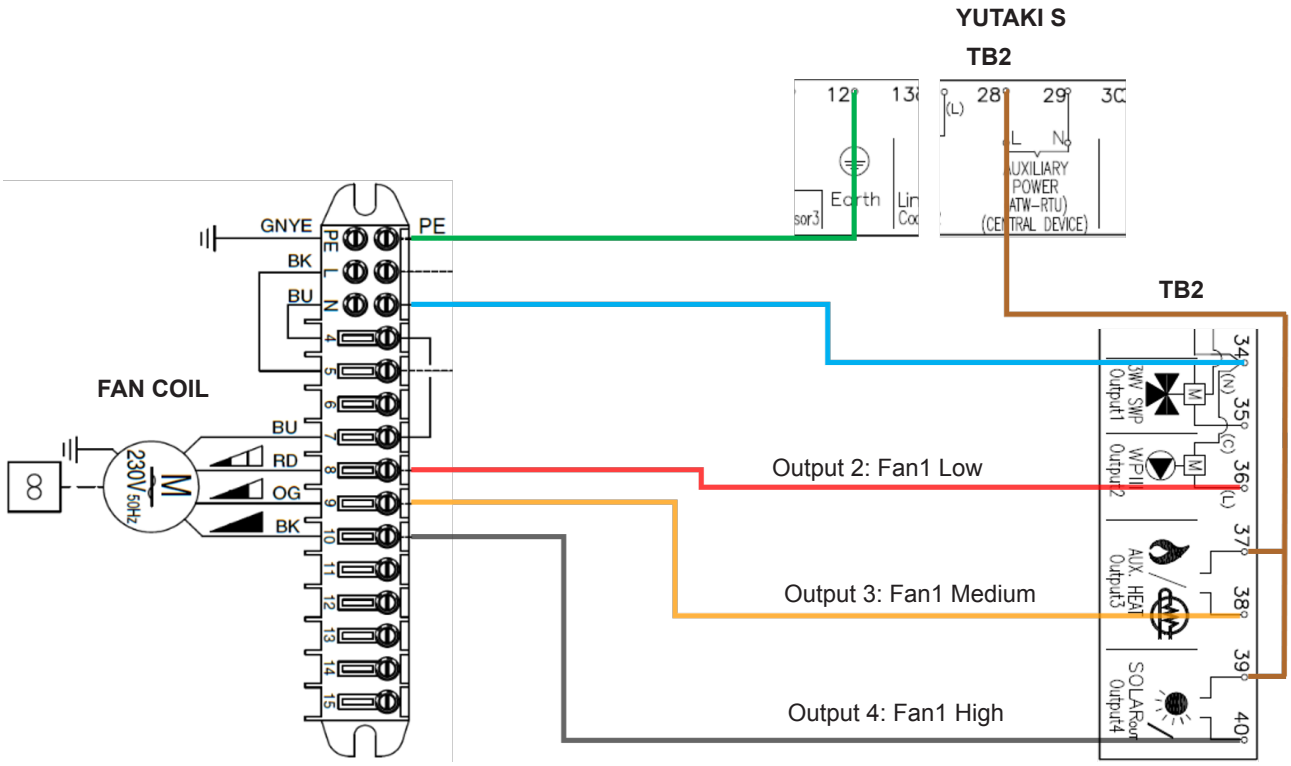
- Live 230Vac
- Maximum 2.0 A for all 3 outputs at the same time

Outputs 3 and 4:

- Dry contact relay for 230Vac
- Maximum 2.5 A for every output

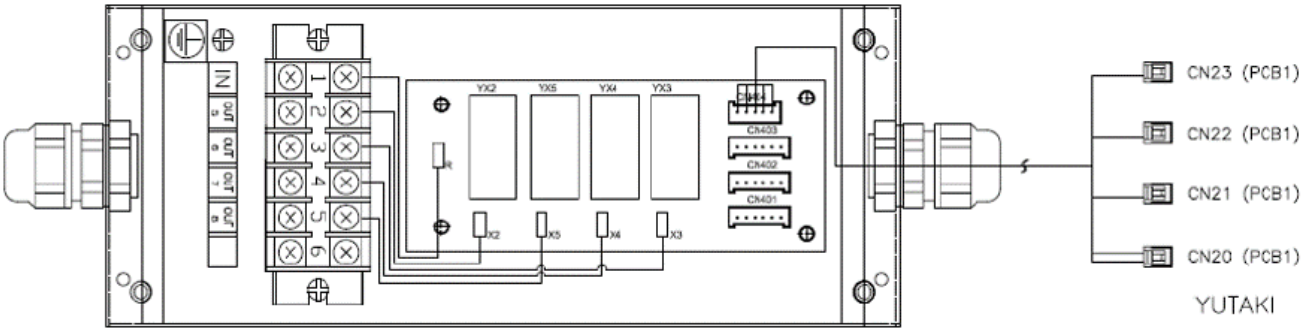
- The 3-speed fan motor control is using just 1 output at every time
- When using Outputs 1 and 2 for the Low or Medium speed: maximum fan-coil input current < 2.0 A
- At least Output 3 or 4 must be used for the High speed: maximum fan-coil input current < 2.5 A
- When Outputs 1 and/or 2 are used to control other devices, the summary of the fan motor current and the other devices has to be considered. This includes Auxiliary Power 28-29 terminals. Total summary maximum current applied < 2.0 A

Fan-coil connexion example: Fan coil by Outputs 2, 3 and 4

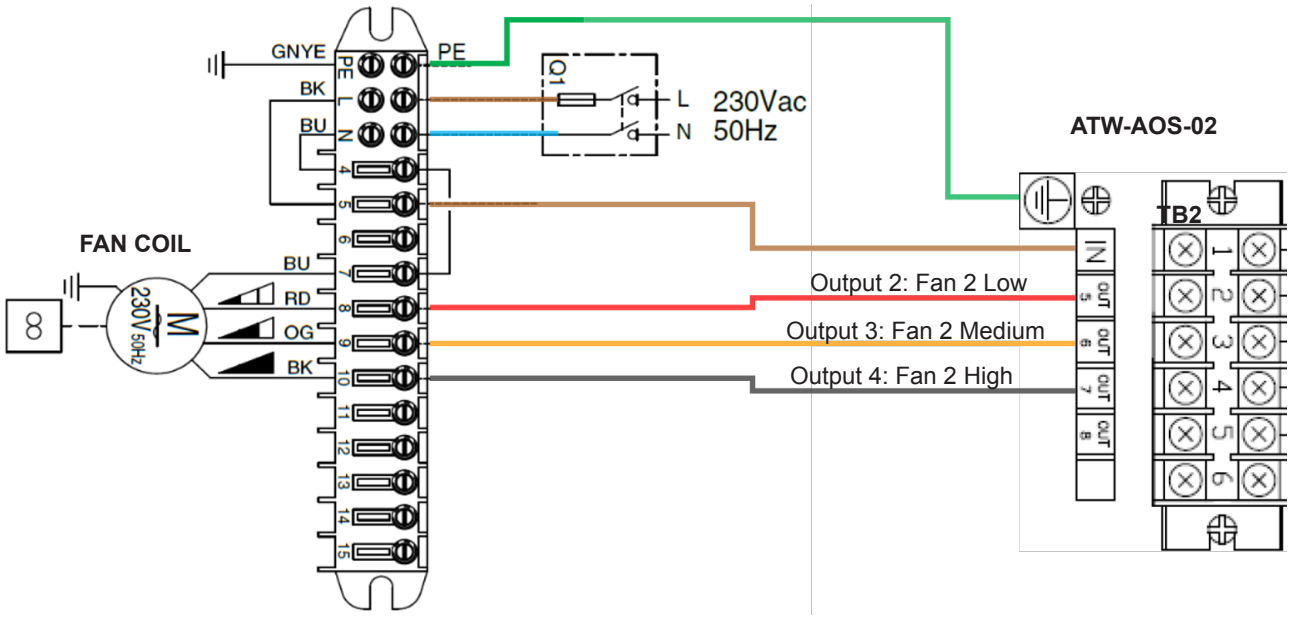


◆ Auxiliary output signal box ATW-AOS-02

- Additional control outputs 5, 6, 7 and 8 for YUTAKI
- Dry contact relay, 230Vac input
- Maximum total output: 10 A
- Maximum individual output: 5 A
- The maximum power input allowed for the fan motor is 5 A



Fan coil connexion example: Fan coil by Outputs 5, 6 and 7



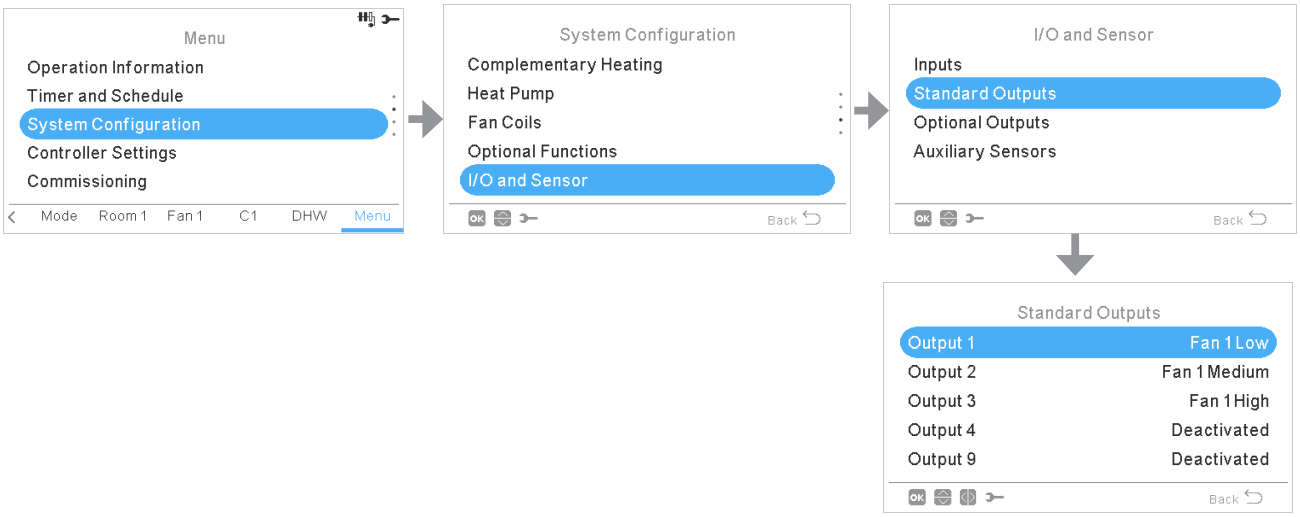
2.10.2 Selecting fan speed outputs

Into the I/O and Sensor menu we can find 2 different output menus:

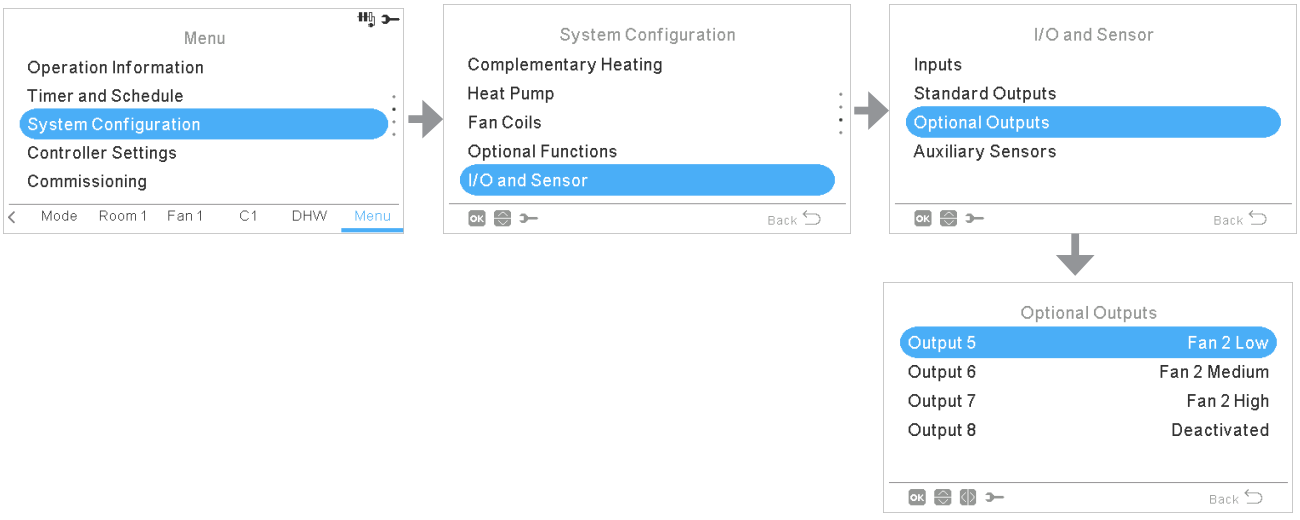
- Standard Outputs: This is used to select the function of the own YUTAKI Terminal Board 2; Outputs 1, 2, 3, 4 (and 9 for S COMBI)
- Optional Outputs: This is used to select the function of the ATW-AOS-02 auxiliary output signal box; Outputs 5, 6, 7 and 8

In case of having 2 fan coils they are required up to 6 configurable outputs.

◆ Standard outputs for fan coil 1:



◆ Optional outputs for fan coil 2:



NOTE

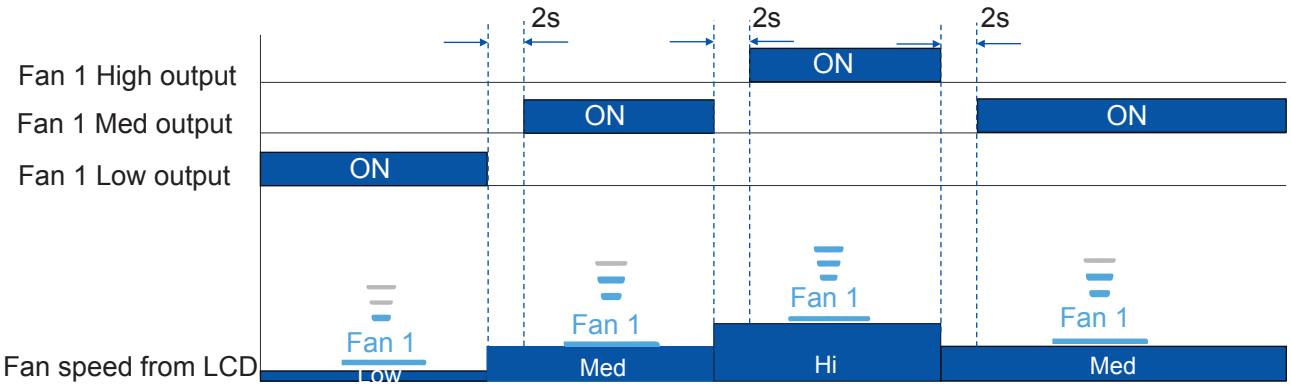
In case of requiring more optional outputs, it is required to purchase ATW-AOS-02 accessory

2.10.2.1 Fan speed control

When selecting a fan speed from the LCD control the assigned output will activate

To prevent of eventual switching problems, when the fan speed is changed the active fan speed output is switched off, after 2 seconds delay time the new fan speed output will be activated

The purpose of this control is to avoid power supply to 2 different motor coils that may cause an eventual damage



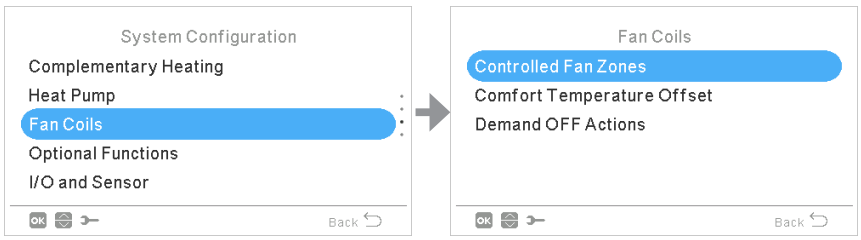
- Fan AUTO mode can be selected as well
- High, Medium or Low fan speed will be decided according to the temperature difference:
  - Heating Δt = Room setting temperature – Room real ambient temperature
  - Cooling Δt = Room real ambient temperature – Room setting temperature
  - Δt ≥ 4ºC → Fan High
  - 1ºC < Δt < 4ºC → Fan Medium
  - Δt ≤ 1ºC → Fan Low

2.10.3 Fan coil control options

There are many different customer requests when installing fan-coils with YUTAKI:

- Circuit 1 and Circuit 2 may be needing different operation for cooling only, heating only, cooling/heating…
- Fan operation during heating may provide discomfort if water in the circuit isn't warm enough
- Fan may be required to stop or keep running during a Demand Off
- Fan coil may be used for cooling in summer and under-floor heating for winter operation so a diverting valve must be controlled for switching the circuits
- During room demand off the fan should stop or maybe a 3-way valve is used to bypass water

YUTAKI provide additional configuration options and outputs to adapt fan coil functionality:

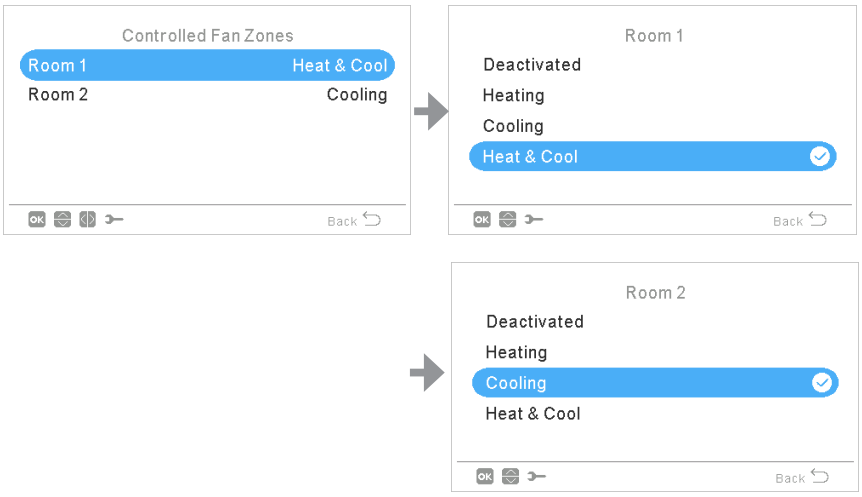


◆ Controlled Fan Zones

It is possible to declare which must be the fan coil used for every circuit:

- Disabled
- Heating
- Cooling
- Heating and Cooling

Using the Controlled Fan Zones menu is possible to change the initial fan coil declaration at any moment to adapt YUTAKI control to the existing fan coil installation.



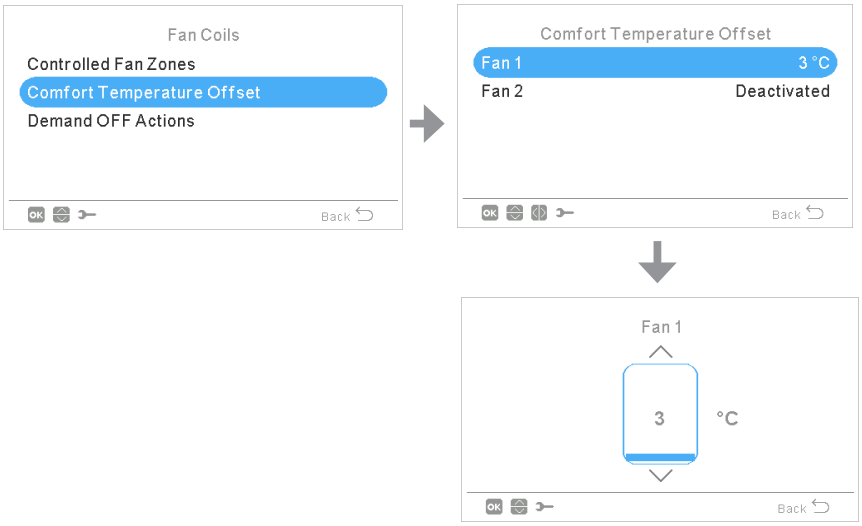
◆ Comfort temperature offset

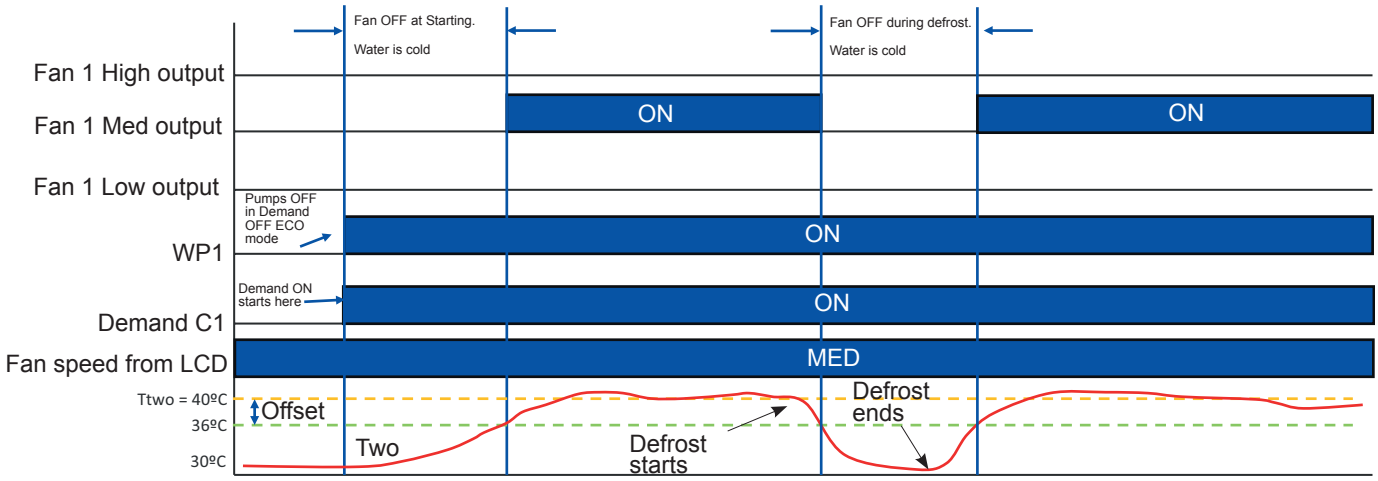
During the starting of the system, room Demand-off or defrost water temperature may not be high enough to provide a comfortable heating: blowing air at cold or even ambient temperature will cause discomfort.

This function allow to define a water temperature offset below the set-point target in order to stop fan operation. Thanks to this, the cold draft that may be caused during start-up or defrost is avoided.

Fan 1 and Fan 2 can be set with a different offset value. Circuit 1 is controlled by Two and Circuit 2 by Two2 sensors

It does not apply for Cooling mode.





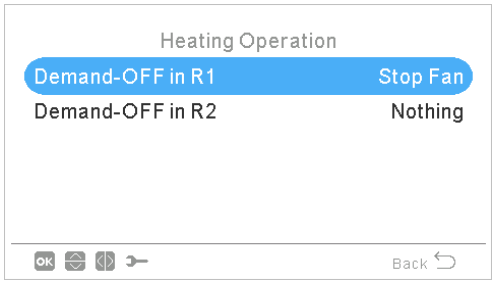
Example: Ttwo = 40ºC and Offset = 4ºC. Fan will be stopped in case Two < 36ºC. In case of C2, temperature judgement is done by means Ttwo and Two2

◆ Demand OFF Actions

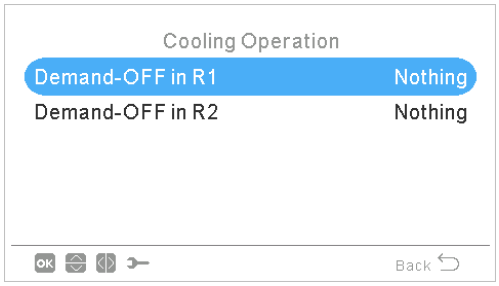
There are 2 conditions where Room 1 and 2 may be switched to Demand OFF:

- Room temperature is satisfied, heating/cooling is not required at that moment
- DHW operation is requested

Demand OFF Actions menu is allowing to select if the Fan must stop or not for every Room 1/2 and mode Heating/ Cooling individually



Demand OFF actions for Room 1 and 2 in Heating mode



Demand OFF actions for Room 1 and 2 in Cooling mode

- During Demand OFF, outputs for Fan coil are set to 0 in case “Stop Fan” option is selected.
- Demand OFF can be due to:
  - Unit is doing DHW operation
  - Unit is doing Swimming Pool operation
  - There is Demand OFF by room temperature

2.10.4 Constant Heat / Constant Cool output

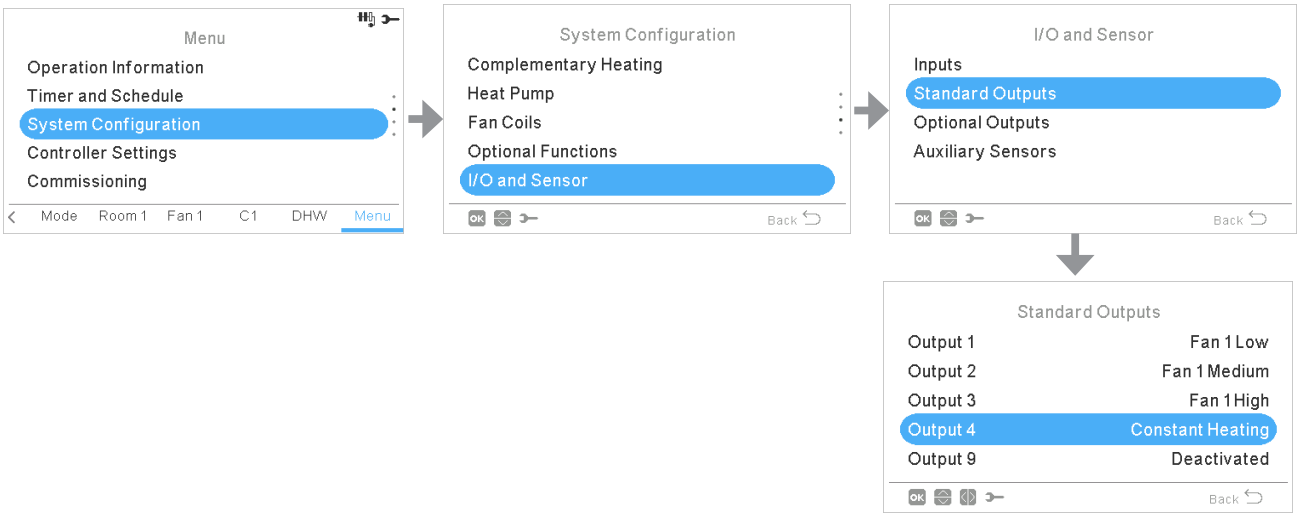
Two new output definitions has been added: Constant Heating and Constant Cooling

- Constant Heating: The selected output is always ON when YUTAKI is in heating mode
- Constant Cooling: The selected output is always ON when YUTAKI is in cooling mode

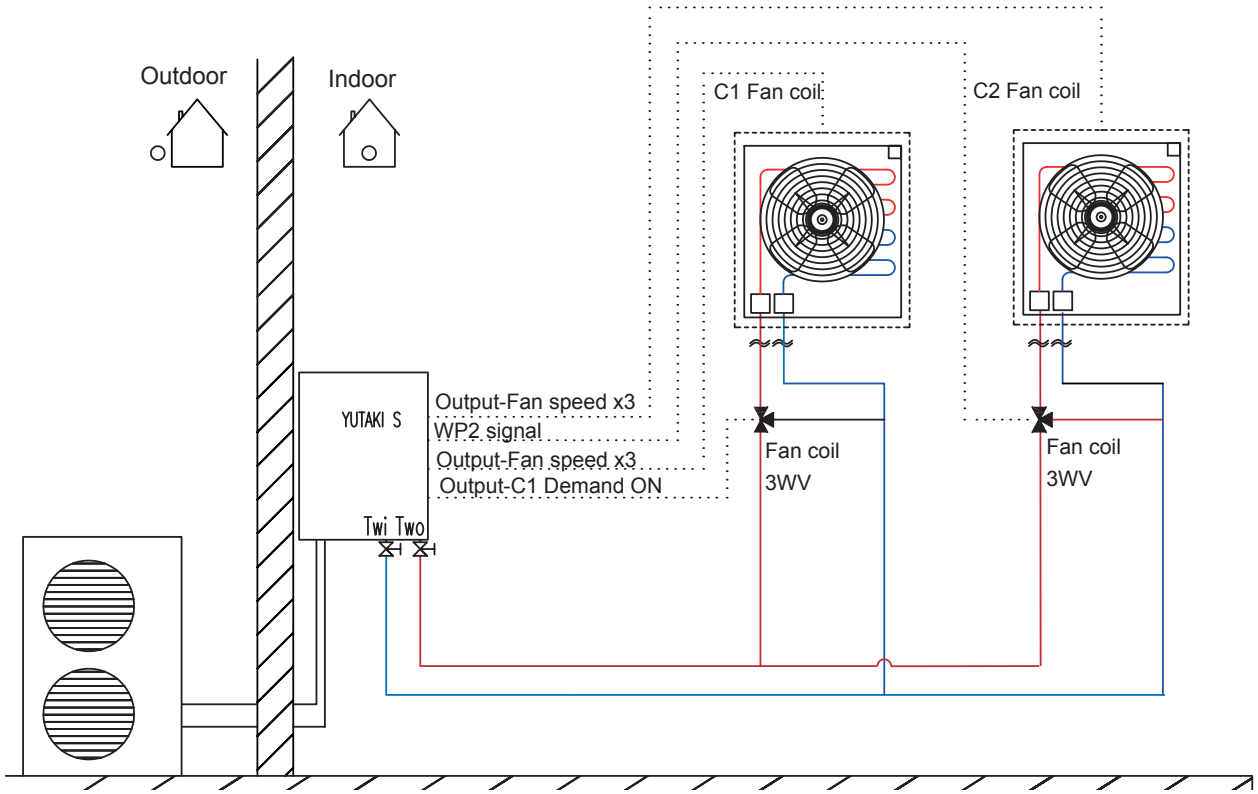
The status is kept permanently regardless Defrost, Thermo ON/OFF or Demand ON/OFF condition

These outputs allow to customise the hydraulic layout by controlling diverting valves:

- For exemple for the use of under-floor heating in winter and fan coil for cooling in summer
- We can control a diverting valve to drive water to the different emitters depending on the heating/cooling mode
- Regardless emitters are different, they are considered the same circuit (C1 or C2) from YUTAKI side

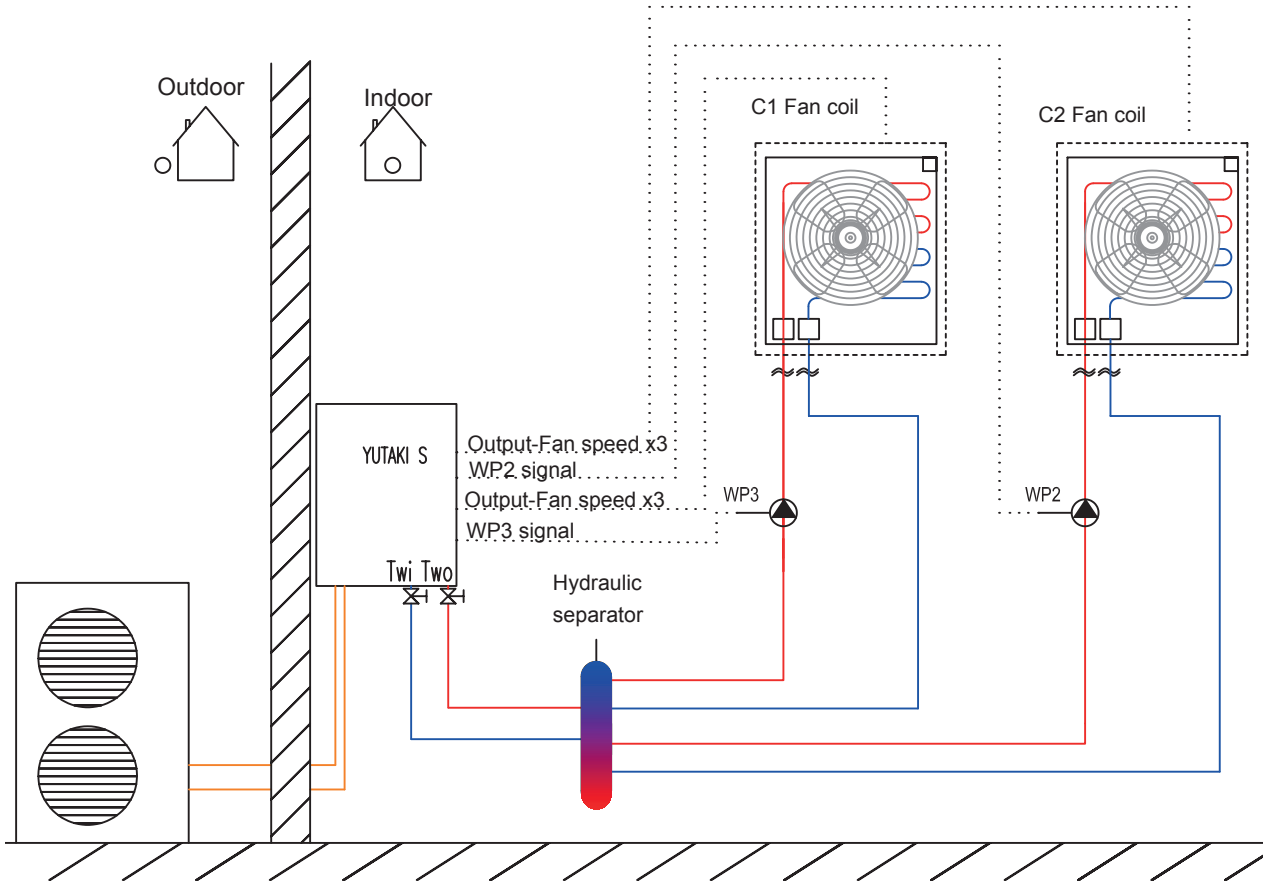


◆ Example 1: Circuit 1 and 2: fan coil with bypass valve



- Circuit 1: Fan coil 1
  - Output 1: C1 Demand ON for bypass valve
  - Output 2: Fan 1 Low
  - Output 3: Fan 1 Medium
  - Output 4: Fan 1 High
- Circuit 2: Fan coil 2
  - WP2 Output: for bypass valve
  - DSW4#5: ON (ECO pumps)
  - Output 5: Fan 2 Low
  - Output 6: Fan 2 Medium
  - Output 7: Fan 2 High
  - Two2 sensor is required for Circuit 2
  - ATW-AOS-02 is required for additional outputs

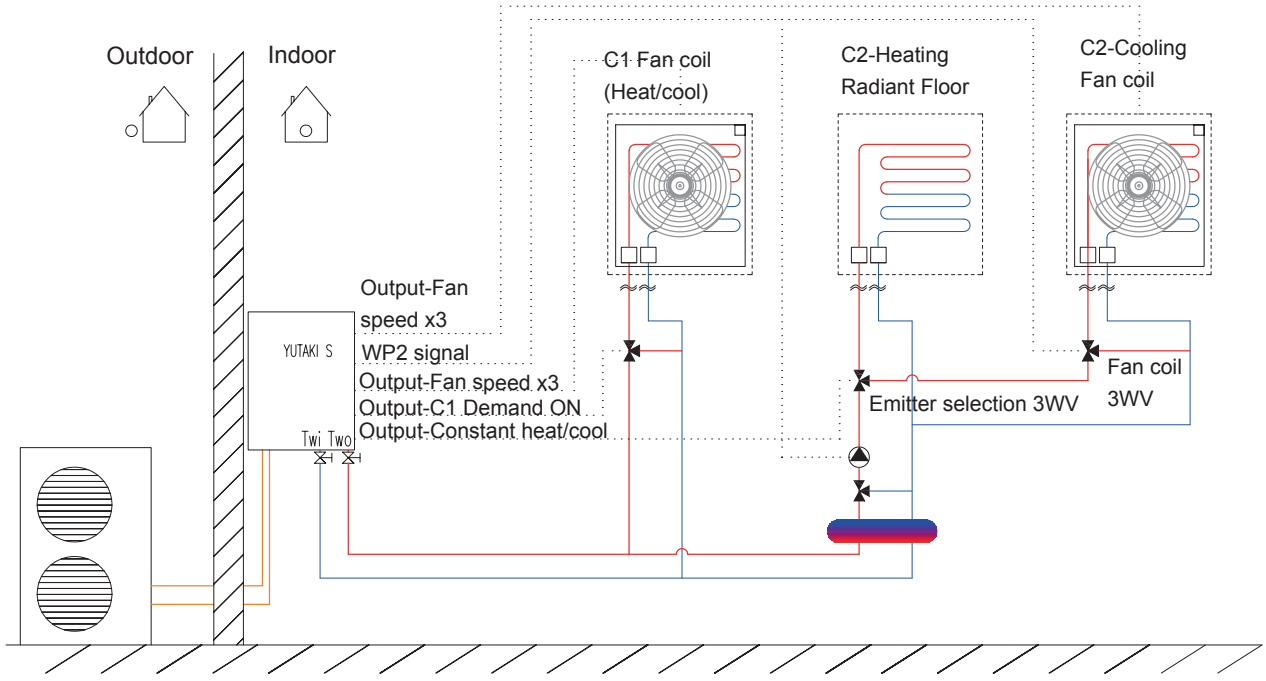
◆ **Example: Circuit 1 and 2: fan coil with parallel pumps**



- Circuit 1: Fan coil 1
  - Output 1: WP3 for pump control
  - Output 2: Fan 1 Low
  - Output 3: Fan 1 Medium
  - Output 4: Fan 1 High
- Circuit 2: Fan coil 2
  - WP2 Output: for pump control
  - Output 5: Fan 2 Low
  - Output 6: Fan 2 Medium
  - Output 7: Fan 2 High
  - Two2 sensor is required for Circuit 2
  - ATW-AOS-02 is required for additional outputs

- DSW4#5: ON (ECO pumps)
- Pump Setup: Parallel

◆ Example 3: Circuit 1: fan coil heat/cool, Circuit 2: Under-floor heating + fan coil for cooling



- Circuit 1: Fan coil 1 (heat/cool)
  - Output 1: C1 Demand ON for bypass valve
  - Output 2: Fan 1 Low
  - Output 3: Fan 1 Medium
  - Output 4: Fan 1 High
- Circuit 2: Under floor heating and Fan coil 2 (cool)
  - Output 5: Constant Heating* for 3-way diverting valve
  - Output 6: Fan 2 Low
  - Output 7: Fan 2 Medium
  - Output 8: Fan 2 High
  - ATW-2TK-07 is required for Under floor heating
  - ATW-AOS-02 is required for additional outputs
  - DSW4#5: ON (ECO pumps) to stop WP2 at C2 Demand OFF

NOTE

** "Constant Cool" output can be used instead. Output selection has to be done according to 3-way valve*

3. Optional functions

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3.1 Outdoor units

YUTAKI units provide a large number of optional functions to adapt the system to the requirements of the customer. Each function is selected from different sources:

- Optional functions through the unit controller. (The optional functions that can be selected from the unit controller are already explained in the previous chapter).
- Optional functions through 7-segment display on the RAS unit PCB.

3.1.1 Optional functions through 7-segment display on the RAS unit PCB

The following optional functions are available for being selected using the PSW switches and 7-segment on the RAS unit PCB:

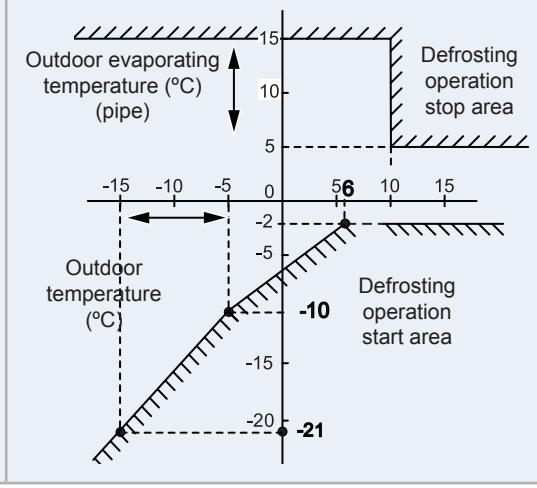
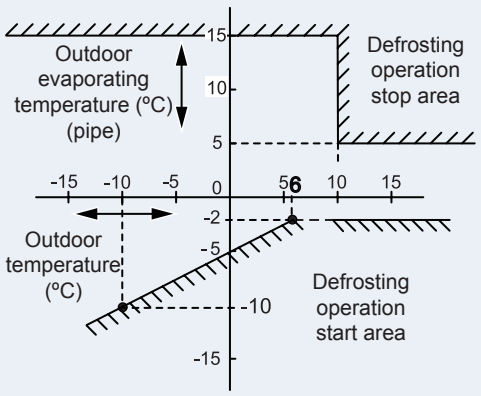
◆ Change of defrost condition

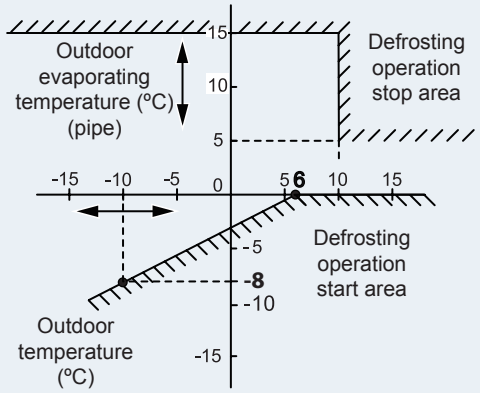
These optional function is available for being selected using the PSW switches and 7-segment on the PCB of the Outdoor Unit:

Indication	Description	Application
dA	Change of defrost condition	This function allows to shift the temperature conditions in order to cause an earlier defrosting. It is useful in installations placed in very cold regions, where frost generates continuously; enabling an earlier defrosting operation results in a lower amount of accumulated frost, therefore keeping higher heating capacity values.
F9	Defrost improvement (only for RAS-(2-3) WHVRP1, option available from udapte software H-0235)	In case F9 is set to 1, this optional function allows to perform defrost operation earlier in order to avoid excessive frost formation. In case F9 is set to 2, same conditions than 1 are applied and also EVO control is smoothed to avoid frost formation.

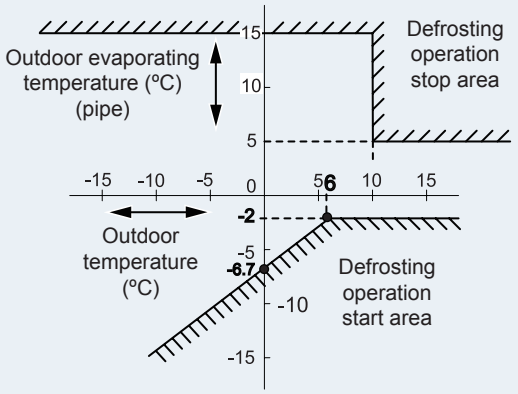
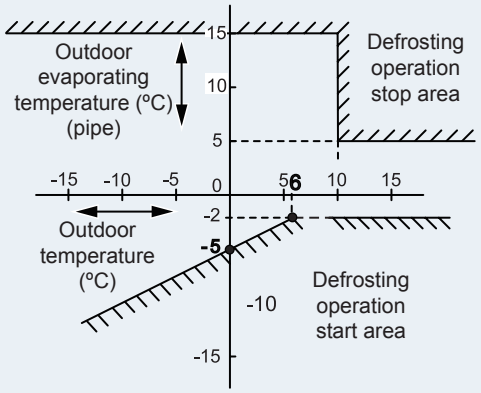
Press “PSW1” and select the setting condition “1-2” at the change of defrost condition “dA”.

Example for RAS-(2-3)WHVRP1

Setting condition	Standard Specifications (factory default state) Function selection setting dA :0	Cold region Function selection setting dA : 1
Temperature conditions under defrosting operation		

Setting condition	Cold and high humidity region Function selection setting Jo :2
Temperature conditions under defrosting operation	

Example for **RAS-(4-10)WH(V)NPE**

Setting condition	Standard Specifications (factory default state) Function selection setting Jo :0	Cold region Function selection setting Jo : 1
Temperature conditions under defrosting operation		

3.1.2 Optional external output signals

◆ Output signals through 7-segment display on the RAS unit PCB

The system has several input and output signals, which can be selected using the following connectors of the RAS PCB:

- Output connector CN7, which has two ports to configure two optional output signals.

The selection of these input and output signals represents the selection of some optional functions programmed in the PCB of the RAS unit through the 7-segment display.

NOTE

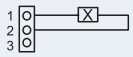
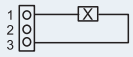
- *Do not set same function to multiple output ports. If set, the setting of the higher output number is cleared to 00.*

◆ Output signals on outdoor units

Indication	Output signal	Application
0	No setting application	No setting.
1	Operation signal	This signal allows to notify that the unit is operating. It enables to start up additional systems such as humidifiers, fans and other additional air-conditioning systems.
2	Alarm signal	This signal allows to notify that protection devices have been activated and to transfer it to additional systems.
3	Compressor ON signal	This signal allows to notify that the compressor is activated. This function can be applied for situations such as checking signals during remote-control operation and for the interlock of the RAS unit.
4	Defrost operation signal	This signal allows to notify that the unit is under defrosting operation.

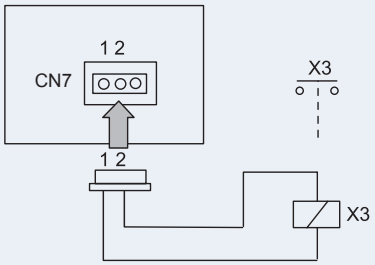
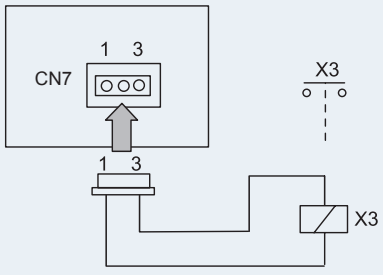
3.1.3 Available ports

The system has the following output ports.

Content		Setting of the port in the PCB of the indoor unit	Remarks	Outlet
Outputs	o1	1-2 of CN7		DC 12V
	o2	1-3 of CN7		DC 12V

◆ Connection

The system has the following connections:

Output connections	
Indication	Connections
o1	
o2	

◆ Specification of the components for a correct installation

Component		Manufacturer or specifications	Remarks
Auxiliary relay (X3)		OMRON mini power relay model: MY1F or equivalent	Voltage between relay terminals 12 Vdc - 75 mA
3P connector cable		Optional part PCC-1A (capable of connecting the JST XHP –3 connector)	Five wires with connectors as one set
Wire (control)	Voltage 12V DC	0.5 mm²	
Wire (power)	Voltage 230V	2.0 mm²	

NOTE

- *The connection of the input signal is only an example.*

- *Keep the CN7 wire as short as possible.*
- *Do not run the wires along 230 V/400 V CA power cables Separately install them at a distance of more than 30 cm. (The cables may intersect.)*
- *If you install the wires along a power supply wire, insert the wires in a metal conduit tube and ground one end of the tube.*
- *The maximum wiring length is 70 m. If you use this function, it is recommended that you use safety devices such as an electrical leakage breaker or a smoke detector.*

3.1.4 Available output signals on outdoor units PCB1

Ind.	Output signal	Application	Port
0	Nº setting application	Nº setting	-
01	Operation signal	This signal allows to pick up the machine's operation signal.	CN7
02	Alarm signal	This signal picks up the machine's alarm.	CN7
03	Compressor ON signal	This single allows to pick up the compressor's operation signal.	CN7
04	Defrost operation signal	This signal allows to pick up the defrosting of the unit.	CN7

NOTE

Do not set same function (01~04) to multiple ports.

3.1.5 Setting of the optional signals

The optional signals of the outdoor unit are set up from the PCB of the outdoor unit and can be selected by pushing switches PSW1, PSW2 and PSW3.

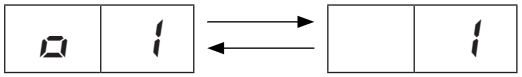
NOTE

Before setting the optional signals, must be complied the following conditions:

- *Outdoor unit must be stopped*
- *Check mode must not be selected*
- *External optional signal must not be connected*

If the initial setting has to be modified, the following instructions must be followed:

1 Set pin 6 of DSW2 to ON. Because of these settings, the output signals selection mode becomes available and the following indication appears on the 7-segment display.



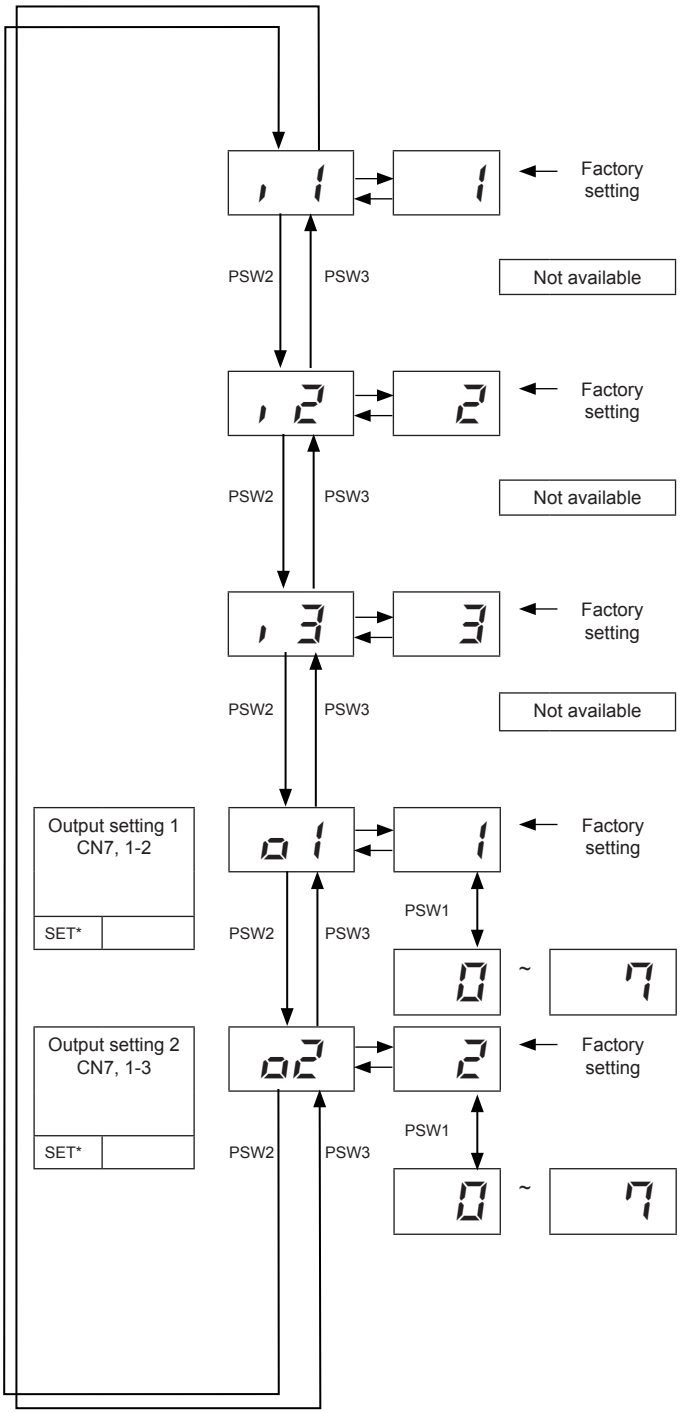
This example indicates that function number 1 “Operation signal” is set at output 1.

2 By pressing the push switches PSW2 and PSW3, the output terminal name can be changed. (See the flowchart)

3 By pressing the push switch PSW1, the function number can be changed. (See the flowchart)

4 After selecting the function number, return pin 6 of DSW2 to OFF position.

The selected contents are memorized in the outdoor unit printed circuit board and the function selection mode is stopped. The memorized data is maintained even power source lines are disconnected.



NOTE

(*) Blank space is for record the selected setting.

3.2 Indoor unit

3.2.1 Heat Pump optional functions

3.2.1.1 Power meter data control

Power meter data control is the measuring of the real power consumption. It can be done connecting an external power meter. The number of pulses of the power meter is a variable that must be set through the unit controller.

NOTE

In case no external pulse power meter is used, YUTAKI unit performs an estimation of the consumption taking into consideration, compressor, tank heaters, space heating heaters, compressor crankase heater, WP1 and electronics. As an estimation, this value may differ from real consumption measured by means an external power meter.

With this, every input pulse is added into its corresponding operation mode (Heating, Cooling, DHW operation, etc.).

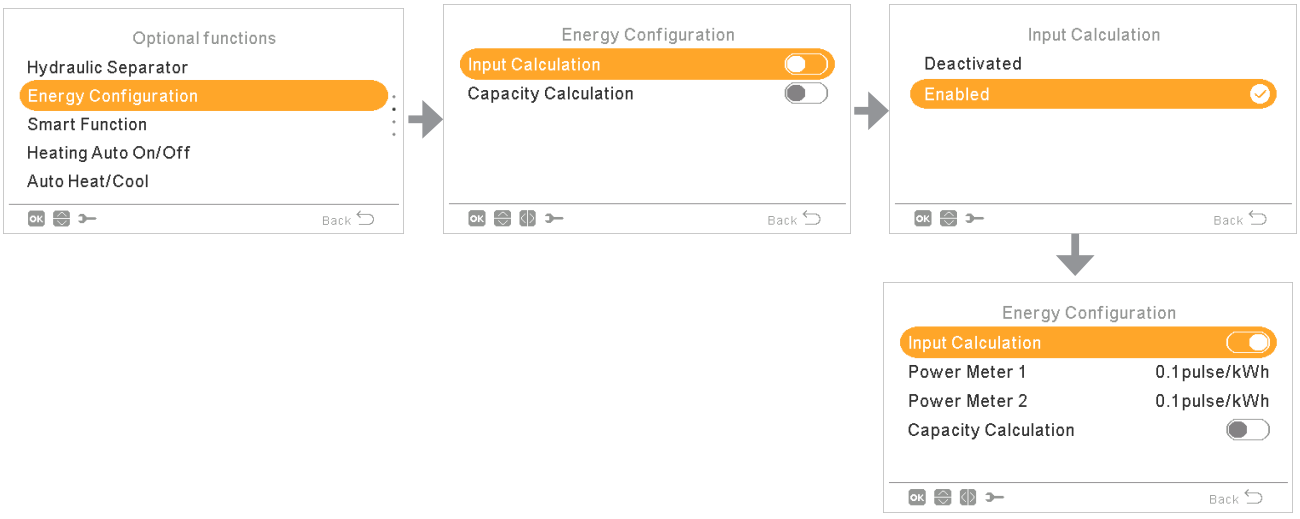
2 options are possible with this function:

- Only one power meter device for the whole installation (Indoor Unit + Outdoor unit).
- Use of 2 separated power meter devices: One for the Outdoor Unit and another one for the Indoor Unit.

User can enable or disable the Power meter data control from the Unit controller (PC-ARFH2E), as explained below:

System configuration → Optional functions → Energy configuration

Description	Default Value	Range	Units
Input calculation	Deactivated	Deactivated/Enabled	-
Power meter 1 (PM1)	Deactivated	0.1 1 10 100 1000	pulse/kWh
Power meter 2 (PM2)	Deactivated	0.1 1 10 100 1000	pulse/kWh



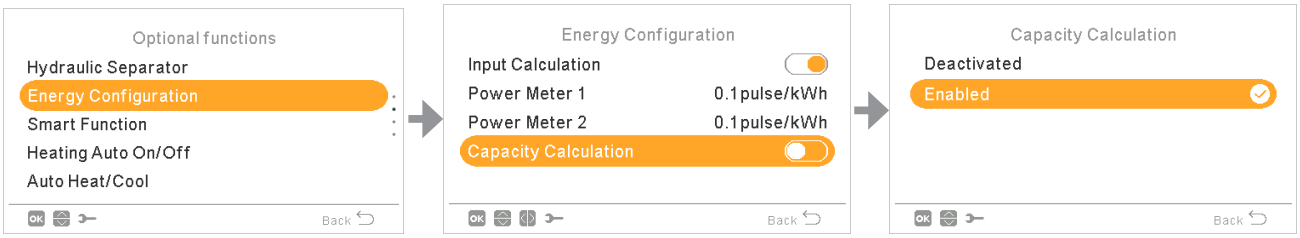
3.2.1.2 Capacity data control

Due to usage of Water temperature inlet and outlet + water flow level, an ESTIMATION of capacity can be checked.

These screens show the value of kWh for each zone (Heating, Cooling, DHW, swimming pool and their total) and also let to see the values month by month

System configuration → Optional functions → System → Energy function

Description	Default Value	Range
Capacity configuration (CAPCo)	Deactivated	Deactivated/Enabled

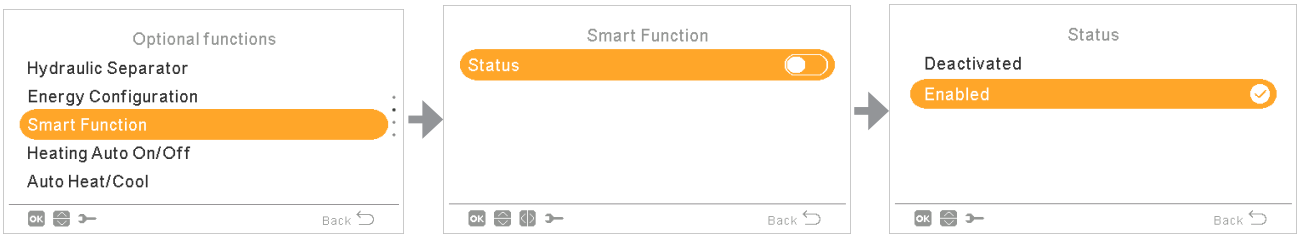


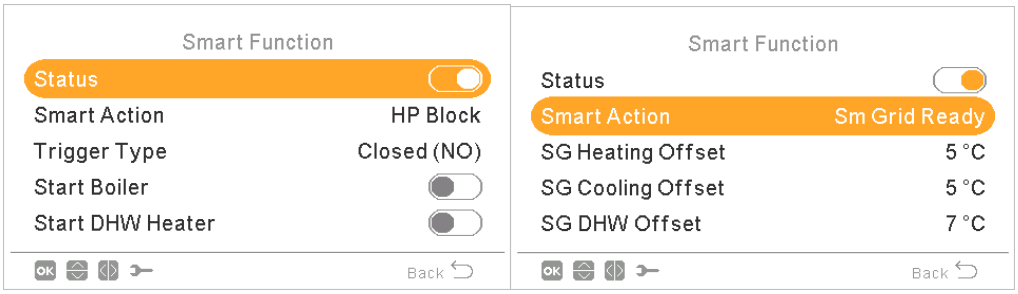
3.2.1.3 Smart function

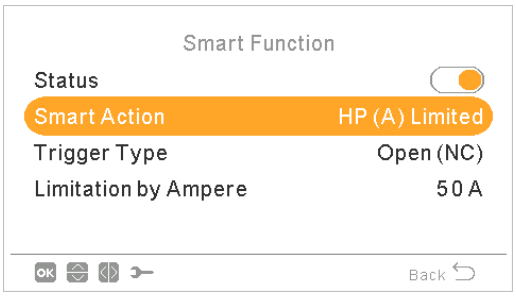
This function can be used to block or limit the heat pump or increase demand due to electricity availability.

System configuration → Optional functions → Smart function

Description	Default Value	Range	Units
Status	Deactivated	Deactivated / Enabled	-
Smart Action	HP block	(0) HP Block (1) HP Limited (A) (2) SG. Grid Ready (3) DHW Block (4) DHW Only	-
Trigger Type	Closed	Closed (NO) Open (NC)	-
Start Boiler	Deactivated	Deactivated / Enabled	-
Start DHW Heater	Deactivated	Deactivated / Enabled	-
SG Heating Offset	5	1 ~15	°C
SG Cooling Offset	5	1 ~ 15	°C
SG DHW Offset	7	1 ~30	°C
Limitation by Ampere	50	3~60	A







NOTE

- *(0) HP Block: Heat Pump is forbidden in any condition (Space Heating, Cooling, DHW, Swimming pool) when signal is active*
- *(1) HP Limited (A): Current consumption is limited to Limitation by Ampere value when signal is active. Function applies to both "Cooling" and "Heating" operation.*
  - *Current data is based on Outdoor unit real current (A) given by compressor + Indoor unit theory calculation by assuming electronic consumptions + heater steps + second cycle compressor current (A).*
    In case of using this function with electrical heater, 1 phase indoor unit power, connection must be indicated by DSW: (DSW1#1:OFF)
- *(3) DHW Block: DHW Operation is forbidden when signal is active.*
- *(4) DHW only: Heat pump operation for any condition except DHW is forbidden when signal is active. DHW operation is allowed normally.*
- *(2) SG Ready: The SG Grid is awarded to the heat pump series, the control technology by integrating the individual heat pump allows in a smart grid by using two digital inputs establishing an unidirectional connection and allowed for four different operation modes:*

Item	SG Input 1	SG Input 2	Action	Description
1	Open	Open	Standard HP mode	SG is not activated.
2	Close	Open	External blocking mode	Heat Pump is forbidden in any condition (Space Heating, Cooling, DHW, Swimming pool) when signal is active in any case
3	Open	Close	Low price mode	Space Heating: Increase Water temperature setting by + SG Heating offset Space Coling: Decrease Water temperature setting by - SG Heating offset DHW: Increase DHWT Temperature setting by + SG DHWT Offset
4	Close	Close	Overcapacity mode	Space Heating: Ttwo=Wcmax (Maximum water temperature) Space Cooling: Ttwo=Wcmin (Minimum water temperature for space cooling) DHW: Tdhws=Tdhwmax (Maximum water temperature)

NOTE

(For (0), (1), (3), (4))

- *If Start Boiler is set to Enabled, boiler operation is forced during action.*
- *If Start DHW Heater is set to Enabled, DHW is enabled to operate but only with heater.*

3.2.1.4 Air purge

When commissioning and installing the unit, it is very important to remove all air in the water circuit. When the air purge function is running, the pump operates without actual operation of the unit and the remove of air in the water circuit will start.

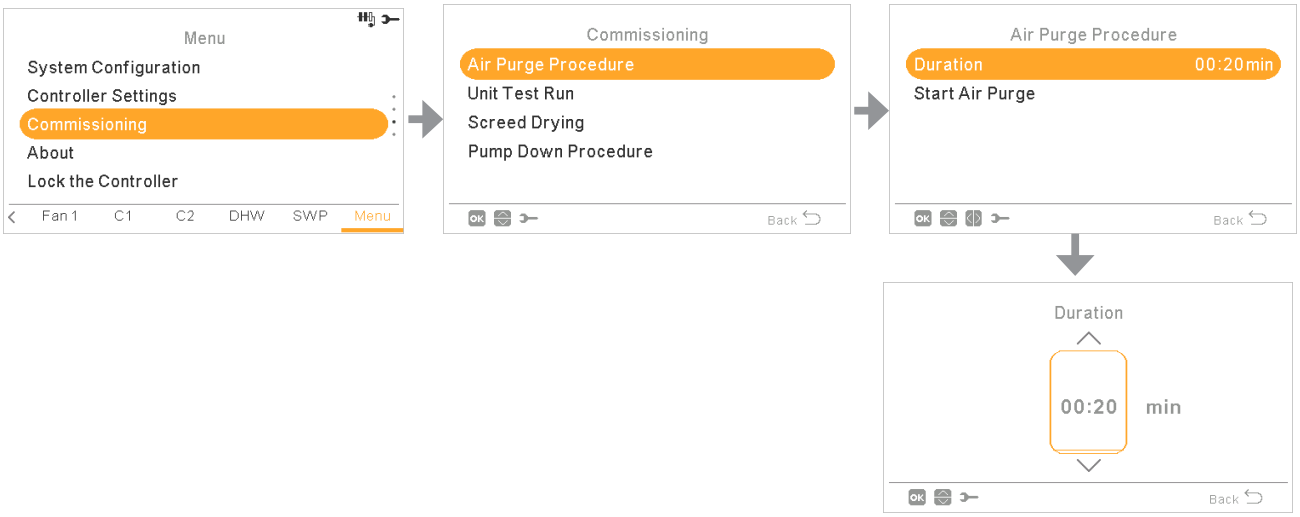
By air purge mode the unit change automatically the pump speed and the position of the 3-way valve between space heating or domestic hot water heating mode.

NOTE

- *The air purge function stops automatically after defined minutes.*
- *Operation with compressor OFF at cooling or heating mode.*
- *Heater OFF during air purge operation.*

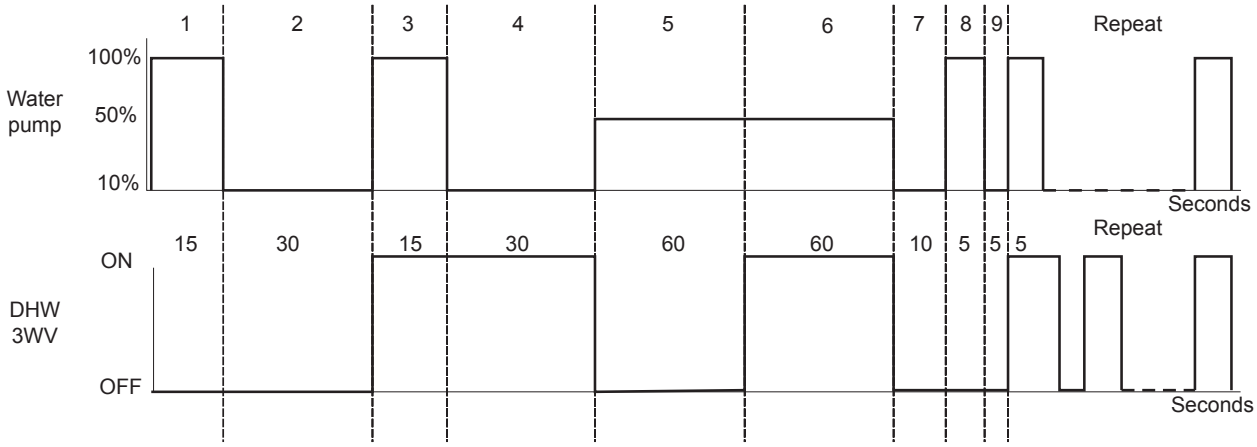
Commissioning → Air Purge Procedure

Description	Default Value	Range	Steps	Units
Duration	00:20	00:20~00:30	00:10	min



NOTE

- *After finish procedure, unit comes back to normal operation*
- *Alarms pressure and flow are ignored during this operation.*
- *During air purge operation it is shown as PU in seven segments*



3.2.1.5 Test run

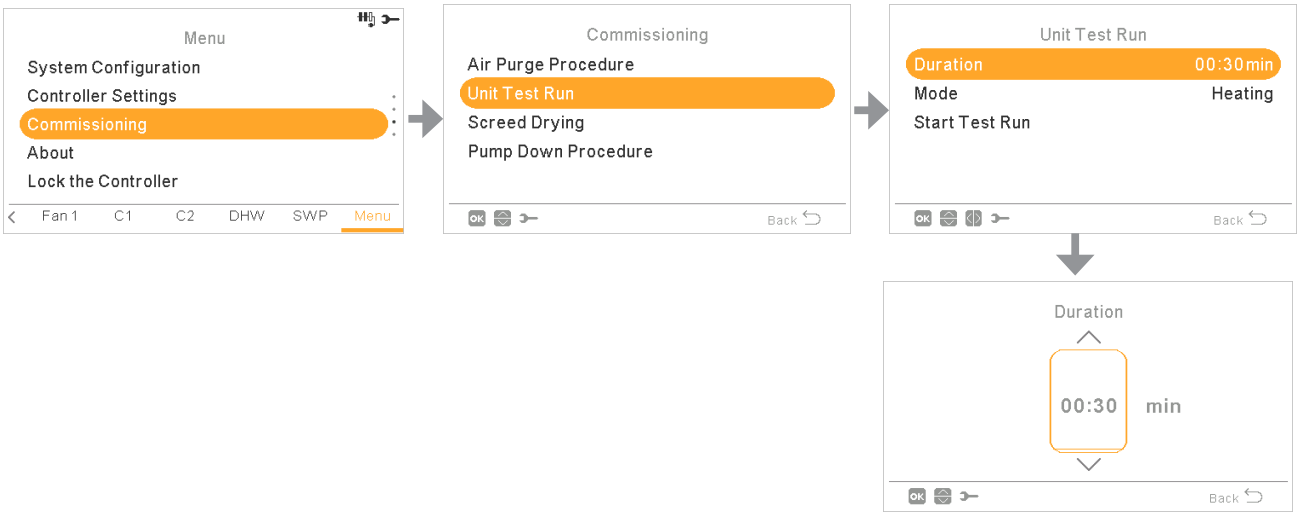
Operation with compressor ON at cooling or heating mode, fix compressor frequency in test run rated frequency.

Activation should be done both through the Unit controller (PC-ARFH2E) selection or through Outdoor unit selection.

Activation through Unit controller (PC-ARFH2E).

Commissioning → Unit Test Run

Description	Default Value	Range	Steps	Units	S/SC	M
Duration	00:30	00:30~12:00	00:10	min	○	○
Mode	Heating	Cooling ~ Heating	-	-	○	○
Start Test Run	-	-	-	-	○	○



3.2.1.6 Pump down procedure

Purpose of pump down procedure is to collect refrigerant at the Outdoor unit in order to perform some maintenance work or replace Outdoor unit.

Whenever Pump down procedure starts, compressor starts operation in cooling mode. Then, by closing high pressure valve at the Outdoor unit, all refrigerant is gathered at the Outdoor unit side.

This function allows to configure duration of pump down in order to protect the system against long term operation.

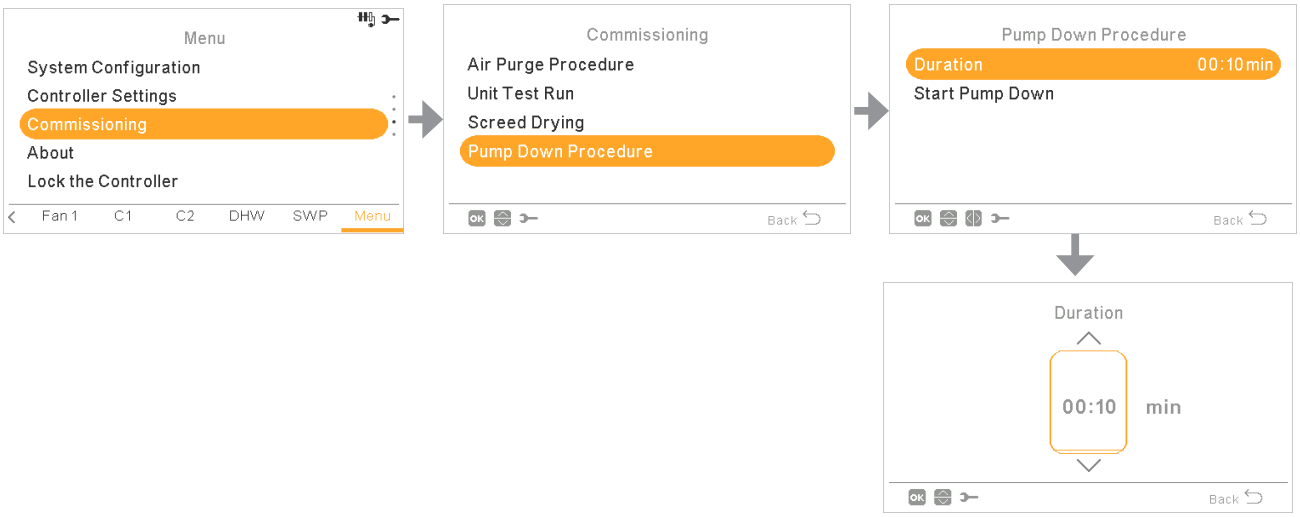
At the end of the configured time, pump down procedure stops and compressor is stopped.

NOTE

During pump down procedure freeze and safety protections are still in operation in order to protect the system. Make sure there is enough water volume to guarantee operation without freezing the heat exchanger.

Commissioning → Pump down procedure

Description	Default Value	Range	Units
Duration	00:10	00:10~00:30	min
Start Pump Down	-	-	-



3.2.1.7 Night shift

Night shift operation reduces compressor load in order to reduce environmental noise, preferably at night.

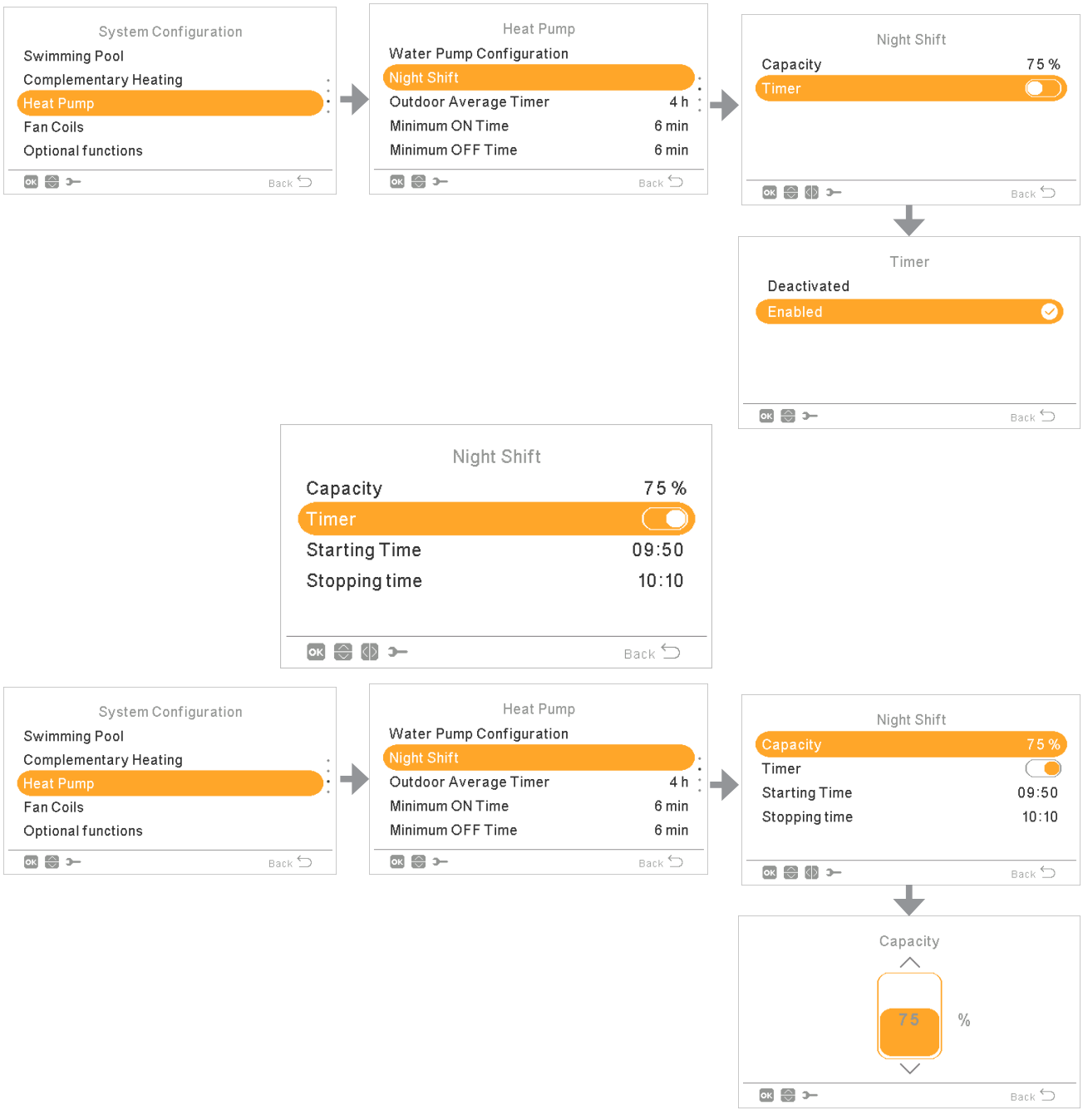
When Night shift function is active, the capacity of the YUTAKI unit is reduced to the percentage defined in the menu and Night shift icon is displayed in the general notifications zone of the Unit controller.

System Configuration → Heat Pump → Night Shift

Description	Default Value	Range	Units
Capacity	75	40~100	%
Timer	Deactivated	Deactivated / Enabled	-
Starting time	20:00	00:00 to 23:50	00:10
Stopping time	08:00	00:00 to 23:50	00:10

Night shift menu allows the user to configure:

- the activation or deactivation of the Night shift timer(status),
- the starting/stopping time,
- and the capacity of the unit while the Night shift is active.



NOTE

- *During Night shift mode, the capacity given by the Outdoor unit is reduced according to the percentage defined by user. This function, however, may drive to an unconfortable situation.*
- *This function is available for Heating, Cooling, DHW and Swimming pool applications.*
- *In case of defrost and compressor protection operation, this function is not applicable.*
- *Protection of the Indoor unit can override this function.*
- *Protection of the Outdoor unit can override this function.*

3.3 Manual operation

Manual operation function for YUTAKI units will allow operation of units without RCS existence and will be selected by DSW setting on main PCB.

3.3.1 Function operation

Manual operation is selected by using SSW1.

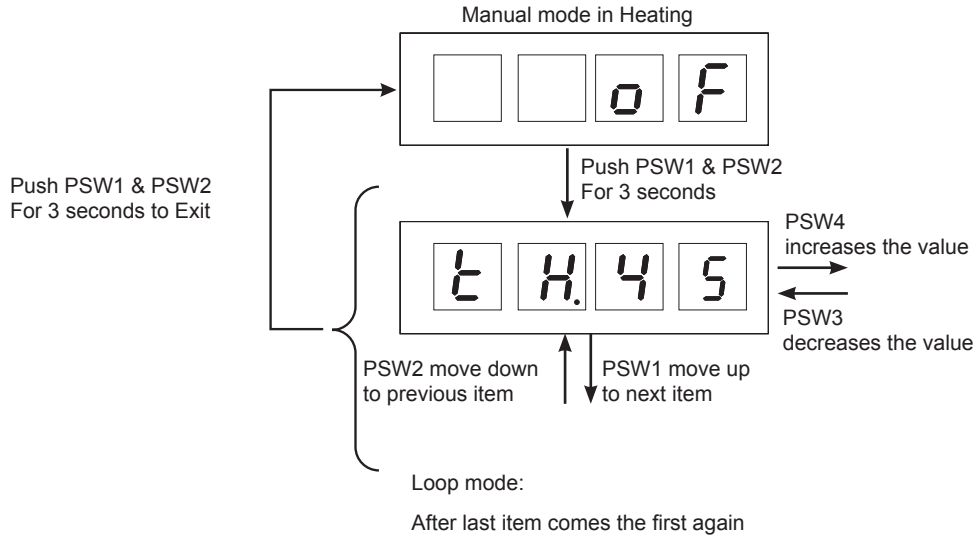
When SSW1 is in “Remote” mode, manual operation is disabled and unit operates using RCS.

When SSW1 is in “Local” mode, manual operation is enabled.

During manual operation, unit will operate normally with following constraints:

- Power to RCS is cut and therefore all communication with RCS are stopped.
- Data which is normally received from RCS, is applied as explained later in this chapter (for example On/Off, Mode, or setting temperature).

3.3.2 7-Segment configuration



Code	7-segment	Description	Default	Range	Steps	Units
HWS	tH.	Heating Water temperature setting	40	20-60	1	ºC
CWT	tC.	Cooling Water temperature setting	19	50~20	1	ºC
MWPS	Ft.	Manual Water Pump Setting	99	40~99	1	%

NOTE

Modified values are applied and stored in EEPROM after user exits configuration mode (pressing PSW1 and PSW2 during more than 3 seconds).

3.3.3 ON/OFF Operation

On/Off order is given by external input in TB2 Terminals 13 &14 (Input 1).

Operation will be as follows:

- When external input is closed, unit operation will be changed to ON.
- When external input is open, unit operation will be changed to OFF.

3.3.4 COOL/HEAT Selection

Whenever SSW2 is set to Heat, unit will be in heat mode.

If SSW2 is set to cool, unit mode will be selected by TB2 Terminals 13 &15 (Input 2):

- When external input is open = Unit works in COOL Operation
- When external input is closed = Unit works in HEAT Operation

4. Electrical checks of the main parts

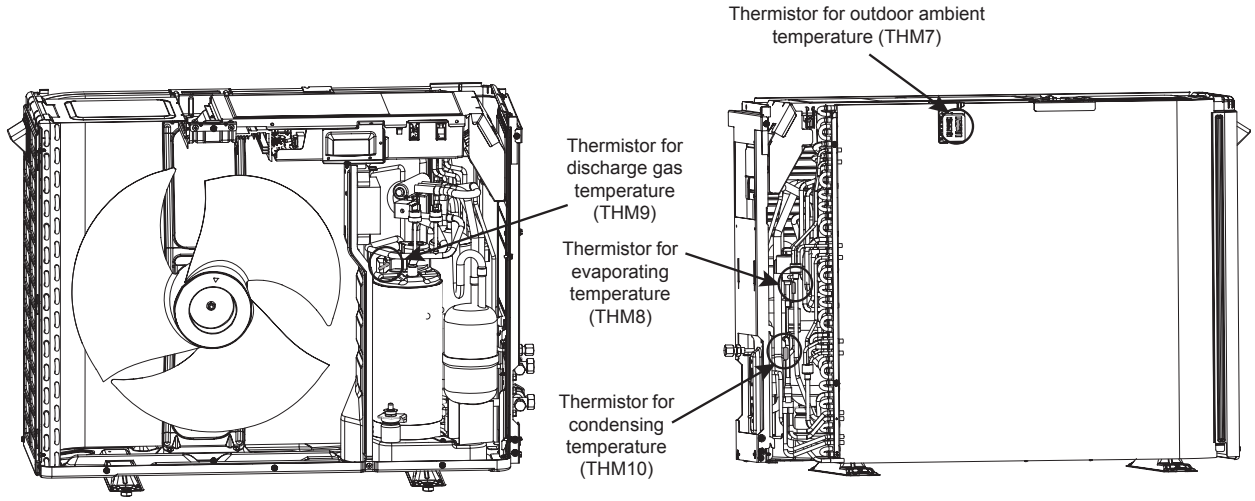
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4.1 Thermistors

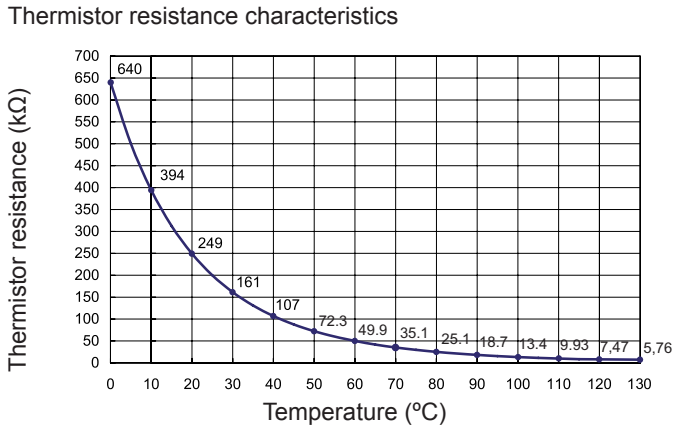
4.1.1 Split system - Outdoor unit

4.1.1.1 Thermistors for RAS-(2-3)WHVRP1



◆ **Thermistor for discharge gas temperature (THM9)**

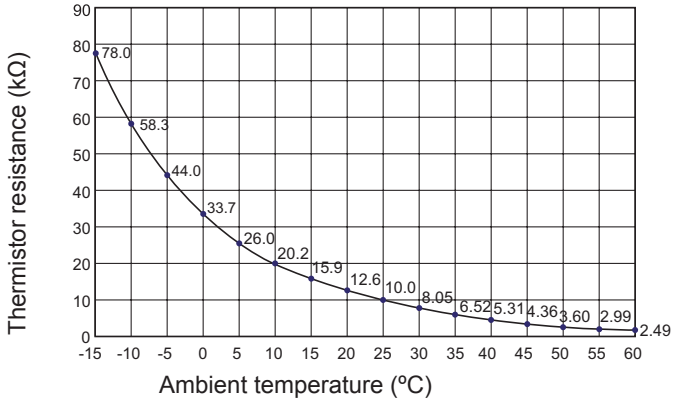
For prevention of discharge gas overheating



◆ **Thermistor for outdoor ambient temperature (THM7)**

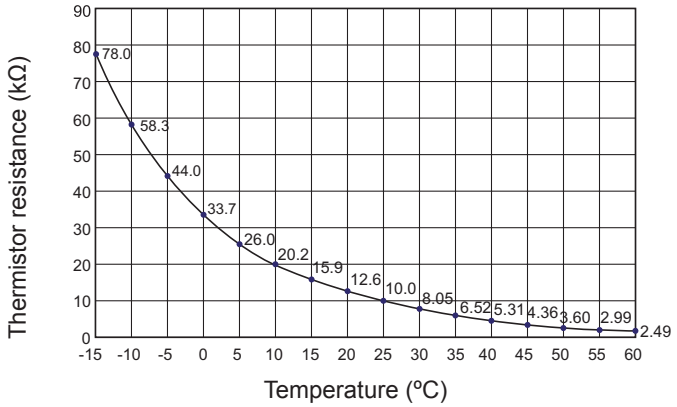
The thermistor resistance characteristics are shown in the figure.

Thermistor resistance characteristics



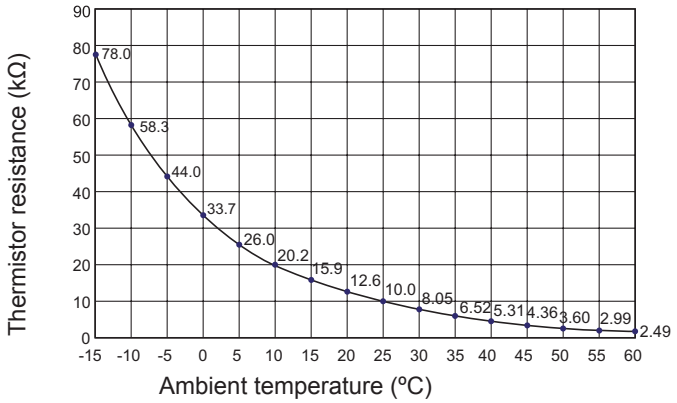
◆ Thermistor for evaporating temperature of outdoor unit in heating operation (for defrosting) (THM8)

Thermistor resistance characteristics

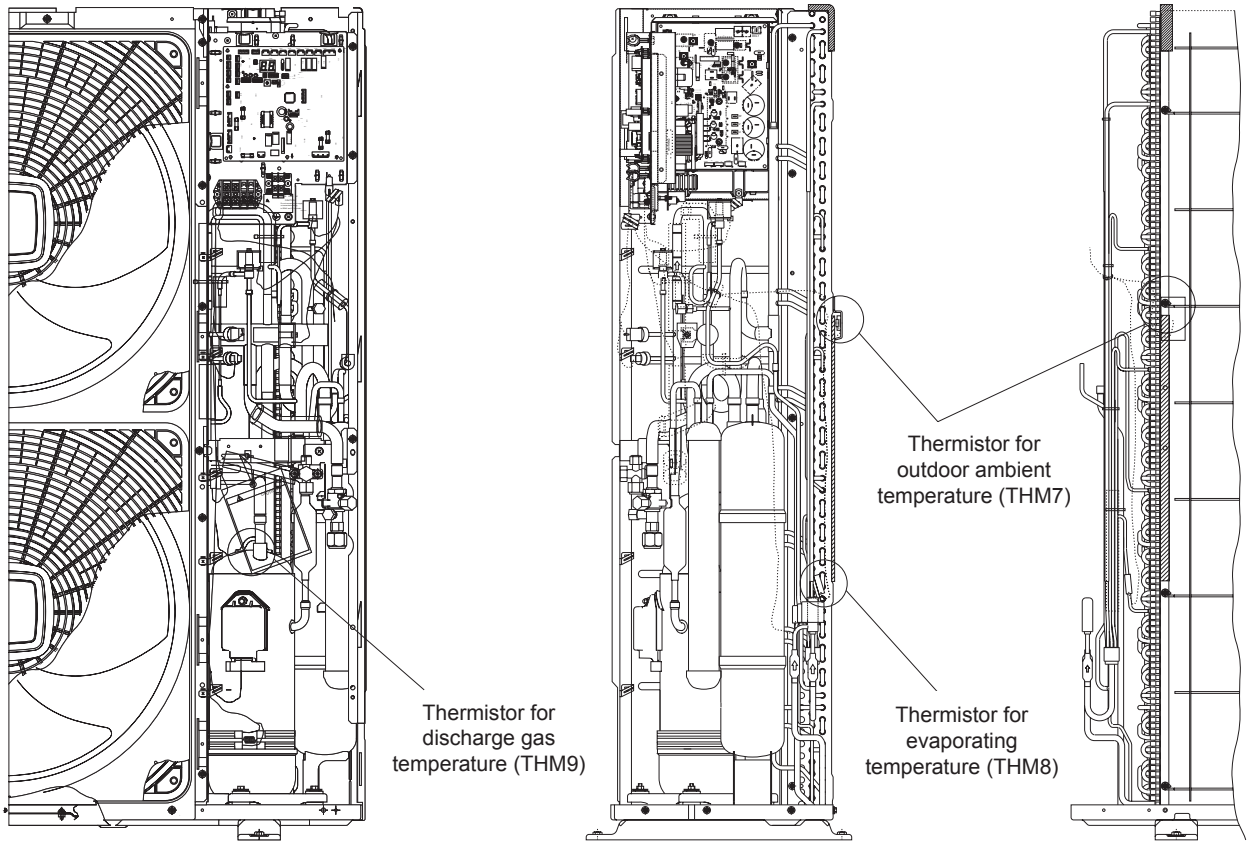


◆ Thermistor for condensing temperature (THM10)

Thermistor resistance characteristics



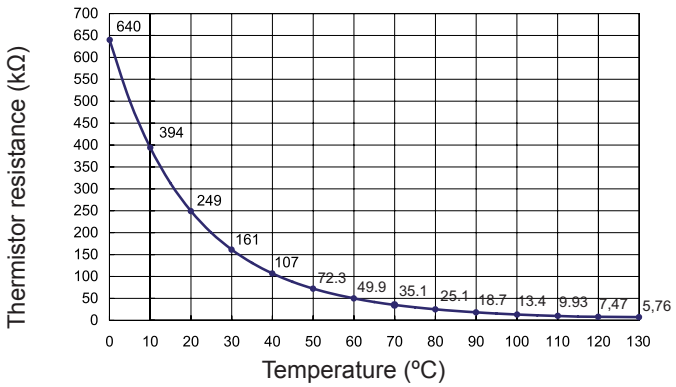
4.1.1.2 Thermistors for RAS-(4-10)WH(V)NPE



Thermistor for discharge gas temperature (THM9)

For prevention of discharge gas overheating

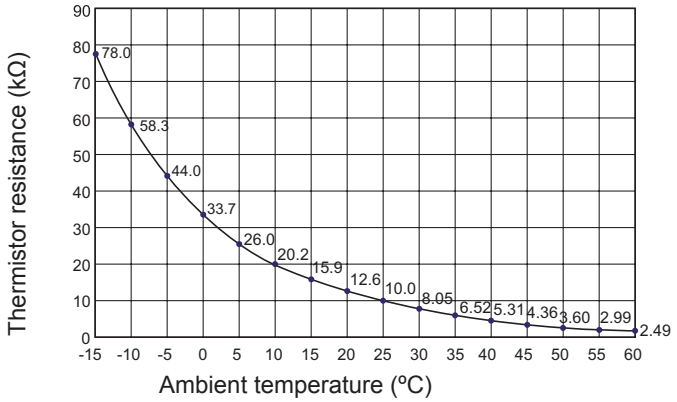
Thermistor resistance characteristics



Thermistor for outdoor ambient temperature (THM7)

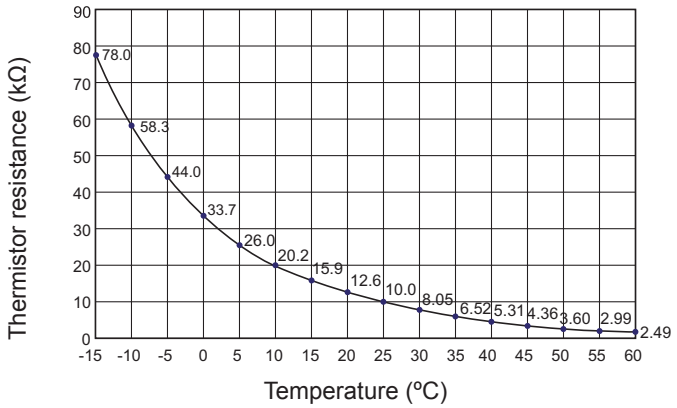
The thermistor resistance characteristics are shown in the figure.

Thermistor resistance characteristics



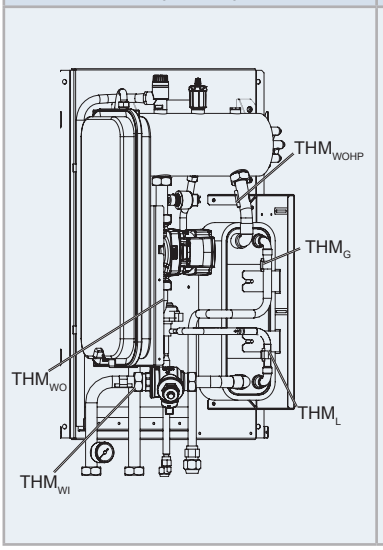
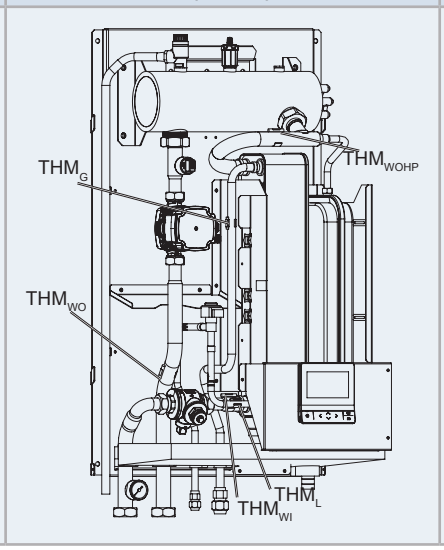
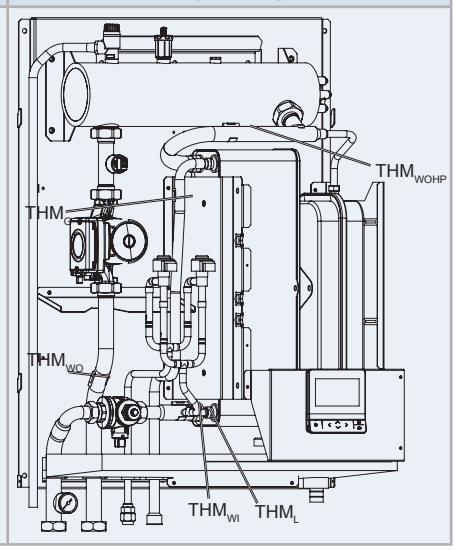
Thermistor for evaporating temperature of outdoor unit in heating operation (for defrosting) (THM8)

Thermistor resistance characteristics



4.1.2 Split system - Indoor unit

◆ YUTAKI S

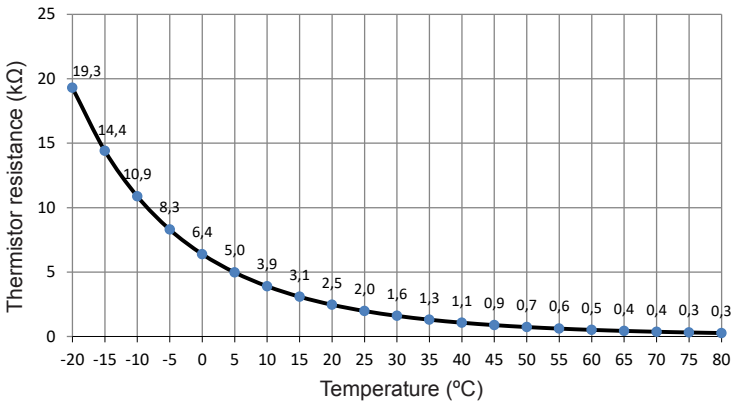
RWM-(2.0-3.0)R1E	RWM-(4.0-6.0)N1E	RWM-(8.0/10.0)N1E
		

Thermistor	Description
THM_L	Liquid pipe thermistor
THM_G	Gas pipe thermistor
THM_{WI}	Water inlet thermistor
THM_{WO}	Water outlet thermistor
THM_{WOHP}	PHEX water outlet thermistor

◆ Thermistor for:

- Indoor unit water inlet temperature (THM_{WI})
- Indoor unit water outlet temperature (THM_{WO})
- Indoor unit water outlet temperature (THM_{WOHP})

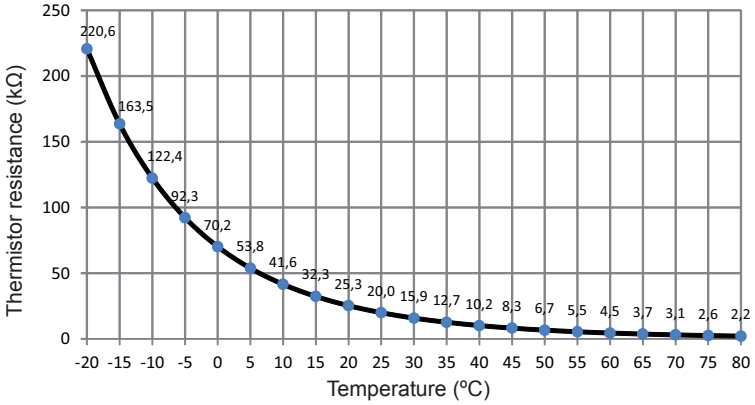
Thermistor resistance characteristics



◆ Thermistor for:

- Second water outlet temperature (THM_{WO2})
- Third Water outlet temperature (THM_{WO3})
- Water temperature of the DHW tank (THM_{DHW}) (Self standing Tank)
- Water setting temperature Swimming Pool (THM_{SWP})

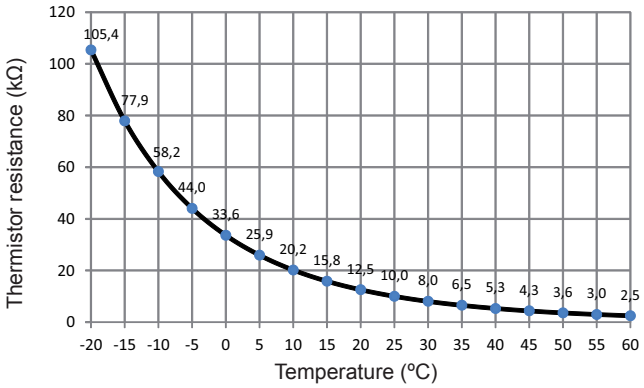
Thermistor resistance characteristics



◆ Thermistor for:

- Indoor ambient temperature (THM_{AMB})
- Liquid pipe (THM_{L})
- Gas pipe (THM_{G})
- Discharge pipe (THM_{D})
- Suction pipe (THM_{S})

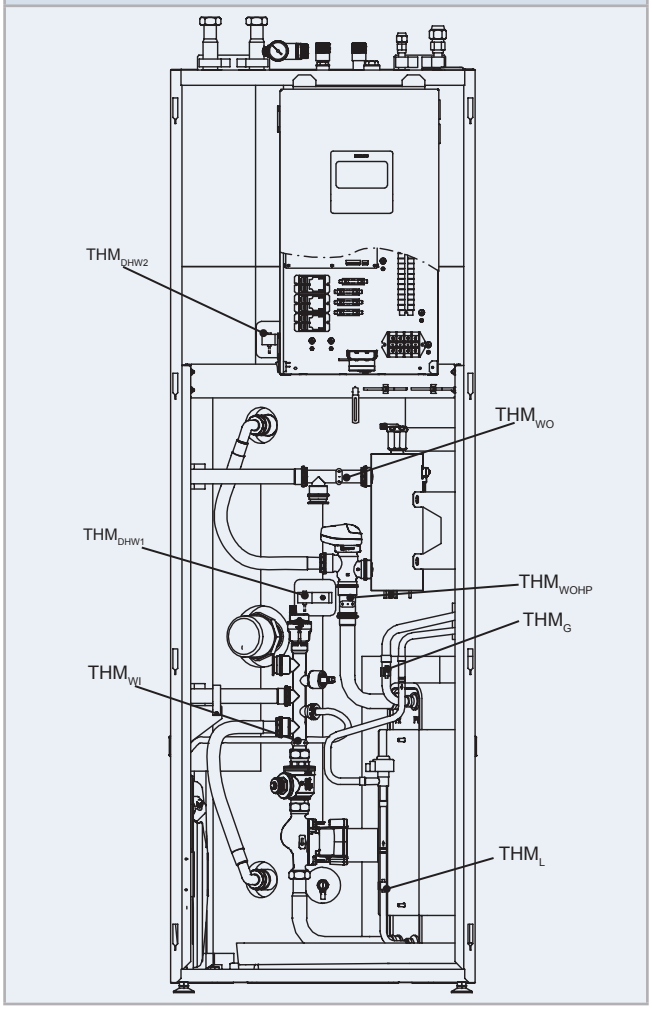
Thermistor resistance characteristics



4

◆ YUTAKI S COMBI

RWD-(2.0-6.0)(N/R)W1E-220S(-K)

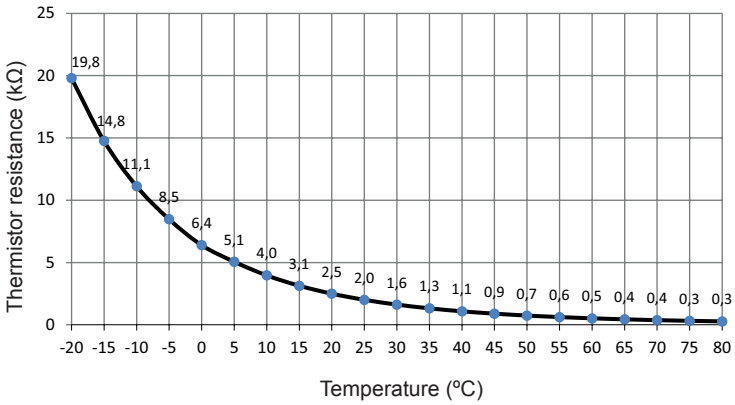


Thermistor	Description
THM$_{L}$	Liquid pipe thermistor
THM$_{G}$	Gas pipe thermistor
THM$_{WI}$	Water inlet thermistor
THM$_{WO}$	Water outlet thermistor
THM$_{WOHP}$	PHEX water outlet thermistor
THM$_{DHW1}$	DHW tank lower thermistor
THM$_{DHW2}$	DHW tank upper thermistor

◆ Thermistor for:

- Indoor unit water inlet temperature (THM_{WI})
- Indoor unit water outlet temperature (THM_{WO})
- Indoor unit water outlet temperature (THM_{WOHP})

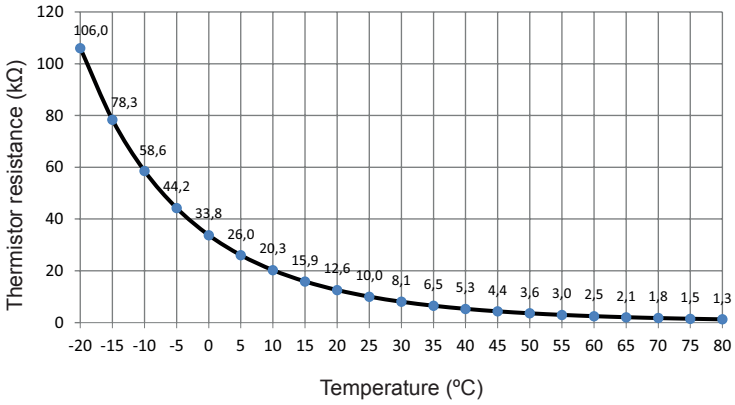
Thermistor resistance characteristics



◆ Thermistor for:

- Water temperature of the DHW tank (THM_{DHWT1}) (Bottom sensor)

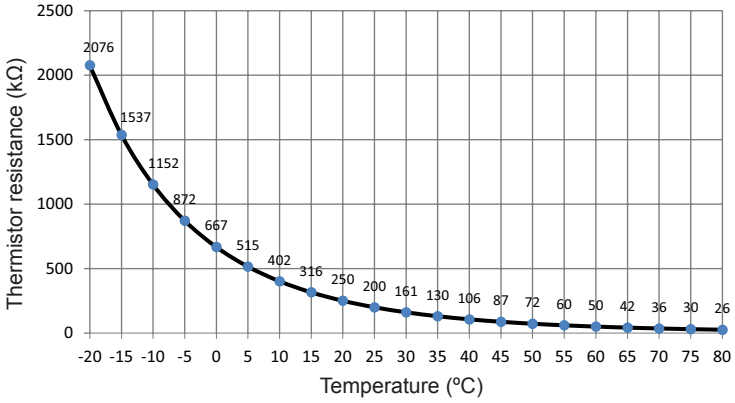
Thermistor resistance characteristics



◆ Thermistor for:

- Water temperature of the DHW tank (THM_{DHWT2}) (Upper sensor)

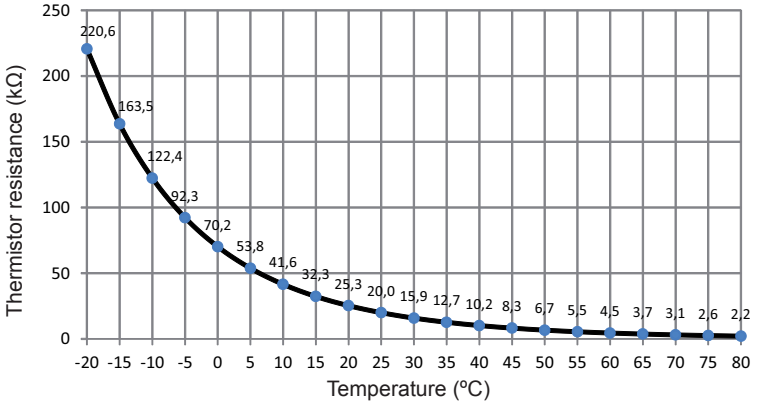
Thermistor resistance characteristics



◆ Thermistor for:

- Second water outlet temperature (THM_{WO2})
- Third Water outlet temperature (THM_{WO3})
- Water setting temperature Swimming Pool (THM_{SWP})

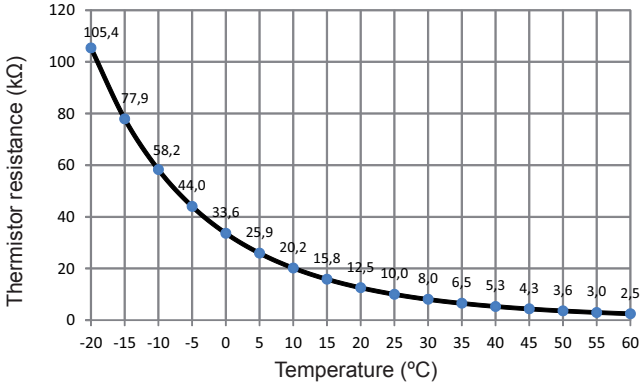
Thermistor resistance characteristics



◆ Thermistor for:

- Indoor ambient temperature (THM_{AMB})
- Liquid pipe (THM_{L})
- Gas pipe (THM_{G})

Thermistor resistance characteristics



4.2 Electronic expansion valve

4.2.1 Split system - Outdoor unit

Micro-computer

↓ Pulse signal

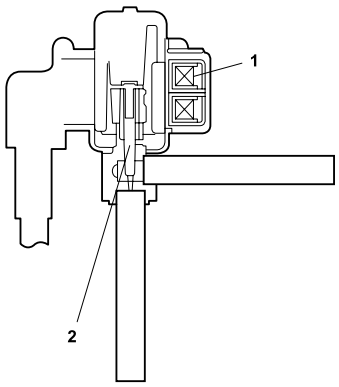
2-phase permanent magnetic pulse motor

Control 0 to 500 pulse by 1 pulse

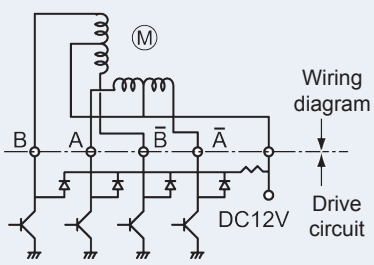
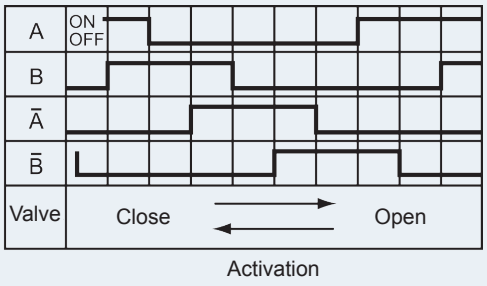
↓

Refrigerant flow control

Precise control



1. Pulse motor.
2. Needle.

Items	Specifications
Type	UKV series
Refrigerant	R32 for 2-3HP / R410A for 4-10HP
Working temperature range	-30 ºC 70 ºC (operation time of the coil: less than 50%)
Mounting direction	Drive shaft in vertical direction within an angle of 45 °C as maximum
Flow direction	Reversible
Drive method	4-Phase canned motor method
Rated voltage	DC12V±1.8 V
Drive condition	63PPS 1.2 phase excitation
Coil resistance (each phase)	46Ω ± 10 (at 20 ºC)
Wiring diagram, drive circuit and activation mode	 

4.2.2 Split system - Indoor unit

1 Check that the voltage of the valve ranges between 12Vdc±1.2V.

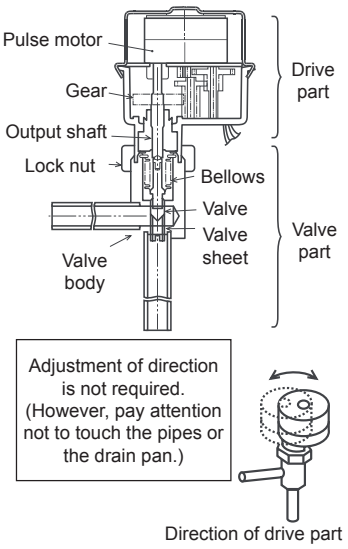
2 Use a multimeter to check the coil resistance (per phase). This ranges between 150 Ω±10% at an ambient temperature of 20ºC.

3 Check the number of pulses per second. This ranges between 100Ω ± 250 pulses per second (the width between pulses is greater than 3 mm) on activating phase 2.

4 Check that the valve flow is reversible.

5 When the valve is fully open and in heating process, check that the temperature of the liquid in the piping increases. If not, this indicates a fault.

6 When the valve is slightly open or fully open, check that the temperature of the freeze protection thermistor is higher than the suction temperature. If not, this indicates a fault.



4.3 Pressure protection device

If the discharge pressure is excessively high the compressor and the component parts of the refrigeration cycle can be damaged. Therefore, in case that the discharge pressure is higher than 4.15 MPa (R32) the protection control is activated and the compressor is stopped.:

In case that the discharge pressure is higher than 3.85 MPa (R32) the protection control might be performed.

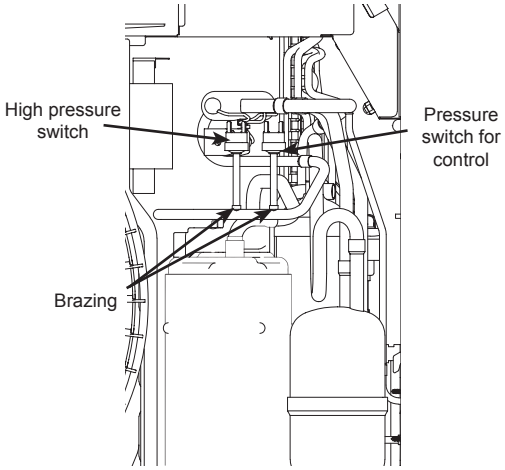
Depending on model (check refrigerant cycle):

1 For controlling the high pressure not to increase excessively during heating operation the gas by-pass circuit and the air volume of the outdoor fan is controlled automatically.

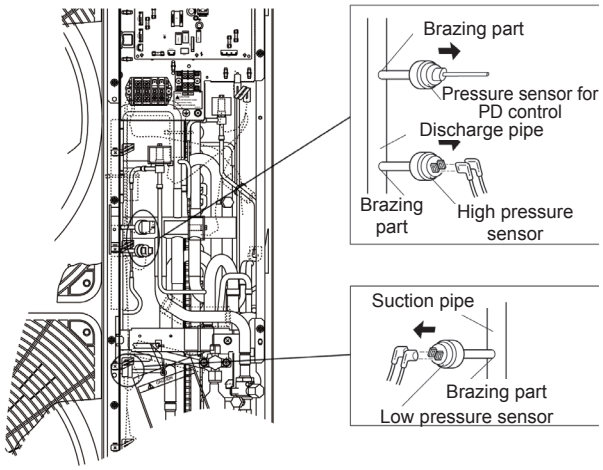
2 The gas by-pass circuit which is composed of the solenoid valve and the capillary tube for flow adjustment control the high pressure not to increase excessively by leading the high pressure gas to the low pressure side.

4.3.1 Split system - Outdoor unit

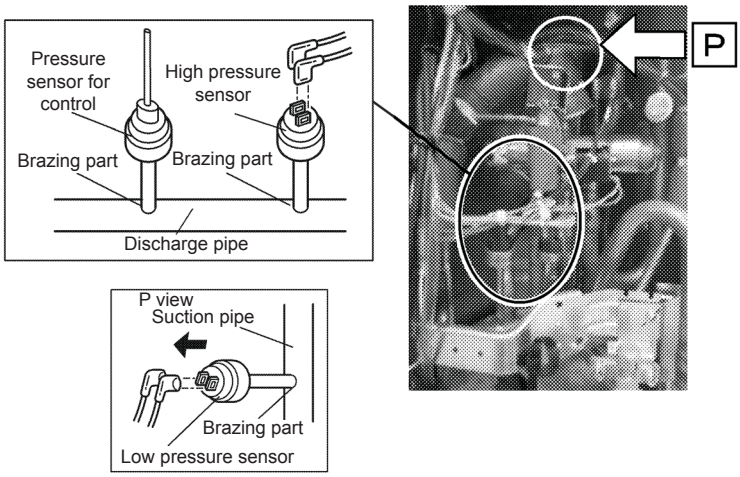
RAS-(2-3)WHVRP1



RAS-(4-6)H(V)NPE



RAS-(8-10)HNPE



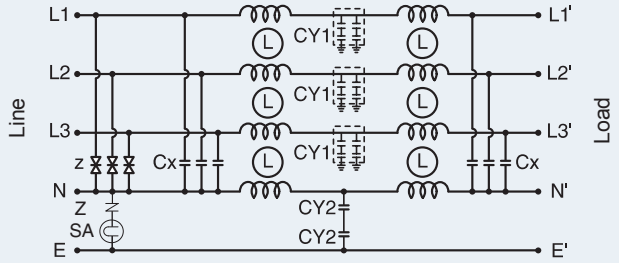
NOTE

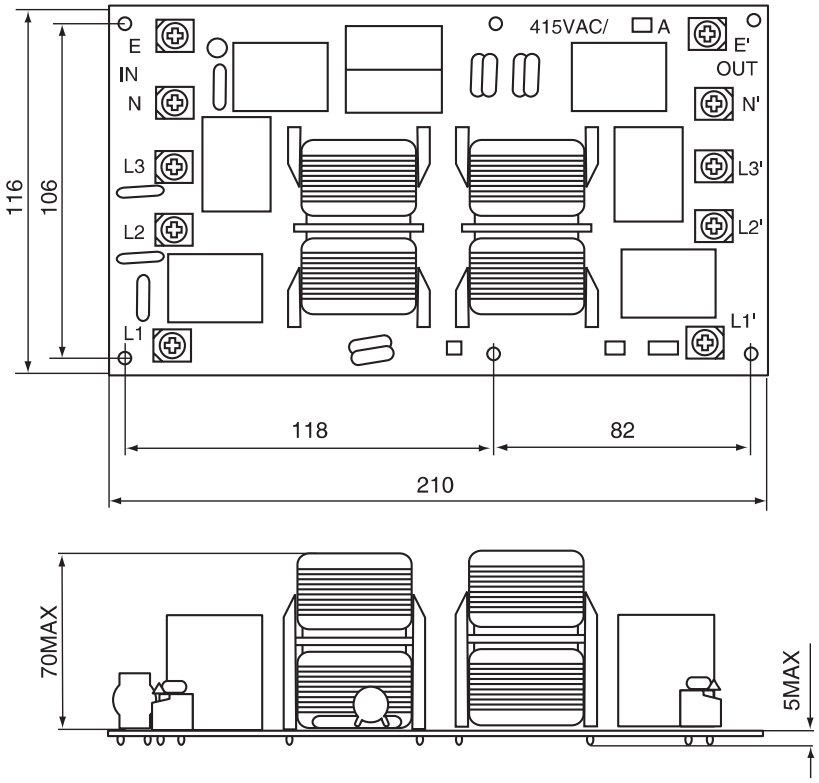
All figures only for illustration purpose. The actual product may differ.

4.4 Noise filter (NF)

4.4.1 Noise filter for RAS-(4.0-10.0)WHNPE

The noise filter decreases the leakage of noise made by the inverter to the power supply side. Terminals indicated with “LOAD” are connected to the inverter side and terminals indicated with “LINE” to the power supply side.

Items	Specifications
Model	4LFB-22930-2F
Rated current	AC415V 27 A
Permissible temperature range	-25 ºC to 65 ºC
Circuit diagram	

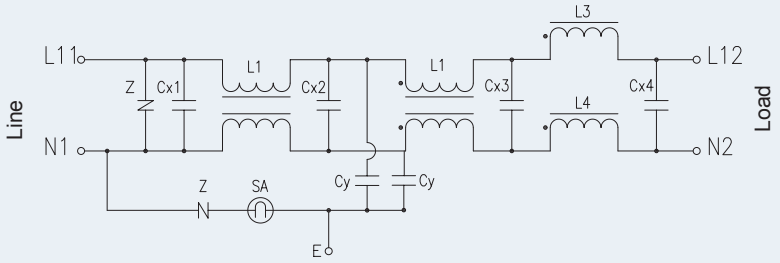


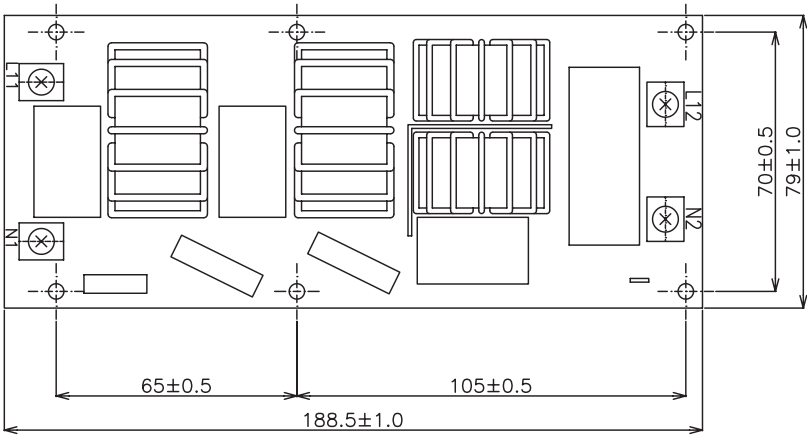
NOTE

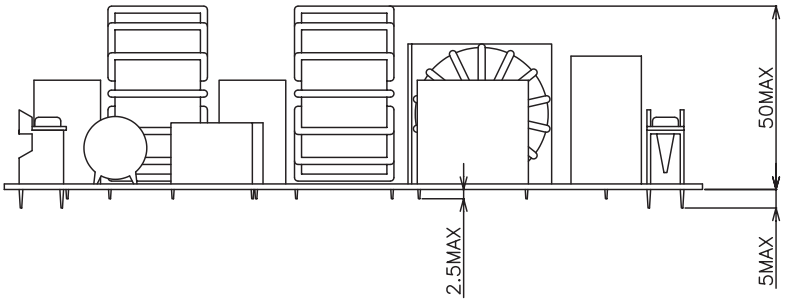
All figures only for illustration purpose. The actual product may differ.

4.4.2 Noise filter for RAS-(4-6)WHVNPE

The noise filter decreases the leakage of noise made by the inverter to the power supply side. Terminals indicated with “LOAD” are connected to the inverter side and terminals indicated with “LINE” to the power supply side.

Items	Specifications
Model	LFB-14930-3MA
Rated current	AC240V 30 A
Permissible temperature range.	-25 ºC to 60 ºC
Circuit diagram	





NOTE

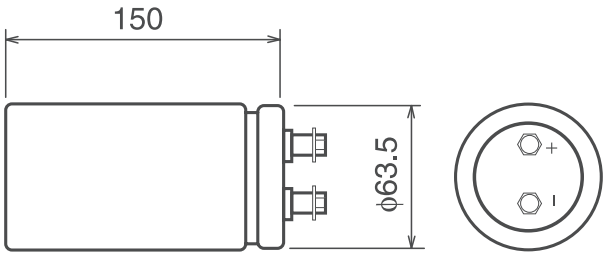
All figures only for illustration purpose. The actual product may differ.

4.5 Capacitor (CB1 CB2)

◆ **Only for RAS-(8-10)WHNPE**

This part is used for changing alternating current to direct current for the inverter. Connect two capacitor in line and used.

Items	Specifications
Models	LNX2W472MSEEHE
Capacity of static electricity	4700 μF
Rated voltage	450 VDC
Permissible temperature range	-25 ºC to 85 ºC

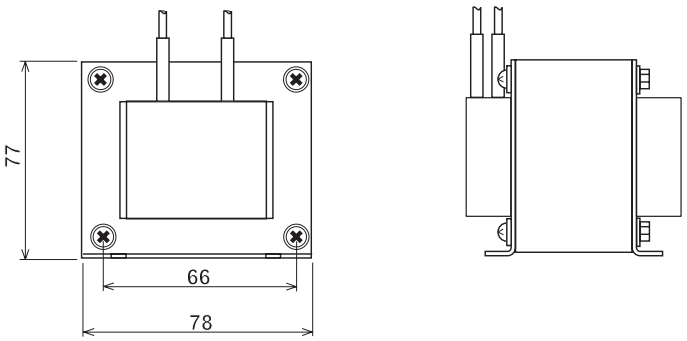


4.6 Reactor (ACL)

This part is used for changing alternating current to direct current for the inverter.

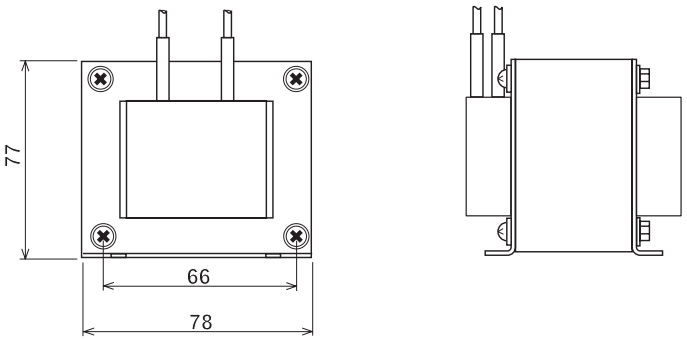
4.6.1 Reactor (ACL) for RAS-(2-3)WHVRP1

Items	Specifications
Character	12 mH±15 (at 1 kHz)
Rated current	15 A
DC Resistance	160 mΩ (max.)
Permissible temperature range	-25ºC to 60ºC



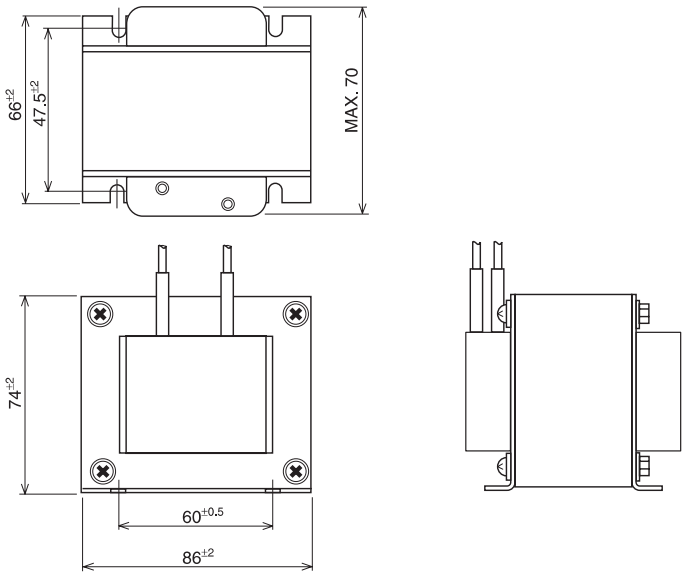
4.6.2 Reactor (DCL) for RAS-(4-6)WHVNPE

Items	Specifications
Character	0.5 mH±15% (at 1 kHz)
Rated current	30 A
DC Resistance	26 mΩ (at 20 ºC)
Permissible temperature range	-20ºC to 60ºC

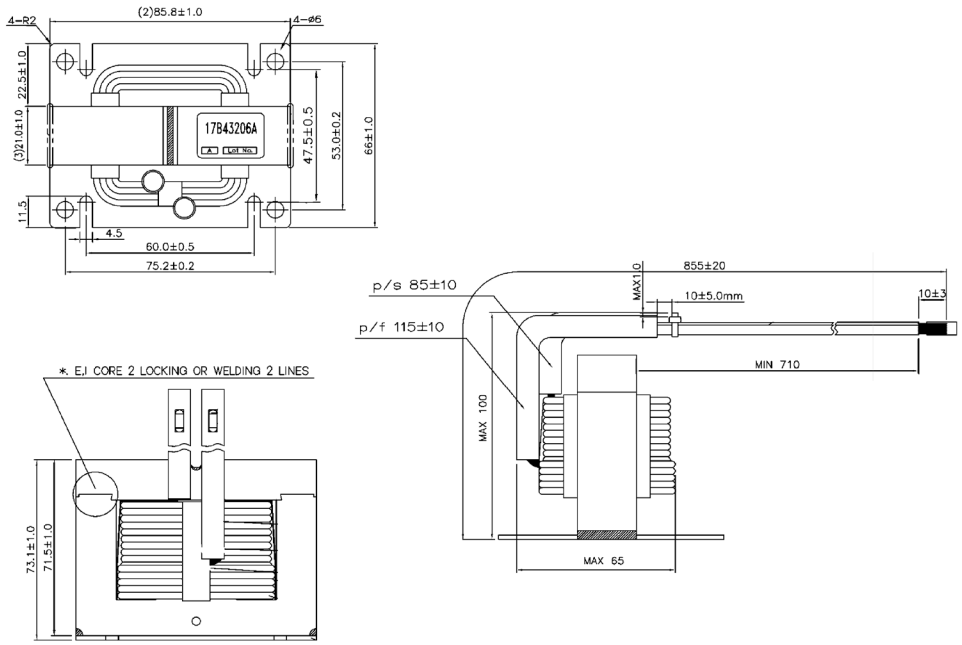


4.6.3 Reactor (DCL) for RAS-(4-6)WHNPE

Items	Specifications
Character	0.5 mH±10% (at 1 kHz)
Rated current	30 A
Direct resistance	15.0 mΩ±20% (at 20 °C)
Permissible temperature range	-20 ºC to 60 ºC



4.6.4 Reactor (DCL) for RAS-(8-10)WHNPE



Items	Specifications
Character	1 mH+15%-10% (at 1 kHz)
Rated current	30 A
Direct resistance	27.4 mΩ±20% (at 20 °C)
Permissible temperature range	-20 ºC to 60 ºC

4.7 Rotary compressor for RAS-(2-3)WHVRP1 units

4.7.1 Reliable mechanism for low vibrating and low sound

1 The rotating direction is definite.

2 The pressure inside of the chamber is high pressure and the surface temperature of the chamber is 60 ºC to 110 ºC.

4.7.2 Principle of compression

1. The gas is inhaled from the inlet port at the outer frame of the fixed scroll.

2. The gas inside of the compression space is compressed toward the center of the scroll.

3. The compression space is minimum at the center of the scroll, and the gas compressed at the maximum is discharged from the outlet port of at the center of the scroll.

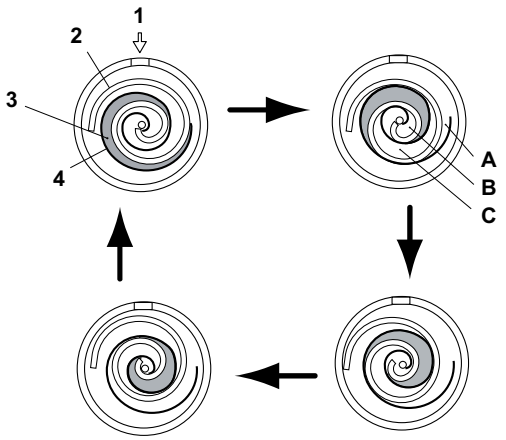
4. The above procedures (suction compression discharge) is repeated continuously.

1. Gas.
2. Rotating scroll.
3. Compression space.
4. Fixed scroll

A. Suction procedure.

B. Discharge process.

C. Compression process.



4.8 Scroll compressor for RAS-(4-10)WH(V)NPE units

4.8.1 Reliable mechanism for low vibrating and low sound

1 The rotating direction is definite.

2 The pressure inside of the chamber is high pressure and the surface temperature of the chamber is 60 ºC to 110 ºC.

4.8.2 Principle of compression

1. The gas is inhaled from the inlet port at the outer frame of the fixed scroll.

2. The gas inside of the compression space is compressed toward the center of the scroll.

3. The compression space is minimum at the center of the scroll, and the gas compressed at the maximum is discharged from the outlet port of at the center of the scroll.

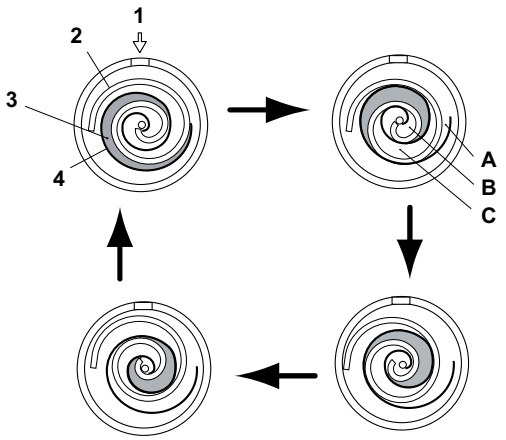
4. The above procedures (suction compression discharge) is repeated continuously.

1. Gas.
2. Rotating scroll.
3. Compression space.
4. Fixed scroll

A. Suction procedure.

B. Discharge process.

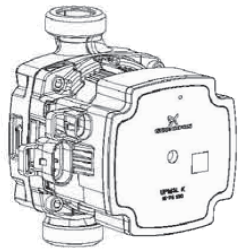
C. Compression process.



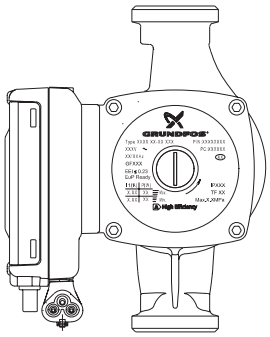
4.9 Water pump

	2-3 HP	4-6 HP	8/10 HP	
Power				
Energy efficiency Index (EEI)	≤ 0.20	≤ 0.20	-	
Max. delivery Head	7.5 m	7.5 m	10.5 m	
Max. Volume flow	4.0 m³/h	4.0 m³/h	5.5 m³/h	
Permitted field of application				
Temperature range for applications at Max. temperature limit values	Of 60ºC = -10 to 130ºC Of 70ºC = -10 to 110ºC		Ambient (ºC) 0 20 30 35 40 55	Liquid (ºC) -95 (+110) -95 (+110) -95 (+110) +95 +95 +75
Max. static pressure	PN 10	PN 10	PN 10	
Electrical Connection				
Mains connection	1~230V +10%-15%, 50/60 Hz (IEC 60038)	1~230V +10%-15%, 50/60 Hz (IEC 60038)	1~230V +10%-15%, 45/75 Hz	
Low voltage directive	2014/35/EC Conform	2014/35/EC Conform	2006/95/EC Conform	
Protection Class	IPX4D	IPX4D	IPX2D	
Insulation Class	F	F	H	
Motor data	UPM3 K	UPM3L K	UPML GEO	
Speed (rpm) (RS**/7.0iPWM1)	560/5990	560/5990	800/4770	
Power consumption (W)	2.0-60	2.0-75	4-75	
Current at 1~230 V (A)	0.04 - 0.58	0.04-0.60	0.4-0.60	

PWM input signal	2.0-6.0 HP
≤10	Maximum speed: Max.
<10/≤84	Variable speed: Min. to Max
>84/≤91	Minimum speed: Min
>91/≤95	Hysteresis area: ON/OFF
>95/≤100	Stand-by mode: OFF



PWM input signal	8.0/10.0 HP
≤10	Maximum speed: Max.
<10/≤84	Variable speed: Min. to Max
>84/≤91	Minimum speed: Min
>91/≤95	Hysteresis area: ON/OFF
>95/≤100	Stand-by mode: OFF



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5.1 Split system - Outdoor unit

Safety Introduction

DANGER

DO NOT TOUCH THE ELECTRICAL COMPONENTS WHILE LEDS 1~4/351~353 on PCB1 or LD1~4 on PCB2 ARE ON, TO AVOID ELECTRICAL SHOCK.

WAIT UNTIL ALL LEDS TURN OFF.

DANGER

- ***Before performing any of the service operations described in this chapter turn all the main switches off and the place security lockers or convenient warning indicators in order to prevent them from turning on accidentally.***
- ***In case of blocked or stucked parts use appropiated tools and eventually lubricants to release them.***
- ***In case of sharped edged parts as covers use security gloves to avoid getting injured.***
- ***When performing brazing work besides security gloves it is must to wear convenient eye protection.***
- ***Check and be sure that all LEDS on the PCB are OFF for all electrical maintenance.***

NOTE

- *All compressors are connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections if not oil existing pipe inside may ignite.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing compressor replace it quickly. If exposed for a long period seal the suction pipe and discharge pipe.*
- *Remove the cap for the compressor just before replacing the compressor. Before mounting the compressor seal the suction pipe and discharge pipe with a tape to protect the compressor from foreign particles. Remove the tape at pipe connection.*
- *Caution for Replacement of Compressor*

Remove the suction pipe and the discharge pipe from the compressor. Isolate the wires and electrical components to protect them from the burner flame when brazing the connection pipes.

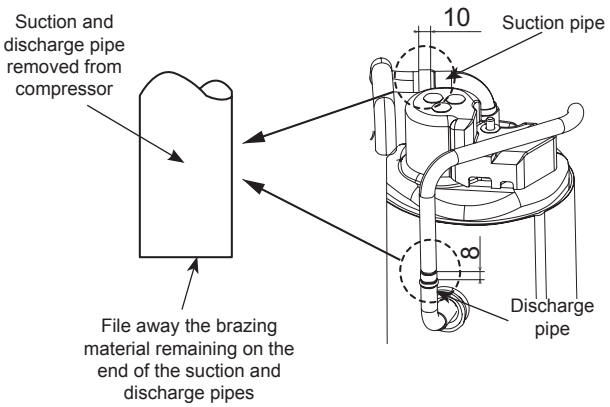
When replacing the compressor, the brazed material used for connecting the compressor and refrigerant pipes can drop into the pipes and get sucked into the compressor, causing a compressor failure. To avoid this, take the following points into account when replacing the compressor:

a. File away brazing material remaining on the end of the refrigerant pipes.

CAUTION

Be careful to avoid filed brazing material entering into the pipes.

b. Insert the pipes fully in to prevent brazing material from entering them.



c. Refer to the table for the recommended amount of brazing material. If using more brazing material than the recommended amount, it may drop into the pipes.

CAUTION

When brazing the pipes, prevent oxidized scale formation by nitrogen substitution.

Thickness of brazing material	Piping diameter (refrigerant cycle side) (mm)						
	Ø6.35	Ø9.52	Ø12.7	Ø15.88	Ø19.05	Ø22.2	Ø28.2
Ø1.6mm	25	30	35	75	100	110	225
Ø2.0mm	15	15	20	45	55	70	135
Ø2.4mm	10	10	15	30	35	45	90

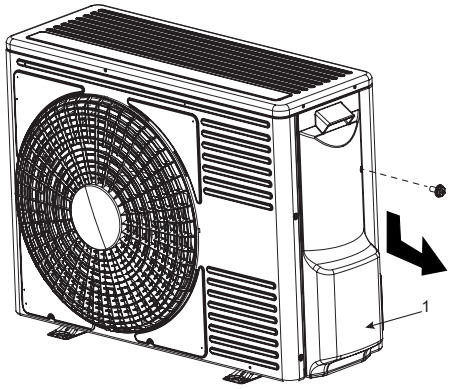
5.1.1 RAS-(2-3)WHVRP1

5.1.1.1 Removing the pipe cover

Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.

Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.

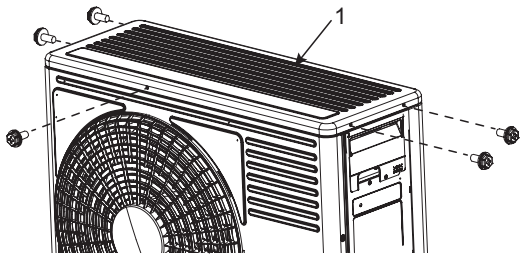
1 Remove pipe cover downward after removing 1 screw.



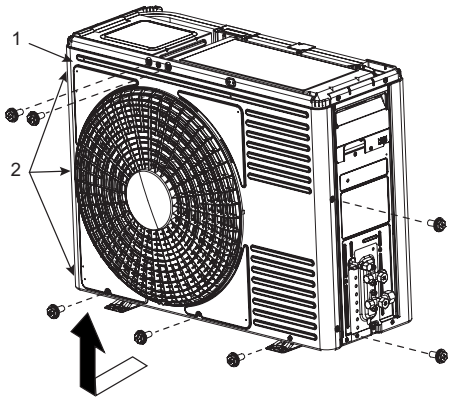
1 - Pipe cover

5.1.1.2 Removing the front cover

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover"*
2 Remove 5 fixing screws and remove the upper cover.
3 To remove the front cover remove 7 fixing screws and 3 left nails.



1 - Upper cover



1 - Front cover
2 - Nails

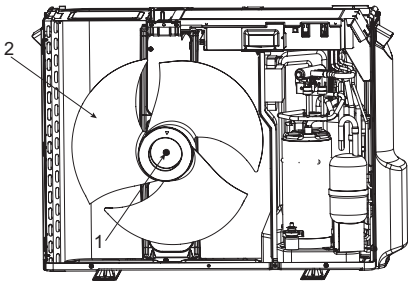
5.1.1.3 Removing the outdoor fan

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover"*
2 Remove 3 fixing screws and remove the upper cover.
3 Remove the front cover following *"5.1.1.2 Removing the front cover"*
4 To remove the propeller fan remove the cap nut which fixes the propeller fan onto the motor shaft.

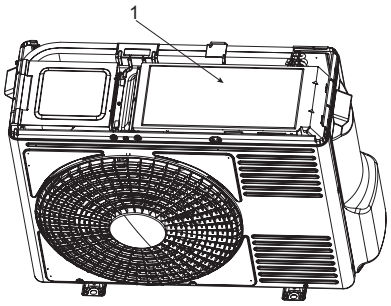
NOTE

- *Use a puller when the propeller fan and fan motor shaft are fixed too tightly.*
- *The cap nut is left thread. For removal turn to the reverse direction to the propeller fan.*

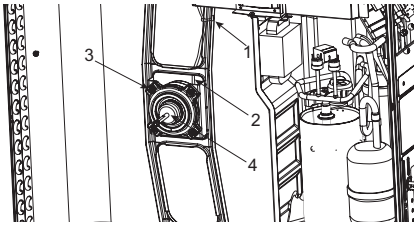
5 Remove the electrical box cover.
6 Remove the fan motor connector (CN24) inserted into the PCB in the electrical box:
   - Remove the fan motor lead wire fixed onto the motor clamp using a cord band.
   - Remove 4 screws which fix the motor.



1 - Cap nut
2 - Propeller fan



1 - Electrical box cover



1 - Cord band
2 - Fan motor lead wire
3 - Four screws
4 - Fan motor

NOTE

- *Be sure to place the lead wire outlet downward when assembling the motor.*
- *Fix the motor lead wire onto the motor clamp using a cord band as before to avoid obstructing the propeller fan.*
- *Assembling the propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 3.0 Nm).*
- *Connect the motor lead wire to the electrical box PCB. (To connect insert into the connector (CN24) on the PCB).*

5.1.1.4 Removing the compressor

NOTE

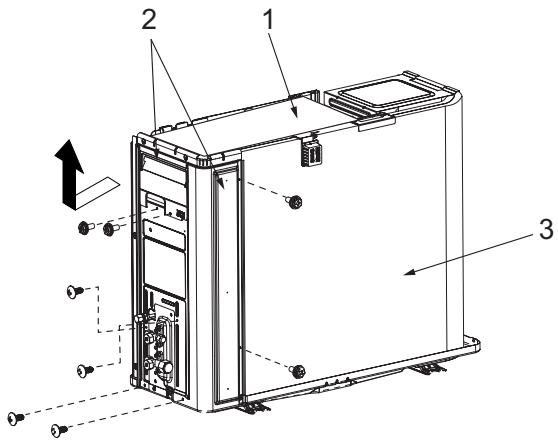
- ***Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle.*** *Be sure to replace the compressor immediately after removing. Seal to the suction and discharge pipes when the refrigerant cycle is left unattached for a prolonged time.*
- *Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape at pipe connection.*
- *To connect wiring at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage the compressor.*

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover"*. When the outdoor unit is installed close to a wall move the unit from the wall removing the refrigerant piping.

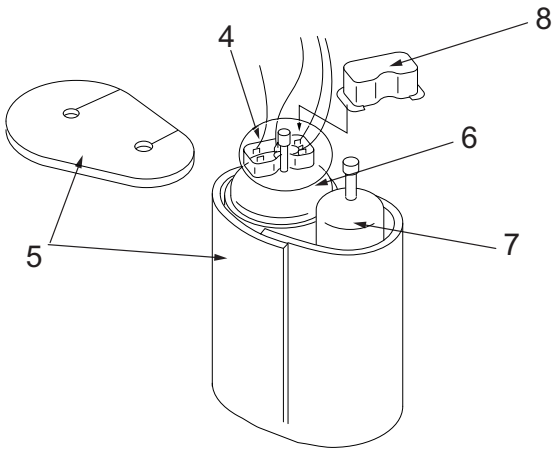
2 Collect the refrigerant from the check joint.

3 Remove the front cover following *"5.1.1.2 Removing the front cover"*.

4 Remove 8 fixing screws and remove the side cover.



1 - Electrical box cover
2 - Side cover
3 - Heat exchanger

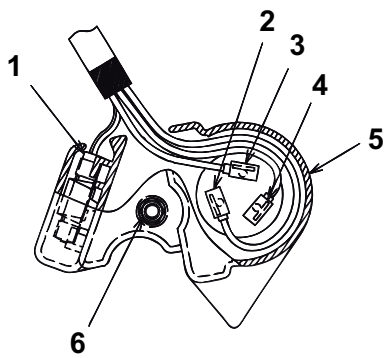


4 - Compressor-top thermistor and wiring
5 - Side and top soundproff cover
6 - Compressor
7 - Accumulator
8 - Terminal box cover

5 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and remove the thermistor on top of the compressor.

CAUTION

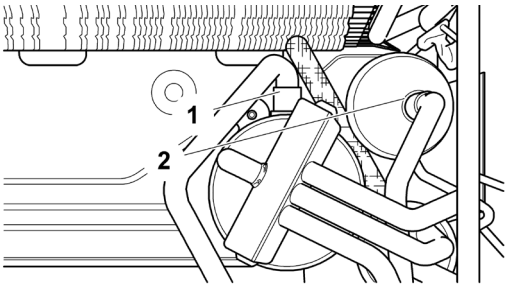
Check the wiring color and layout when disconnecting. Connecting wires in wrong order at reassembling may result in compressor damage.



1 - Compressor-top thermistor mount onto terminal cover with metal fitting.
2 - Yellow.
3 - White.
4 - Red.
5 - Terminal cover.
6 - M8 hexagonal nut.

6 Remove the suction and discharge pipes from the compressor.

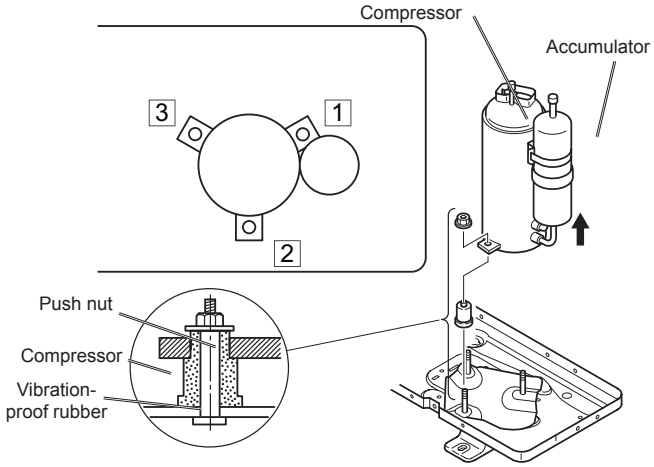
Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.



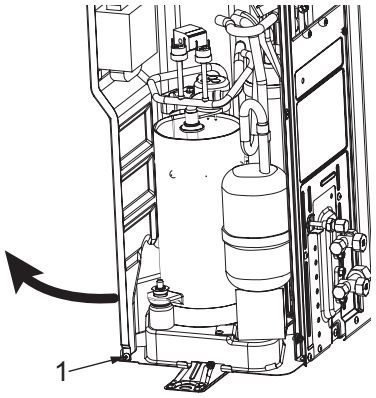
1- Brazing Discharge pipe.
2 - Brazing Suction pipe.

7 Remove push nuts 1 and 2 which fixes the compressor. Lift the compressor and remove from the unit body. (3 in the figure does not have a push nut).

8 Check if the Faston terminal has any abnormality when replacing the compressor. (Ensure the pull out force greater than 20 N). If the Faston terminal is identified faulty replace to a new one.



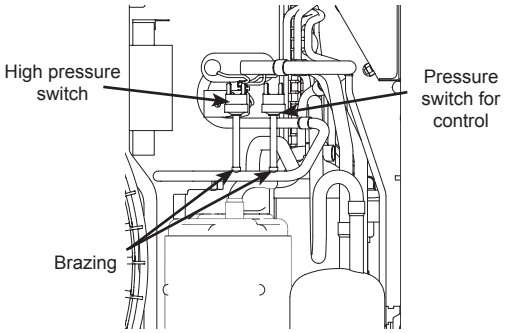
9 In case that is necessary more space to take out the compressor, remove the screw of the metal sheet.



1 - Metal sheet screw

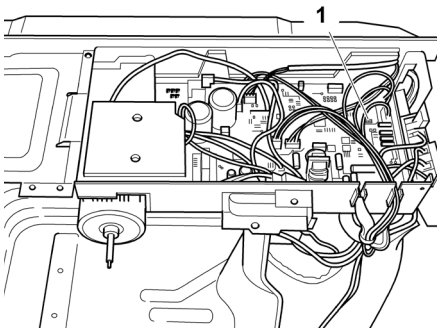
5.1.1.5 Removing the high pressure switch and pressure switch for control

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover"*.
2 Remove 5 fixing screws and remove the upper cover.
3 Remove the front cover following *"5.1.1.2 Removing the front cover"*.
4 Collect the refrigerant from the check joint.
5 Disconnect the Faston Terminals.
6 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



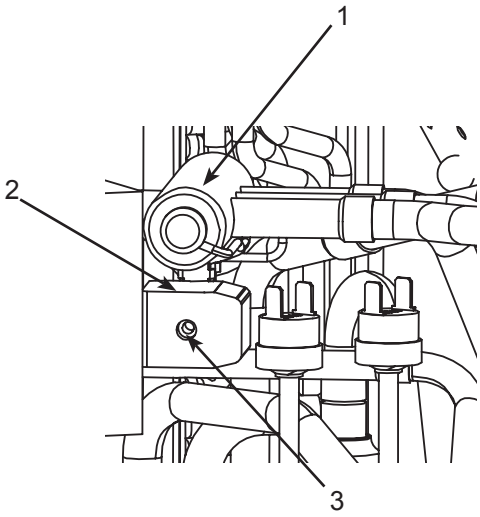
5.1.1.6 Removing the four-way valve coil

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover"*.
2 Remove 5 fixing screws and remove the upper cover.
3 Remove the front cover following *"5.1.1.2 Removing the front cover"*.
4 Disconnect the PCN6 connector on the control PCB of the electrical box.



1 - PCN6 Connector (Green)

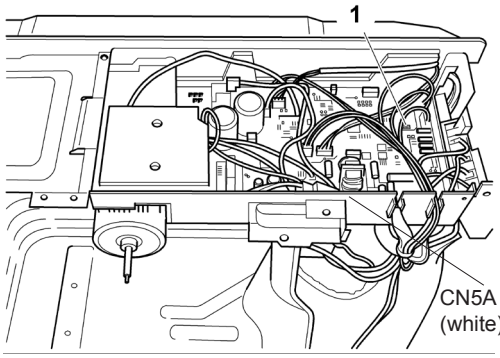
5 Remove 1 fixing screw to remove the 4-way valve coil.

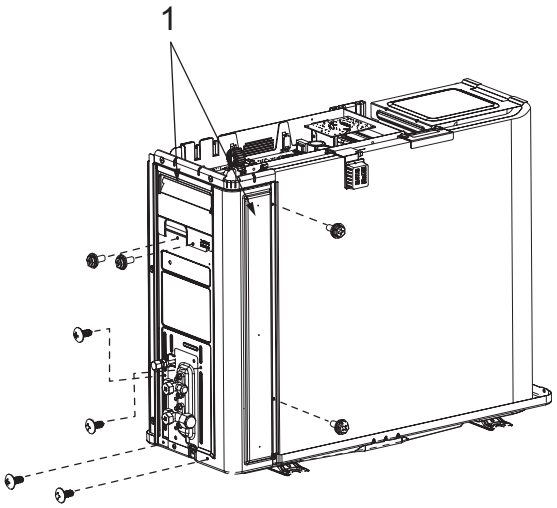


1 - 4-way valve.
2 - 4-way valve coil.
3 - Screw.

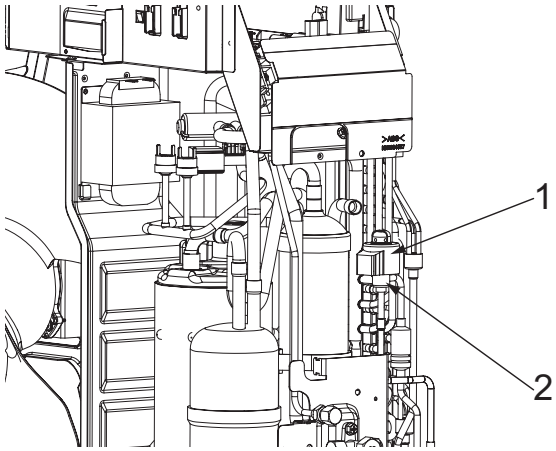
5.1.1.7 Removing the electronic expansion valve coil

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover".*
2 Remove 5 fixing screws and remove the upper cover.
3 Remove the front cover following *"5.1.1.2 Removing the front cover".*
4 Remove the electrical box cover.
5 Remove 8 fixing screws and remove the side cover.
6 Remove the CN5A connector on the control PCB of the electrical box.
7 Hold and disconnect the coil of the expansion valve. The expansion valve coil is equipped with a lock mechanism. Ensure that the coil is locked when replacing.





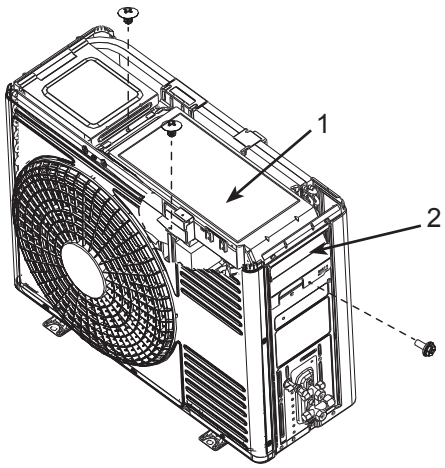
1 - Side cover



1 - Expansion valve coil
2 - Expansion valve body

5.1.1.8 Removing the electrical box

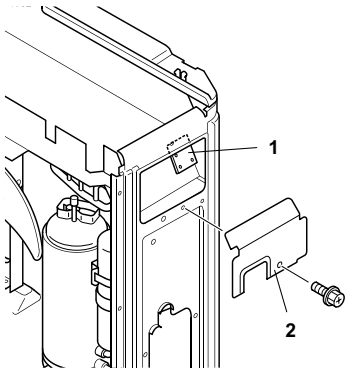
1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover".*
2 Remove 5 fixing screws and remove the upper cover.
3 Remove the electrical box cover.
4 Remove 1 fixing screw and remove the terminal cover.
5 Disconnect all the wiring connected to the control PCB.
6 Remove 2 screws which fix the electrical box.
7 Pull up and remove the electrical box.

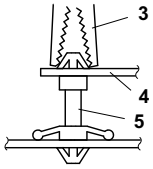


1 - Electrical box cover
2 - Terminal cover

5.1.1.9 Removing Display PCB

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover".*
2 Remove 1 fixing screw and remove the terminal cover.
3 Disconnect all the wiring connected to the display PCB.
4 Hold the upper part of 4 holders with long nose pliers and remove the display PCB.





1 - Display PCB (PWB2).
2 - Terminal cover.
3 - Long nose pliers.
4 - Display PCB.
5 -Holder.

NOTE

- *DO NOT touch electrical components on the PCB. Pay attention not to bend or apply much force onto PCB in order to avoid PCB failure.*
- *To connect wiring at reassembling ensure that the terminal numbers and wiring mark band codes are matched. Incorrect wiring may result in malfunction or damage of electrical components.*
- *Different dip switch setting shall be applied for each model when the electrical box is replaced; See chapter "6. Troubleshooting".*
- *Pay attention not to clamp any wiring between plates or electrical components when closing electrical box cover or front cover at reassembling.*

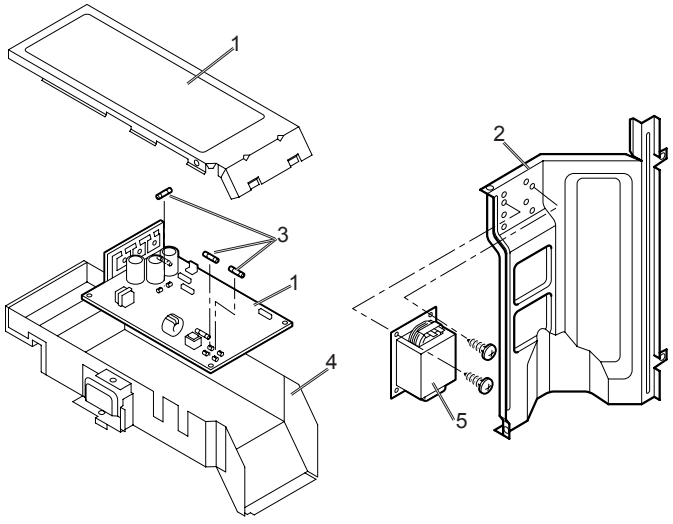
5.1.1.10 Removing other electrical components

1 Remove the pipe cover following *"5.1.1.1 Removing the pipe cover".*
2 Remove 3 fixing screws and remove the upper cover.
3 Remove the electrical box cover.
4 Removing Electrical Components.

Remove the 2 fixing screw and remove the reactor.

- To mount components be sure to match the wiring connection with the mark band codes.

1	Electrical box cover.
2	Partition plate.
3	Fuse.
4	Electrical box.
5	Reactor.



5.1.2 RAS-(4-6)WH(V)NPE

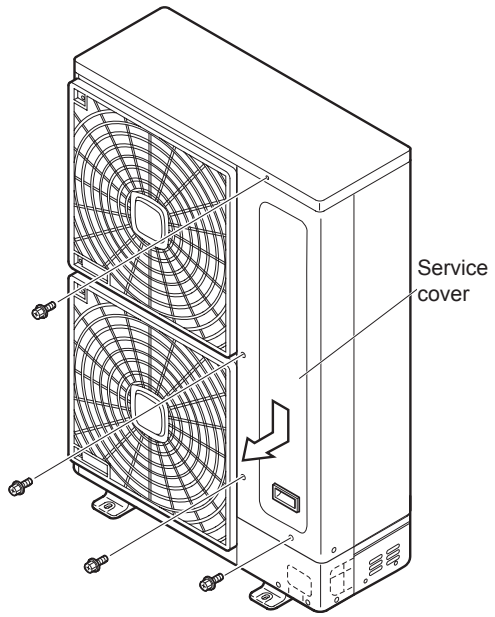
5.1.2.1 Removing the service cover

NOTE

- *Follow the procedures explained below to remove main parts and components. For reassembling, follow the instructions in the reverse way.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.*

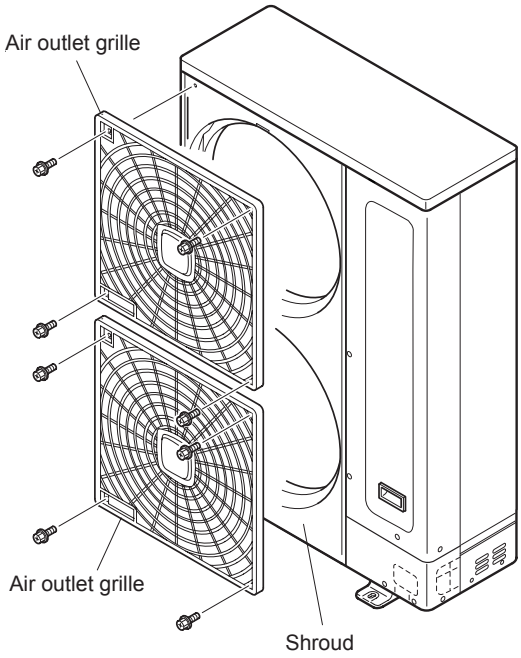
1 Remove the 4 fixing screws, slide the service cover downward and remove it.

- Pay attention not to fall off the service cover.



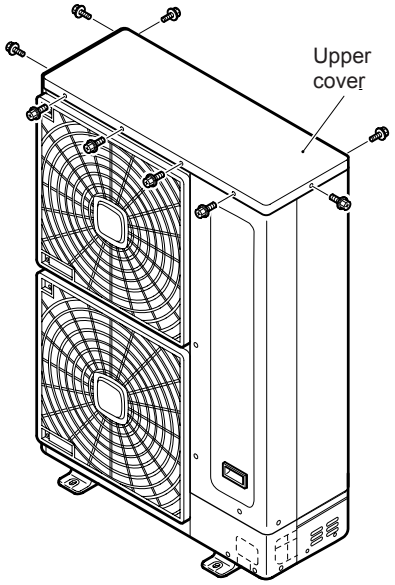
5.1.2.2 Removing the air outlet grille

1 Remove the 8 fixing screws of the shroud.



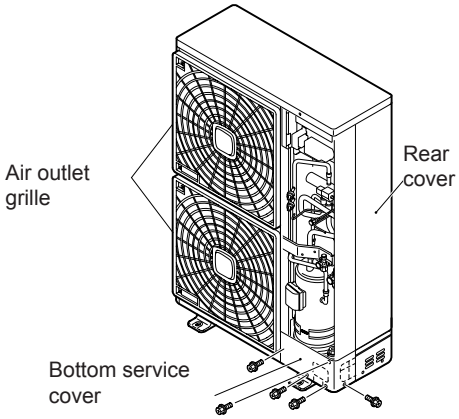
5.1.2.3 Removing upper cover

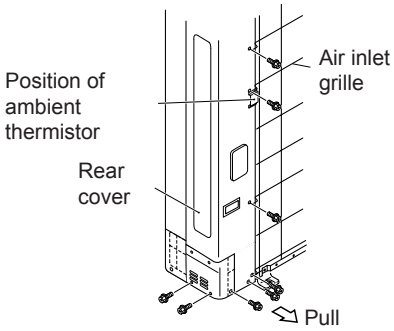
1 Remove 11 screws fixing the upper cover and remove the upper cover upward.



5.1.2.4 Removing the bottom service cover and rear cover

1 Remove 5 screws fixing the lower part of service cover and remove the lower part of service cover by pulling towards front side.
2 Remove the upper cover according to the item *"5.1.2.3 Removing upper cover"*
3 Remove 10 screws fixing panel and remove the rear panel by pulling in the arrow direction.





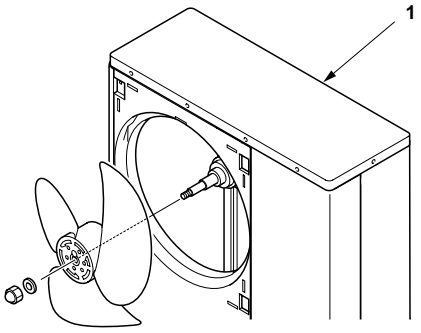
5.1.2.5 Removing outdoor fan motor

1 Remove the service cover following *"5.1.2.1 Removing the service cover"*

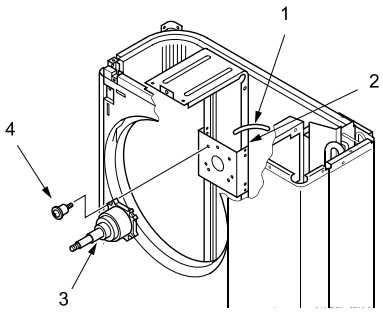
2 Remove the outlet grille following *"5.1.2.2 Removing the air outlet grille"*

3 Remove the upper cover following *"5.1.2.3 Removing upper cover"*

4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).



1	Upper cover

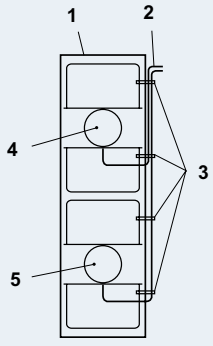


1	Fan motor lead wire.
2	Motor clamp.
3	Motor.
4	Screw with spacer.

5 Remove the fan motor connector from PCB in the electrical box.

6 Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp.

7 Remove the 4 screws which fix the motor.

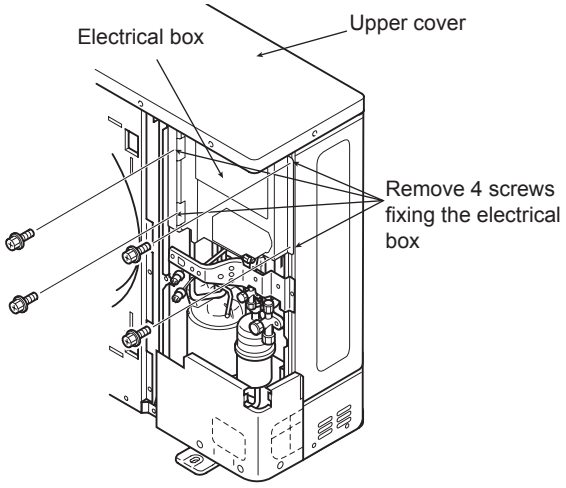
Model		RAS-(4-6)WH(V)NPE
Fan Motor Compresor number	DC Fan Motor	Inverter PCB CN202 (Red)
	AC Fan Motor	Inverter PCB CN201 (White)
Screws for motor fixing.	DC Fan Motor	4 x M4 screw (with spacer)
	AC Fan Motor	4x M4 screws
1. Motor clamp. 2. Fan motor lead wire. 3. Plastic tie. 4. DC Fan Motor. 5. AC Fan Motor.		

NOTE

- *When assembling the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).*
- *Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.*
- *Assembling the propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)*
- *Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).*
- *Be sure to attach the outlet grille onto the shroud after replacing the fan motor.*

5.1.2.6 Removing the electrical box

1 Remove the service cover following *"5.1.2.1 Removing the service cover"*
2 Remove the upper cover following *"5.1.2.3 Removing upper cover"*. Remove 4 screws which fix the electrical box.
3 Pull up and remove the electrical box.



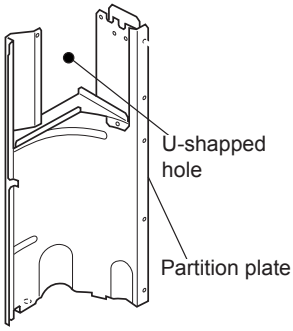
NOTE

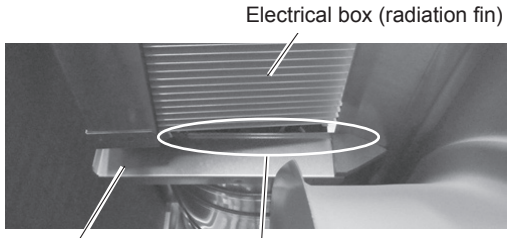
The following operations must be performed in order to remove the electrical box.

1 Remove the reversing valve coil from the reversing valve: *"5.1.2.10 Removing the reversing valve coil"*.
2 Remove the expansion valve coil from the expansion valve: *"5.1.2.11 Removing the electronic expansion valve coil"*.
3 Remove the solenoid valve coil from the solenoid valve: *"5.1.2.12 Removing the solenoid valve coil (SVA and SVC)"*.
4 Remove the Faston terminals of high/low pressure switch and the pressure switch for control from the switch body: *"5.1.2.8 Removing the high pressure switch and pressure switch for control"*.
5 Remove all connectors on the control PCB.
6 Remove the compressor wires in the terminal box of the compressor.
7 To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).



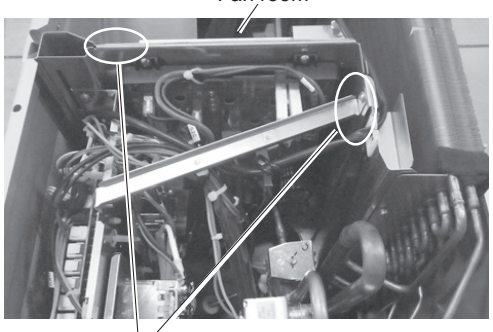
Original position





Place the electrical box (radiation fin) in front of the partition plate.
(Refer to the original position)

Fan room

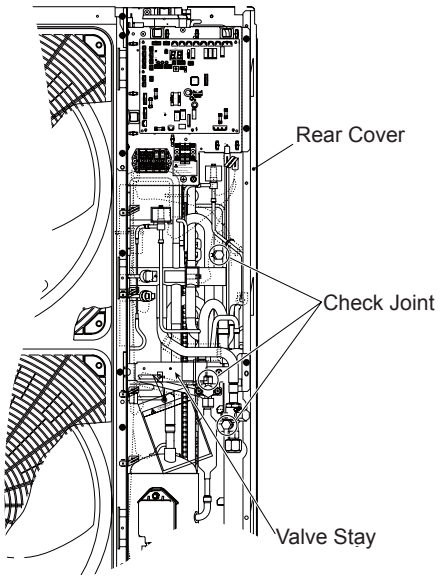


Place the electrical box to hook the parts onto the partition plate.

5.1.2.7 Removing the compressor

1 Remove the service cover, bottom service cover and rear cover following *"5.1.2.1 Removing the service cover"* and *"5.1.2.4 Removing the bottom service cover and rear cover"*. When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall. Collect the refrigerant from the check joint.

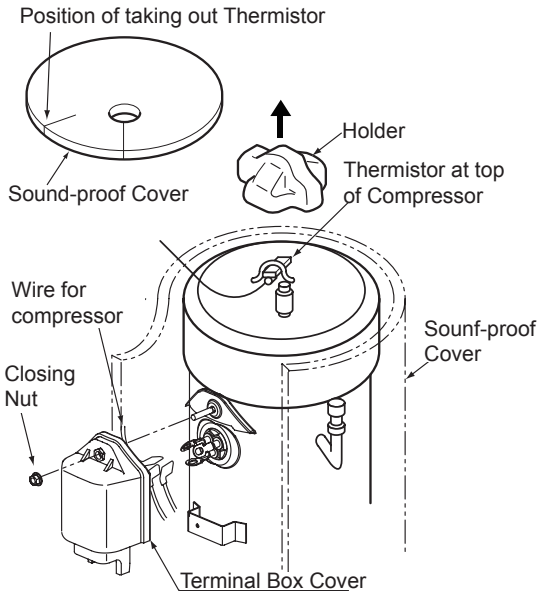
2 Remove the valve stay.



NOTE

Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.

3 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover.



NOTE

Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

4 Remove the rubber cap and the thermistor attached on top of the compressor.

5 Remove the crankcase heater.

NOTE

- *Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.*
- *Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.*
- *For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.*

6 Remove the suction pipe and discharge pipe from the compressor.

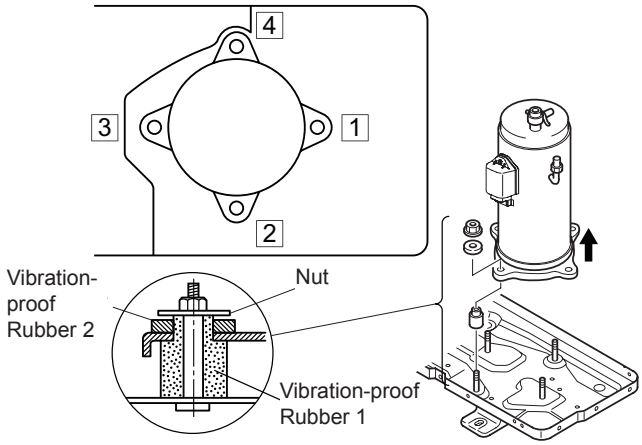
NOTE

Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

7 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

NOTE

To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLOSE ATTENTION not to crush to break the pipe.

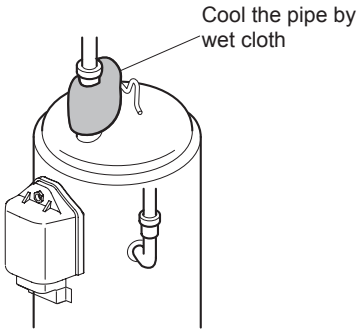


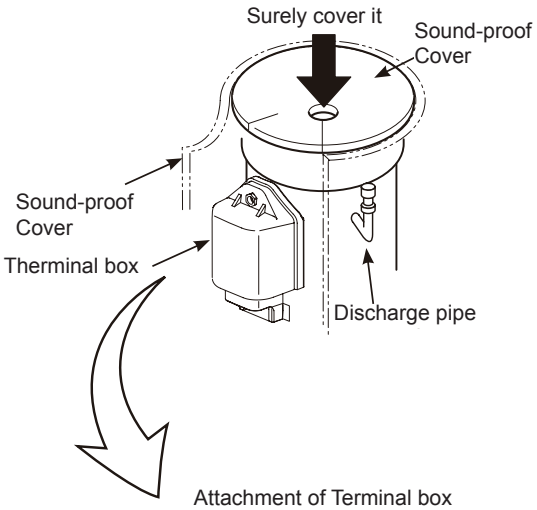
Fixation of the compressor to the bottom plate				
Compressor position	1	2	3	4
Vibration-proof rubber 1	x	x	x	x
Vibration-proof rubber 2	x	x	—	—
Nut	x	x	—	—

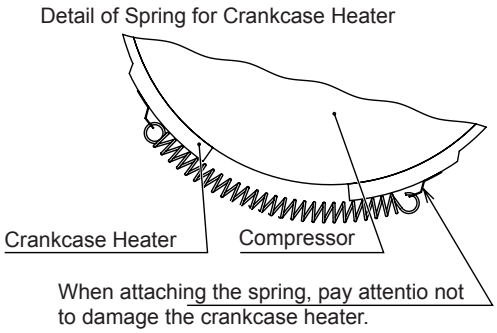
8 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.

NOTE

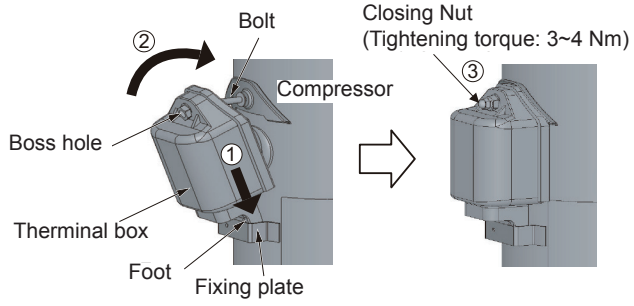
PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.







Attachment of Terminal box



1 Perform in the reverse procedure of removing after replacing the compressor.

a. Check if the Faston terminal has any abnormality. (Ensure the pull out force greater than 20 Nm). If the Faston terminal is identified faulty replace with a new one.

b. Ensure the fixture of the lead wires.

c. Surely fix the terminal box by tightening the closing nut (Tightening Torque: 3.0 Nm).

d. Attach the top of sound-proof cover to cover surely the compressor.

e. Wrap the sound-proof cover to cover the terminal box and the discharge pipe.

f. Attach the crankcase heater without torsion and gap to the compressor as following figure.

5.1.2.8 Removing the high pressure switch and pressure switch for control

1 Remove the service cover and the bottom service cover following *"5.1.2.1 Removing the service cover"*, and *"5.1.2.4 Removing the bottom service cover and rear cover"*.

2 Collect the refrigerant from the check joint according to *"5.1.2.7 Removing the compressor"* in this chapter.

High pressure switch and pressure switch for control

1 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.

2 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.

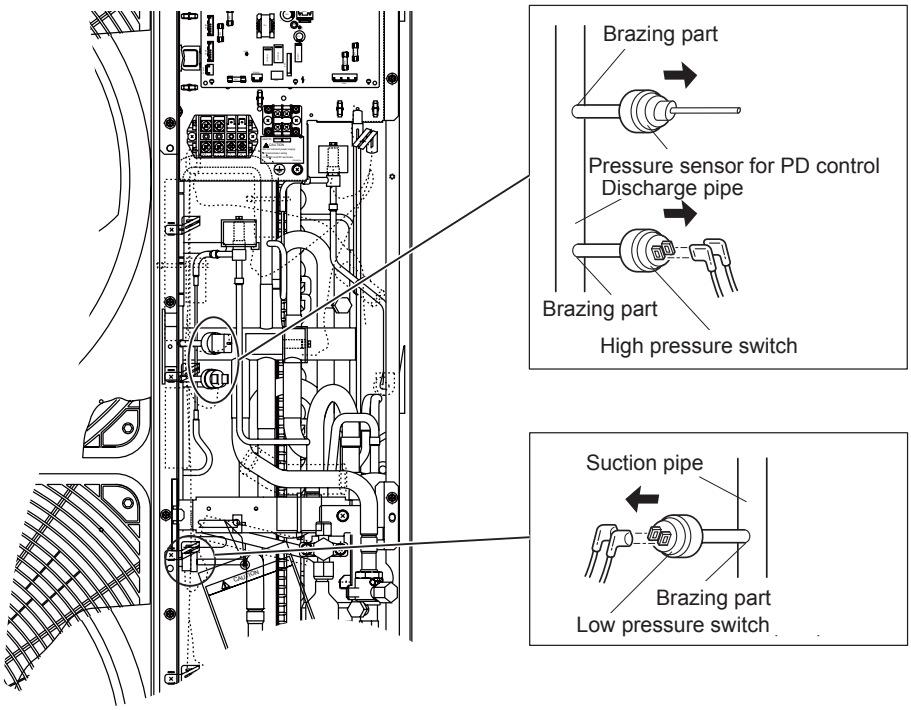
NOTE

The procedure (1) is not required when removing the pressure sensor for PD control. However, check to ensure that the connector (CN100) on OU PCB1 is disconnected.

Low pressure switch

1 Disconnect the Faston Terminals of Low Pressure Switch.

2 Remove the low pressure switch from the brazed part of suction piping.



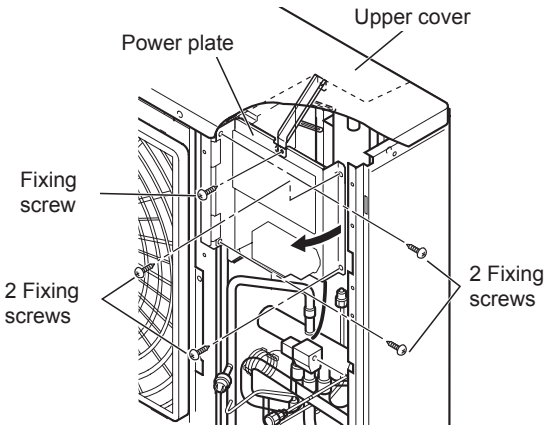
5.1.2.9 Opening the electrical box (P plate)

1 Remove the service cover following *"5.1.2.1 Removing the service cover"* in this chapter.

2 Unplug all the connectors of the electrical box.

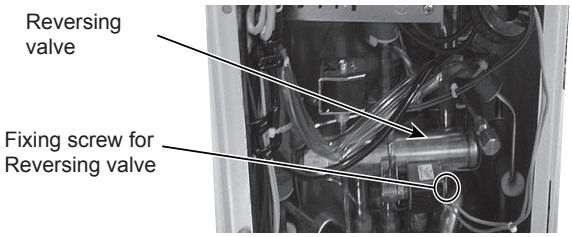
3 Remove 5 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.

- Check that the LED201 (red) on the inverter PCB (PCB2) is OFF.



5.1.2.10 Removing the reversing valve coil

1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *"5.1.2.1 Removing the service cover"*, *"5.1.2.4 Removing the bottom service cover and rear cover"* and *"5.1.2.3 Removing upper cover"*. Disconnect the PCN100 connector on the control PCB of the electrical box.
2 Remove 1 fixing screw to remove the reversing valve coil.
3 When reassembling, perform the procedure in the reverse way of removing.

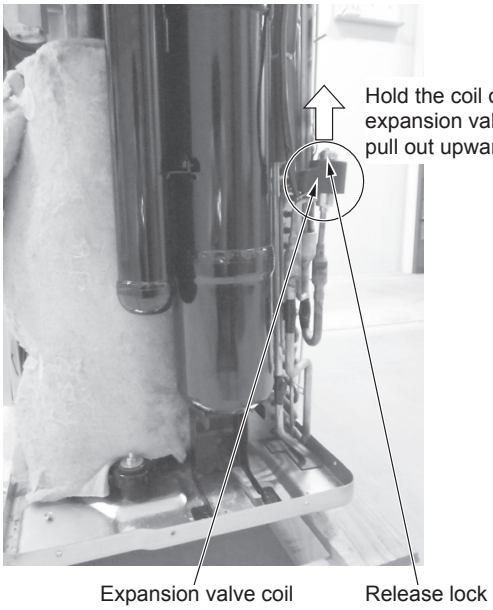


NOTE

Fix the wires with plastic bands to the original position.

5.1.2.11 Removing the electronic expansion valve coil

1 Remove the service cover, the bottom service cover and the rear cover following *"5.1.2.1 Removing the service cover"* and *"5.1.2.4 Removing the bottom service cover and rear cover"*.
2 Disconnect the CN5A connector on the control PCB of the electrical box.
3 Hold the coil of the expansion valve and pull out upward. It is easier to remove the expansion valve coil if it is rotated while pulling it upward.
4 When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.

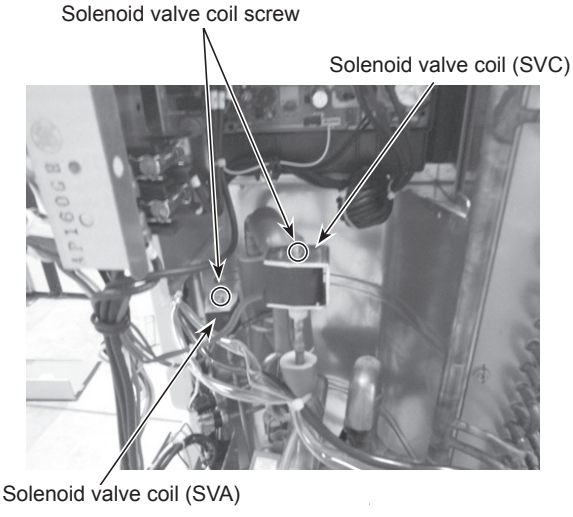


NOTE

Fix the wires with plastic bands to the original position.

5.1.2.12 Removing the solenoid valve coil (SVA and SVC)

1 Remove the service cover and the upper cover following *"5.1.2.1 Removing the service cover"* and *"5.1.2.3 Removing upper cover"*.
2 Unplug the connector PCN7 (SVA) and PCN14 (SVC) on OU PCB1.
3 Remove the fixing screw, and remove the solenoid valve coils (SVA and SVC) upward.
4 When reassembling after replacing the solenoid valve coil, perform the procedure in the reverse way of removing.



NOTE

Fix the wires by plastic bands to the original position.

5.1.2.13 Removing the reversing valve

1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *"5.1.2.1 Removing the service cover"*, *"5.1.2.4 Removing the bottom service cover and rear cover"* and *"5.1.2.3 Removing upper cover"*.

2 Recover the refrigerant from check joints according to *"5.1.2.7 Removing the compressor"*.

3 Remove the reversing valve coil according to *"5.1.2.10 Removing the reversing valve coil"*.

4 Remove the reversing valve assemblies from the fixed positions (5 brazing parts).

   a. Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.

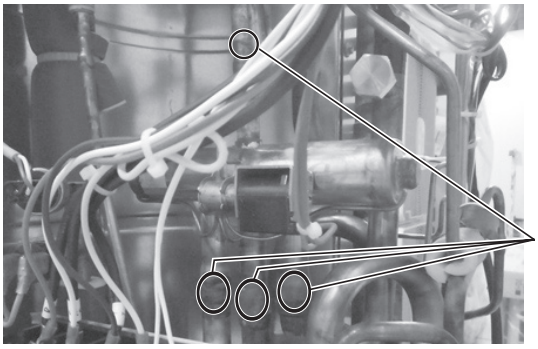
   b. Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.

5 Remove reversing valve from the assemblies. (5 brazing parts) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.

6 When reassembling after replacing the reversing valves, perform in the reverse procedure of removing.

   a. Run the lead wires to be located to the original position, and fix them with the plastic band.

   b. Attach the crankcase heater according to *"5.1.2.7 Removing the compressor"*.



5.1.2.14 Removing the electronic expansion valve and solenoid valve

1 Remove the service cover, the bottom service cover and the rear cover following *"5.1.2.1 Removing the service cover"* and *"5.1.2.4 Removing the bottom service cover and rear cover"*

2 Recover the refrigerant from check joints according to *"5.1.2.7 Removing the compressor"*

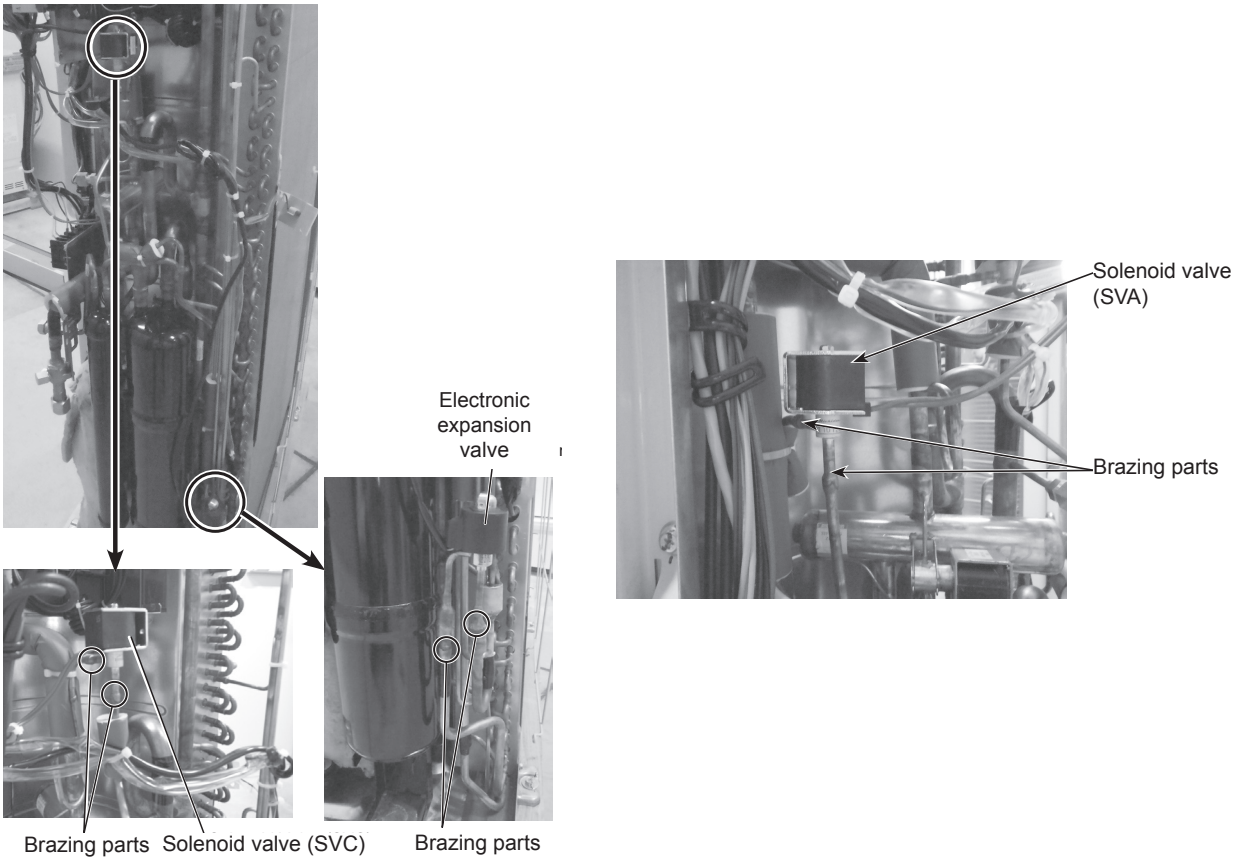
3 Remove the coils according to *"5.1.2.10 Removing the reversing valve coil"* and *"5.1.2.12 Removing the solenoid valve coil (SVA and SVC)"*.

4 Remove the brazed parts as shown in the figures.

- Electronic Expansion Valve (EVO) Brazed Parts: 2
- Solenoid Valve (SVA) Brazed Parts: 2
- Solenoid Valve (SVC) Brazed Parts: 2

a. Remove the electronic expansion valve and the solenoid valve with cooling the valve bodies by wet cloth.

b. Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



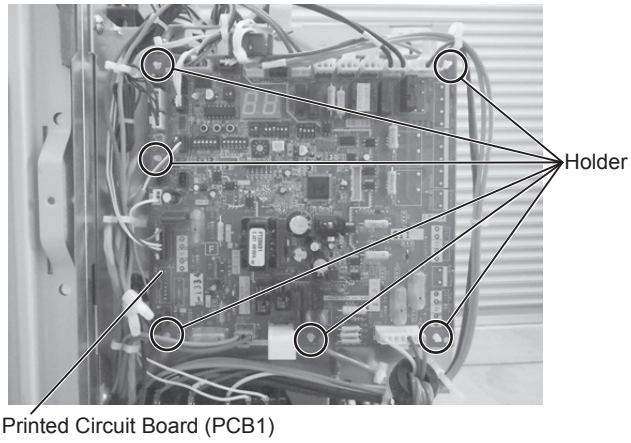
5 When reassembling after replacing the valves, perform in the reverse procedure of removing.

NOTE

Run the lead wires to be locate them to the original position, and fix them with plastic band.

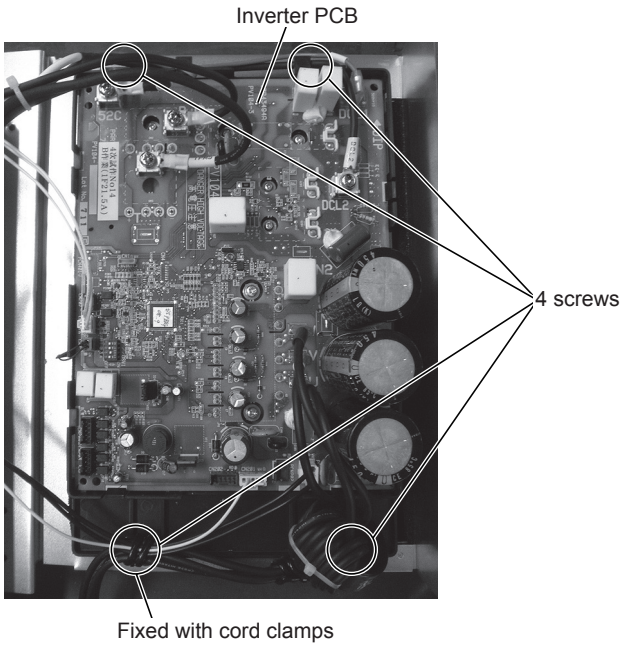
5.1.2.15 Removing the PCB (PCB1)

1 Remove the service cover following *"5.1.2.1 Removing the service cover"*.
2 Remove all the wiring connected to the control PCB.
3 Remove the 6 holders. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.



5.1.2.16 Removing inverter module

1 Remove the service cover following *"5.1.2.1 Removing the service cover"* in this chapter.
2 Open the P plate turning counter clockwise approximately 90° following *"5.1.2.9 Opening the electrical box (P plate)"*.
3 Check that the LED201 (red) on Inverter is OFF when the P plate is opened. Remove all the wiring connected on the Inverter.
4 Remove 4 screws which fix the Inverter. Hold the wires placed at the bottom side.
5 Pull the Inverter toward right side from the front of the product. (Remove along with the plastic case and the radiation fin).



5.1.2.17 Removing other electrical components

1 Remove the service cover following *"5.1.2.1 Removing the service cover"* in this chapter.
2 Open the P plate turning counter clockwise approximately 90° following *"5.1.2.9 Opening the electrical box (P plate)"*.
- Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

CMC

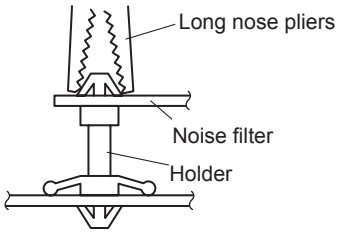
1 Remove all the wiring connected to CMC.
2 Remove 2 screws fixing the CMC.

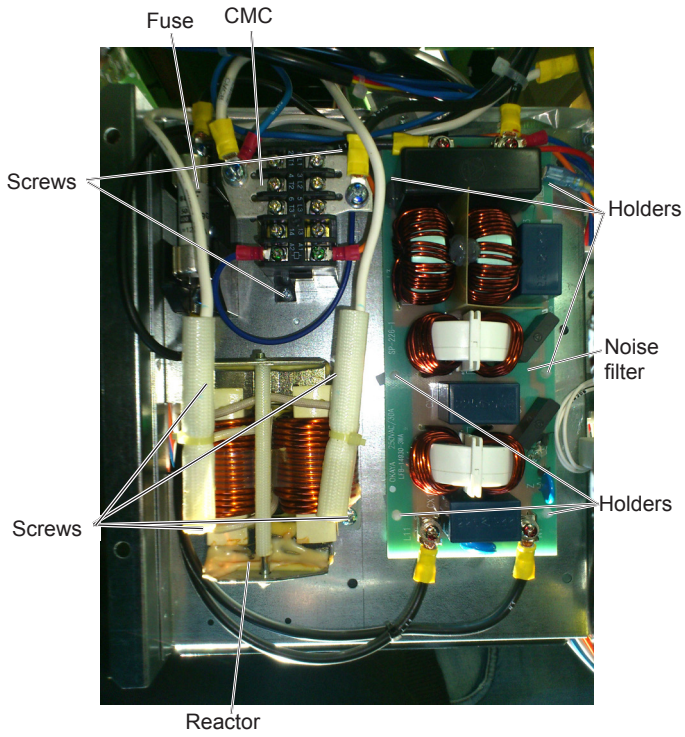
Reactor

1 Remove 4 screws fixing the reactor.

Noise filter

1 Remove all the wiring connected to the noise filter.
2 Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.





NOTE

- *To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.*
- *When attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.*

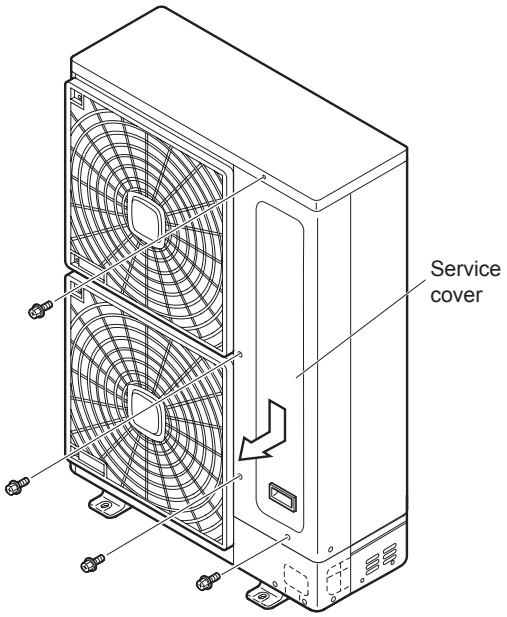
5.1.3 RAS-(8/10)WHNPE

5.1.3.1 Removing the service cover

NOTE

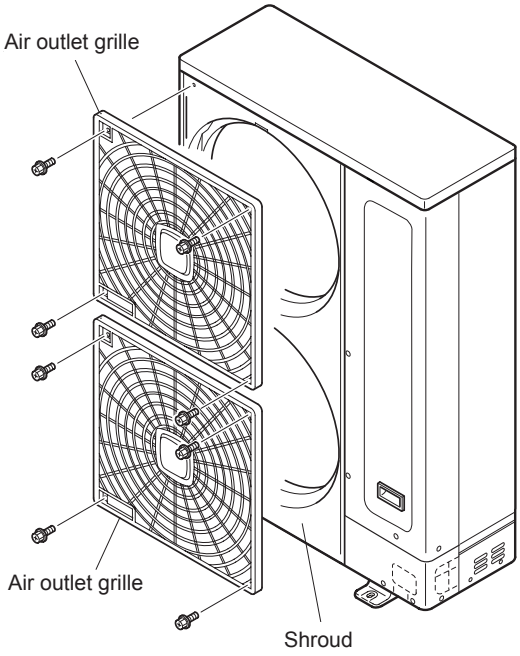
- *Follow the procedures explained below to remove main parts and components. When assembling, follow in the reverse procedure of removal.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.*

1 Remove the 4 fixing screws, slide the service cover downward and remove it.
   - Pay attention not to fall off the service cover.



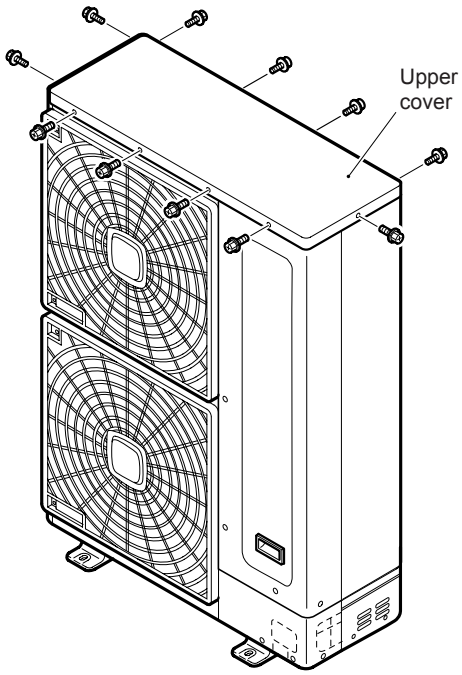
5.1.3.2 Removing the air outlet grille

1 Remove the 8 fixing screws of the shroud.



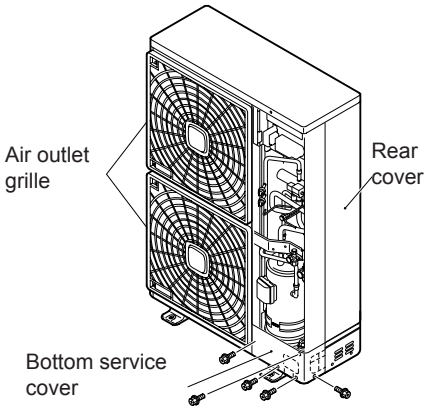
5.1.3.3 Removing the upper cover

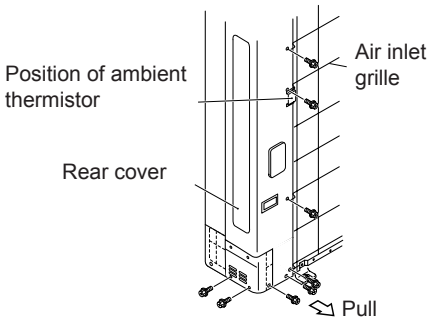
1 Remove 11 screws fixing the upper cover and remove the upper cover upward.



5.1.3.4 Removing the bottom service cover and rear cover

1 Remove 5 screws fixing the lower part of service cover and remove the lower part of service cover by pulling towards front side.
2 Remove the upper cover according to the item *"5.1.3.3 Removing the upper cover"*.
3 Remove 10 screws fixing panel and remove the rear panel by pulling it backwards.





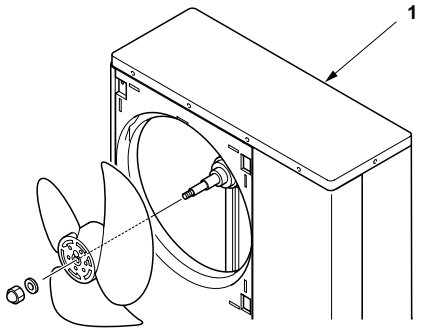
5.1.3.5 Removing the fan motor

1 Remove the service cover following *"5.1.3.1 Removing the service cover"*.

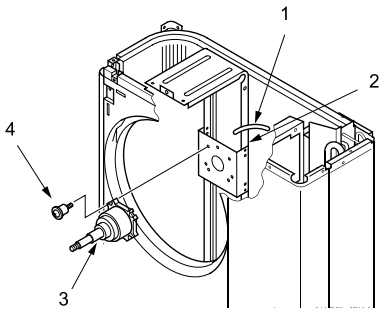
2 Remove the outlet grille following *"5.1.3.2 Removing the air outlet grille"*.

3 Remove the upper cover following *"5.1.3.3 Removing the upper cover"*.

4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).



1	Upper cover

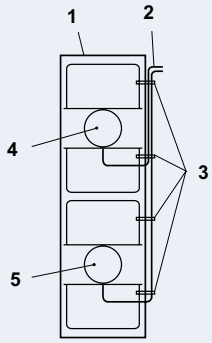


1	Fan motor lead wire.
2	Motor clamp.
3	Motor.
4	Screw with spacer.

5 Remove the fan motor connector from PCB in the electrical box.

Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp.

Remove 4 screws which fix the motor.

Model		RAS-(8-10)WHNPE
Fan Motor Compressor number	DC Fan Motor	Inverter PCB CN406 (Red)
	AC Fan Motor	Inverter PCB CN405 (White)
Screws for motor fixing	DC Fan Motor	4 x M6 screw (with spacer)
	AC Fan Motor	4x M6 screws
1. Motor clamp. 2. Fan motor lead wire. 3. Plastic tie. 4. DC Fan Motor. 5. AC Fan Motor.		

NOTE

1 When assembling the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud paying attention there is no contact between them).

2 Fix the motor lead wire onto the motor clamp using a plastic tie to avoid obstructing the propeller fan.

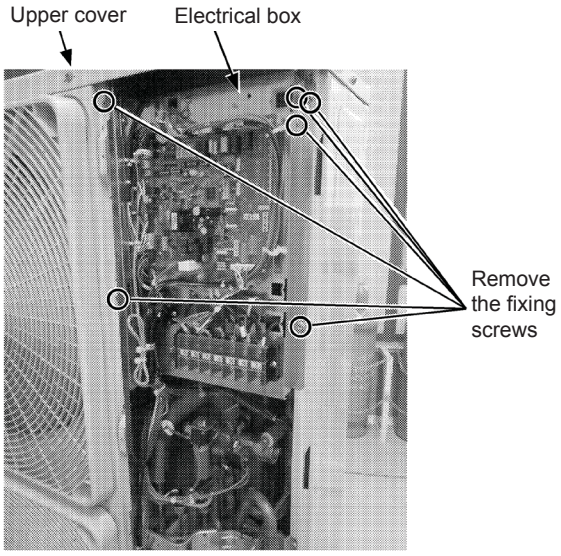
3 Assembling the propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)

4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).

5 Be sure to attach the outlet grille onto the shroud after replacing the fan motor.

5.1.3.6 Removing the electrical box

1 Remove the service cover following *"5.1.3.1 Removing the service cover"*.
2 Remove the upper cover following *"5.1.3.3 Removing the upper cover"*. Remove 6 screws which fix the electrical box.
3 Pull up and remove the electrical box.



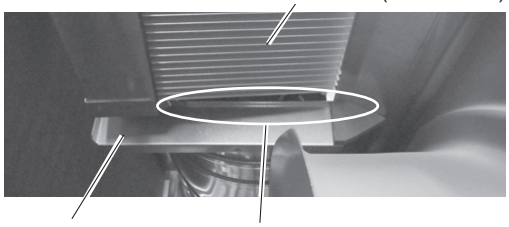
NOTE

The following wiring must be removed to dismount the electrical box.

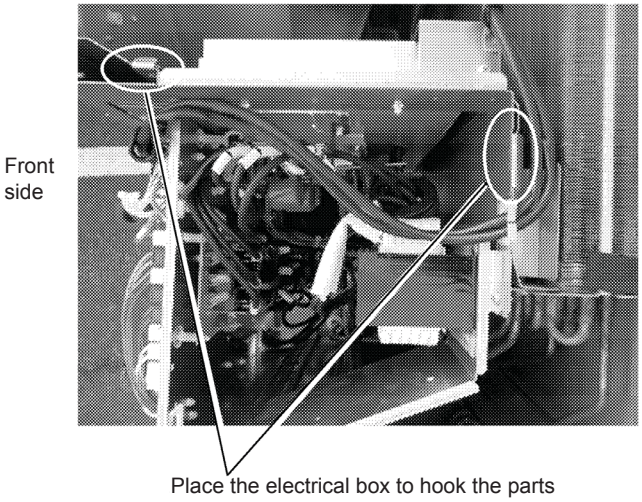
1 Remove the reversing valve coil from the reversing valve: "5.1.3.10 Removing reversing valve coil".
2 Remove the expansion valve coil from the expansion valve: "5.1.3.11 Removing the electronic expansion valve coil".
3 Remove the solenoid valve coil from the solenoid valve: "5.1.3.12 Removing the solenoid valve coil (SVA and SVC)".
4 Remove the Faston terminals of high/low pressure switch and the pressure switch for control from the switch body: "5.1.3.8 Removing the high pressure switch and the pressure switch for control".
5 Remove all connectors on the control PCB.
6 Remove the compressor wires in the terminal box of the compressor.
7 To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).



Original position



Place the electrical box (radiation fin) in front of the partition plate.
(Refer to the original position)



Place the electrical box to hook the parts onto the partition plate.

5.1.3.7 Removing the compressor

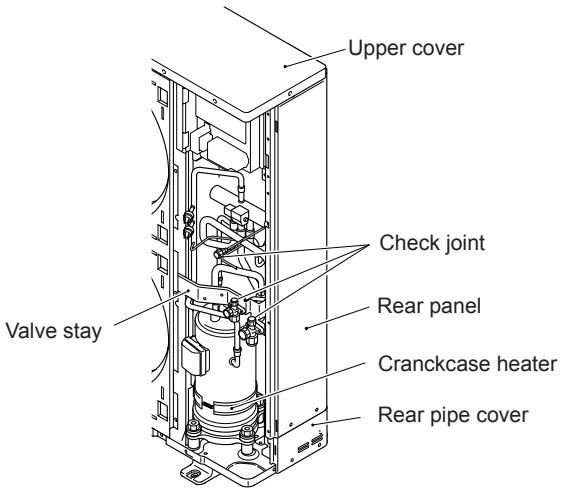
1 Remove the service cover and the bottom service cover following *"5.1.3.1 Removing the service cover"*, and *"5.1.3.4 Removing the bottom service cover and rear cover"*. When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.

2 Collect the refrigerant from the check joint.

NOTE

Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.

3 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover.



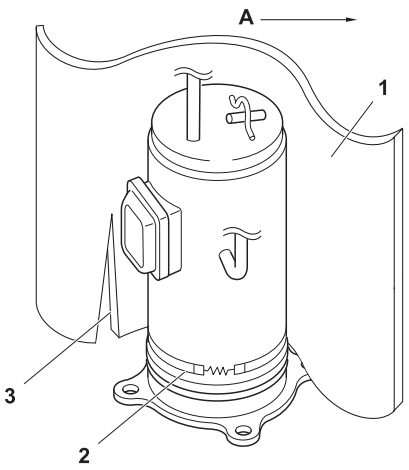
NOTE

Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order when reassembling may result in compressor damage.

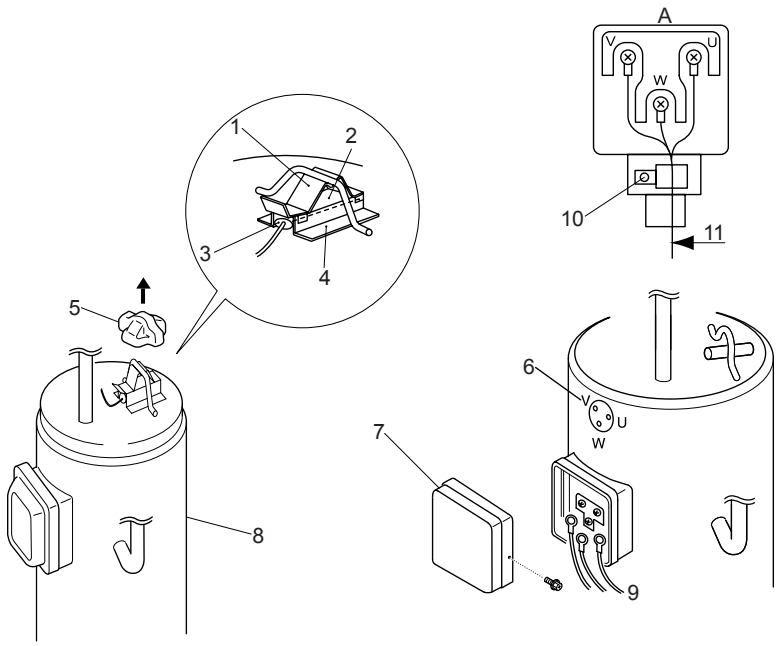
4 Remove the rubber cap, the upper cover and the thermistor attached on top of the compressor.

5 Remove the crankcase heater.

1	Sound-proof cover
2	Oil heater
3	Cut part
A	Direction to remove the cover



1	Thermistor holder
2	Holder
3	Td Thermistor
4	Thermistor fixing plate
5	Rubber cap Th Thermistor
6	Indication of terminal number
7	Terminal box cover
8	Compressor
9	Compressor wires
10	Fix it with screw
11	Compressor wires (3 wires)
A	Details for compressor terminals



NOTE

- *Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.*
- *Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.*
- *For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.*

6 Remove the suction pipe and discharge pipe from the compressor.

NOTE

Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

7 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

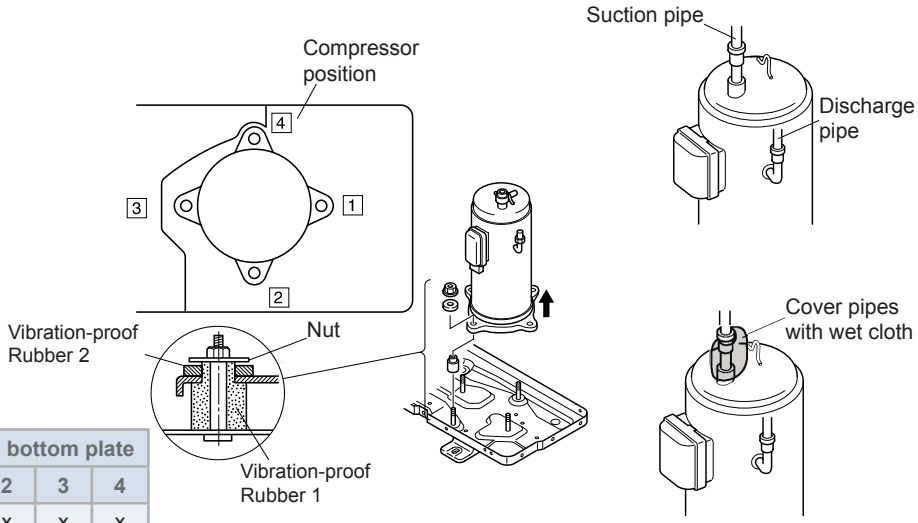
NOTE

To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLOSE ATTENTION not to crush to break the pipe.

8 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.

NOTE

PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.



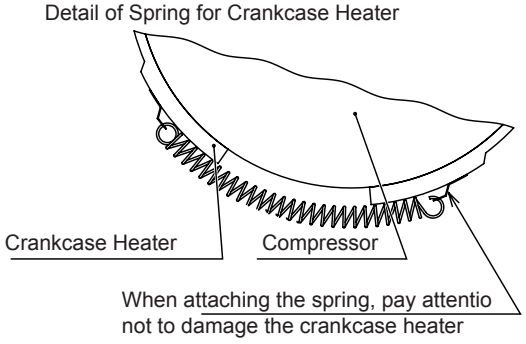
Fixation of the compressor to the bottom plate				
Compressor position	**1**	**2**	**3**	**4**
Vibration-proof rubber 1	x	x	x	x
Vibration-proof rubber 2	x	x	—	—
Nut	x	x	—	—

9 Reassemble the parts in the reverse order of removing procedures.

Tighten the screws (U V and W) for compressor wires with 2.5 Nm.

Fix the wires firmly.

Attach the crankcase heater without torsion and gap to the compressor as following figure.



5.1.3.8 Removing the high pressure switch and the pressure switch for control

1 Remove the service cover following *"5.1.3.1 Removing the service cover"* in this chapter.
2 Collect the refrigerant from the check joint according to *"5.1.3.7 Removing the compressor"*, in this chapter.

High pressure switch and pressure switch for control

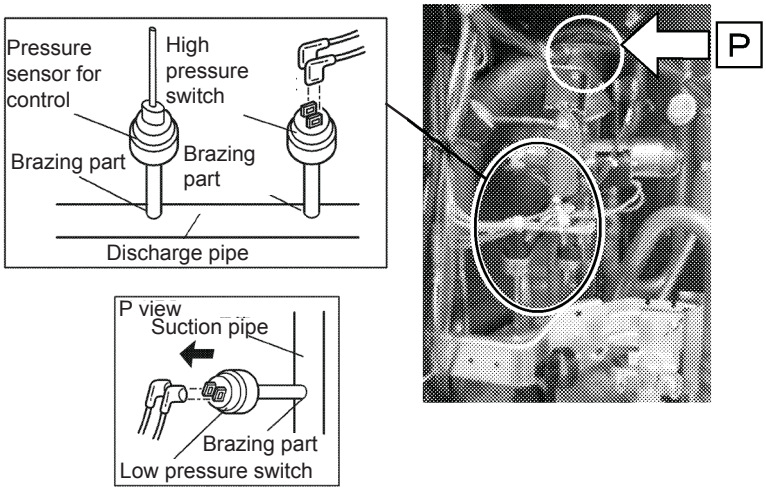
1 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
2 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.

NOTE

The procedure (1) is not required when removing the pressure sensor for PD control. However, check to ensure that the connector (CN100) on OU PCB1 is disconnected.

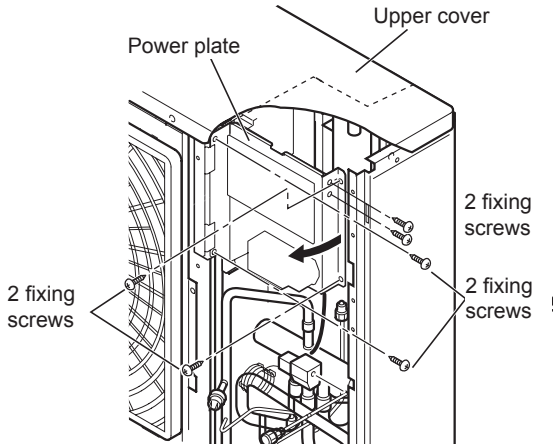
Low pressure switch

1 Disconnect the Faston Terminals of Low Pressure Switch.
2 Remove the low pressure switch from the brazed part of suction pipe.



5.1.3.9 Opening the electrical box (P-Mounting Plate)

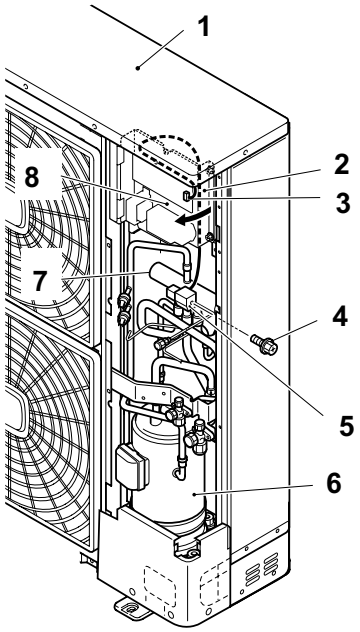
1 Remove the service cover following *"5.1.3.1 Removing the service cover"* in this chapter.
2 Remove 6 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
- Check that the LED201 (red) on the inverter PCB (PCB2) is OFF when opening P-mounting plate.



5.1.3.10 Removing reversing valve coil

1 Remove the service cover following *"5.1.3.1 Removing service cover"* in this chapter.
2 Remove the connector (PCN100) on the control PCB (PCB1) of the electrical box.
3 Remove the reversing valve coil by removing 1 screw fixing the coil.

1	Upper cover.
2	Power Plate.
3	PCN6.
4	Fixing screw for reversing valve coil.
5	Reversing valve coil.
6	Compressor.
7	Reversing valve.
8	Electrical Box.



4 When reassembling, perform the procedure in the reverse way of removing.

NOTE

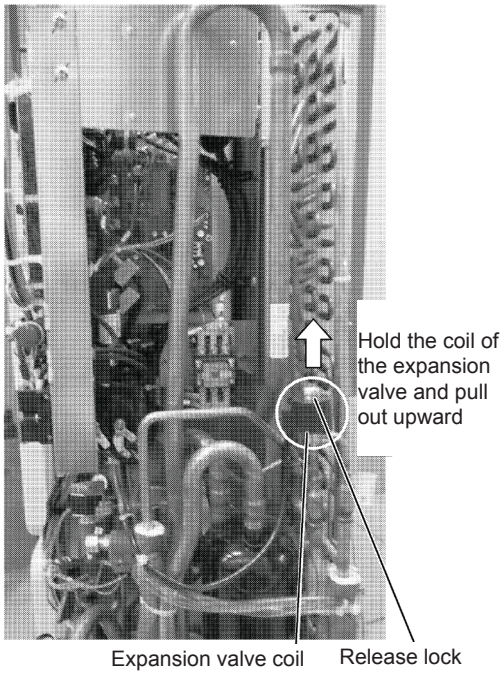
Fix the wires with plastic bands to the original position.

5.1.3.11 Removing the electronic expansion valve coil

1 Remove the service cover, the bottom service cover and the rear cover following *"5.1.3.1 Removing service cover"* and *"5.1.3.4 Removing the bottom service cover and rear cover"*.
2 Disconnect the CN5A connector on the control PCB1 of the electrical box. Hold the coil of the expansion valve and pull out upward. It is easier to remove the expansion valve coil if it is rotated while pulling it upward.
3 When reassembling, after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.

NOTE

Fix the wires with plastic bands to the original position.

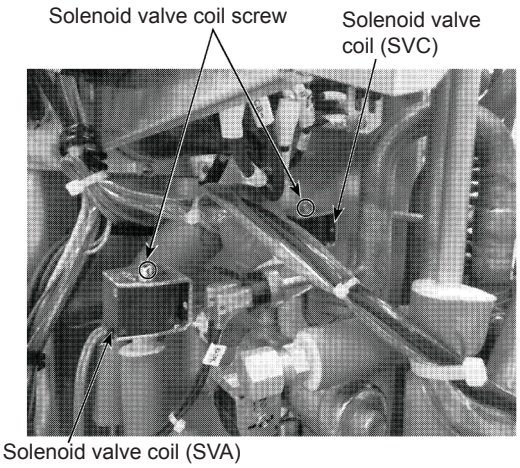


5.1.3.12 Removing the solenoid valve coil (SVA and SVC)

1 Remove the service cover following *"5.1.3.1 Removing the service cover"*.
2 Open the P-mounting plate. Check to ensure the LED201 (Red) of the inverter PCB (PCB2) is OFF.
3 Unplug the connector PCN7 (SVA) and PCN14 (SVC) on OU PCB1. Remove the fixing screw, and remove the solenoid valve coil (SVA and SVC) upward.
4 When reassembling after replacing the solenoid valve coil, perform the procedure in the reverse way of removing.

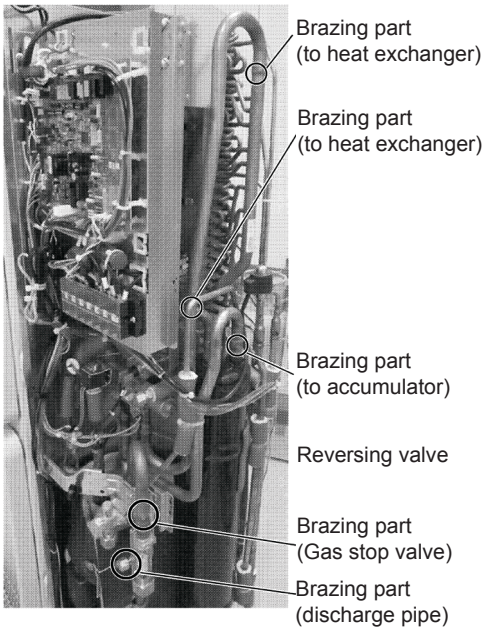
NOTE

Fix the wires with plastic bands to the original position.

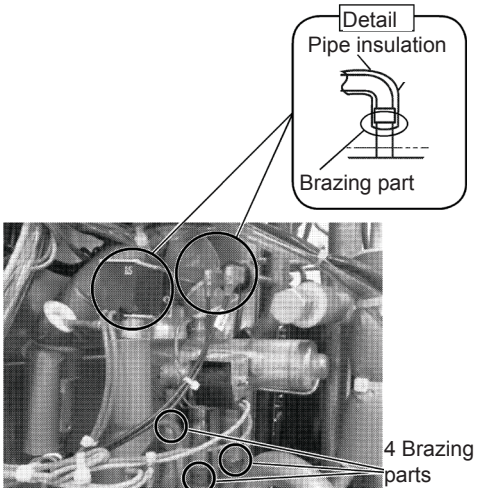


5.1.3.13 Removing the reversing valve

1 Remove the service cover, the bottom service cover and the rear cover following *"5.1.3.1 Removing the service cover"* and *"5.1.3.4 Removing the bottom service cover and rear cover"*.
2 Remove the reversing valve coil according to *"5.1.3.10 Removing reversing valve coil"*.
3 Recover the refrigerant from check joints according to *"5.1.3.7 Removing the compressor"*.
4 Remove the reversing valve assemblies from the fixed positions (5 brazing parts).
   a. Remove the reversing valve and the stop valve with cooling the valve bodies with a wet cloth.
   b. Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



5 Remove reversing valve from the assemblies. (5 brazing parts) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
6 When reassembling after replacing the reversing valves, perform in the reverse procedure of removing.
   a. Run the lead wires to be located to the original position, and fix them with plastic band.
   b. Attach the crankcase heater according to *"5.1.3.7 Removing the compressor"*.
7 Reassemble the parts in the reverse order of removing procedures.



5.1.3.14 Removing the electronic expansion valve and solenoid valve

1 Remove the service cover, the bottom service cover and the rear cover following *"5.1.3.1 Removing the service cover"* and *"5.1.3.4 Removing the bottom service cover and rear cover"*.

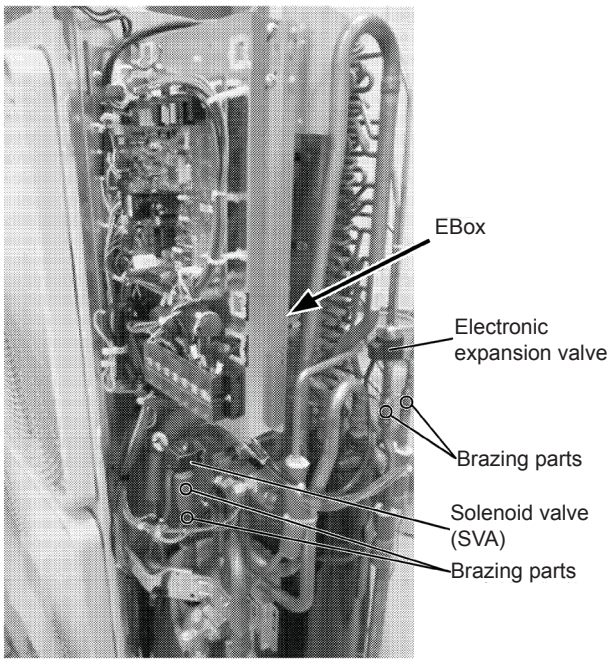
2 Recover the refrigerant from check joints according to *"5.1.3.7 Removing the compressor"*.

3 Remove the coils according to *"5.1.3.10 Removing reversing valve coil"* and *"5.1.3.12 Removing the solenoid valve coil (SVA and SVC)"*.

4 Remove the brazed parts as shown in the figures:
- Electronic Expansion Valve (EVO) Brazed Parts: 2
- Solenoid Valve (SVA) Brazed Parts: 2
- Solenoid Valve (SVC) Brazed Parts: 2

a. Remove the electronic expansion valve and the solenoid valve cooling the valve bodies with a wet cloth.

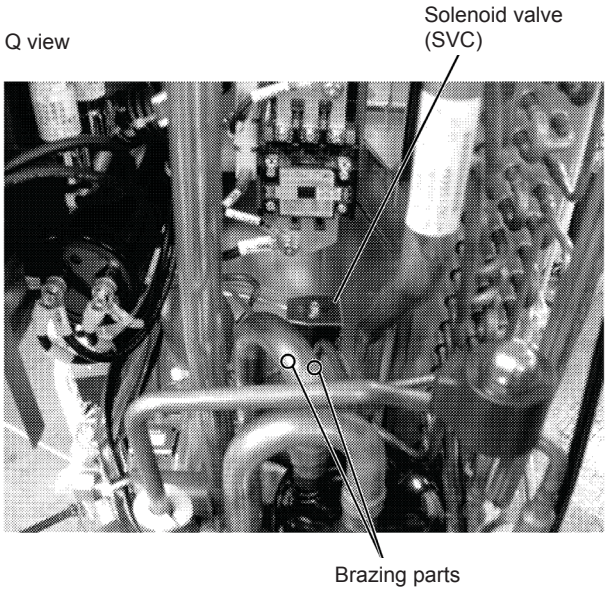
b. Perform the brazing work with attention not to burn the electrical wiring and the pipe insulations.



5 When reassembling after replacing the valves, perform in the reverse way of removing.

NOTE

Run the lead wires to be located to the original position, and fix them by the plastic band.

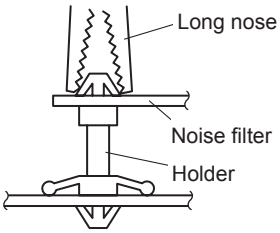


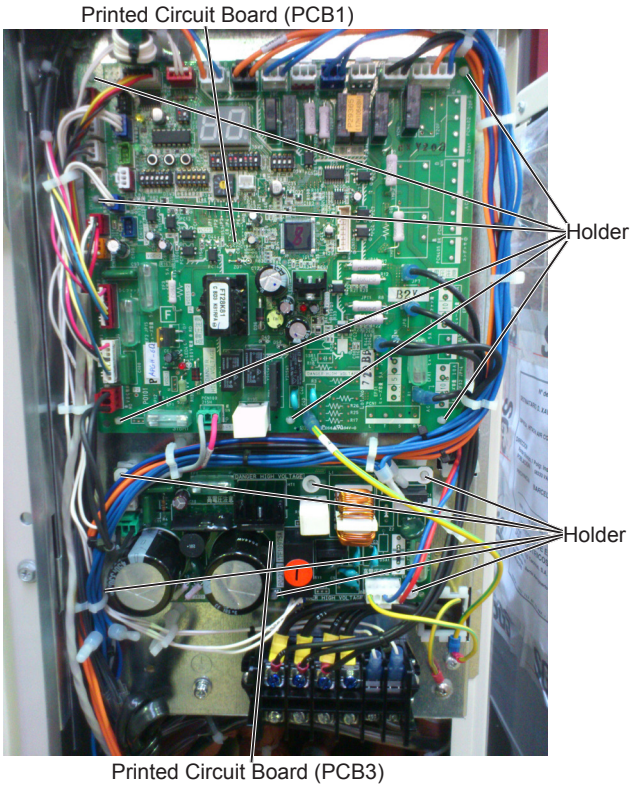
5.1.3.15 Removing the PCB (PCB1) and the relay PCB (PCB3)

1 Remove the service cover following *"5.1.3.1 Removing the service cover"*.

2 Remove all the wiring connected to the control PCB and the relay PCB.

3 Remove the 6 holders for each PCB. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.





5.1.3.16 Removing the inverter module

1 Remove the service cover following *"5.1.3.1 Removing the service cover"*.

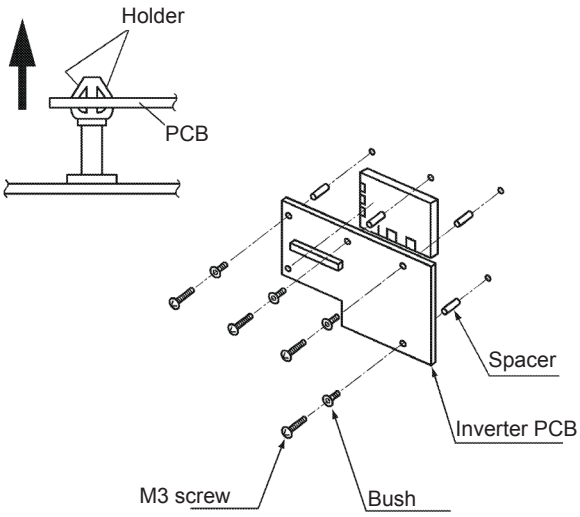
2 Open the P plate turning counter clockwise approximately 90° following *"5.1.3.9 Opening the electrical box (P-Mounting Plate)"*.

- Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

3 Remove 4 screws M3, remove the bushes and remove the spacers fixing the inverter

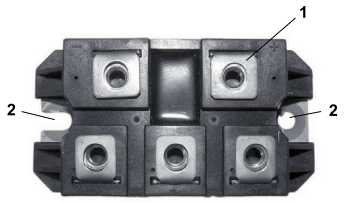
NOTE

When mounting again be sure to place the bushes and spacers.



5.1.3.17 Removing the diode module (DM)

1 Disconnect the wirings of terminal + - U V W on the diode module.
2 Remove 2 M5 fixing screws on the diode module.
3 Remove the diode module from the electrical box.



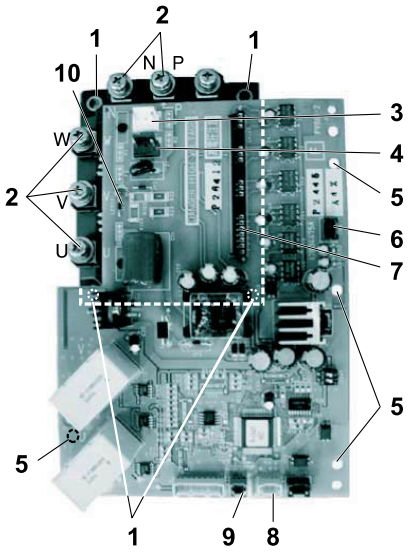
1	5 Screws (M5)
2	Fixing screw (M5)

5.1.3.18 Removing transistor module (IPM)

1 Disconnect all the wirings connected to the transistor module.
2 Remove the connectors CN2, CN3, CN206, PCN301 and PCN302 from the transistor module.
3 Disconnect the wirings of P N U V W on the transistor module.
4 Remove 4 M4 fixing screws on the transistor module.
5 Remove the transistor module from the electrical box.
6 Reassemble the parts in the reverse order of removing order.

NOTE

- *To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.*
- *When attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.*



1	Screws for transistor module (M4)
2	Screw (M5)
3	PCN301
4	PCN302
5	Screws for PCB (M3)
6	CN3
7	Inverter PCB
8	CN206
9	CN2
10	LED201

5.1.3.19 Removing other electrical components

1 Remove the service cover following *"5.1.3.1 Removing the service cover"* in this chapter.

2 Open the P plate turning counter clockwise approximately 90° following *"5.1.3.9 Opening the electrical box (P-Mounting Plate)"*.

- Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

Capacitors

1 Remove all the wiring connected to the capacitors.

NOTE

The wires have polarity symbols. Identify the wire mark band and the indication on the capacitor when connecting wires.

2 Remove 3 screws fixing each capacitor.

CMC

1 Remove all the wiring connected to CMC.

2 Remove 2 screws fixing the CMC.

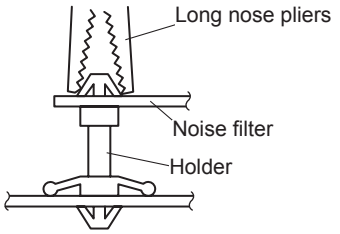
Reactor

1 Remove 4 screws fixing the reactor.

Noise filter

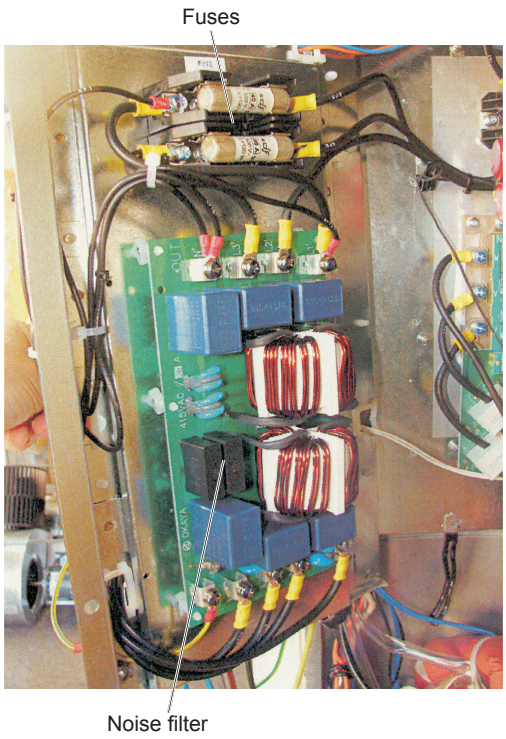
1 Remove all the wiring connected to the noise filter.

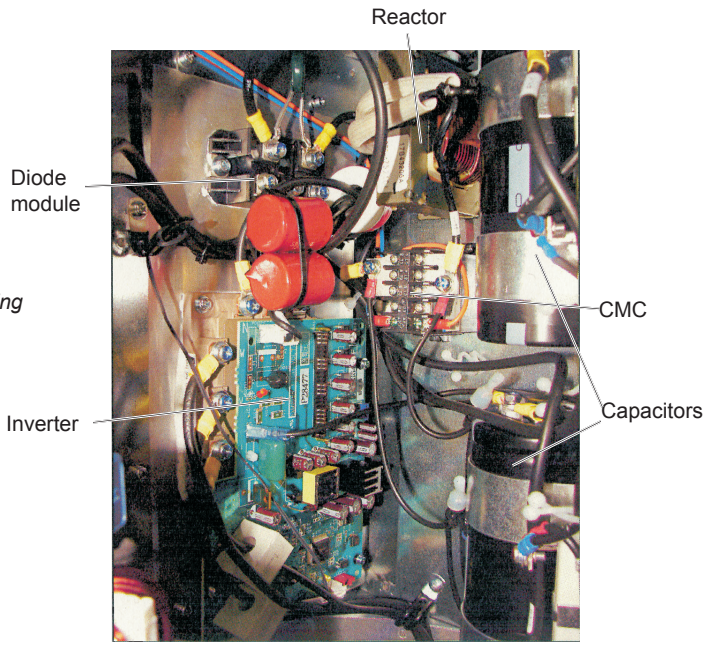
2 Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.



NOTE

When assembling components, be sure to match the wiring connections with the mark band codes.





5.2 Split system - YUTAKI S - RWM-(2.0-10.0)(N/R)1E

DANGER

- ***Disconnect the units from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***Wait minimum 10 minutes or more from all power supplies have been turned OFF.***
- ***When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components.***
- ***In case of replacing Hydraulic parts, drain water from the unit its needed. Close Shutdown valves and open the drain valves.***

CAUTION

- *In case of replacing refrigerant parts, collect refrigerant to the outdoor unit by pump down procedure.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing refrigerant parts, replace it quickly. If exposed for a long period, seal the liquid pipe and gas pipe.*
- *All refrigerant parts are connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections, if not, oil existing pipe inside may ignite.*
- *When performing brazing work, besides security gloves it is a must to wear convenient eye protection.*
- *In case of blocked or stacked parts, use appropriated tools and eventually lubricants to release them.*
- *In case of sharped edged parts, as covers, use security gloves to avoid getting injured.*
- *Pay attention of no falling off the service cover.*
- *Take care when removing service cover; the parts inside the unit could be hot.*

5.2.1 First steps for maintenance and servicing

There are 3 operations installers must do for most of servicing and maintenance procedures:

- To remove the unit cover.
- Opening of the E-Box cover. It is needed to have access to the PCB and the other electrical components placed inside the E-Box. Also, it is the first step to get access to the inside of the unit, as it is necessary to open the E-Box and have access to the cycle and hydraulic components of the unit.
- Opening the E-Box: To have access to the cycle and hydraulic components inside the unit.

5.2.2 Covers

5.2.2.1 Removing the Service cover

NOTE

Service cover needs to be removed for most of operations inside the indoor unit.

1 Remove the screw which fixes the service cover.



2 Slide the service cover slightly upward and remove it pulling backwards.

CAUTION

- *Take care with the LCD display of the unit controller while removing the frame.*
- *Pay attention of no falling off the service cover.*



5.2.2.2 Opening the E-box cover

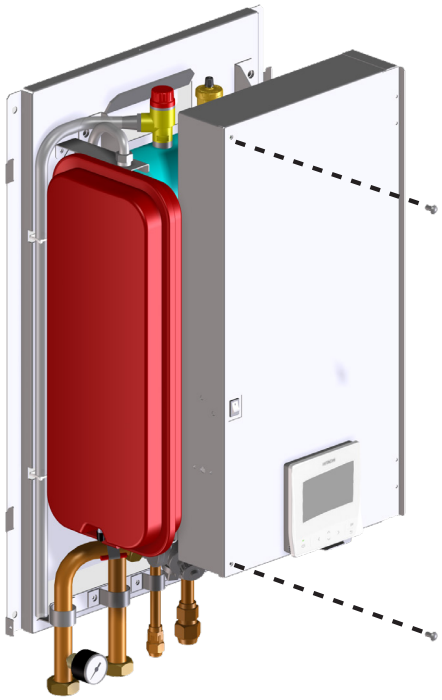
The following operations should be done before proceeding to the opening of the E-box.

- Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*

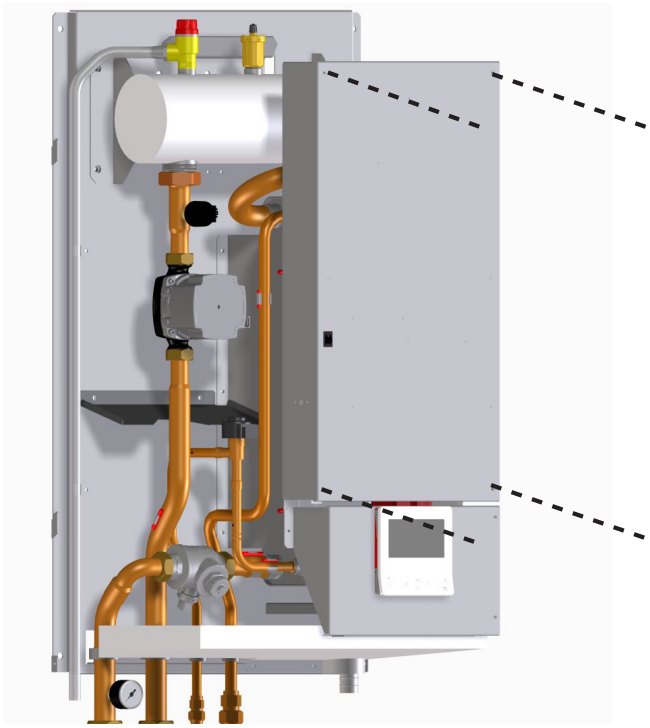
Then,

1 Remove the screws fixing the cover of the E-box

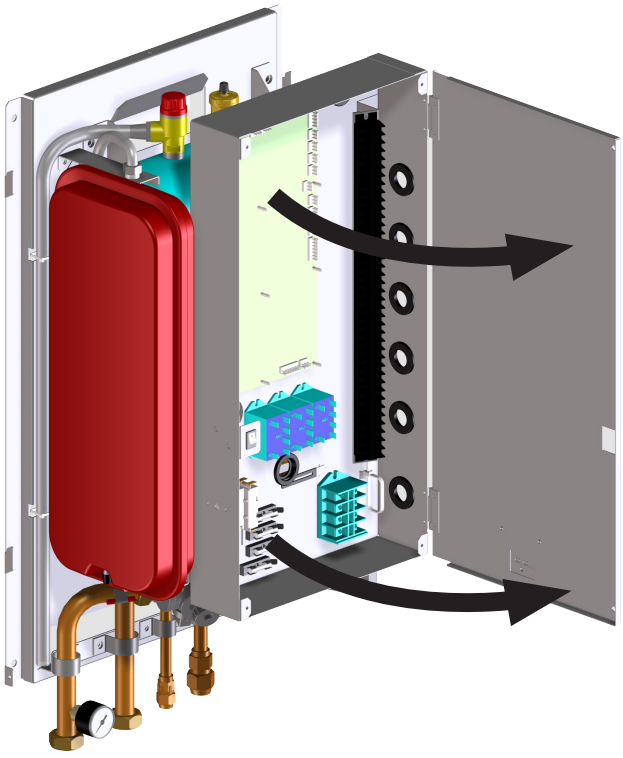
RWM-(2.0-3.0)R1E



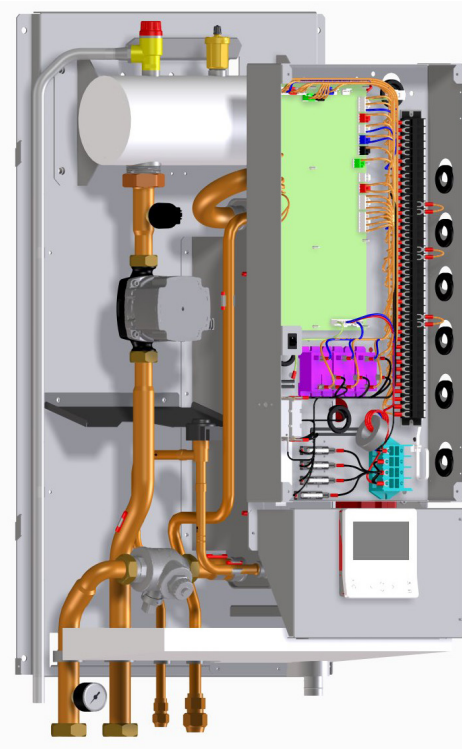
RWM-(4.0-10.0)N1E



2 For RWM-(2.0-3.0)R1E: From the left side of the E-box cover, gently pull backwards to open the E-box.



3 For RWM-(4.0-10.0)N1E: Remove the EBox cover



⚠ CAUTION

Pay attention of no falling off the service cover.

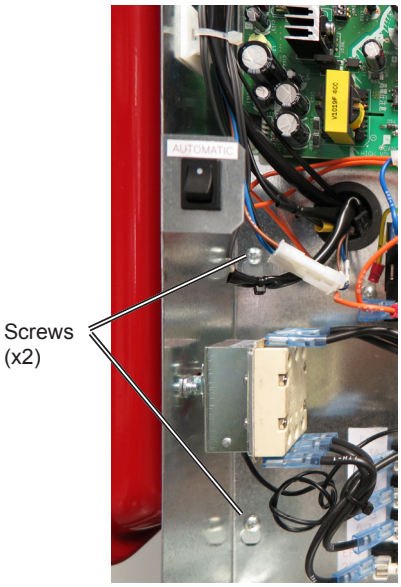
5.2.2.3 Opening the E-Box

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*

Then,

All models

1 Loosen the 2 screws fixing the E-Box.



2 From the left side, gently pull up and then backwards to open the E-box.



5.2.3 Cycle and hydraulic components

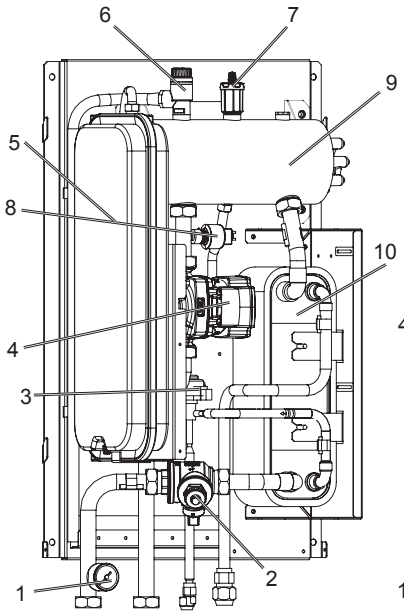
5.2.3.1 Access to the cycle and hydraulic parts

The following operations should be done to have access to the cycle and hydraulic components:

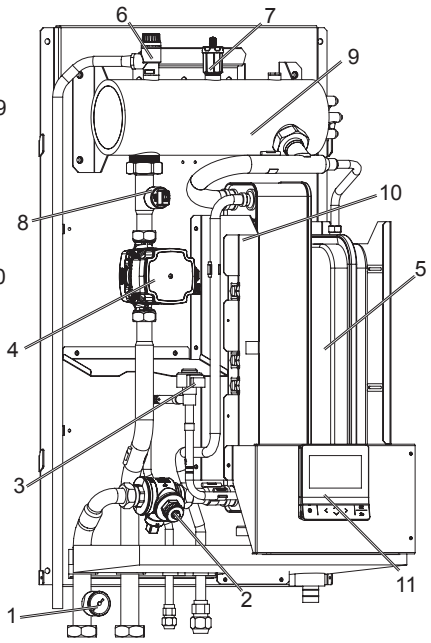
1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*
3 Opening of the E-Box as explained in chapter *"5.2.2.3 Opening the E-Box"*

5.2.3.2 Location of components

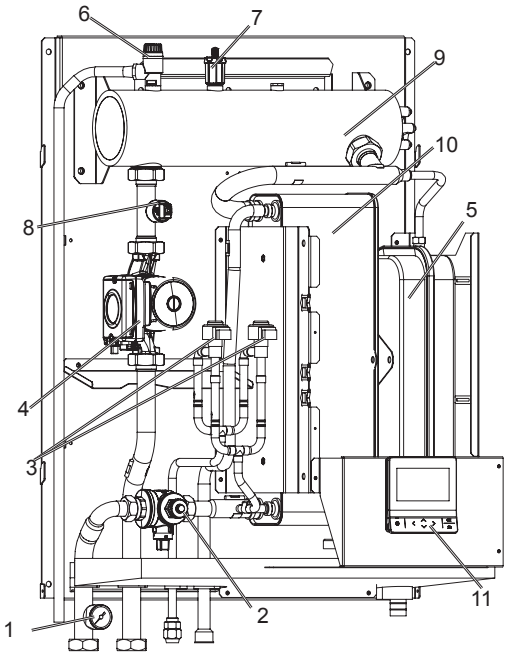
RWM-(2.0-3.0)R1E



RWM-(4.0-6.0)N1E



RWM-(8.0/10.0)N1E



Item	Description
1	Manometer
2	Filter Plus Ball Valve
3	Expansion Valve (2.0-6.0) HP: x1; (8.0-10.0) HP: x2)
4	Water pump
5	Expansion vessel
6	Safety valve
7	Air purge
8	Pressure water sensor
9	Electrical heater
10	Plate heat exchanger
11	Unit controller (*)

NOTE

(*): The unit controller of YUTAKI S (2.0-3.0) HP is integrated in the E-Box Cover.

5.2.3.3 Removing the Manometer

1 Drain the indoor unit water as explained at section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.

2 Remove front cover and open the E-Box to have access to the inner components.

3 Unscrew manometer capillary joint from the water pipe.



4 Install the new one by performing the procedures described above in reverse way.

NOTE

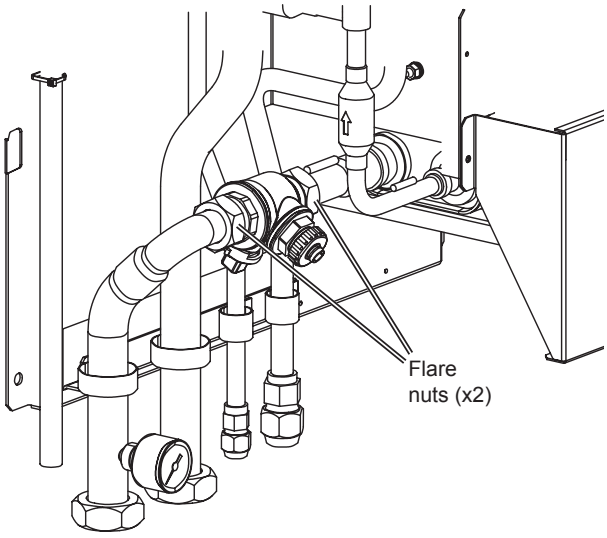
- *Be sure of the position of the manometer.*
- *Apply Teflon to the thread of the manometer port before assembling to avoid leakage.*

5.2.3.4 Removing the Filter plus ball valve

To remove the filter ball the following operations should be done:

1 Drain the indoor unit water as explained at section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.

2 Loosen the flare nuts of the filter plus ball valve



NOTE

For further information about the Filter plus ball valve, refer to "6 Filter plus" of "7. Maintenance notes" chapter.

5.2.3.5 Removing the Water pump

RWM (2.0-6.0)(N/R)1E

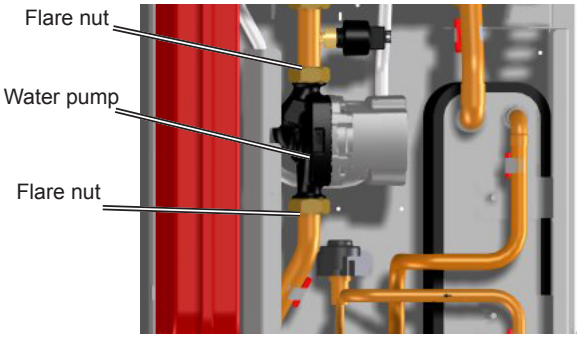
To remove the water pump the following operations should be done:

1 Remove the Service cover as explained in *"5.2.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.
3 Turn the water pump to the left to have better access to the cables. (Loose the nuts first if its necessary)
4 Remove the power supply connector of the water pump and the signal transmission cable.
5 Loosen the flare nuts.
6 Remove the water pump.



NOTE

- *Be sure of the position of the Water pump.*
- *Be careful, do not loose the gaskets of the water pump.*
- *Check the gaskets. If they are damaged, replace them for new ones.*



◆ Deblocking device of the water pump

The deblocking device consists of an axial moving plungertightened by an O-ring and pulled back by a spring inside a stainless steel housing that is welded to the rotor can.

By pushing and turning a screw driver, Phillips No. 2, the plunger pushes the shaft in axial direction into the pump,while it can be turned as well. The force is high enough todeblock pumps which are seized by lime e.g. if an appliance is stored for months after being wet tested.Before, during and after the deblocking, the device is tightand must not release any water



CAUTION

Be aware of splashing hot water.

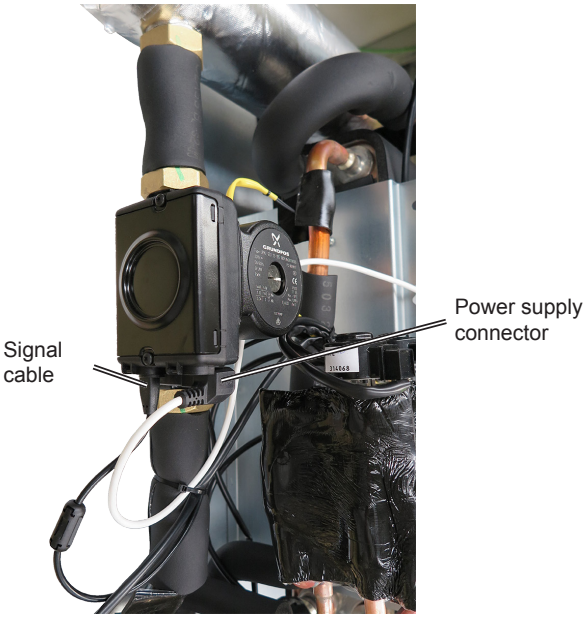
RWM (8.0/10.0)N1E

1 Remove the Service cover as explained in *"5.2.2.1 Removing the Service cover"*

2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.

3 Remove the wiring from the Water pump:

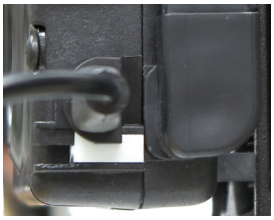
- Remove the Power supply plug connector.
- Remove the Signal cable connector.



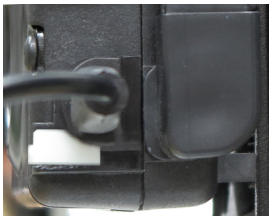
NOTE

To remove the connector of the signal cable it is necessary to move the fixing slide securing the connector, as it is shown in the picture below.

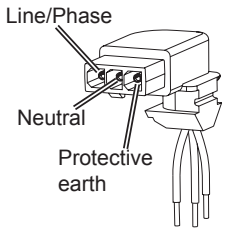
Locked



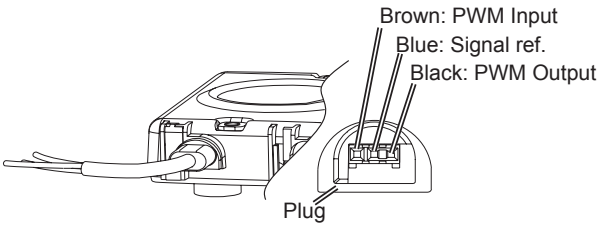
Unlocked



Power supply Cable

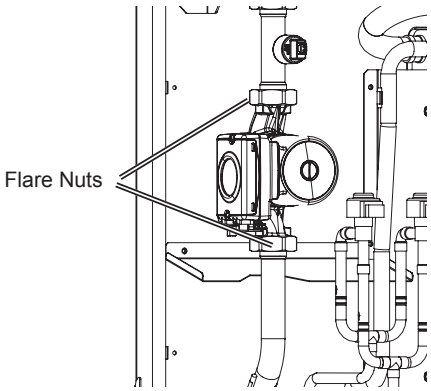


Signal cable



4 Loosen the flare nuts.

5 Remove the water pump.



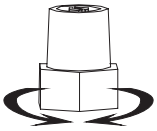
NOTE

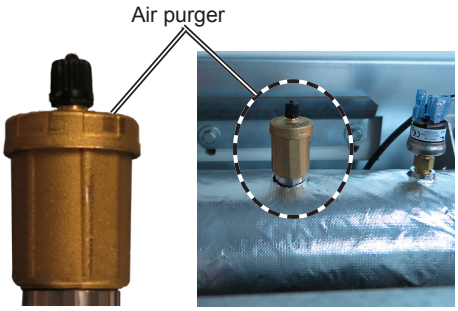
To reassemble the Water pump, proceed in reverse way.

5.2.3.6 Replacing the Air purger

To remove the air purger the following operations should be done:

1 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.
2 Unscrew the Air purger.
3 Replace the Air purger for a new one.





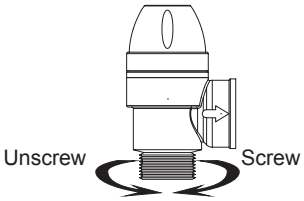
NOTE

- *Lubricate the Thread of the Air purger when reassembling.*
- *To reassemble the Air purger, proceed in reverse way than disassembling.*

5.2.3.7 Replacing the Safety valve

Proceed as explained below to replace the Safety valve:

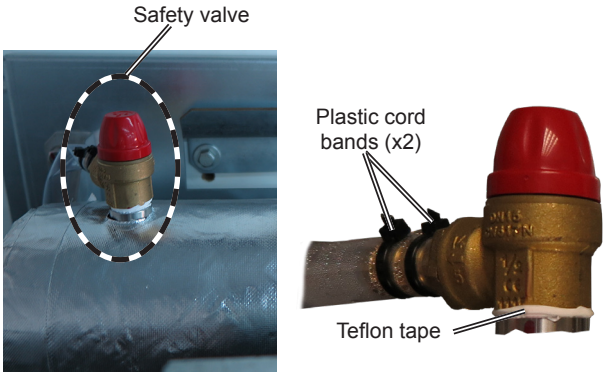
1 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.
2 Loosen the screw of the hose clamp fixing the drain hose
3 Unscrew the Safety valve.



4 Replace the Safety valve for a new one if needed.

NOTE

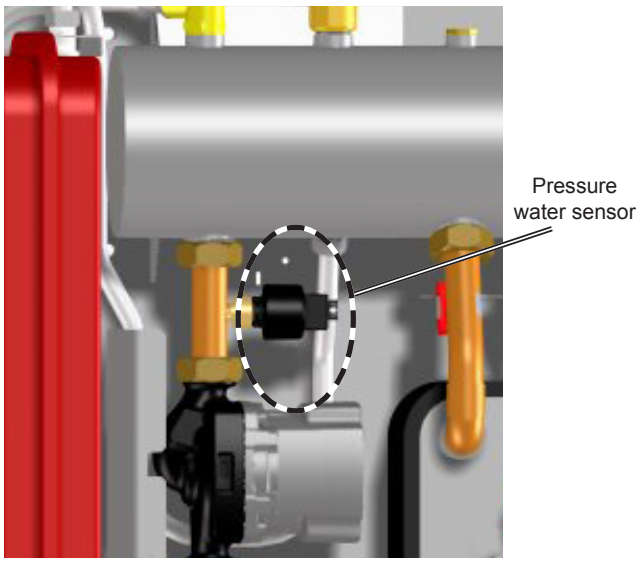
- *Use Teflon tape on the thread to avoid any leakage.*
- *To reassemble the Safety valve proceed in reverse way than disassembling.*



5.2.3.8 Replacing the Pressure water sensor

To replace the Pressure switch, follow the instruction given below:

1 Remove the Service cover as explained in *"5.2.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.
3 Disconnect from electrical box and release the cable.
4 Unscrew the Pressure sensor.
5 Screw the Pressure sensor using the gasket.
6 Lead the cable to electrical box and connect to PCB-PCN3.



NOTE

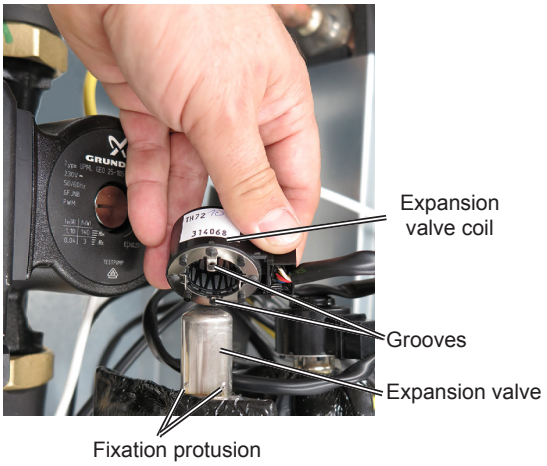
- *Use Teflon tape to avoid any leakage from the thread*
- *To reassemble the Pressure switch proceed in reverse way than disassembling.*

5.2.3.9 Replacing the Expansion valve coil

1 Remove the Service cover as explained in *"5.2.2.1 Removing the Service cover"*

2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.

3 Remove the coil of the expansion valve:
Slightly rotate the coil while pulling it upwards. The coil has a fixation system which comprises a protrusion at the Expansion valve that has to match with the grooves located at the coil. (See the picture beside).



4 At the Ebox, remove the CN7A connector from the PCB1.

5 Cut all the plastic cord bands fixing the cables of the Expansion valve coil.

6 Replace the Expansion valve and reassemble it in reverse way. Remember to fix the cables, with plastic cord bands, in the same way and position than were before disassembling.

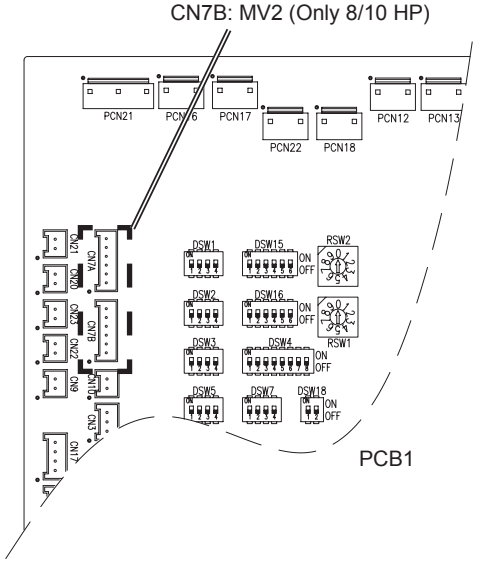
NOTE

- *RWM-(8.0/10.0)NE models have 2 expansion valves:*
- *MV1: Connected to CN7A and MV2: Connected to CN7B.*
- *See the electric diagrams*

Expansion valve coil connections to PCB1:

CN7A: MV1 (All models)

CN7B: MV2 (Only 8/10 HP)



5.2.3.10 Removing the Expansion valve

To remove the expansion valve the following operations should be done:

1 Remove the Service cover as explained in *"5.2.2.1 Removing the Service cover"*

2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.

At the expansion valve location,

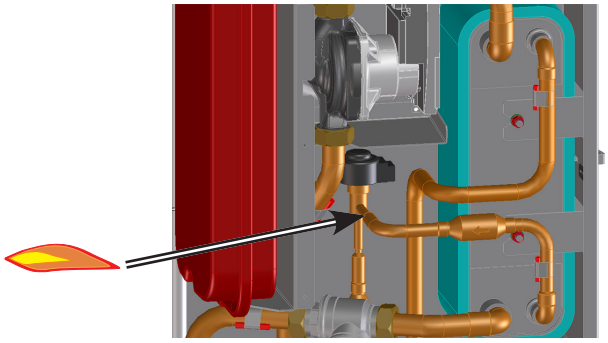
1 Remove the butyl sheet:
The butyl sheet is adhered around electronic expansion valve and the inlet piping and outlet piping of the electronic expansion valve. Remove the butyl sheet of the surface of the piping.



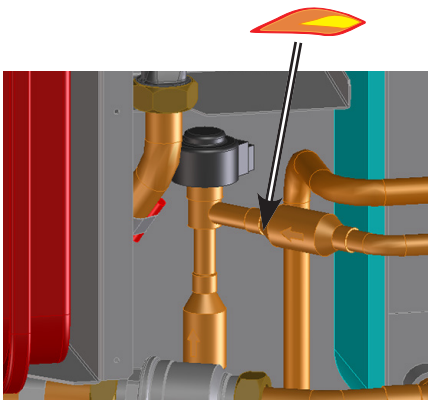
2 Remove the coil of the expansion valve as explained in *"5.2.3.10 Replacing the Expansion valve coil"*

3 Remove the Expansion valve by unbrazing the brazed parts with a blowtorch.

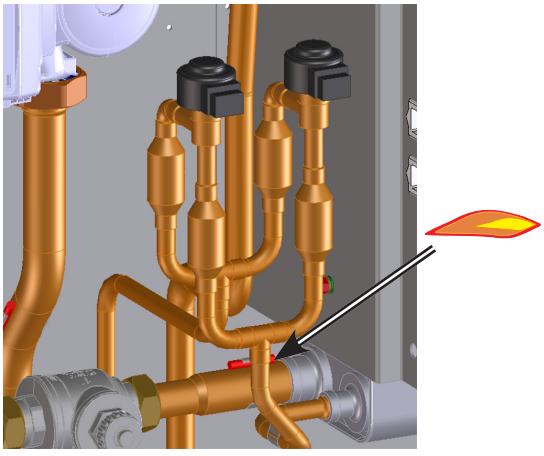
   a. Unbraze the connection between the expansion valve pipe and the strainer.



RWM-2.0R1E



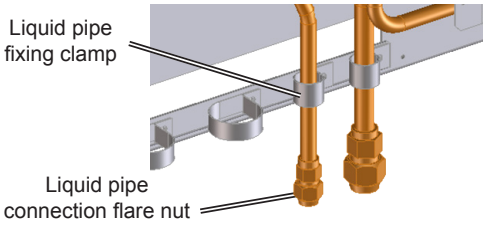
RWM-(2.5-3.0)R1E



RWM-(8.0/10.0)N1E

b. Unscrew the flare nut of the pipe. Unscrew the clamp that fixes the pipe.

c. Remove the Expansion valve assembly. Proceed to desolder the brazed parts and replace the expansion valve for a new one.



NOTE

To reassemble the Expansion valve proceed in reverse way than disassembling.

NOTE

During replacement work, pay attention to the separation part and prevent the dust, foreign particle, etc. from entering into the separation part. (The sensitive part of the valve is its mechanical system.)Do not damage the junction part of the valve with the tools.

5.2.3.11 Removing the Expansion vessel

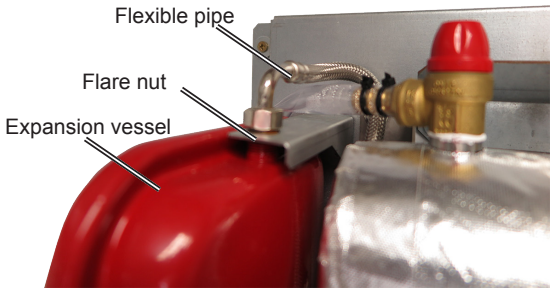
1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*

2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*

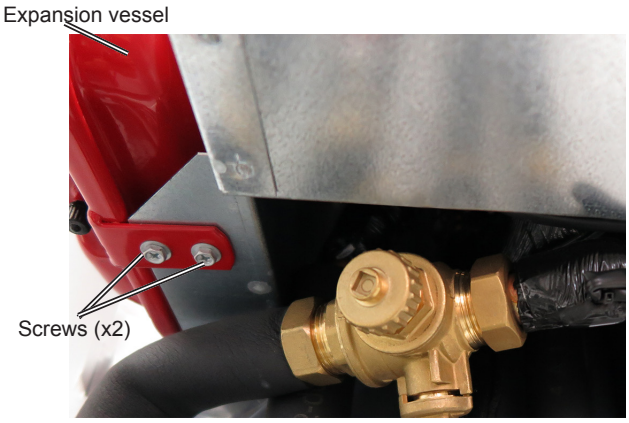
3 Open the E-Box as explained in chapter *"5.2.2.3 Opening the E-Box"*

4 Drain the unit as explained in *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes".*

5 Unscrew the flare nut of the flexible pipe at the top of the expansion vessel.



6 Remove the screws fixing the Expansion vessel at its bottom.



5.2.3.12 Removing the Plate heat exchanger (PHEX)

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover"*.
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover"*.
3 Open the E-Box as explained in chapter *"5.2.2.3 Opening the E-Box"*
4 Drain the unit as explained in *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes"*.
5 Collect the refrigerant by Pump down as explained in *"Evacuation and refrigerant charge"* in chapter *"7. Maintenance notes"*.

Then,

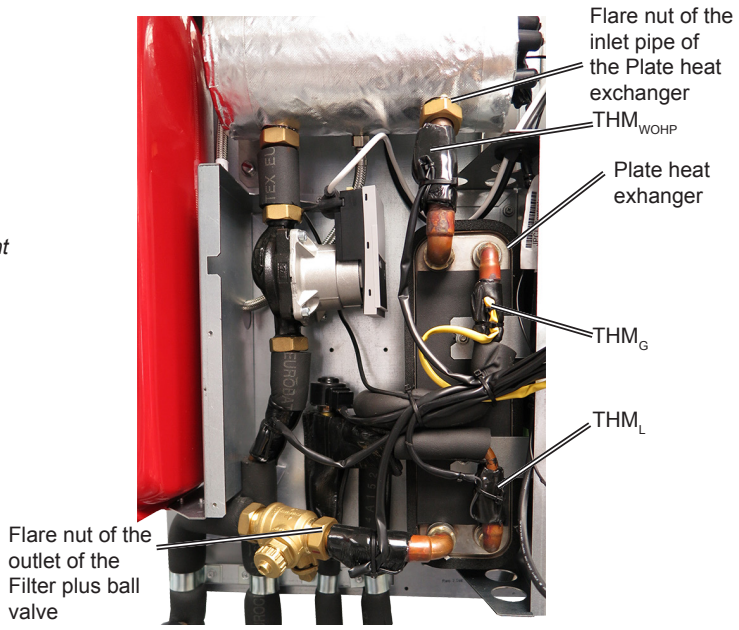
RWM-(2.0-3.0)R1E

1 Cut all the cord bands attaching all the wires and thermistors
2 Remove the following thermistors THM_{WOHP}, THM_{L} and $THM_{G.}$

NOTE

To remove the thermistors refer to its relevant instructions in this chapter.

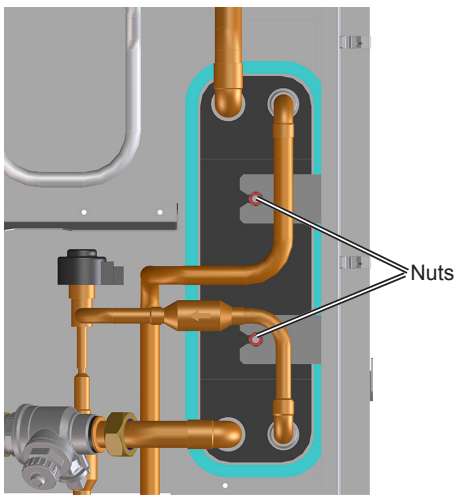
3 Loosen the flare nut attached to the inlet pipe of the Plate heat exchanger.
4 Loosen the flare nut of the outlet of the Filter plus ball valve.
5 Remove the metallic clamps fixing the water outlet pipe, the Refrigerant gas pipe and the Refrigerant liquid pipe.



6 Remove the Plate heat exchanger:
Remove the nuts fixing the Plate heat exchanger and remove it paying attention not to damage any other part of the unit (cables, pipes, gaskets, etc).

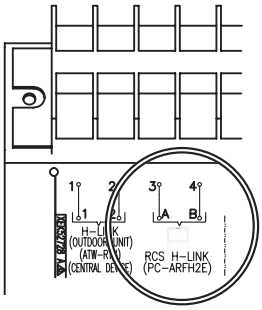
CAUTION

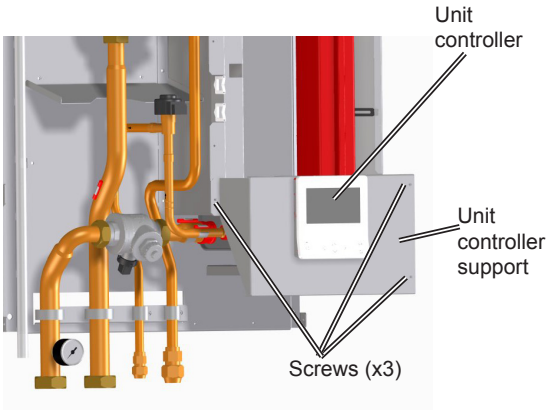
Be careful when handling the Plate heat exchanger. Pipes and Plate heat exchanger can be extremely hot.



RWM-(4.0-10.0)N1E

1 Disconnect the Unit controller from the table board of the PCB and remove the screws (x3) fixing the Unit controller support.





2 Cut all the cord bands attaching all the wires and thermistors.

3 Remove the following thermistors THM_{WOHP}, THM_{WI}, THM_{L} and THM_{G}.

NOTE

To remove the thermistors refer to its relevant instructions in this chapter.

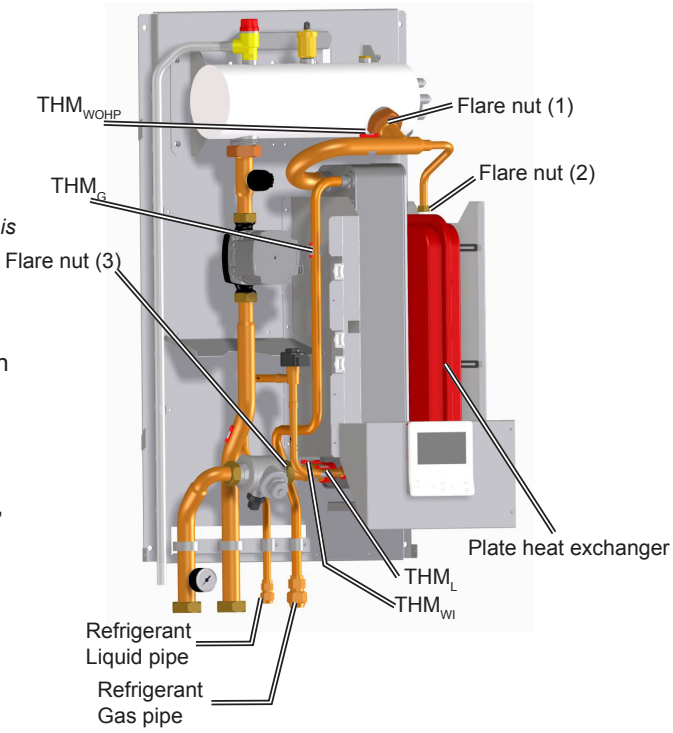
4 Loosen the flare nut attached to the inlet pipe of the Electrical heater (1).

5 Loosen the flare nut of the flexible pipe of the Expansion vessel (2).

6 Loosen the flare nut of the outlet of the Filter plus ball valve (3).

7 Remove the metallic clamps fixing the water outlet pipe, the Refrigerant gas pipe and the Refrigerant liquid pipe.

8 Unscrew the flare nuts of the refrigerant pipes (Liquid and Gas).



9 Remove the Plate heat exchanger:
Remove the nuts fixing the Plate heat exchanger and remove it paying attention not to damage any other part of the unit (cables, pipes, gaskets, etc).

CAUTION

Be careful when handling the Plate heat exchanger. Pipes and Plate heat exchanger can be extremely hot.

5.2.3.13 Removing the Electrical heater

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*
3 Open the E-Box as explained in chapter *"5.2.2.3 Opening the E-Box"*
4 Drain the unit as explained in *"Draining operation for YUTAKI S"* in chapter *"7. Maintenance notes".*

Then,

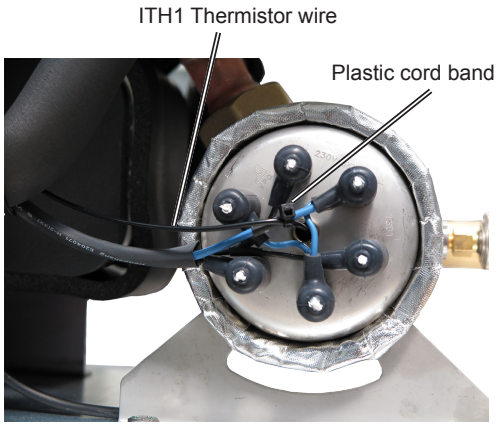
1 Cut the plastic cord band of the ITH_1 thermostat, located at the head of connectors of the Electrical heater.
2 Softly pull the thermistor backwards and remove it from the Electrical heater

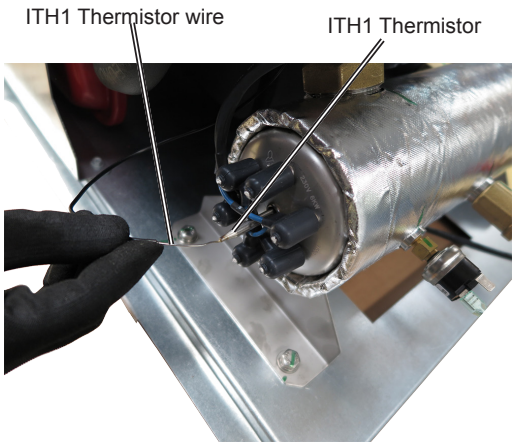
NOTE

Take special care with the Thermistor when handling it. Once it is removed, place it in a place where it cannot be damaged when removing the Electrical heater.

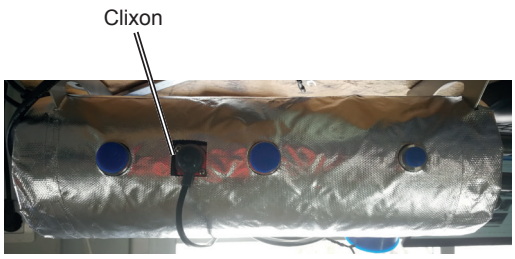
CAUTION

Do not unscrew, remove or manipulate the terminals at the head of the Electrical heater. When removing the Electrical heater, disconnection procedure must be done on the Electrical Box, as explained below.



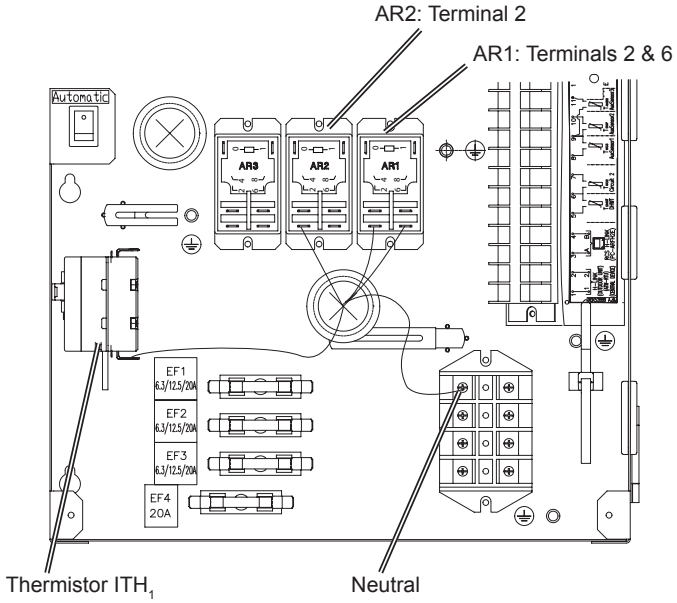


3 Remove the clixon from the Electrical heater



4 Cut the plastic cord bands attached to the harness of the Electrical heater.

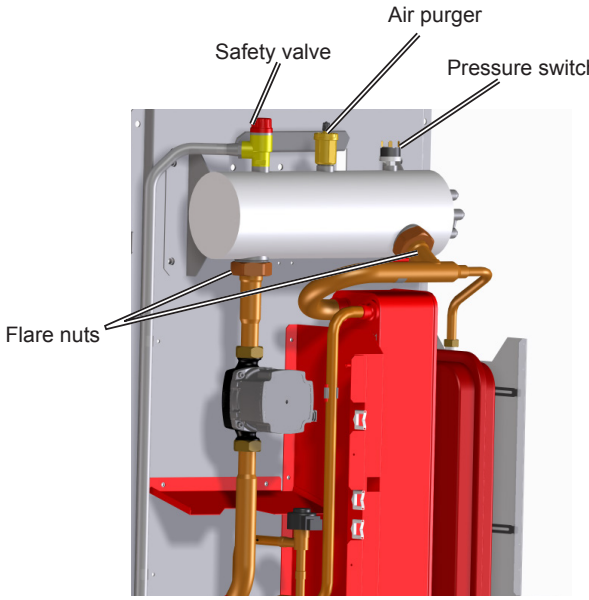
5 Remove the terminals of the Electrical heater cables, located inside the EBox



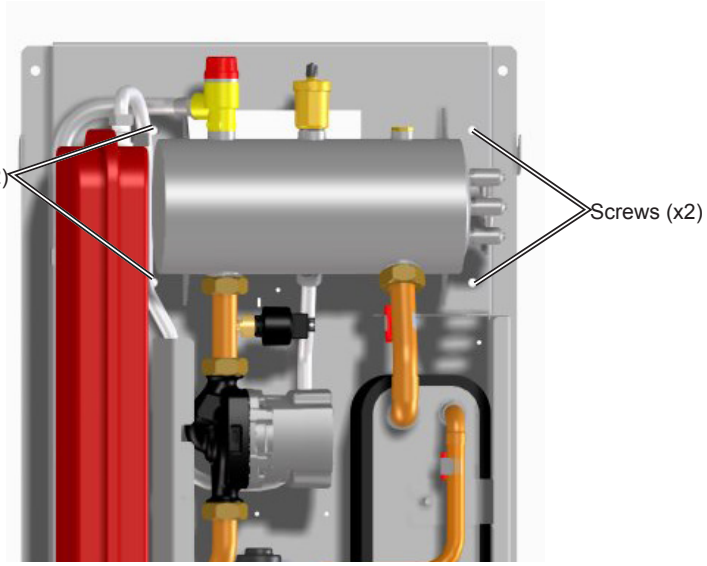


6 Loosen the flare nuts connecting the pipes to the Electrical heater

- Remove the Air purger as explained in
- Remove the Safety valve as explained in
- Remove the Pressure switch as explained in



- Remove the 4 screws fixing the Electrical heater to the rear panel.



5.2.4 Electrical components

DANGER

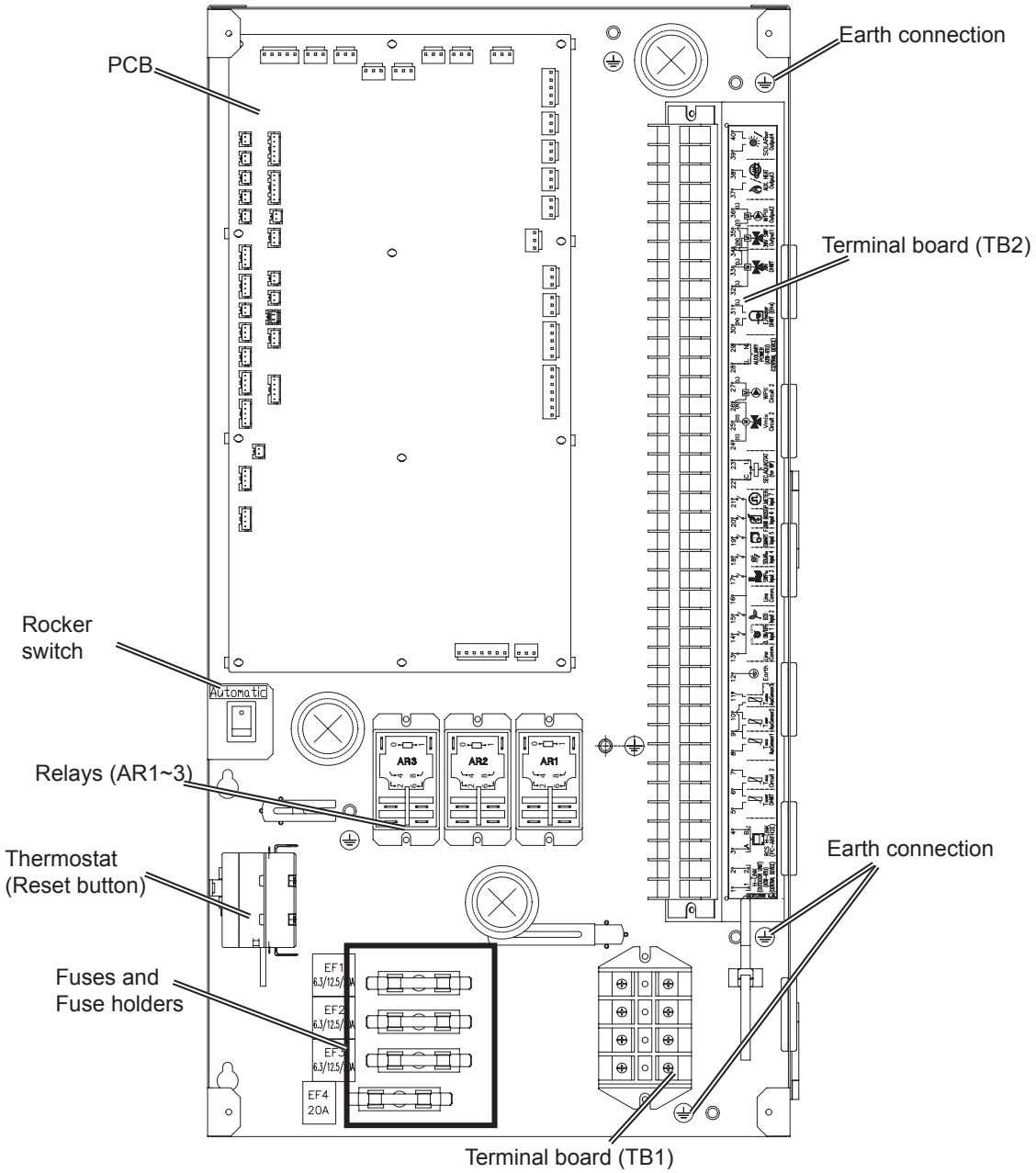
- ***Disconnect the YUTAKI S from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components.***

CAUTION

- *When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid possible failures and damage to electrical components.*
- *To properly disconnect these components from the PCB, see the "8.5 Electrical Wiring Diagrams" section of "8. Electrical and control settings" chapter of this manual.*
- *Cover the thermistors with the cork tape or pipe insulation according to each location. Both materials are factory supplied. Replace them if damaged during the servicing.*

5.2.4.1 Location of components of the PCB

E-Box



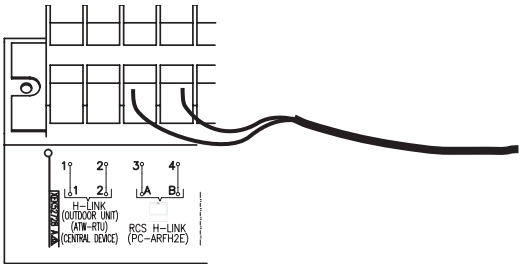
5.2.4.2 Removing the unit controller

Remove the Service cover as explained in chapter *"5.2.2.1 Removing the Service cover".*

Then,

1 Open the E-Box cover as explained in *"5.2.2.2 Opening the E-box cover".*

2 Disconnect the cables of the Unit controller connected to the terminals 3 and 4 of the Terminal Board (TB1).

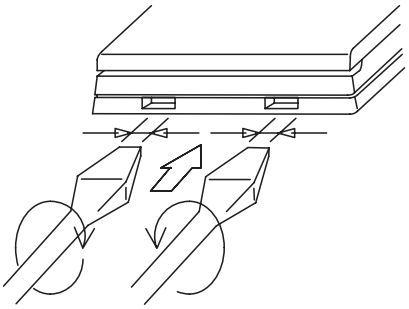


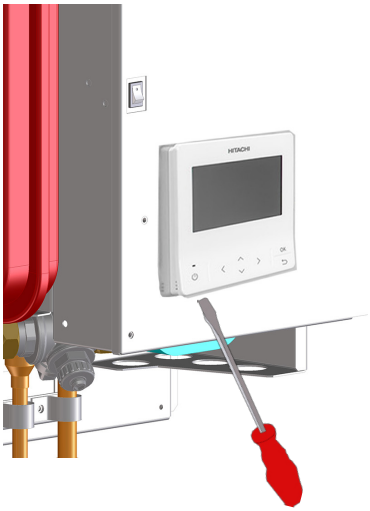
3 Cut the plastic cord bands attaching the PC-ARFH2E cables

4 Open the Unit controller front cover.

NOTE

Refer to the Instructions manual of the PC-ARFH2E Unit controller for more information regarding the opening and disassembling of the device.

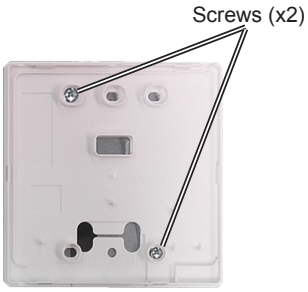






5 Gently pull the harness backwards

6 Remove the screws (x2) fixing the unit controller base to the unit

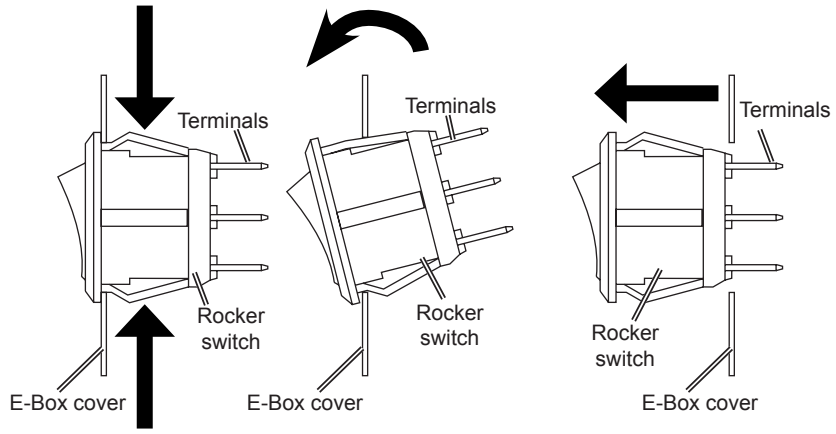


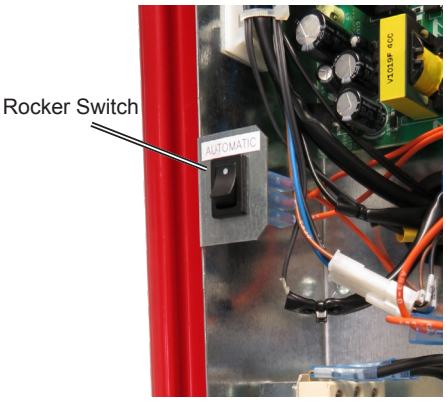
NOTE

When reassembling, proceed in reverse way than disassembling.

5.2.4.3 Replacement of the rocker switch

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover"*.
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover"*.
3 Disconnect the terminals of the Rocker switch.
4 From the rear side of the Switch press backwards. (See the pictures below).

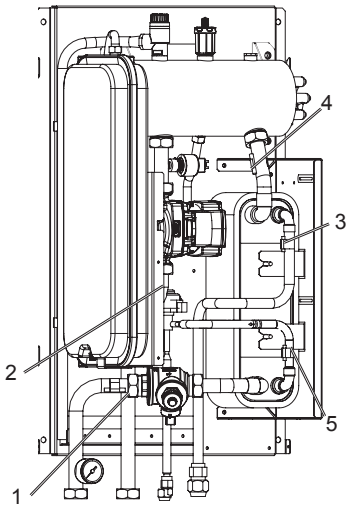




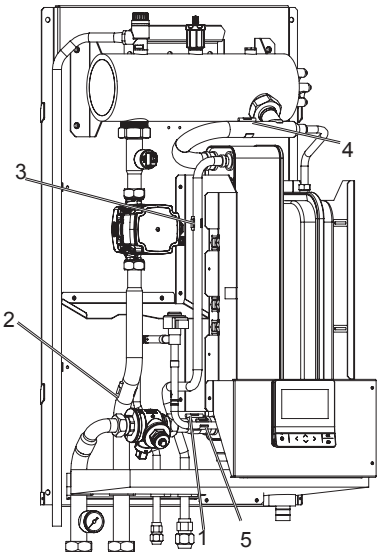
5.2.4.4 Replacing thermistors (THM_{WO}, THM_{WI}, THM_{L}, THM_{G}, THM_{WOHP})

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover"*.
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover"*.

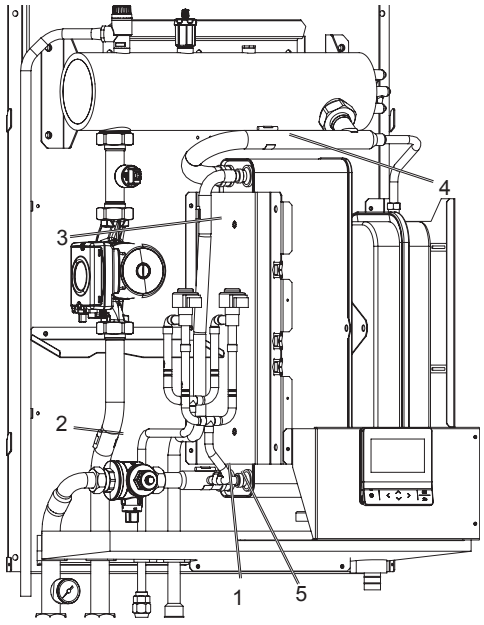
RWM-(2.0-3.0)R1E



RWM-(4.0-6.0)N1E



RWM-(8.0/10.0)N1E



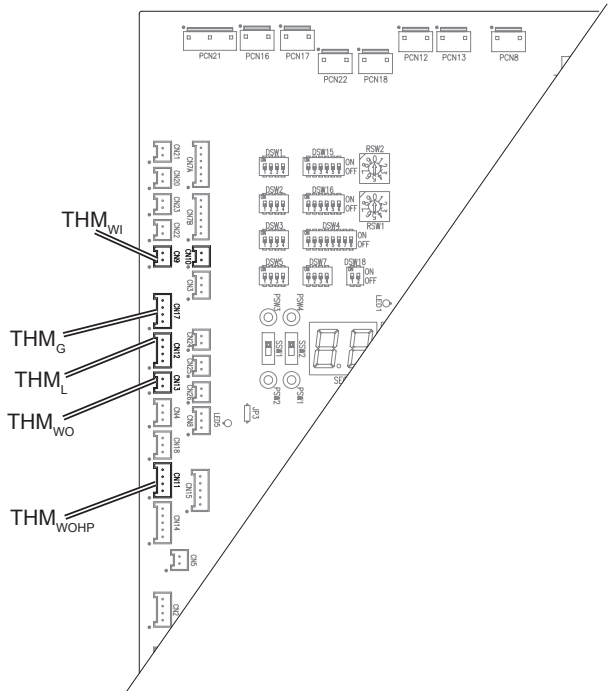
Item	Description	Connector
1	Water inlet pipe thermistor THM_{WI}	CN9
2	Water outlet pipe thermistor THM_{WO}	CN13
3	Gas refrigerant pipe thermistor THM_{G}	CN17
4	Water Outlet heat pump pipe thermistor THM_{WOHP}	CN11
5	Liquid refrigerant pipe thermistor THM_{L}	CN12

NOTE

Additional Thermistors can be connected to the PCB according to the configuration of the installation. Refer to the Wiring diagram to see where they should be connected.

3 Disconnect the thermistor to be replaced from the correct connector of PCB2.

4 Cut and remove the plastic cord band attached to the thermistor harness.



CAUTION

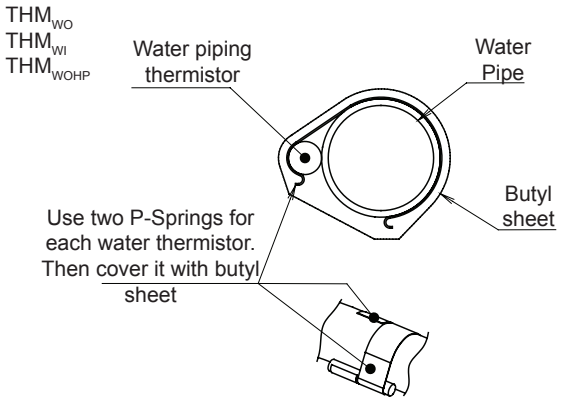
In case of P-Spring deforming, it needs to be replaced.

5 Remove the pipe insulation of thermistor.

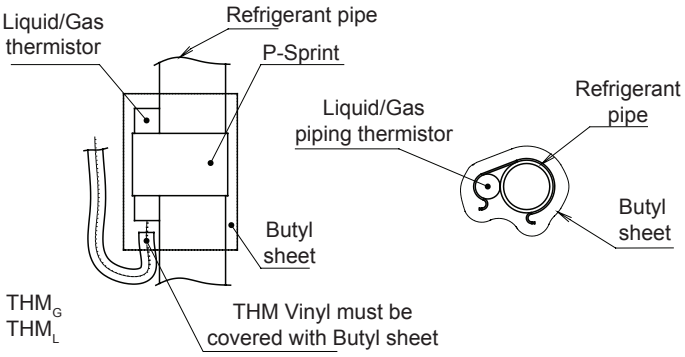
6 Remove special clamp that is attached with copper pipe and sensor.

7 Install new thermistor using P-Spring and Butyl Sheet as shown in the following drawing:

Water thermistors



Refrigerant thermistors



NOTE

When reassembling, install thermistor wire by performing the process in reverse way.

5.2.4.5 Replacement of the thermostat reset switch

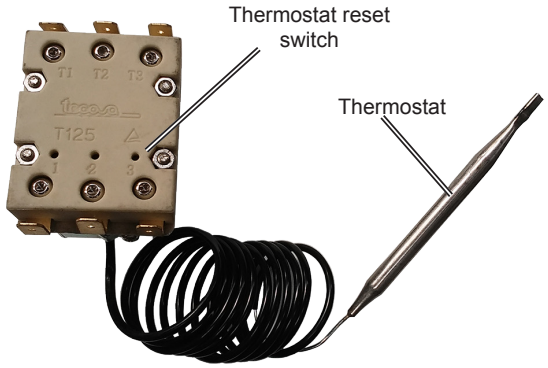
1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*

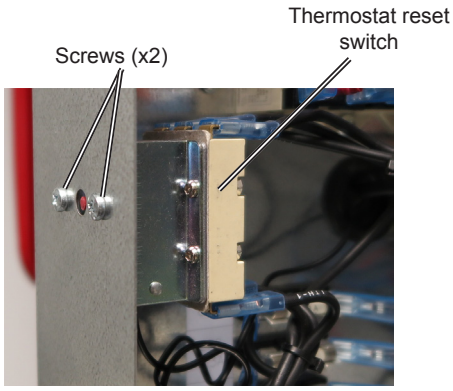
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*

3 Disconnect all the terminals connected to the Thermostat reset switch.

NOTE

The Thermostat of the Electrical heater is connected and sealed to the Thermostat reset switch. To proceed to the disassembling of the Thermostat from the electrical heater follow the instructions given in "5.2.3.13 Removing the Electrical heater"





4 Remove the screws (x2) fixing the thermostat reset switch to the Electrical box.

NOTE

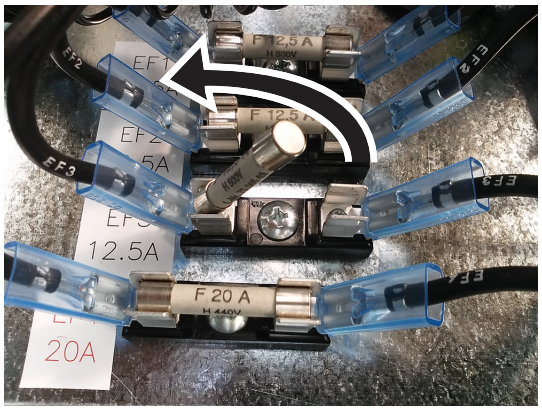
When reassembling, proceed in reverse way.

5.2.4.6 Replacement of fuses (EF1~4)

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*

2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*

3 Once the broken fuse is detected, pull it from its placement.



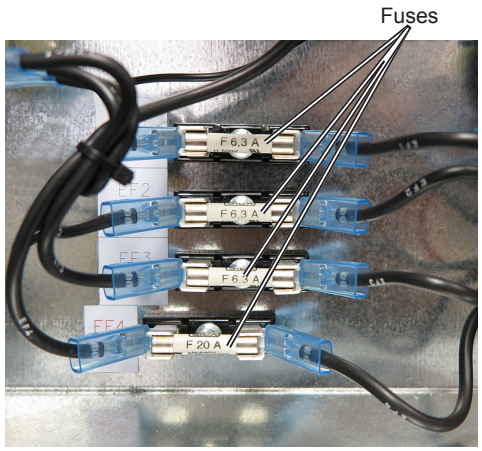


Table of fuses

Fuse	Dimensions (Ø x L) (mm)	RWM-(2.0-3.0)R1E	RWM-(4.0-10.0)N1E
EF1	6.35 x 31.8	6.3 A	12.5 A
EF2		6.3 A	12.5 A
EF3		6.3 A	12.5 A
EF4		20 A	20 A

5.2.4.7 Removing the fuse holder

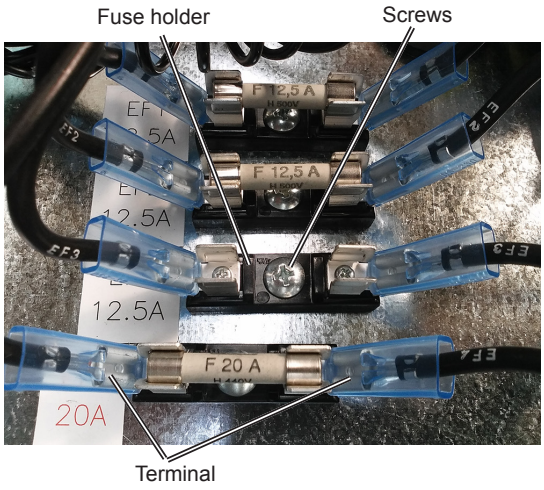
1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*

For those cases where a replacement of the fuse holder is necessary, proceed with the following instructions:

3 Remove the fuse as explained in *"5.2.4.5 Replacement of fuses (EF1~4)"*
4 Disconnect the cables from the terminals of the fuse holder.
5 Remove the screw fixing the fuse holder and replace it.

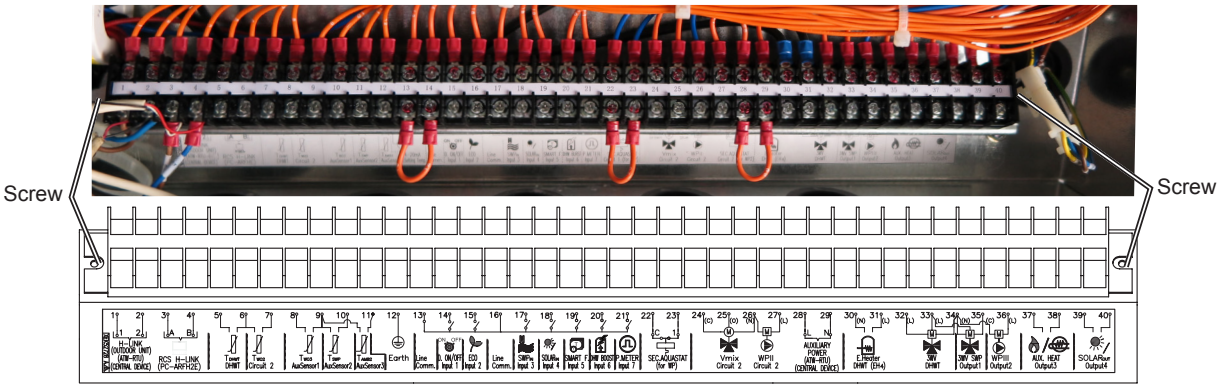
NOTE

The reassembling of the fuse should be done in reverse way than disassembling.



5.2.4.8 Replacement of the terminal board (TB2)

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*
3 Remove all the cables connected to the terminal board.
4 Remove the screws fixing the Terminal board to the E-Box



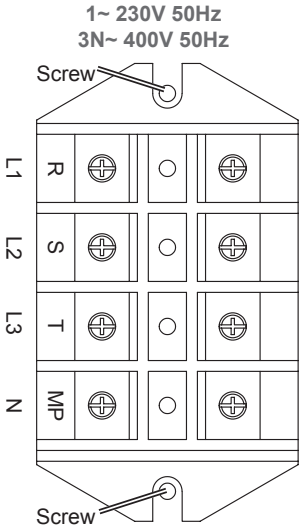
NOTE

Take note of the connections on the PCB. In particular, special connections, bridges, etc. Check the wiring diagram for any doubt you may have. Any incorrect connection may damage the unit.

5.2.4.9 Replacement of the terminal board (TB1)

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*

1 Remove all the cables connected to the terminal board.
2 Remove the screws fixing the Terminal board to the E-Box



5.2.4.10 Replacement of relays (AR1~3)

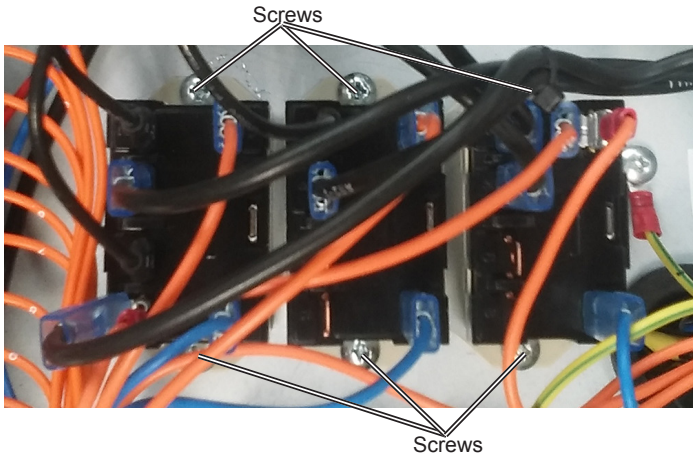
1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover".*
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover".*

Then,
3 Identify the abnormal relay. Once detected, disconnect the cables.

NOTE

Take note of the connections on the Relays. Check the wiring diagram for any doubt. Any incorrect connection may damage the unit.

4 Remove the screws attaching the relay to the E-Box.

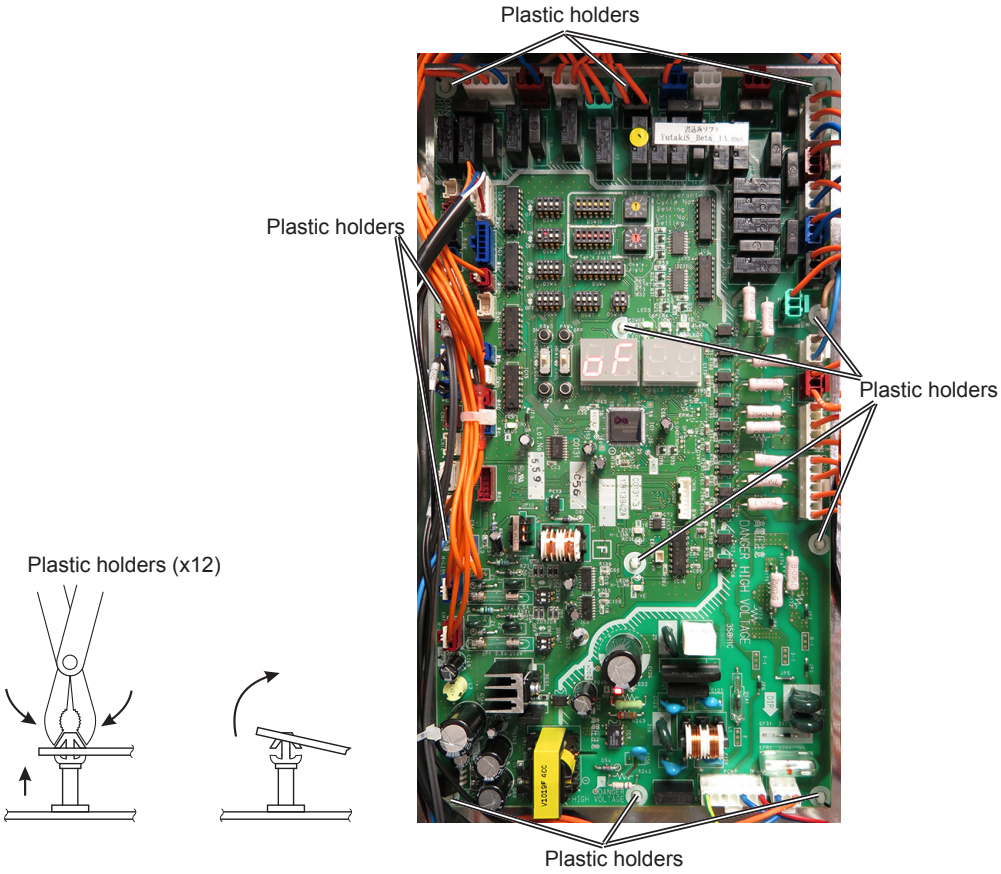


5.2.4.11 Replacement of the PCB

1 Remove the cover as explained in chapter *"5.2.2.1 Removing the Service cover"*.
2 Open the E-Box cover as explained in chapter *"5.2.2.2 Opening the E-box cover"*.

Then,

1 Remove all the connectors connected to the PCB.
2 Remove the plastic holders that fix the PCB to the E-Box.



5.3 Split system - YUTAKI S COMBI - RWD-(2.0-6.0)(N/R)W1E-220S(-K)

DANGER

- ***Disconnect the units from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***Wait minimum 10 minutes or more from all power supplies have been turned OFF.***
- ***When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components.***
- ***In case of replacing Hydraulic parts, drain water from the unit its needed. Close Shutdown valves and open the drain valves.***

CAUTION

- *In case of replacing refrigerant parts, collect refrigerant to the outdoor unit by pump down procedure.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing refrigerant parts, replace it quickly. If exposed for a long period, seal the liquid pipe and gas pipe.*
- *All refrigerant parts are connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections, if not, oil existing pipe inside may ignite.*
- *When performing brazing work, besides security gloves it is a must to wear convenient eye protection.*
- *In case of blocked or stacked parts, use appropriated tools and eventually lubricants to release them.*
- *In case of sharped edged parts, as covers, use security gloves to avoid getting injured.*
- *Pay attention of no falling off the service cover.*
- *Take care when removing service cover; the parts inside the unit could be hot.*

5.3.1 First steps for maintenance and servicing

There are 2 operations installers must do for most of servicing and maintenance procedures:

- To remove the Service cover.
- Opening of the E-Box cover. It is needed to have access to the PCB and the other electrical components placed inside the E-Box. Also, it is the first step to get access to the inside of the unit, as it is necessary to open the E-Box to have access to the cycle and hydraulic components.

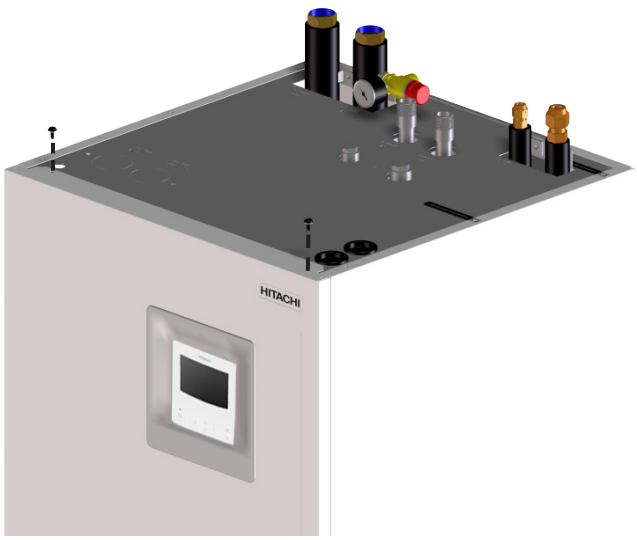
5.3.2 Covers

5.3.2.1 Removing the Service cover

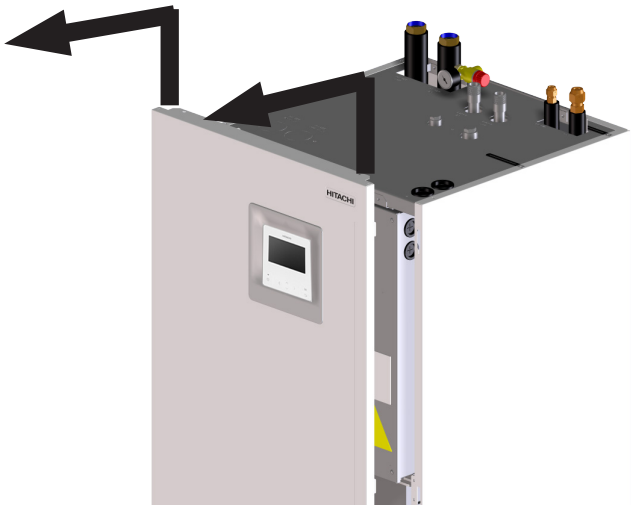
NOTE

Cover needs to be removed for most of operations inside the indoor unit. Back, left and right covers are not need to be removed.

1 Remove the 2 screws of the indoor unit front cover.



2 Slide the service cover slightly upward and remove it pulling to back.



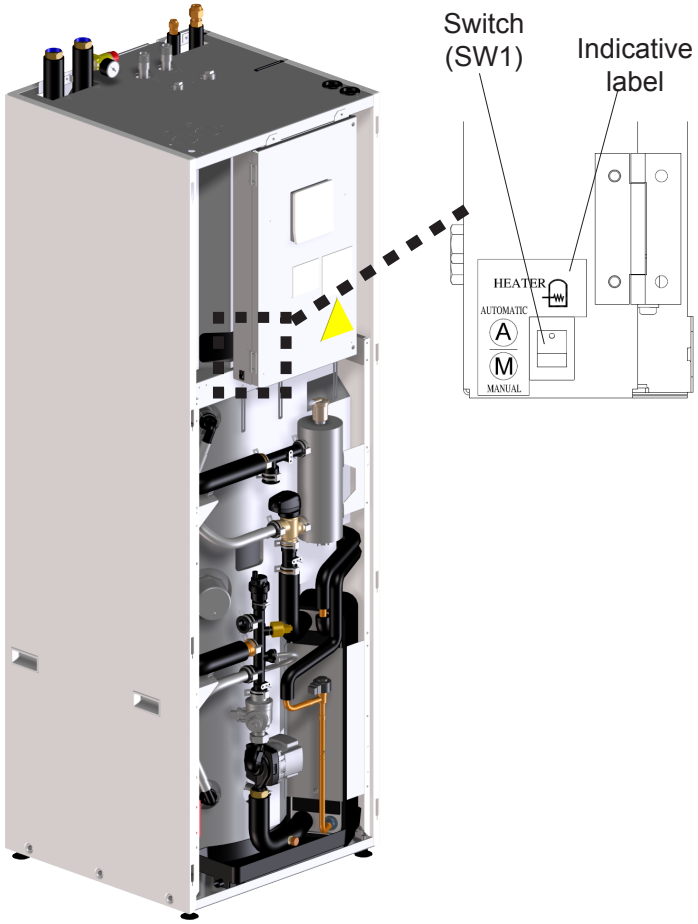
⚠ CAUTION

- *Pay attention of no falling off the service cover.*
- *Take care when removing service cover; the parts inside the unit could be hot.*

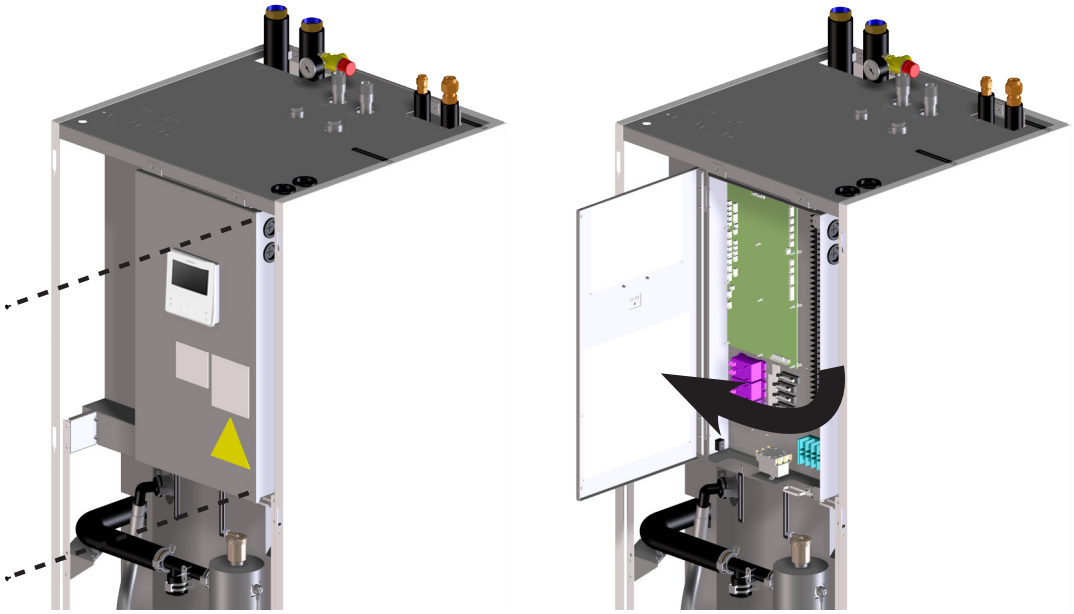
5.3.2.2 Opening the EBOX cover

⚠ DANGER

- ***Disconnect the unit from the power supply before touching any of the parts in order to avoid an electrical shock.***
- ***Do not touch the switch for DHW tank heater operation when handling the electrical box. Keep the position of this switch in factory setting position ("Automatic" operation).***

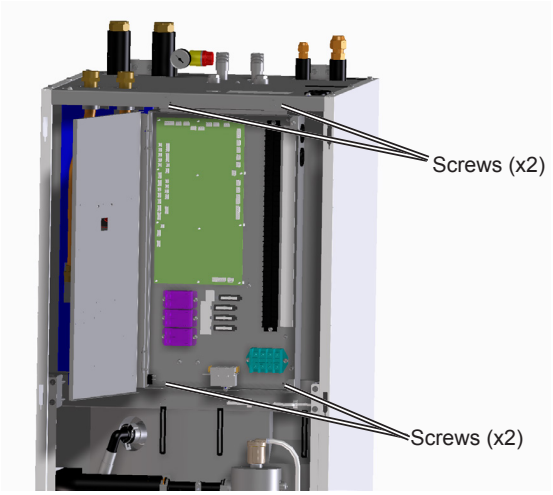


1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Unscrew the 2 front screws of the electrical box cover and then, open it.

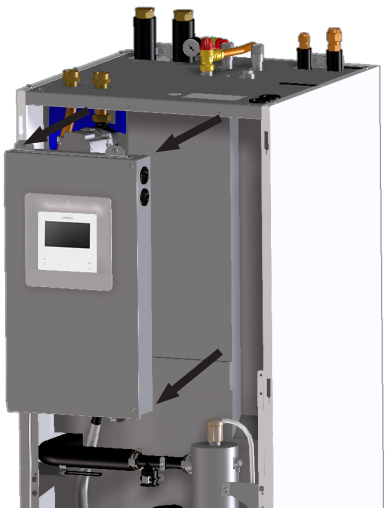


5.3.2.3 Removing the EBOX

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Remove the EBOX cover as explained in *"5.3.2.2 Opening the EBOX cover"*
3 Loosen the screws (x4) fixing the EBOX



4 Pull the EBOX back and to remove the EBOX



5.3.3 Cycle and hydraulic components

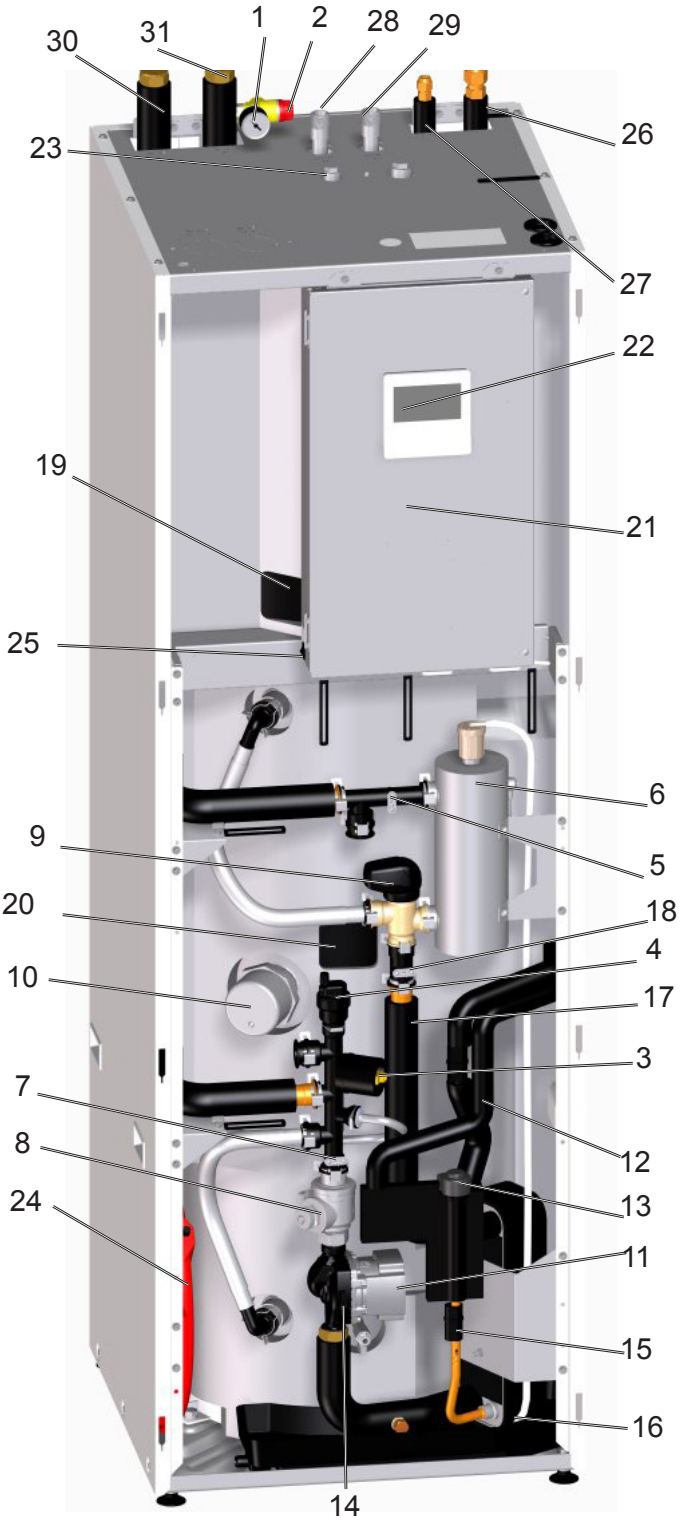
5.3.3.1 Access to the cycle and hydraulic parts

The following operations should be done to have access to the cycle and hydraulic components:

- Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
- Opening the EBOX cover as explained in *"5.3.2.2 Opening the EBOX cover"*
- Occasionally, remove the EBOX as explained in *"5.3.2.3 Removing the EBOX"*

5.3.3.2 Location of components

The next illustration shows the location of the main parts of the YUTAKI S COMBI.



Item	Description
1	Manometer
2	Safety valve
3	Water pressure sensor
4	Air purger
5	Water outlet pipe thermistor THM_{WO}
6	Electric water heater
7	Water inlet pipe thermistor THM_{WI}
8	Water strainer
9	3 way valve (for space heating and DHW)
10	DHW tank heater + thermostat
11	Water pump
12	Refrigerant strainer (x2)
13	Expansion valve
14	Drain port (For DHW) - G 3/8”
15	Refrigerant liquid pipe thermistor THM_{L}
16	Plate heat exchanger (PHEX)
17	Refrigerant gas pipe thermistor THM_{G}
18	Water outlet PHEX Thermistor THM_{WOHP}
19	DHW lower thermistor THM_{DHWT1}
20	DHW upper thermistor THM_{DHWT2}
21	EBOX
22	Unit controller
23	Pressure and temperature relief valve (Only UK models)
24	Expansion vessel 6L
25	Switch for DHW emergency operation
26	Refrigerant gas pipe connection - Ø15.88 (5/8”)
27	Refrigerant liquid pipe connection 2.0HP: Ø 6.35 (1/4”) / 2.5~6HP: Ø9.52 (3/8”)
28	DHW inlet pipe connection - G 3/4” male
29	DHW outlet pipe connection - G 3/4” male
30	Water outlet pipe connectio 2.0-6.0HP: G 1” female
31	Water inlet pipe connection 2.0-6.0HP: G 1” female

5.3.3.3 Removing the manometer

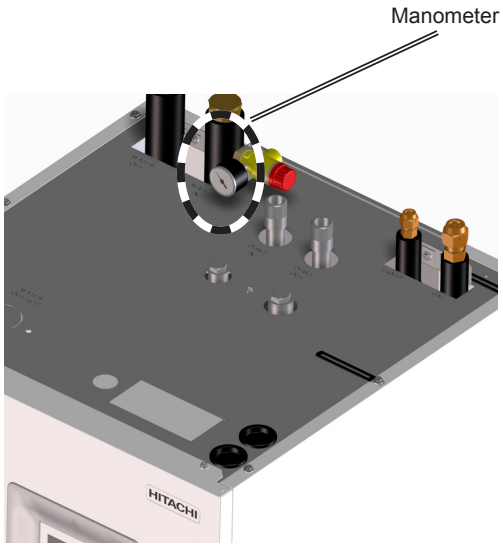
1 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*

2 Unscrew the manometer from the security valve to remove it.

3 Replace the manometer.

NOTE

- *When reassembling, proceed in the reverse way than disassembling.*
- *Use Teflon tape on the thread to avoid any leakage.*

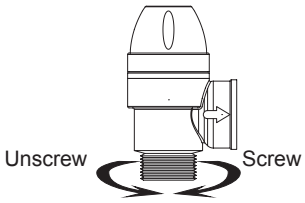


5.3.3.4 Removing the Safety valve

1. Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*

2. Loosen the screw of the hose clamp fixing the drain hose

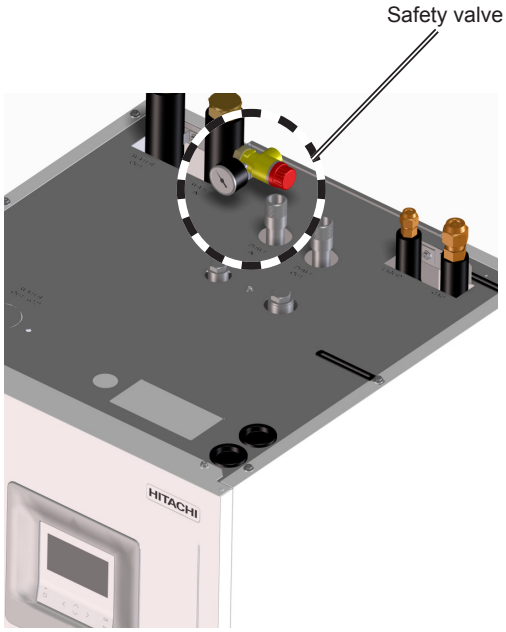
4 Unscrew the Safety valve.



5 Replace the Safety valve for a new one if needed.

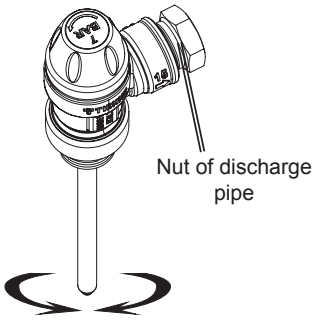
NOTE

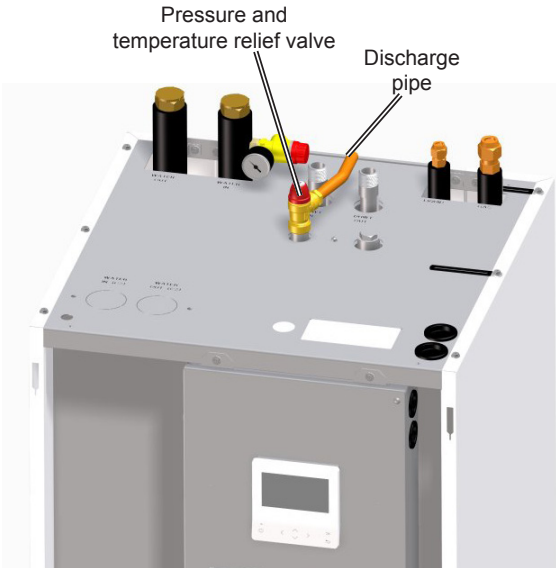
- *Use Teflon tape on the thread to avoid any leakage.*
- *To reassemble the Safety valve proceed in reverse way than disassembling.*



5.3.3.5 Replacement of the Pressure and temperature relief valve (Only models for UK market)

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the Upper cover as explained in *"5.3.2.2 Opening the EBOX cover"*
3 Loosen the nut of the discharge pipe.
4 Unscrew the Pressure and temperature relief valve.





Technical features

Maximum Temperature	120° C
Minimum Temperature	-5° C
Operating Temperature	96° C
Maximum Pressure	10 bar
Operating pressure	7 bar
Maximum Open Pressure	20 %
Minimum Closing differential	20 %

5.3.3.6 Removing the Air purger

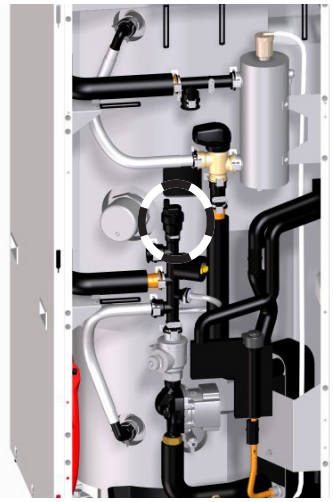
1 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*

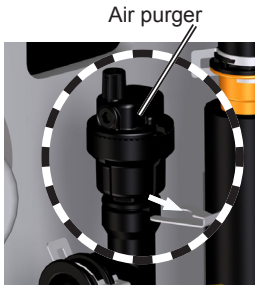
2 Pull the locking clip and remove the air purger.

3 Insert the new air purger and attach the locking clip.

NOTE

To reassemble the Air purger, proceed in reverse way than disassembling.





5.3.3.7 Remove the air purger of the electrical heater

1 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*

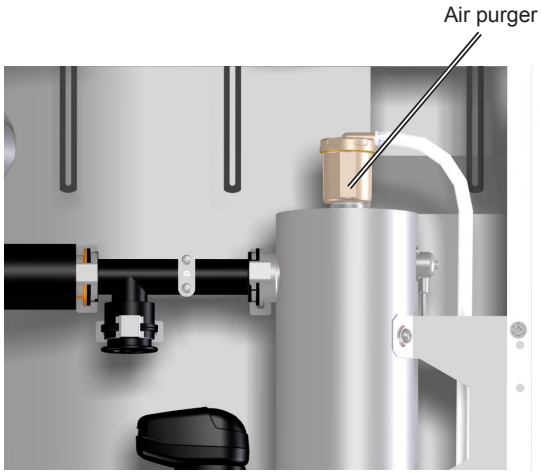
2 Pull the condansation pipe from the air purger.

3 Unscrew the air purger from the electrical heater.

4 Insert the new air purger and attach the condensation pipe.

NOTE

To reassemble the Air purger, proceed in reverse way than disassembling.

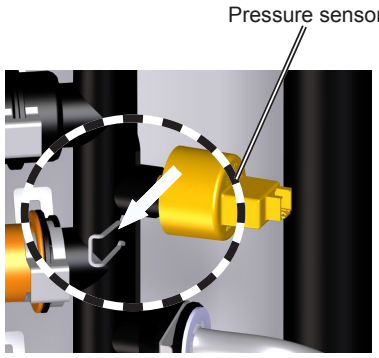


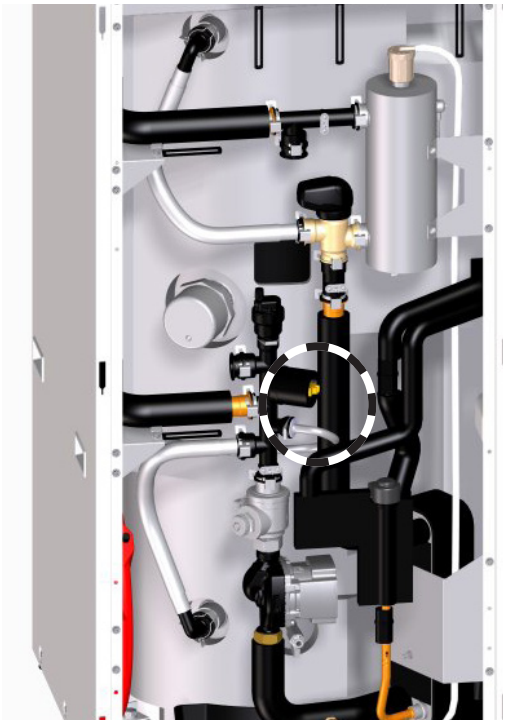
5.3.3.8 Removing the Water pressure sensor

1 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*
2 Disconnect from electrical box and release the cable.
3 Pull the locking clip and remove the water pressure sensor.
4 Insert the new Pressure sensor and attach the locking clip.
5 Lead the cable to the electrical box and connect to PCB-CN3.

NOTE

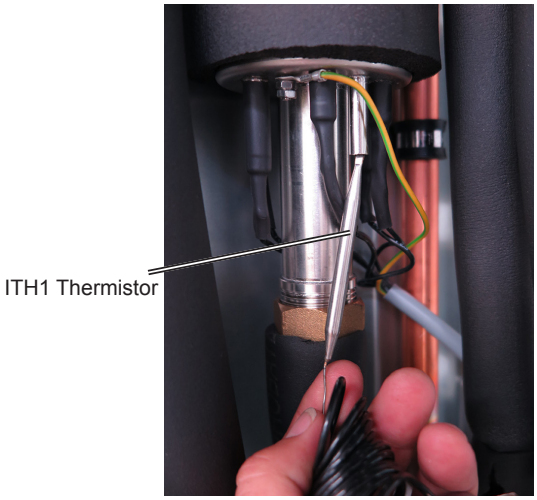
To reassemble the Pressure switch proceed in reverse way than disassembling.





5.3.3.9 Removing the Electrical heater

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*
3 Cut the plastic cord band of the ITH_1 thermostat, located at the head of connectors of the Electrical heater.



4 Softly pull the thermistor backwards and remove it from the Electrical heater

NOTE

Take special care with the Thermistor when handling it. Once it is removed, place it in a place where it cannot be damaged when removing the Electrical heater.

CAUTION

Do not unscrew, remove or manipulate the terminals at the head of the Electrical heater. When removing the Electrical heater, disconnection procedure must be done on the Electrical Box, as explained below.

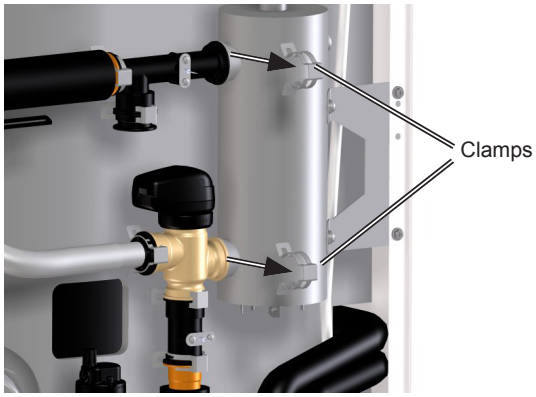
5 Cut the plastic cord bands attached to the harness of the Electrical heater.

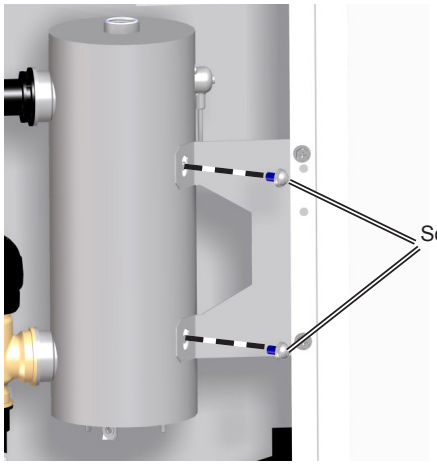
6 Remove the Electrical heater cables from the CN33 connector and the Earth cable, located inside the EBox

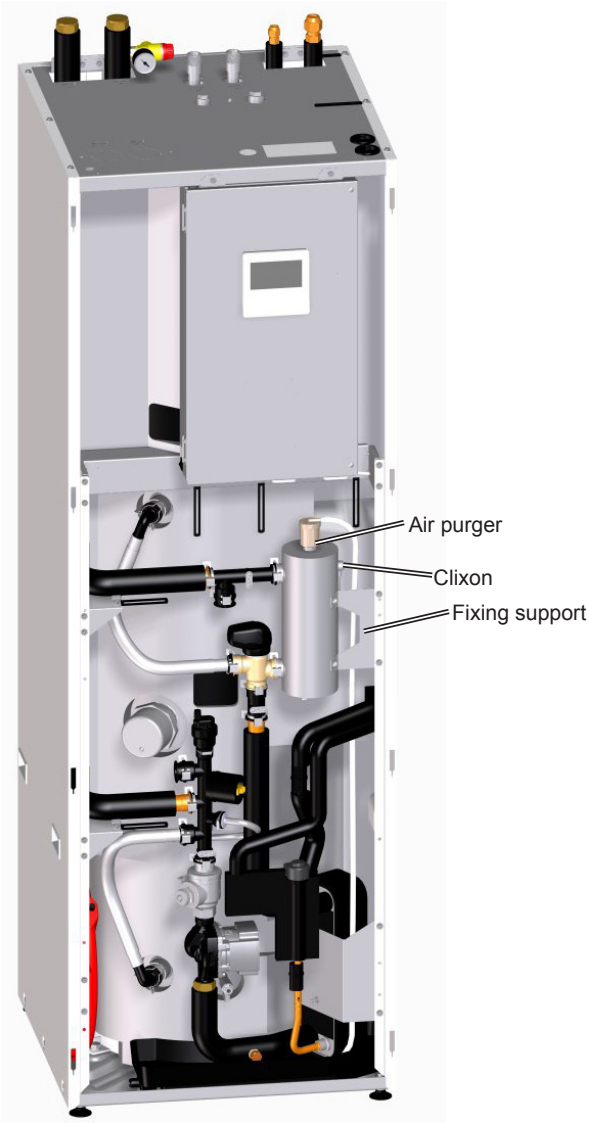
7 Pull the harness, following its way to the Electrical heater.

8 Remove the Water outlet thermistor (THMWO) as explained in *"5.3.4.4 Replacing thermistors (THMWO, THMWI, THML, THMG)"*

9 Remove the clamp at the outlet port of the Electrical heater and the clamp at the 3 way valve connection.





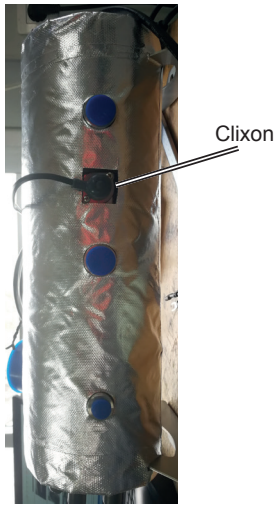


10 Remove the air purge of the electrical heater.

11 Loose the screws of the fixing support of the electircal heater to take it out.

12 Remove the Electrical heater.

13 Unscrew the 2 screws of the clixon from the Electrical heater.



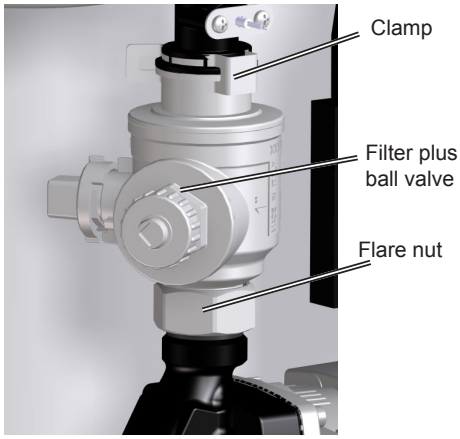
⚠ CAUTION

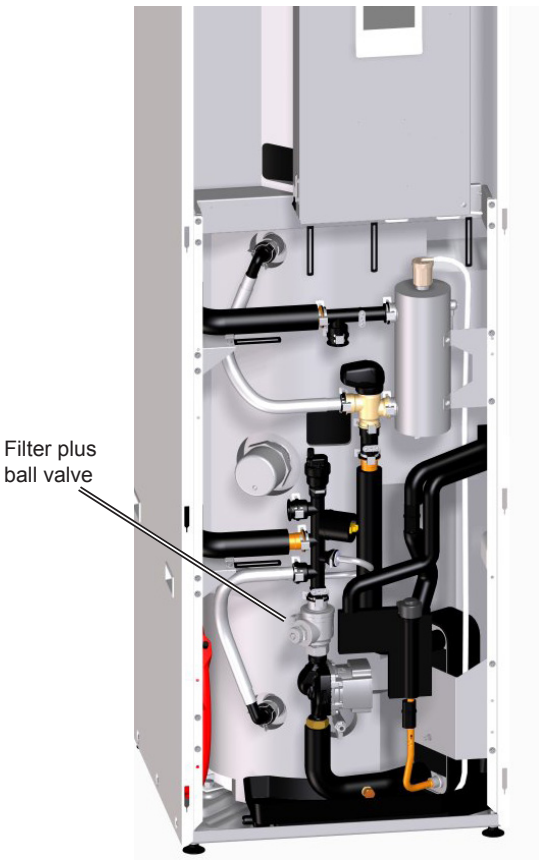
Take special care when manipulating the Electrical heater as it can be extremely hot.

5.3.3.10 Removing the Filter plus ball valve

To remove the Filter plus ball valve the following operations should be done:

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*.
3 Loosen the flare nut connecting the filter plus ball valve with the water pump.
4 Remove the clamp at the upper side of the filter.





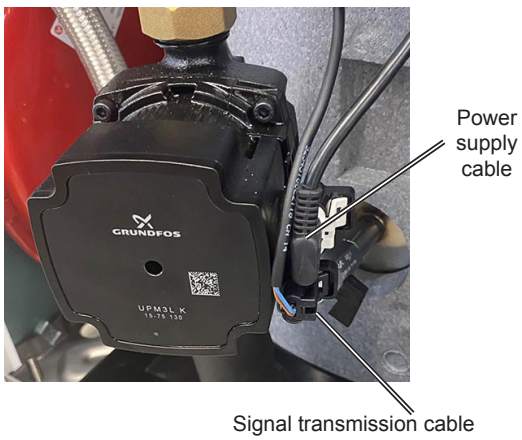
NOTE

For further information about the Filter plus ball valve, refer to "6 Filter plus" of "7. Maintenance notes"chapter.

5.3.3.11 Removing the Water pump

To remove the water pump the following operations should be done:

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*.
3 Turn the water pump to the left to have better access to the cables. (Loose the nuts first if its necessary)
4 Remove the power supply connector of the water pump and the signal transmission cable.
5 Loosen the flare nuts.
6 Remove the water pump.



NOTE

- *Be sure of the position of the Water pump.*
- *Be careful, do not loose the gaskets of the water pump.*
- *Check the gaskets. If they are damaged, replace them for new ones.*



◆ Deblocking device of the water pump

The deblocking device consists of an axial moving plungertightened by an O-ring and pulled back by a spring inside a stainless steel housing that is welded to the rotor can.

By pushing and turning a screw driver, Phillips No. 2, the plunger pushes the shaft in axial direction into the pump,while it can be turned as well. The force is high enough todeblock pumps which are seized by lime e.g. if an appliance is stored for months after being wet tested.Before, during and after the deblocking, the device is tightand must not release any water



Deblocking screw

CAUTION

Be aware of splashing hot water.

5.3.3.12 Removing the 3WV

To remove the 3-Way valve the following operations should be done:

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*.
3 Disconnect the cables of the 3WV from the electrical box.
4 Remove the clamps connecting the 3WV to the pipes.
5 Remove the 3WV.

NOTE

- *Be sure of the position of the 3WV.*
- *Be careful, do not loose the gaskets of the 3WV.*
- *Check the gaskets. If they are damaged, replace them for new ones.*

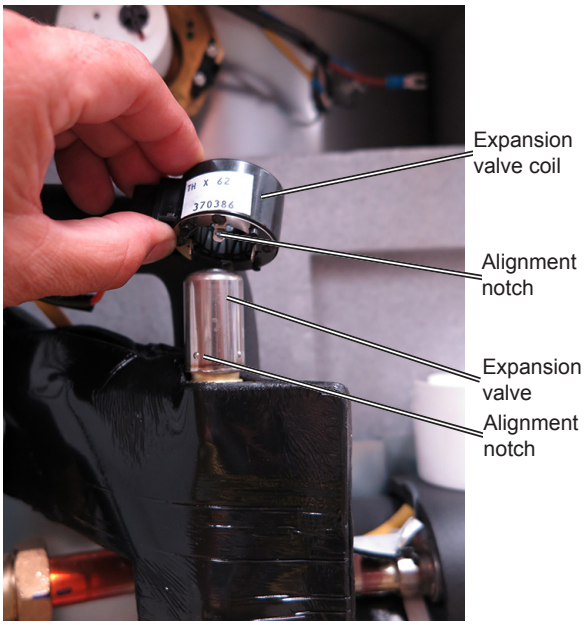


5.3.3.13 Removing the Expansion valve coil

To remove the Expansion valve coil, the following operations should be done:

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*

2 Remove the coil of the expansion valve:
Slightly rotate the coil while pulling it upwards. The coil has a fixation system which comprises a protrusion at the Expansion valve that has to match with the orifices located at the coil (see the picture beside), called alignment notch.



3 At the Ebox, remove the CN7A connector from the PCB1.

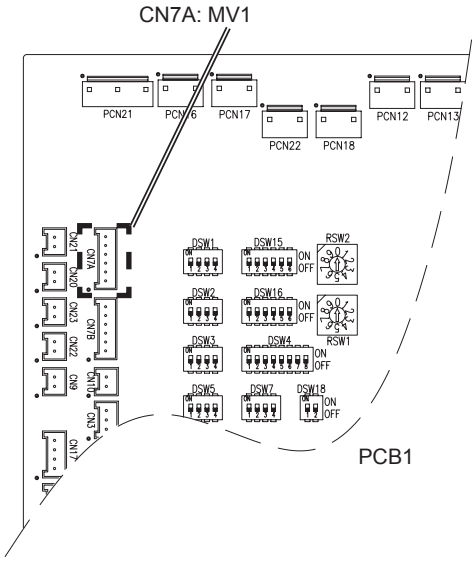
4 Cut all the plastic cord bands fixing the cables of the Expansion valve coil.

5 Replace the Expansion valve and reassemble it in reverse way. Remember to fix the cables, with plastic cord bands, in the same way and position than were before disassembling.

NOTE

See the electric diagrams

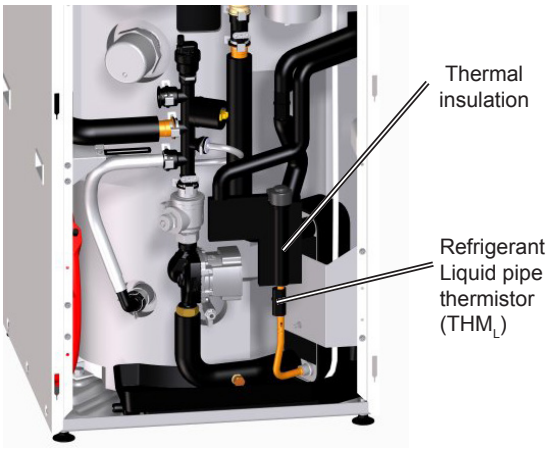
Expansion valve coil connections to PCB1:



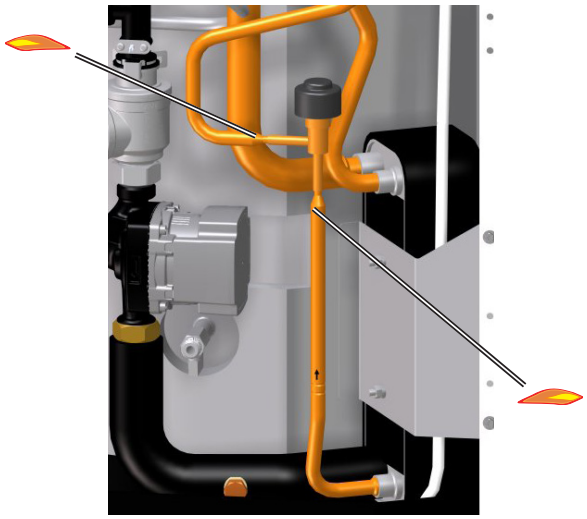
5.3.3.14 Replacement of the Expansion valve

To remove the Expansion valve, the following operations should be done:

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*
3 Remove the thermal insulation wrapping the Refrigerant liquid pipe.
4 Remove the Refrigerant liquid pipe thermistor THM_L. (This is necessary to protect the thermistor from the hot temperature when removing the welding of the Expansion valve).
5 Protect the pipe behind the expansion valve with a sheet metal from hot temperature.



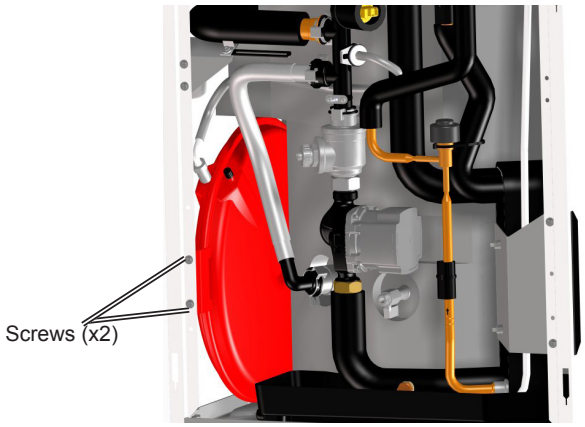
6 Remove the brazed parts with a blowtorch.
7 Remove the Expansion valve.



5.3.3.15 Removing the Expansion vessel

To remove the Expansion vessel, the following operations should be done:

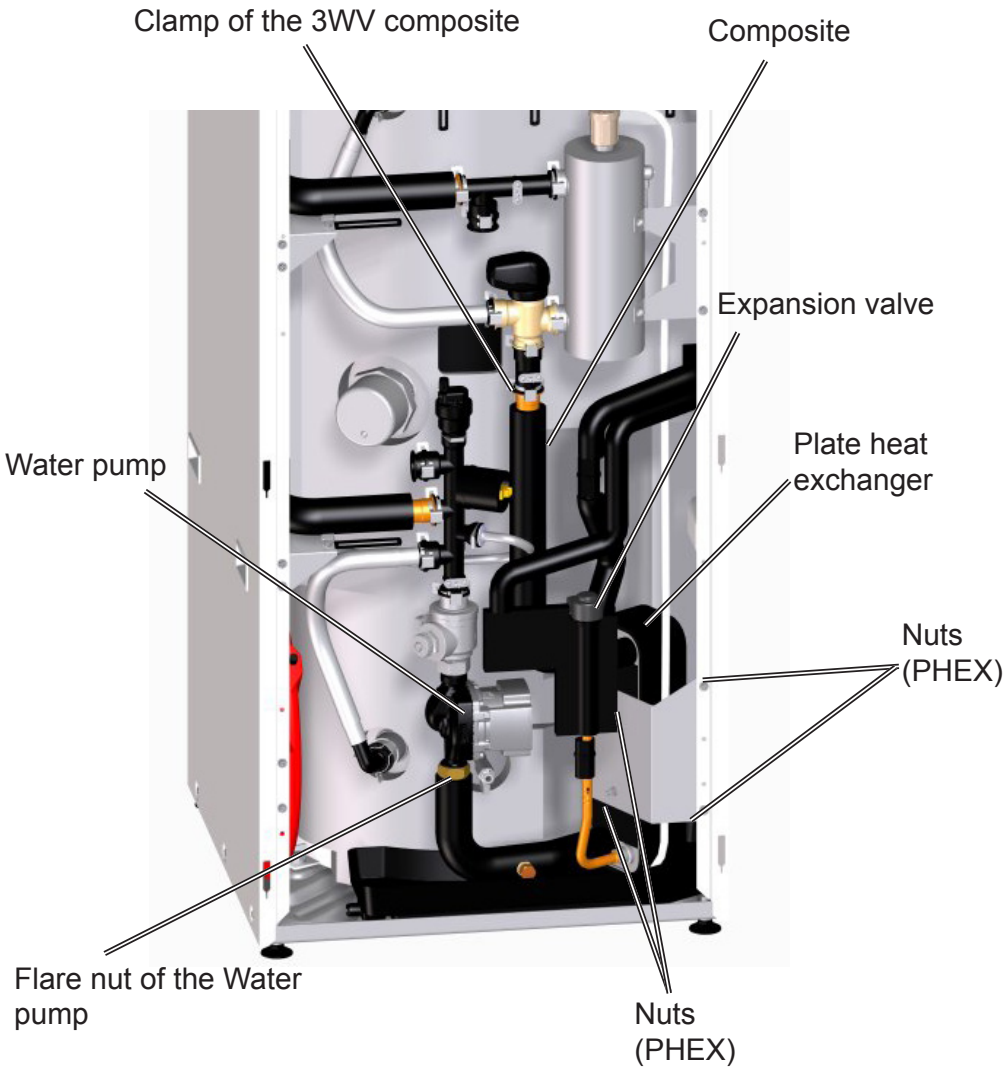
1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*
3 Unscrew and remove the screws (x2) fixing the Expansion vessel to the unit
4 Once the expansion vessel is disassembled from its position, proceed to removing the flexible pipe.



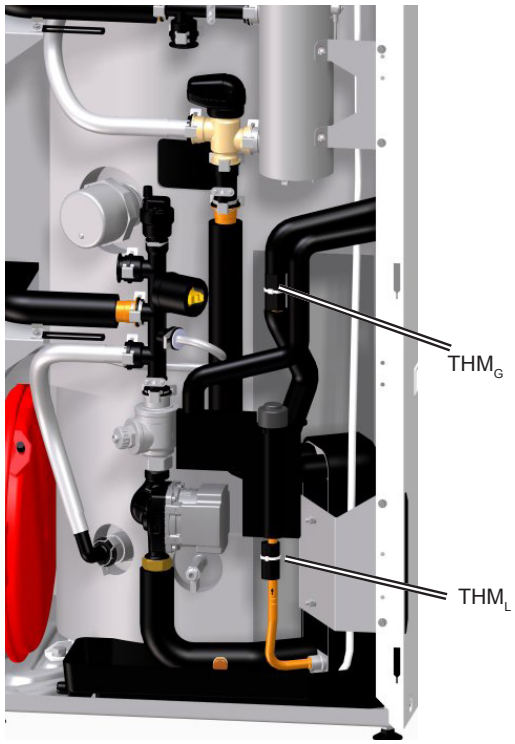
5.3.3.16 Removing the Plate heat exchanger (PHEX) and Expansion valve ensamble

To remove the Plate heat exchanger, the following operations should be done:

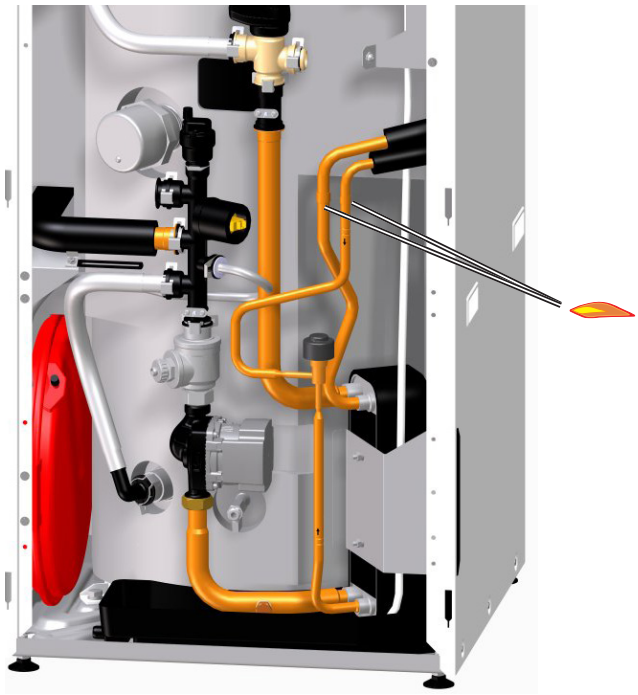
1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*



3 Cut the plastic cord bands fixing the harnesses to the pipes THML, THMG, and water pressure.
4 Remove the thermistor from their location:
   • THM_G
   • THM_L
5 Remove the clamp of the 3WV composite.
6 Loosen the flare nut of the outlet port of the water pump.



7 Unbraze ( ) the refrigerant gas pipe and the liquid pipe with a blow torch.
8 Loosen the nuts that fix the PHEX to the unit and the nuts of the fixing plate.
9 Remove the Plate heat exchanger with the expansion valve.



5.3.4 Electrical components

DANGER

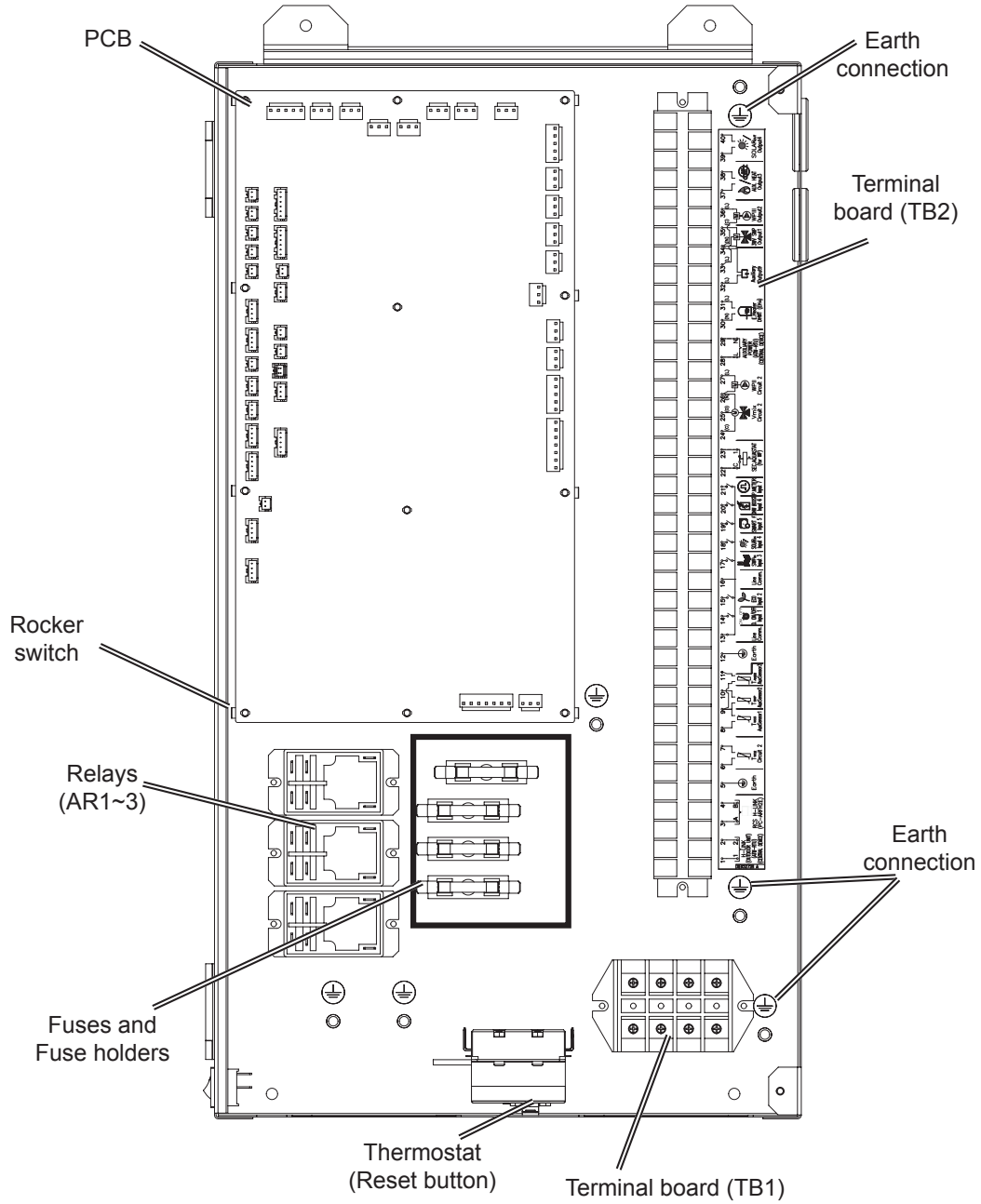
- ***Disconnect the YUTAKI S from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components.***

CAUTION

- *When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid possible failures and damage to electrical components.*
- *To properly disconnect these components from the PCB, see the "8.5 Electrical Wiring Diagrams" in "8. Electrical and control settings" chapter of this manual.*
- *Cover the thermistors with the cork tape or pipe insulation according to each location. Both materials are factory supplied. Replace them if damaged during the servicing.*

5.3.4.1 Location of components of the PCB

E-Box

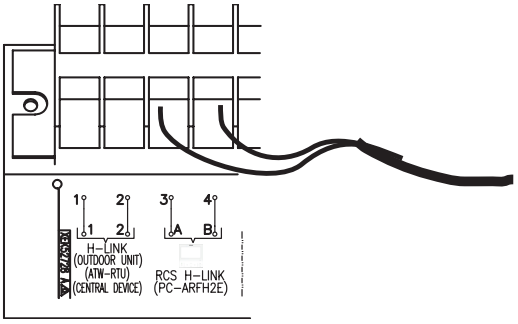


5.3.4.2 Removing the unit controller

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*

2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*

3 Disconnect the cables of the Unit controller connected to the terminals 3 and 4 of the Terminal Board (TB1).

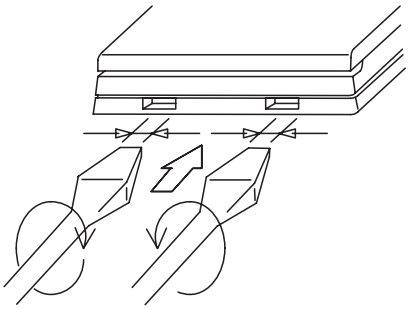


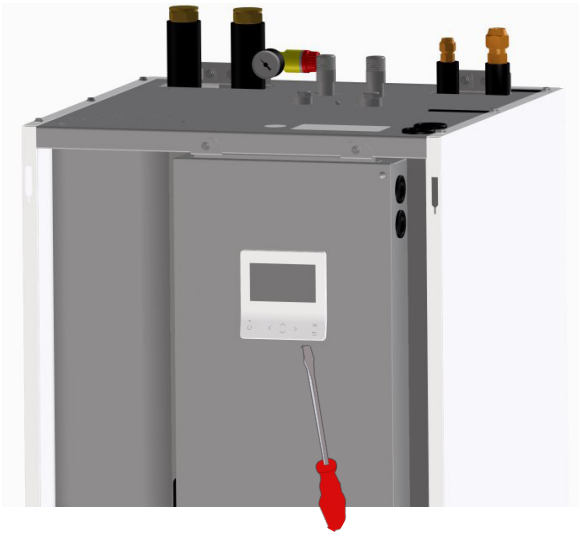
4 Cut the plastic cord bands attaching the PC-ARFH2E cables

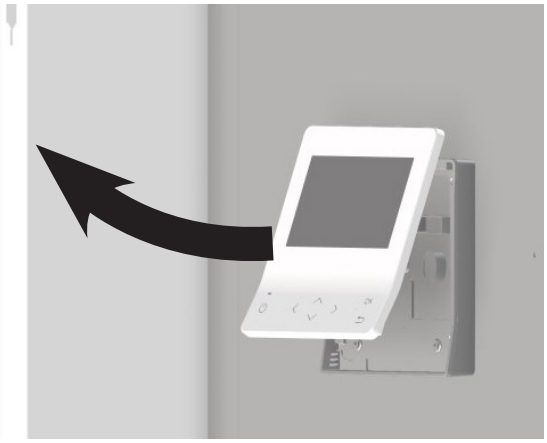
5 Open the Unit controller front cover.

NOTE

Refer to the Instructions manual of the PC-ARFH2E Unit controller for more information regarding the opening and disassembling of the device.

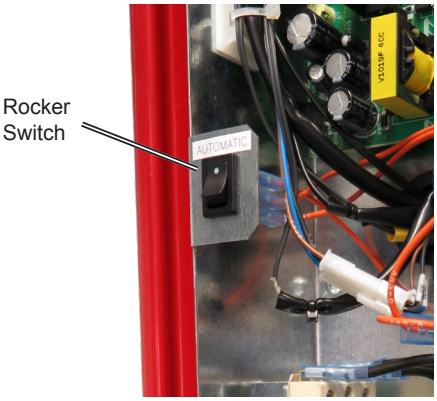


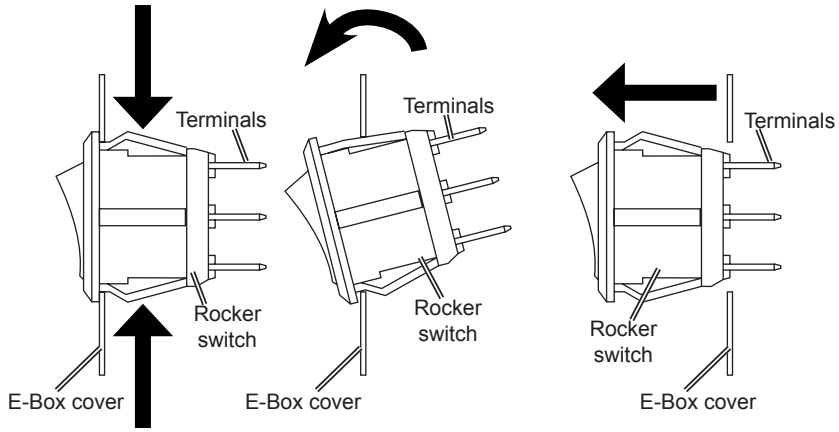




5.3.4.3 Replacement of the rocker switch

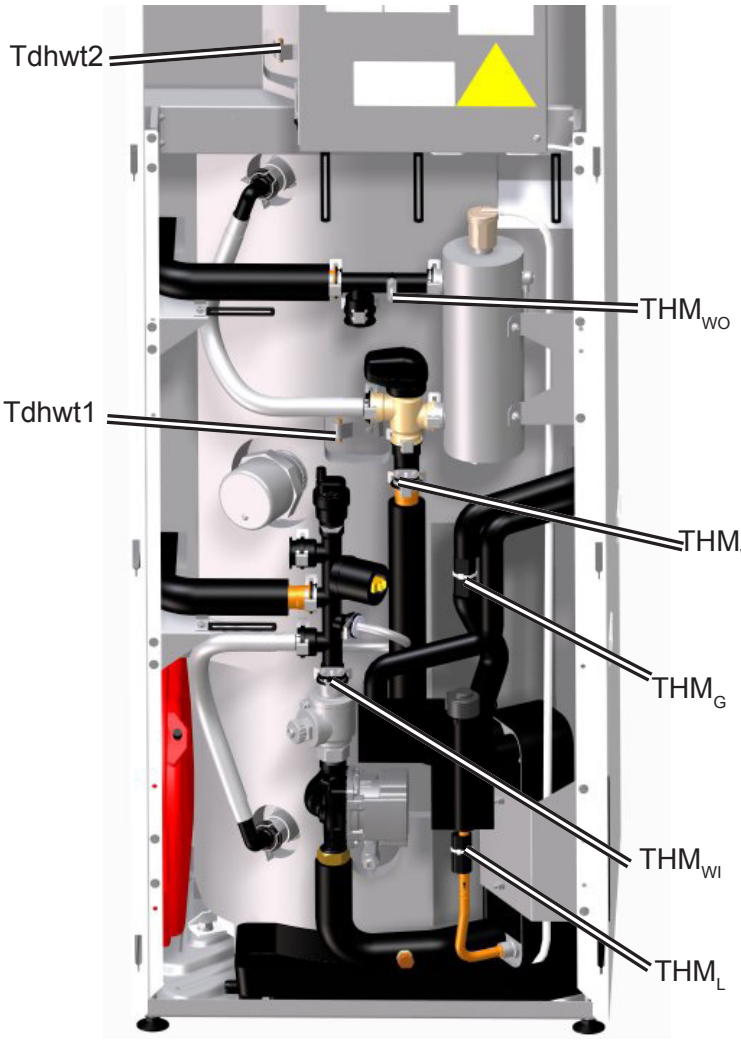
1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*
3 Disconnect the terminals of the Rocker switch.
4 From the rear side of the Switch press backwards. (See the pictures below).





5.3.4.4 Replacing thermistors (THM_{WO}, THM_{WI}, THM_{L}, THM_{G})

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*



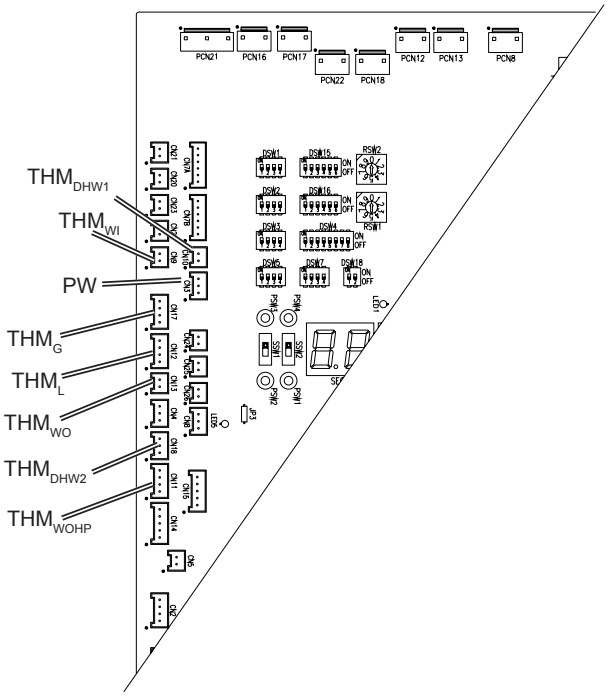
Description	Connector
Water outlet pipe thermistor THM_{WO}	CN13
Water inlet pipe thermistor THM_{WI}	CN9
Gas refrigerant pipe thermistor THM_{G}	CN17
Liquid refrigerant pipe thermistor THM_{L}	CN12
Water Outlet HP pipe thermistor THM_{WOHP}	CN11
Thermistor for DHW tank THM_{DHW1}	CN10
Thermistor for DHW tank THM_{DHW2}	CN18

NOTE

Additional Thermistors can be connected to the PCB according to the configuration of the installation. Refer to the Wiring diagram to see where they should be connected.

3 Disconnect the thermistor to be replaced from the correct connector of PCB2

4 Cut and remove the plastic cord band attached to the thermistor harness.



◆ Refrigerant thermistors

1 Remove the pipe insulation of thermistor.

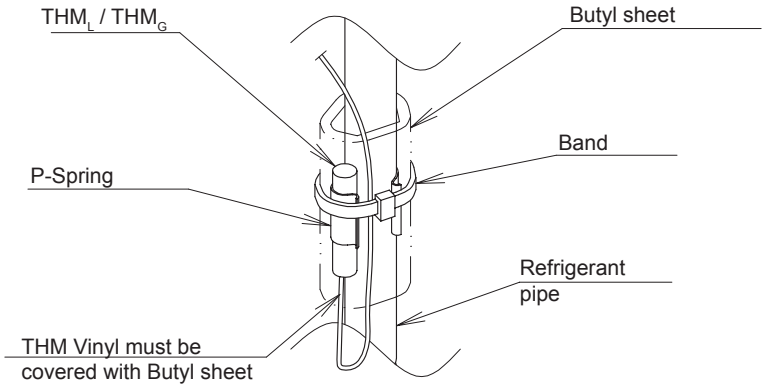
2 Remove the P-Spring that is attached with copper pipe and sensor.

3 Install new thermistor using P-Spring and Butyl Sheet as shown in the following drawing.

NOTE

In case of P-Spring deforming, it needs to be replaced.

Detailed figure of the routing of the THM$_L$ and THM$_G$ lead wire



NOTE

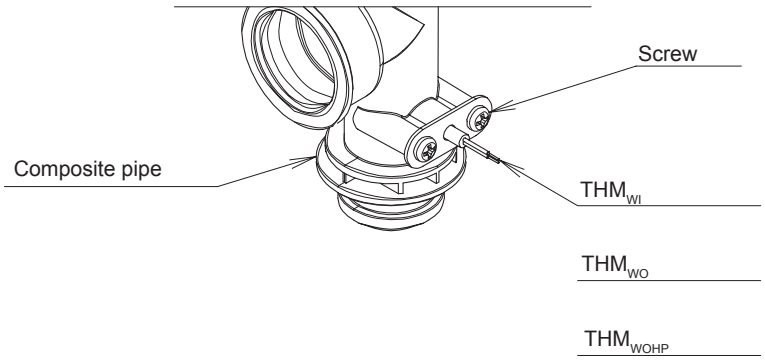
When reassembling, install thermistor wire by performing the process in reverse way.

◆ Water thermistors

Detailed figure of the routing of the THM_{WI}, THM_{WO} and THM_{WOHP} lead wire

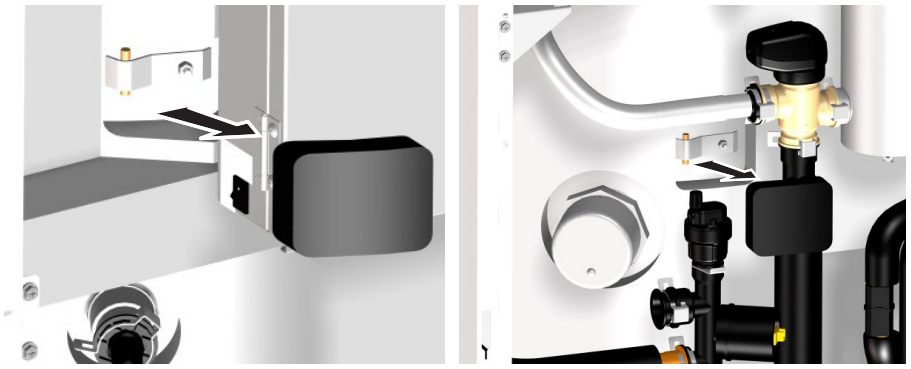
1 Drain the Indoor unit as explained in section *"Draining operation for YUTAKI SCOMBI"* in chapter *"7. Maintenance notes"*

1 Remove the 2 screws fixing the thermistor.
2 Take the thermistor out of the pipe.

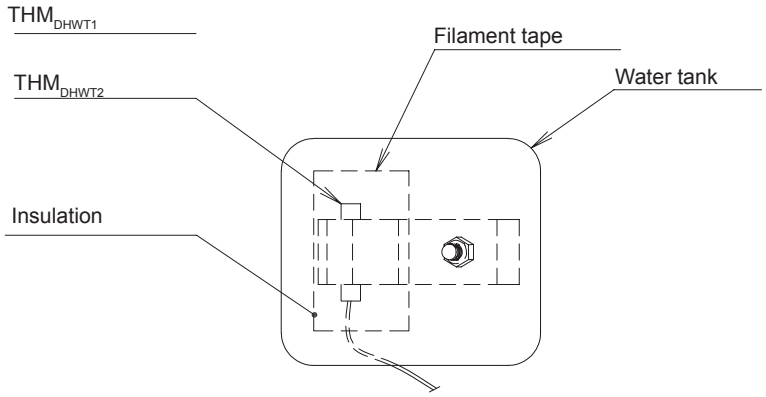


Detailed figure of the routing of the DHW thermistors (THM_{DHWT1} and THM_{DHWT2})

1 Remove the insulations of the tank.



2 Remove the P-Spring that is attached with the sensor.
3 Install new thermistor using P-Spring and Butyl Sheet as shown in the following drawing.



NOTE

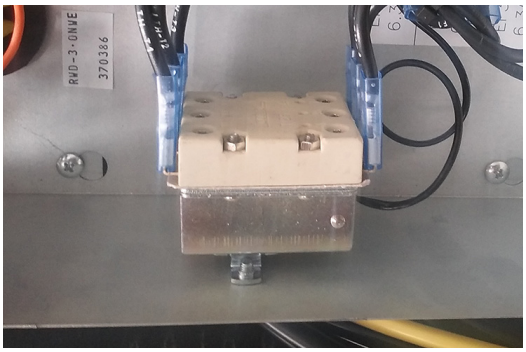
In case of P-Spring deforming, it needs to be replaced.

5.3.4.5 Replacement of the thermostat reset switch

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*

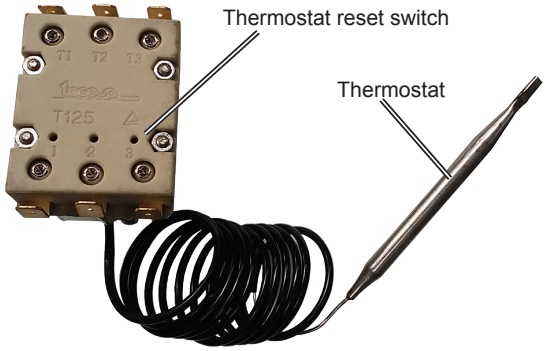
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*

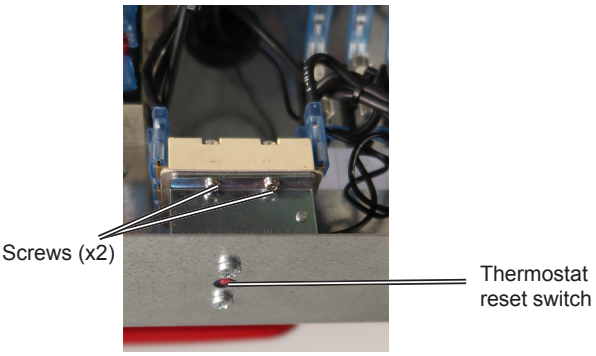
3 Disconnect all the terminals connected to the Thermostat reset switch.



NOTE

The Thermostat of the Electrical heater is connected and sealed to the Thermostat reset switch. To proceed to the disassembling of the Thermostat from the electrical heater follow the instructions given in "5.3.3.8 Removing the Electrical heater".





4 Remove the screws (x2) fixing the thermostat reset switch to the Electrical box.

NOTE

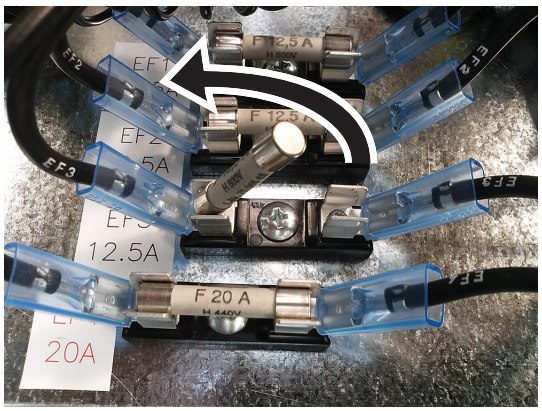
When reassembling, proceed in reverse way.

5.3.4.6 Replacement of fuses (EF1~4)

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*

2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*

3 Once the broken fuse is detected, pull it from its placement.



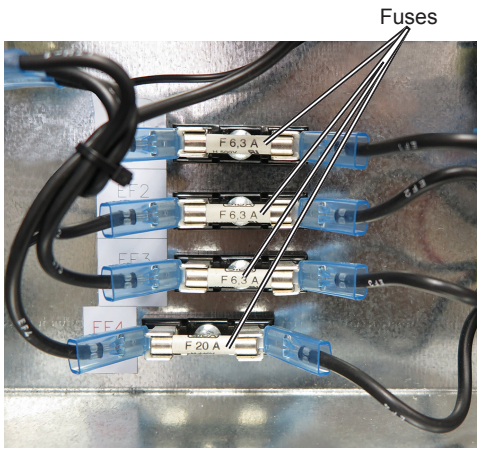


Table of fuses

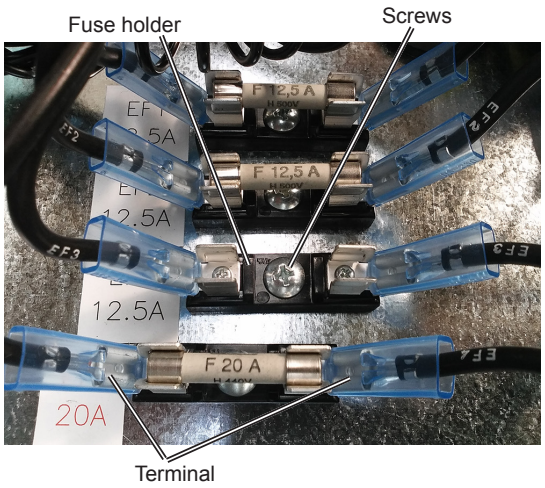
Fuse	Dimensions (Ø x L) (mm)	RWD-(2.0-3.0)RW1E-220S(-K)	RWD-(4.0-6.0)NW1E-220S(-K)
EF1	6.35 x 31.8	6.3 A	12.5 A
EF2		6.3 A	12.5 A
EF3		6.3 A	12.5 A
EF4		20 A	20 A

5.3.4.7 Removing the fuse holder

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*

For those cases where a replacement of the fuse holder is necessary, proceed with the following instructions:

3 Remove the fuse as explained in *"5.3.4.6 Replacement of fuses (EF1~4)"*
4 Disconnect the cables from the terminals of the fuse holder.
5 Remove the screw fixing the fuse holder and replace it.

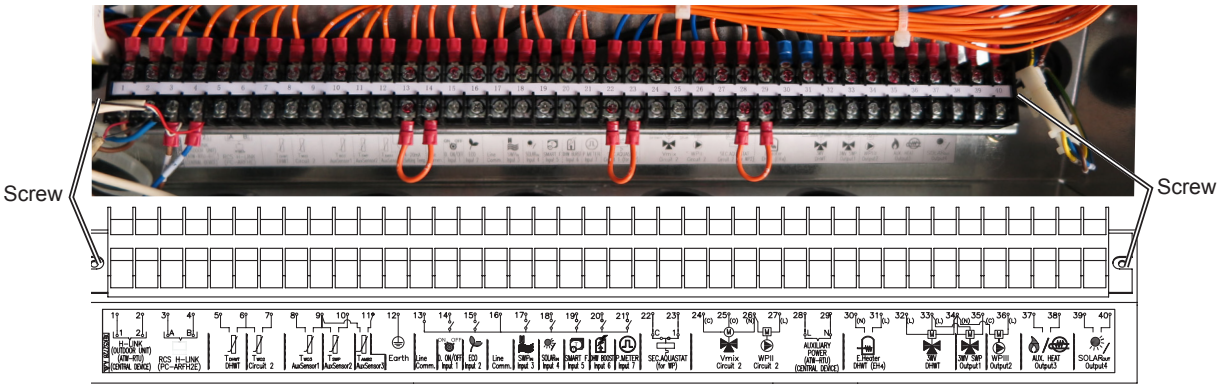


NOTE

The reassembling of the fuse should be done in revers way than disassembling.

5.3.4.8 Replacement of the terminal board (TB2)

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*
3 Remove all the cables connected to the terminal board.
4 Remove the screws fixing the Terminal board to the E-Box

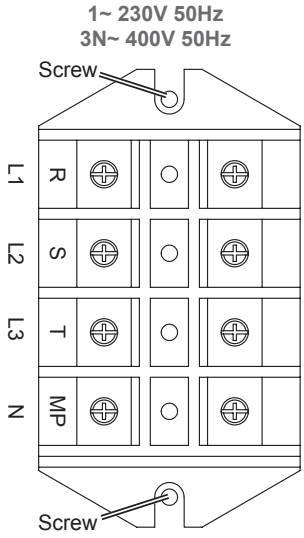


NOTE

Take note of the connections on the PCB. In particular, special connections, bridges, etc. Check the wiring diagram for any doubt you may have. Any incorrect connection may damage the unit

5.3.4.9 Replacement of the terminal board (TB1)

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*
3 Remove all the cables connected to the terminal board.
4 Remove the screws fixing the Terminal board to the E-Box



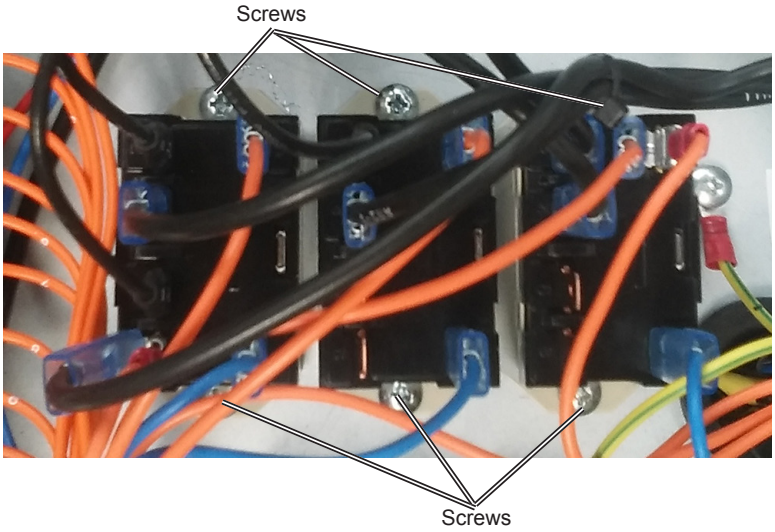
5.3.4.10 Replacement of relays (AR1~3)

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*
3 Identify the abnormal relay. Once detected, disconnect the cables.

NOTE

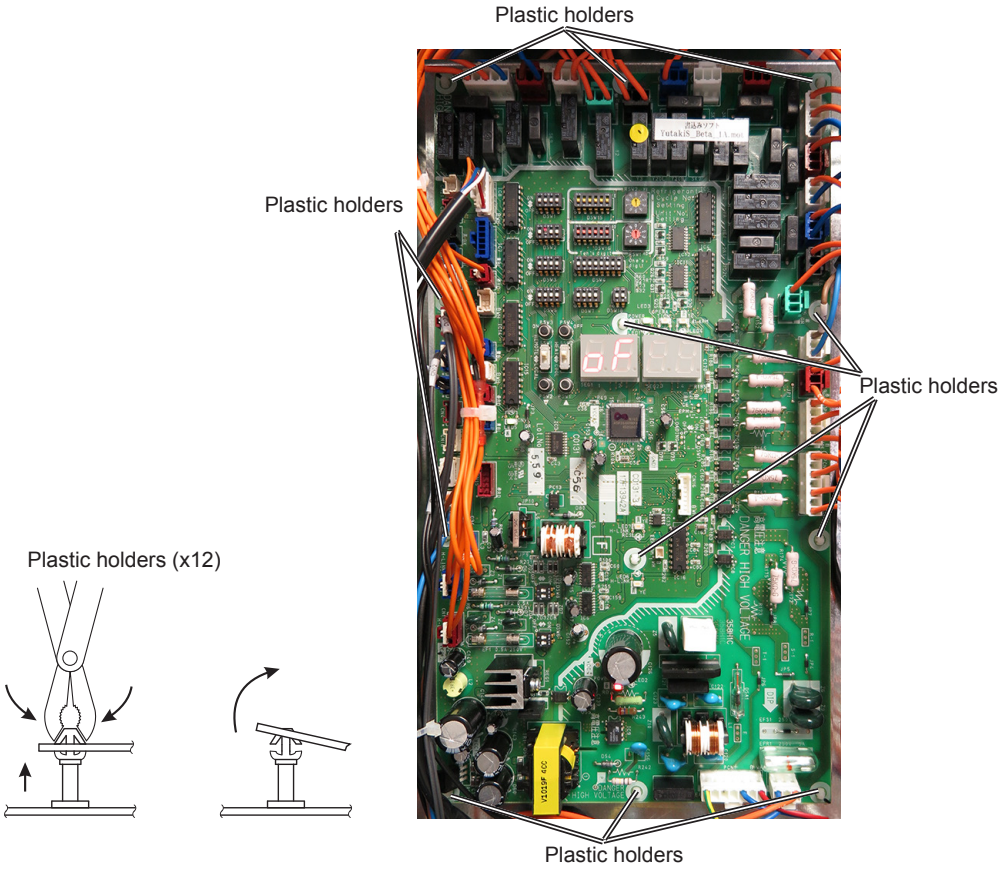
Take note of the connections on the Relays. Check the wiring diagram for any doubt. Any incorrect connection may damage the unit

4 Remove the screws attaching the relay to the E-Box.



5.3.4.11 Replacement of the PCB

1 Remove the Service cover as explained in *"5.3.2.1 Removing the Service cover"*
2 Open the E-Box cover as explained in *"5.3.2.2 Opening the EBOX cover"*
3 Remove all the connectors connected to the PCB
4 Remove the plastic holders that fix the PCB to the E-Box



HITACHI

6. Troubleshooting

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6.1 Initial troubleshooting

6.1.1 Power supply failure to the indoor unit and the remote control switch (PC-ARFH2E)

- The LED and the Unit controller are not indicated.
- Not operated

If the fuses are blown out or a breaker is activated, investigate the cause of the overcurrent and take the necessary action.

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Power failure or power is not ON		Measure the voltage by means of the voltmeter	Supply the power
Blown out fuse or activation of the breaker at the power source	Short circuit supplied between the wires	Check for any uncovered part of the wires	Remove the cause of the short circuit and replace the fuse
	Short circuit of the wires to earth	Measure the insulation resistance	Remove the cause of the short circuit and replace the fuse
Blown out fuse at the control circuit	Short circuit supplied between the wires	Check for any uncovered part of the wires	Remove the cause of the short circuit and replace the fuse
	Short circuit of the control circuit to earth	Measure the insulation resistance	Remove the cause of the short circuit and replace the fuse
Disconnected cable of the remote control switch		Connect the cable	Replace the cable or repair the cable
Insufficient contacting at the connectors of the remote control switch	Insufficient connection or incorrect connection of the indoor unit PCB	Check the connectors	Correctly connect the connector
	Insufficient connection or incorrect connection of the indoor unit PCB in the remote control switch		
Failure of the remote control switch		Check the remote control switch by means of the self-check mode	Replace the remote control switch if it failed
Failure of PCB	Unconnected wires to PCB	Check the connectors	Correctly connect the wires
	Failure of PCB	Check PCB by means of the self-check mode	Replace PCB if it failed
Incorrect wiring connection		Take action according to the procedure explained in *"3.2.1.5 Test run"* chapter	

6.1.2 Abnormal operation of the devices

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
No defrost operation mode is available during the heating process or the defrost operation continues	Failure of thermistor for outdoor evaporating temperature during heating	Failure of thermistor	Replace or correctly connect when it is abnormal	
		Disconnected wire of thermistor		
	Failure of 4-way valve	Disconnected 4-way valve coil	Measure the resistance of coil	Replace the 4-way valve
		Incorrect activation of 4-way valve	Enforced power supply	
	Disconnected control wires between indoor unit and outdoor unit		Check the connectors	Correctly connect the wiring
	Failure of the PCB of the indoor unit	Disconnected wiring to PCB	Check the connectors	Correctly connect the wiring
		Failure of PCB	Check PCB by means of the self-check mode	Replace PCB when the check mode is not available
	Failure of the PCB of the indoor unit	Disconnected wiring to PCB	Check the connectors	Correctly connect the wiring
		Failure of the PCB	Check PCB by means of the self-check mode	Replace if PCB fails
Insufficient cooling process	Indoor cool load is higher than the cooling capacity		Calculate the cool load	Use a bigger unit
	Excessively low suction pressure	Gas leakage or shortage of refrigerant	Measure superheat	Correctly charge the refrigerant after repairing the gas leakage
		Excessively small diameter tube or long piping	Measure and check the field-supplied pipes	Use the correct pipes
		Incorrect activation of the check valve of the outdoor unit	Check whether or not the temperature difference before/ after the check valve	Replace the check valve of the outdoor unit
		Failure or malfunction of the expansion valve	Check for clogging	Remove the clogging
			Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
			Is the thermistor on the compressor normal?	Replace the thermistor
			Is the thermistor installed correctly on compressor?	Correctly install the thermistor
		Clogged strainer in the indoor unit; clogging at the low pressure piping	Check the temperature difference at the inlet and the outlet of the strainer	Replace the strainer in the indoor unit
		Clogging at the low pressure piping	Check the temperature difference	Remove the clogging

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Insufficient cooling process	Excessively high discharge pressure	Insufficient air flow at the outdoor unit heat exchanger	Clogging of the outdoor unit heat exchanger?	Remove the clogging
			Obstacles at the inlet or the outlet of the outdoor unit heat exchanger	Remove the obstacles
			Is the service area for the outdoor unit sufficient?	Secure the service area
			Correct fan speed?	Replace the fan motor
		Excessively high air temperature to the outdoor unit heat exchanger	Short-circuited air to the outdoor unit?	Remove the cause of the short-circuited air
			Any other heat load near the outdoor unit?	Remove the heat source
		Excessively charged refrigerant	Expansion valve opening	Correctly charge the refrigerant
		Non-condensated gas in cycle	Check each temperature and each pressure	Charge the refrigerant after the vacuum pumping
		Clogging of the discharge piping	Check for clogging	Remove the clogging
		Failure or malfunction of the expansion valve	Check for clogging	Remove the clogging
			Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
			Is the thermistor on the compressor normal?	Replace the thermistor
			Is the thermistor installed correctly on the compressor?	Correctly install the thermistor
	Malfunction or internal leakage of the 4-way valve		Check the temperature difference at the inlet and the outlet of the 4-way valve	Replace the 4-way valve
	Excessively low suction pressure	Malfunction or internal leakage of the 4-way valve	Check the temperature difference between the inlet and the outlet of 4-way valve	Replace the 4-way valve
		Failure of solenoid valve for bypass	Check refrigerant leakage of solenoid valve	Replace solenoid valve
	Discharge temperature of the indoor unit is unstable		Check the expansion valve of the indoor unit in the same system	Replace the failed expansion valve of the indoor unit

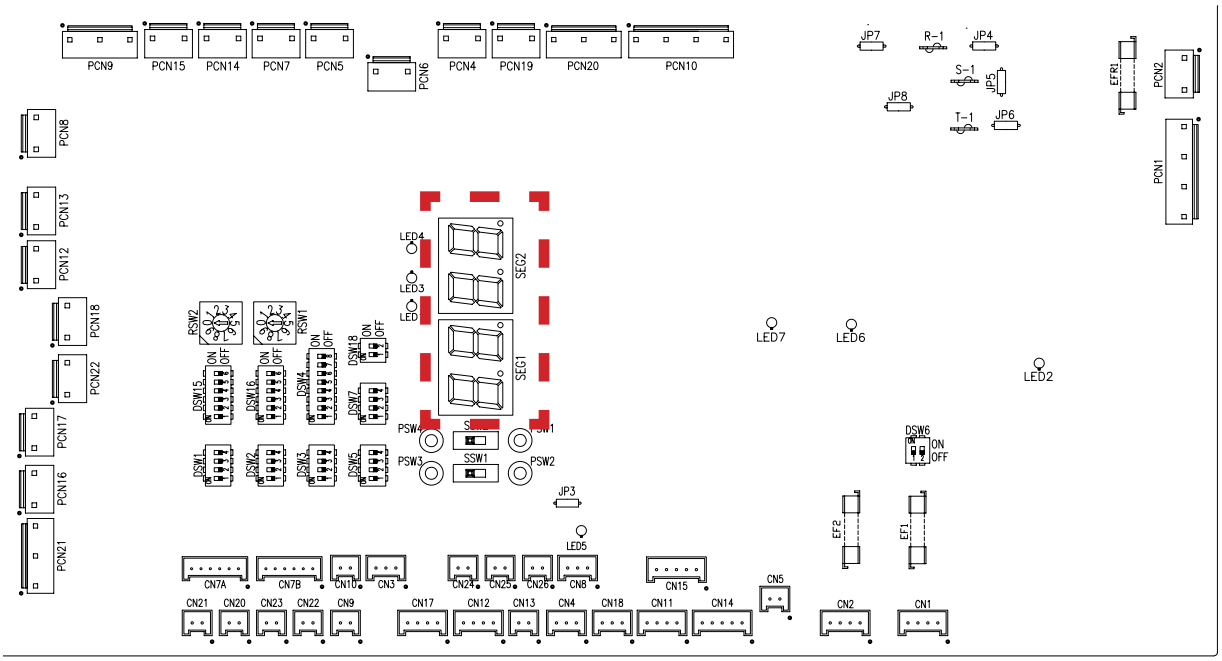
Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Insufficient heating process	Indoor heat load is greater than the heating capacity		Calculate the heat load	Replace the unit with a bigger unit
	Excessively low suction pressure	Gas leakage or insufficient refrigerant charge	Measure superheat	Correctly charge the refrigerant after the gas leakage check and repairing
		Excessively small diameter or long piping	Measure the field supplied piping	Use the specified pipes
		Failure or malfunction of the expansion valve	Check for clogging	Remove the clogging
			Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
			Is the thermistor on the compressor normal?	Replace the thermistor
			Is the thermistor installed correctly on compressor?	Correctly install the thermistor
		Clogging of IU/OU strainer	Check the temperature difference between the inlet and the outlet of strainer	Replace the strainer for the outdoor unit or the indoor unit
		Clogging of suction piping	Check the temperature difference of each part	Remove the clogging
		Insufficient air flow through the outdoor unit heat exchanger	Is the outdoor unit heat exchanger clogged?	Remove the clogging
			Are there any obstacles at the inlet or the outlet of outdoor unit?	Remove the obstacles
			Is the service area for the outdoor unit sufficient?	Secure a sufficient service area
			Check the speed of the outdoor unit fan	Replace the fan motor
		Excessively low air temperature through the outdoor unit heat exchanger	Check for any short-circuited air to the outdoor unit	Remove the cause of the short-circuited air
		Defrosting is insufficiently completed	Check the thermistor for the defrost operation	Replace the thermistor for the defrost operation
	Excessively high discharge pressure	Excessively charged refrigerant	Check the refrigerant quantity	Correctly charge the refrigerant
		Non-condensate gas in refrigerant cycle	Check the refrigerant quantity	Recharge the refrigerant after the vacuum pumping
		Clogging of the discharge pressure piping	Check for clogging	Remove the clogging
	Malfunction or internal leakage of the 4-way valve		Check the temperature difference at the inlet and the outlet of the 4-way valve	Replace the 4-way valve
	Malfunction of the check valve of the outdoor unit		Check the temperature difference at the inlet and the outlet of the check valve	Replace the check valve
	Excessively high suction pressure	Malfunction or internal leakage of 4-way valve	Check the temperature difference at the inlet and the outlet of the 4-way valve	Replace the 4-way valve
	Discharge temperature of the indoor unit is unstable		Check the expansion valve of the indoor unit in the same system	Replace the failed expansion valve of the indoor unit

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Cooling or heating process with an abnormal sound	Foreign particles inside of the fan casing		Visually inspect it	Remove the foreign particles
	Outdoor unit propeller fan is hitting the shroud		Visually inspect it	Adjust the position of the propeller fan
	Abnormal sound from the compressor	Faulty Installation	Check that each part is tightly fixed	Tightly fix each part
		Liquid refrigerant compression	Adjust the suction gas temperature and pressure	Ensure superheat
		Wear or breakage of the internal compressor parts	Abnormal sound from the inside of the compressor	Replace the compressor
		No heating by the oil heater	Check the resistance (oil heater, fuse)	Replace the oil heater or the fuse
	Humming sound from the magnetic conductor		Check the surface of the contacts	Replace the magnetic switch
	Abnormal vibration of the cabinets		Check each fixing screw	Tightly fix each screw
Outdoor fan does not operate when the compressor operates	Obstacle at the outdoor fan		Check the obstacles	Remove the obstacles
	Watching condition for the heating process		Wait for the switching of the 4-way valve (1 ~ 3 minutes)	If the 4-way valve does not switch, check for insufficient refrigerant

6.2 Normal operation

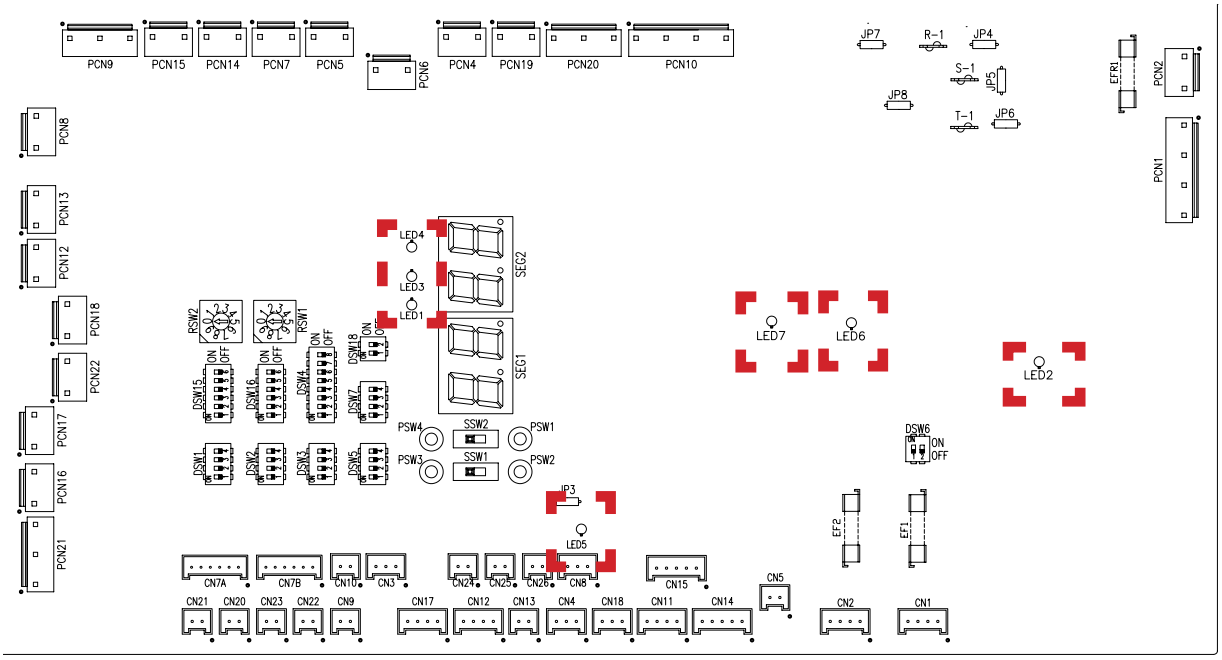
6.2.1 Normal operation display on YUTAKI S and YUTAKI S COMBI (PCB1)

◆ **7-Segment display**



	Segment Display	
	SEG 1	SEG 2
Proceeding initialization (Product software XXX)	H-	CodE
Unit OFF - Normal	oF	--
Unit OFF - Air Purge		Pu
Cooling – Demand OFF	Co	St
Cooling – Thermo OFF		oF
Cooling – Thermo ON		on
Heating – Demand OFF	hE	St
Heating – Thermo OFF		oF
Heating – Thermo ON		on
Heating – Boiler ON (Demand OFF, Thermo OFF, Thermo ON)		bo
Hot Sanitary Water – Demand OFF	hS	St
Hot Sanitary Water – Thermo OFF		oF
Hot Sanitary Water – Thermo ON		on
Hot Sanitary Water – Boiler Operation (Demand OFF, Thermo OFF, Thermo ON)		bo
Swimming Pool – Demand OFF	SP	St
Swimming Pool – Thermo OFF		oF
Swimming Pool – Thermo ON		on
Alarm	A.	CodE
Test Run Heating	tH	--
Test Run Cooling	tC	--
Tariff function enabled	--	td
Seizure protection (note code means seizure protection state)	SE	CodE

◆ LED indication



Name	Colour	Indication
LED 1	Green	Power indication
LED 2	Red	Power indication
LED 3	Red	Heat pump operation (Thermo ON/OFF)
LED 4	Yellow	Alarm (Flickering with 1 sec interval)
LED 5	Green	Inverter transmission
LED 6	Yellow	H-LINK transmission
LED 7	Yellow	H-LINK RCS transmission

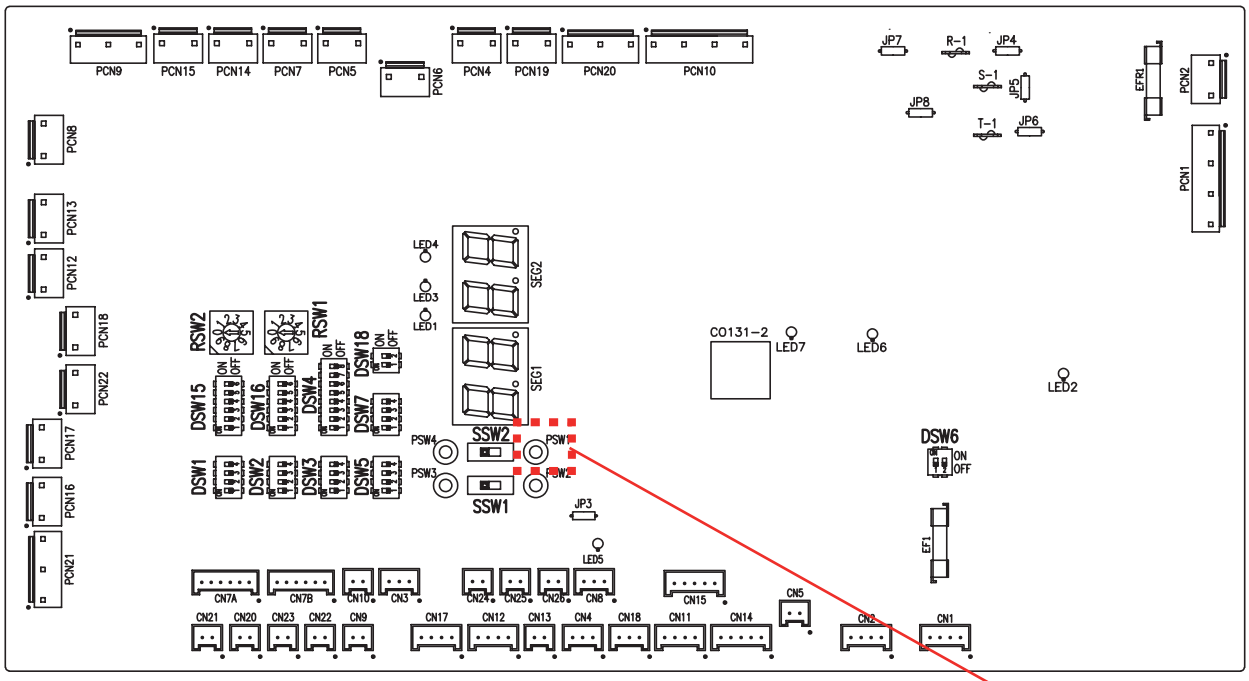
6.2.2 Normal operation display at Unit controller

The Unit controller is an interactive interface that shows all the operation status at real time. At normal operation the unit controller screen shows all the information related to the settings and conditions of the outdoor and indoor unit.

6.3 Troubleshooting in check mode

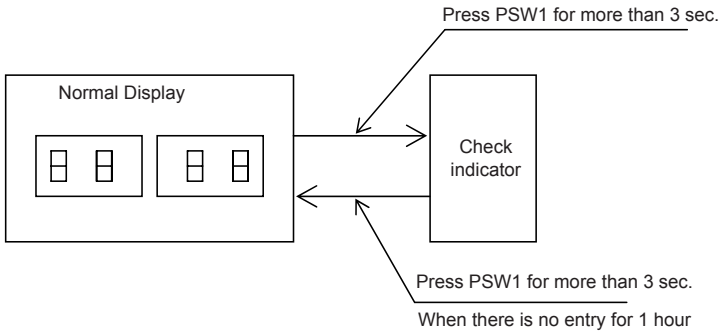
6.3.1 Troubleshooting using the 7 segment display (Indoor unit)

Operating conditions may be checked by 7-segment and push switches (PSW) on the PCB1 in the indoor unit. During checking data, do not touch the electric parts except for the indicated switches because 220-240V is applied to them. Pay attention not to contact the tools with electrical parts. If contacted, electrical parts will be damaged.



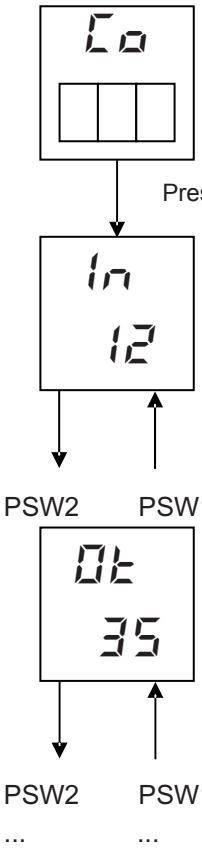
Status indication. Press PSW1 more than 3 seconds to change the status display mode

Change to check indicator mode to display different items.



This is he procedure to follow to check with the combination of checking switches (▲: PSW2 ▼: PSW1):

- To start checking, press PSW1 switch for more than three seconds.
- To proceed checking, press the PSW1 switch.
- To back to the previous item, press the PSW1 switch.
- To cancel this checking, press the PSW2 switch for more than 3 seconds.



This section shows an example of “check indication”

Temperature is displayed with the number rounded up to the nearest whole number. Fix the minus sign to the box on the left.

Cold water inlet temperature

Example of 12ºC

Cold water outlet temperature

Example of 35ºC

◆ Check mode items PCB1

Code Display	Data display	Description
oF hE hS SP AL	St oF on bo 888	Normal operation
tH	88.8	Heat water Temperature Setting (ºC)
tc	88.8	Cold Water Temperature Setting (ºC)
in	88.8	Water Inlet Temperature (THM_{WI}) (ºC)
ot	88.8	Water outlet Temperature (THM_{WO}) (ºC)
o1	88.8	Water outlet temperature heat pump (THM_{WOHP})
o2	88.8	Water outlet Temperature Circuit 2 (THM_{WO2}) (ºC)
A1	88.8	Auxiliary temperature 1 (THMaux1)
oh.	88.8	Tank water temperature 2 (top) (THM_{DHWT2})
oh	88.8	Water Temperature DHW (THM_{DHW}) (ºC)
A2	88.8	Auxiliary temperature 2 (THM_{AUX2})
tA	88.8	Outdoor Unit Ambient Temperature (THM7) (ºC)
A3	88.8	Auxiliary temperature 3 (THM_{AUX3})
t1	88.8	Outdoor Unit Average Ambient Temperature (2 hours) (ºC)
t1.	88.8	Second Outdoor Unit Average Ambient Temperature (2 hours) (ºC)
tG	88.8	Indoor unit refrigerant Gas Temperature (THM_G) (ºC)
tL	88.8	Indoor unit refrigerant Liquid Temperature (THM_L) (ºC)
Pr	88.8	Water pressure (WPS) (bar)
td	88.8	Discharge GasTemperature (ºC)
t5	888	Evaporation gas Temperature (ºC)

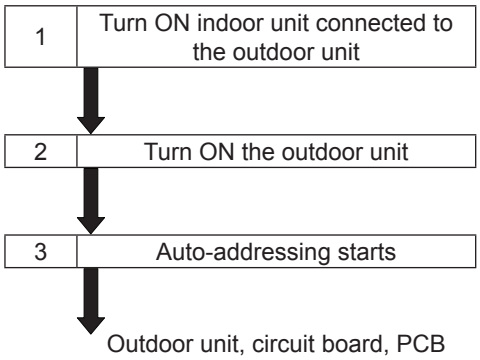
Code Display	Data display	Description
dF	888	Defrosting
d1	888	Cause of stoppage
h1	888	Inverter Operation frequency (Hz)
E1	888	Indoor Expansion valve opening (%)
Eo	888	Outdoor Expansion valve opening (%)
PP	888	Water Pump (0-100)
FF	888	Water Pump Feedback Frequency (0-100)
FP	8.88	Water flow (m^3/h)
d1	888	Digital inputs
do	888	Digital outputs
ou	888	Refrigerant Cycle Address
iu	888	Indoor Unit Address
no	888	ROM Nº
Cd	888	Capacity Code
Co	888	Outdoor capacity Code
CP	888	Unit Type (See Table Below)

Indoor & Outdoor Unit Capacity Code

Capacity	Code
2HP	14
3HP	22
4HP	32
5HP	40
6HP	48
8HP	64
10HP	80

6.3.2 Troubleshooting using the 7 segment display (Outdoor unit)

◆ Simple checking by 7-segment display



During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display:

1 Disconnection of power supply to the indoor unit.

2 Reverse connection of the operating line between the outdoor and indoor units.

3 Duplication of indoor unit number.

- **Normal case:**
  The 7-segment display of the outdoor unit is not indicated.
- **Abnormal case:**
  If there is something wrong, the 7-segment display of the outdoor unit displays the following indications:

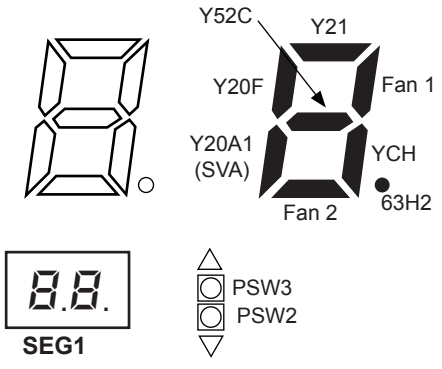
Cause	Indication	Remarks
A. The indoor unit is not supplied with power.	03	Continues to flash after 30 seconds.
B. Disconnection of the operating line between the outdoor units and the indoor unit.	03	Continues to flash after 30 seconds.
C. Duplicated settings of the indoor unit number on the rotary switch RSW, see the description of the alarm code "35").	—	—

◆ Checking method by 7-segment display

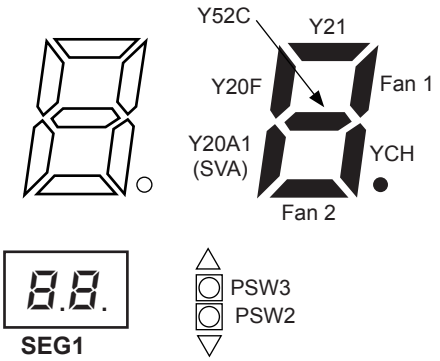
Operating conditions and each part of refrigeration cycle can be checked by 7-segment and push switches (PSW) on the PCB in the outdoor unit. During checking data, do not touch the electric parts except for the indicated switches because 220-240V is applied to them. Pay attention not to contact the tools with electrical parts. If contacted, electrical parts will be damaged.

- To start checking, press PSW2 switch for more than three seconds.
- To proceed checking, press the PSW2 switch.
- To back to the previous item, press the PSW3 switch.
- To cancel this checking, press the PSW2 switch for more than 3 seconds.

RAS-(2-3)WHVRP1



RAS-(4-10)WH(V)NPE



◆ Check mode items

NOTE

For figures consisting of more than 2 digits, the upper 2 digits and lower 2 digits of the figures are indicated alternatively every 0.5 sec In the 7-segments display, as shown below (the lower 2 digits are shown together with a dot at the lower right corner)

Example: 1253



RAS-(2-3)WHVRP1

Item	Item		Indication data	
	Check number	Indic.	Indic.	Contents
Input/output state of outdoor micro-computer	01	SC	3	Indicates only for the segments corresponding to the equipment in the figure. (See figure above)
Capacity of operating indoor unit	02	oP	36	00~199 In case that capacity is higher than 100, the last two digits flash
Control software number	03	SP	12↔34.	Control Software No. in use is indicated. Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.
Inverter software number	04	iP	12↔34.	Inverter Software No. in use is indicated. Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.
Inverter order frequency to compressor	05	H1	74	0~115 (Hz) In case that frequency is higher than 100Hz, the last two digits flash.
Air flow step	06	Fo	15	00~15 step
Outdoor unit expansion valve opening	07	Eo	30	00~100 (%) In case that expansion valve opening is 100%, "00" flashes
Discharge Pressure (High)	08	P.d	3.5	0.1~4.9 (MPa)
Suction Pressure (Low)	09	P.S	0.5	0.0~1.9 (MPa)
Temperature at the top of compressor	10	Td	94	00~142 (ºC) In case that temperature is higher than 100ºC, the last two digits flash
Evaporating temperature at heating	11	TE	34	-19~80ºC
Ambient air temperature	12	To	44	-19~80ºC
Outdoor condensing Temperature		Tc		(only when there is no Pd sensor)
Condenser Pipe Temperature	13	TC	22	-19~80ºC
Control information	14	TF	20	Internal information of the PCB
Inverter Firstly Current	15	A1	12	00~199 (A) In case that current is higher than 100ºC, the last two digits flash
Inverter secondary current	16	A2	20	00~199 (A) In case that current is higher than 100ºC, the last two digits flash
Indoor unit address	17	nA	00	00~63
Indoor unit expansion valve opening	18	EA	20	00~100 (%) In case that opening is 100%. "00" flashes
Liquid pipe temperature of indoor unit (freeze protection)	19	LA	05	-19~127 (ºC) When Temp. is higher than 100, the last two digite flash.
Gas Pipe Temperature of Indoor Unit	20	uA	26	-19~127 (ºC) When Temp. is higher than 100, the last two digite flash.
Indoor unit inlet air temperature	21	iA	28	-19~127 (ºC) When Temp. is higher than 100, the last two digite flash.
Indoor unit outlet air temperature	22	oA	20	-19~127 (ºC) When Temp. is higher than 100, the last two digite flash.
Cause of indoor unit stoppage	23	dA	01	00~99 Indicated Cause of Stoppage Code
Total accumulated operation time of Compressor	24	UJ	00↔00	0 to 9999 (x 10 hours) Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.
Accumulated operation time of compressor (can be reset to zero for instance when compressor is replaced)	25	cU	00↔00	0 to 9999 (x 10 hours) Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.

Item	Item		Indication data	
	Check number	Indic.	Indic.	Contents
Outdoor unit alarm code	26	AC	08	00~99 Indicated Alarm Code
Cause of stoppage at inverter	27	iF	1	00~99 Indicated Cause of Stoppage Code
Cause of FAN1 stoppage	28	F1	0	00~99 Indicated Cause of Stoppage Code
Cause of FAN2 stoppage	29	F2	2	00~99 Indicated Cause of Stoppage Code
Abnormal data record	30	n1	00	One of the abnormal data record from latest (n1) to oldest (n9) is indicated. Alarm code or cause code is indicated.
Total capacity of indoor unit connected	31	CP	36	00~199 In case that capacity is higher than 100, the last two digits flash
Quantity of connected indoor units	32	AA	2	00~64
Refrigerant address	33	CA	0	00~63

RAS-(4-10)WH(V)NPE

Item	Item		Indication data		
	Check number	Indic.	Indic.	Contents	
Input/output state of outdoor micro-computer	01	SC	3	Indicates only for the segments corresponding to the equipment in the figure. (See figure above)	
Capacity of operating indoor unit	02	oP	11	00~199 In case that capacity is higher than 100, the last two digits flash	
Control software No.	03	SP	11	Control Software No. in use is indicated. Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.	
Inverter software No.	04	iP	11	Control Software No. in use is indicated. Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.	
Inverter order frequency to compressor	05	H1	74	0~115 (Hz) In case that frequency is higher than 100Hz, the last two digits flicker	
Air flow ratio	06	Fo	80	00~15	
Outdoor unit expansion valve opening	07	Eo	30	00~100 (%) In case that expansion valve opening is 100%, "00" flashes	
Discharge pressure (high)	08	Pd	30	0.1 to 4.9 MPa	
Temperature at the top of compressor	09	Td	02	00~142 (ºC) In case that temperature is higher than 100ºC, the last two digits flash	
Evaporating temperature at heating	10	TE	-2	-19~80ºC	
Ambient air temperature	11	To	-3	-19~80ºC	
Inverter fin temperature	12	TF	20	-10~100 (ºC) In case that temperature is 100%, "00" flashes	
Inverter firstly current	13	A1	12	00~199 (A) In case that current is higher than 100ºC, the last two digits flash	
Inverter secondary current	14	A2	20	00~199 (A) In case that current is higher than 100ºC, the last two digits flash	
Outdoor unit address	15	nA	00	00~63	The right character of the indication represents the indoor unit setting number. Single: A
Indoor unit expansion valve opening	16	EA	20	00~100 (%) In case that opening is 100%. "00" flashes	
Liquid pipe temperature of indoor unit (freeze protection)	17	LA	05	-19~127 (ºC)	
Indoor unit intake air temperature	18	iA	28	-19~127 (ºC)	
Indoor unit discharge air temperature	19	oA	20	-19~127 (ºC)	
Cause of indoor unit stoppage	20	dA	05	(See table at the next page)	
Total accumulated operation time of Compressor	21	UU	00	0 to 9999 (x 10 hours) Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.	

Item	Item		Indication data	
	Check number	Indic.	Indic.	Contents
Accumulated operation time of the compressor (can be reset to zero, example, when compressor is replaced)	22	cU	00	0 to 9999 (x 10 hours) Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.
Alarm code for abnormal stoppage of compressor	23	AC	08	Alarm code on compressor
Cause of stoppage at inverter	24	iF	1	(See table at the next page)
Abnormal data record	25	n1	00	One of the abnormal data record from latest (n1) to oldest (n9) is indicated. Alarm code or cause code is indicated.
Total capacity of indoor unit connected	26	CP	22	00~199 In case that capacity is higher than 100, the last two digits flash
Quantity of connected indoor units	27	AA	2	00~64
Refrigerant adress	28	dA	0	00~63

◆ Cause of indoor unit stoppage (dA)

Indication	Contents
00	Operation OFF, Power OFF
01	Thermo-OFF
02	Alarm
03	Freeze protection overheating protection
05	Instantaneous power failure at outdoor unit
06	Instantaneous power failure at indoor unit
07	Stoppage of Cooling Operation due to Low Outdoor Air Temperature Stoppage of Heating Operation due to High Outdoor Air Temperature
10	Demand
11	Retry due to compression ratio decrease
12	Retry due to low pressure increase
13	Retry for Pd in crease prevention
15	Vacuum/discharge gas temperature increase retry
16	Retry due to discharge gas SUPERHEAT decrease
17	IPM error retry, instantaneous over current of inverter retry, electronic thermal activation of inverter retry, abnormal current sensor of inverter retry
18	Retry due to inverter voltage decrease Retry due to Inverter Overvoltage Retry due to inverter transmission anomaly
19	Retry due to Expansion Valve Control
21	Forced Thermo-OFF
22	Outdoor hot start control
24	Thermo-OFF during energy saving operation mode
26	Retry due to high pressure decrease
28	Cooling air discharge temperature decrease
33	Forced Thermo-OFF (example: due to Air Filter Cleaning)
34	Forced Thermo-OFF (example: due to Motion Sensor)
35	Retry due to abnormal operating mode (Reversing valve switching failure)
39	Forced Thermo-OFF due to Power Saving Control

NOTE

- *The cause code for indoor unit stoppage is not always "02" (Alarm) during stoppage by the anomaly. If the unit is under Thermo-OFF by other cause of stoppage before "02" (Alarm) occurs, the previous cause code for indoor unit stoppage remains.*
- *When the transmitting between the inverter PCB and the outdoor unit PCB1 is disconnected for 30 seconds, the outdoor micro-computer will be reset. Accordingly when the alarm code "04" (Abnormal Transmitting between Inverter PCB and Outdoor Unit PCB1) occurs, the cause code for indoor unit stoppage may be indicated "05".*
- *When the transmitting between the indoor unit and the outdoor unit is disconnected for 3 minutes, the indoor micro-computer will be reset. Accordingly when the alarm code "03" (Abnormal Transmitting between Indoor Unit and Outdoor Unit) occurs, the cause code for indoor unit stoppage may be indicated "06".*

Cancellation of Forced Thermo OFF (c 1) (only for RAS-(4-10)WH(V)NPE)

Turn ON the power source and wait for more than 30 seconds. Then press PSW1 for more than 3 seconds.

Forced thermo-OFF (indoor unit error code 21) will be cancelled.

However, this function may damage the compressor, use only on inevitable occasion.

- In case of using the remote control switch (PC-ARFH2E), the cancellation is also available with it.
- When “Operation Lock” indication flashes on the unit controller, press FAN SPEED and LOUVER switches simultaneously for more than 3 seconds.
- “Operation Lock” Indication is disappeared and operation is available.

◆ Cause of inverter stoppage (c24)

Code	Cause	Cause of stoppage for corresponding unit	Remark	
			Indication during retry	Alarm Code
1	Automatic Stoppage of Transistor Module (DIP-IPM Error) (Overcurrent, Undercurrent, Temperature increase)	17	P7	53
2	Instantaneous Over Current	17	P7	48
3	Abnormal Inverter Fin Thermistor	17	P7	54
4	Electronic Thermal Activation (Inverter overcurrent)	17	P7	48
5	Inverter Voltage Decrease (Undervoltage)	18	P8	06
6	Over Voltage	18	P8	06
7	Abnormal Inverter Transmission	18	-	04
8	Abnormal Current Detection	17	P7	51
9	Instantaneous Power Failure Detection	18	-	-
11	Reset of Micro-Computer for Inverter	18	-	-
12	Earth Fault Detection from Compressor (Only Starting)	17	P7	53
13	Phase detection anomaly	18	P8	-
14	Inverter Non-Operation	18	-	55
15	Inverter Non-Operation	18	-	55
16	Inverter Non-Operation	18	P8	55
17	Communication Anomaly	18	P8	55
18	Protection Device Activation (PSH)	-	-	02
19	Protection Detection Device Anomaly	-	-	38
20	Early Return Protection Device	18	P7	53
21	Loss of synchronism	17	-	31

◆ Cause of compressor stop

When the compressor stops due any of the factors below, Stop Reason Code (d1 Code) is sent to Indoor Unit.

The Code will be overridden when another Code is sent before it.

Stop reason code	Stop factors	52C Relay	OU	IU
00	Switch OFF	OFF	o	o
01	Thermo OFF	ON	o	o
02	Alarm	OFF	o	o
03	Freeze protection	ON	o	–
05	Momentary power failure detection in Outdoor unit and reset of the Outdoor PCB micro controller	OFF	o	–
06	Momentary power failure detection in Indoor unit and reset of the indoor PCB micro controller	ON	–	o
07	Outdoor temperature at cooling lower than -5°C (Outdoor temperature -15°C at annual cooling setting)	ON	o	–
	Outdoor air temperature and indoor suction temperature for heating (Overload condition)	ON	o	–
	Stop due to outdoor heating temperature lower than -20°C (Low temperature condition)	ON	o	–
10	Demand (external input)	ON	o	–
	Emergency stop (DSW1-4: ON or forced stop input)	OFF	o	–
13	Discharge pressure increase prevention for cooling and heating	ON	o	o
15	Gas shortage detection (detected by pipe temperature: gas shortage detection I)	OFF	o	o
	Gas shortage detection (detected by compressor-top temperature: gas shortage detection II)	OFF	o	o
	Compressor-top overheating (Td)	ON	o	o
16	Abnormal decrease of discharge gas superheat degree (TdSH)	ON	o	o
17	Inverter trip (Instantaneous overcurrent, Electronic thermal activation, Current sensor anomaly)	OFF	o	o
18	Inverter trip (Inverter undervoltage, Overvoltage, Transmission error, Microcomputer reset)	OFF	o	o
19	Prevention Control for expansion valve opening deviance	ON	o	o
21	Thermo OFF stop due to oil return control	ON	o	–
	Forced Thermo OFF of simultaneous twin or greater (when other units are Thermo OFF)	ON	o	–
22	Outdoor unit Heat Start Control	OFF	o	–
26	Retry stop due to high pressure decrease anomaly	ON	o	o
28	Cooling discharge temperature control	ON	o	–
35	Refrigerating cycle anomaly (Bad or wrong switch of 4-way valve)	OFF	o	–
36	Forced stop upon return from defrosting	ON	o	–
39	Stop due to indoor unit rotation control	ON	o	–
41	Stop due to pump down control	ON	o	–

◆ Table of capacity codes of indoor unit

Code	Equivalent horsepower
06	0.8
08	1.0
10	1.3
11	1.5
13	1.8

Code	Equivalent horsepower
14	2.0
16	2.3
18	2.5
22	3.0
32	4.0

Code	Equivalent horsepower
40	5.0
48	6.0
64	8.0
80	10.0

◆ Protection control code on 7-segment display

1 Protection control code is displayed on 7-segment when a protection control is activated.

2 Protection control code is displayed while function is working, and goes out when released.

3 When several protection control are activated, code number with higher priority will be indicated (see below for the priority order).

a. Higher priority is given to protection control related to frequency control than the other. Priority order:
- High-pressure increase protection
- Over current protection
- Cold draft protection

b. In relation to retry control, the latest retrial will be indicated unless a protection control related to frequency control is indicated.

RAS-(2-3)WHVRP1

Priority	Protection control	Code
1	Low-Pressure Ratio Control at Cooling Operation	P0
2	High-pressure ratio control at heating operation	P1
3	High-pressure rise protection	P2
4	Current protection	P3
5	Inverter fin temperature rise prevention	P4
6	Discharge gas temperature rise protection	P5
7	Unbalance Power Source Detecting	P9
8	Demand current control	PA

RAS-(4-10)WH(V)NPE

Priority	Protection control	Code
1	Pressure ratio control	P01
2	High-pressure rise protection	P02
3	Current protection	P03
4	Inverter fin temperature rise prevention	P04
5	Discharge gas temperature rise protection	P05
6	Demand current control (running current limit control)	P0A
7	High pressure decrease protection (only Premium series)	P09

NOTE

The protection control code being indicated on 7-segment display is changed to an alarm code when the abnormal operation occurs. Also, the same alarm code is indicated on the remote control switch.

◆ Activating condition of protection control code

To monitor the conditions such as the temperature change and others, the control of the frequency and other controls are performed by the protection control in order to prevent the abnormal operations. The activating conditions of protection control are shown in the table below:

RAS-(2-3)WHVRP1

Code	Protection Control	Activating Condition	Remarks
P0	Low-Pressure Ratio Control at Cooling Operation	If Compression Ratio ε exceeds a threshold value => Frequency Increase	—
P1	High-Pressure Ratio Control at Heating Operation	If Compression Ratio ε is lower than a threshold value => Frequency Decrease	—
P2	High-Pressure Increase Protection	High Pressure Switch for Control is activated => Frequency Decrease	—
P3	Over Current Protection	Inverter Output Current > 10.5A => Frequency Decrease	—
P4	Inverter Temperature Increase Protection	Inverter Fin Temperature RAS-(2-3)WHVRP1 ≥ 70 ºC => Frequency Decrease	—
P5	Discharge Gas Temperature Increase Protection	Temperature at the top of compressor is high => Frequency Decrease	—
P9	Unbalance Power Source Detecting	Inverter Output Current exceeds a threshold value => Frequency Decrease	—
PA	Current Demand Control	Inverter Output Current exceeds a threshold value => Frequency Decrease	In case of Demand Control Setting

RAS-(4-10)WH(V)NPE

Code	Protection control	Activating condition	Remarks
P01	Pressure ratio control	Compression ratio ε ≥ 7.5 => frequency decrease Compression ratio ε ≤ 1.6 => frequency increase	ε = (Pd+0.1)/(Ps+0.1)
P02	High-pressure increase protection	High Pressure Switch for Control is activated => Frequency Decrease	
P03	Inverter current protection	If Inverter PCB secondary current > (*1)A => frequency decrease	
P04	Inverter fin temperature increase prevention	Inverter fin temperature RAS-(4-6)WHNPE ≥ 70 ºC RAS-(4-6)WHVNPE ≥ 80 ºC RAS-(8-10)WHNPE ≥ 82 ºC => frequency decrease	
P05	Discharge gas temperature increase protection	Temperature at the top of compressor is high => frequency decrease (Maximum temperature is different depending on the frequency) Temperature at the top of compressor > 107 ºC => Indicate P5	
P09	High-pressure decrease protection	Discharge pressure of compressor decrease under 10MPa => Frequency increase	Cooling operation and lowest step fan or heating operation
P0A	Demand current control (running current limit control)	Compressor run current ≥ demand setting value => frequency decrease	Demand setting value: upper limit of total running current is set to 100%, 80%, 70%, 60% at normal operation using input on PCB1

Ps: Suction pressure of compressor (MPa)

Pd: Discharge pressure of compressor (MPa)

(1)*

Connection	380-415V					220-240V		
HP	4	5	6	8	10	4	5	6
Current (A)	14.0	14.0	16.0	24.0	24.0	30.5	30.5	30.5

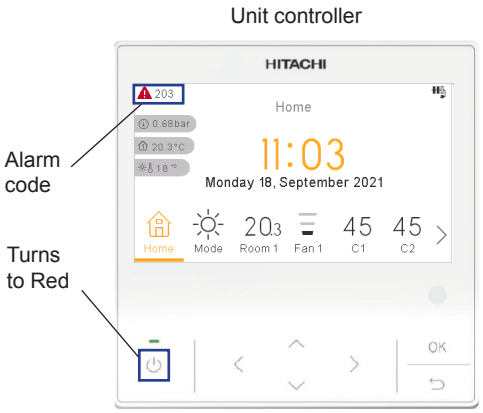
NOTE

- *During protection control (except during alarm stoppage), the protection control code is indicated.*
- *The protection control code is indicated during protection control and turns off when cancelling the protection control.*
- *After retry control, the condition of monitoring is continued for 30 minutes.*

6.4 Alarm code indication in Unit controller

When an alarm is activated it will be displayed in the Unit controller screen of the unit controller. A danger symbol ⚠ and the alarm code will be displayed at the top left of the screen.

The unit screen shows the alarms coming from the outdoor unit, from the indoor unit and also from the unit controller itself (it can happen a problem with the communication between indoor unit and outdoor unit). If that was the case, the unit controller will show an alarm code related to a communication failure between IU and OU.



- Malfunction

  The ON/OFF button turns red. The ALARM indicator appears on the liquid crystal display: Contact your HITACHI service supplier.

- Power supply failure

  All displays disappear. If the unit stops due to a power shortage, it will not start again, even though the power comes back on. Carry out the start-up operations again. If the power failure lasts less than 2 seconds, the unit will start again automatically.

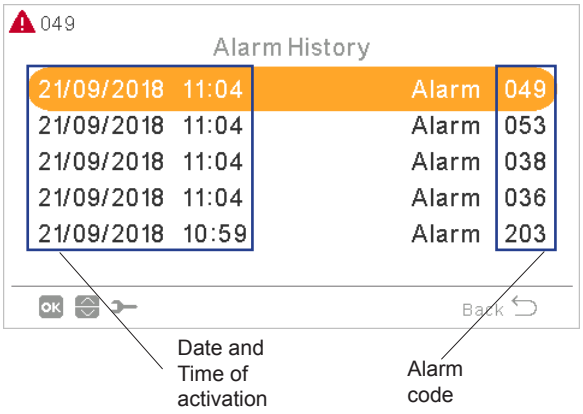
- Electrical noise

  The display can disappear from the screen and the unit can stop. This is because the microcomputer has been activated to protect the unit from electrical noise.

◆ Alarm history

The system keeps the last 20 alarms stored. Each alarm entry has the following data:

- Date: date of activation in yy/mm/dd format.
- Time: the hour and minute of activation
- Alarm code: The alarm code



NOTE

- *An alarm is registered when activated, not during all the time that is shown on the Unit controller screen.*
- *Alarms are registered each time appears. Even if that alarm is deactivated, if appears again, will be registered again.*
- *When an alarm is registered and switches to another alarm, the second one will be registered too.*
- *If a new alarm appears when the list of 20 registered alarms is full, the oldest one will be removed from the list to allow the new one to be in the list.*

In case of being in installer mode, a menu related only to the alarm history window will be displayed by selecting an alarm and pressing the OK button. 4 options will be shown:

- Alarm description: Shows basic information of the alarm when it is selected.
- Unit previous status: Displays the main variables recorded at the same time as the alarm occurred.
- Remove the selected alarm: It will delete the selected alarm only.
- Clear alarms: Remove all the registered alarms.

6.5 Alarm codes for the outdoor and indoor units

Alarm Code	Retry stop code	OU	YUTAKI S / SC	Origin	Detail of Anomaly	Main Factors
2	–	o	–	Outdoor Unit	Activation of the protection device (high pressure switch)	Activation of PSH, locked motor, abnormal operation in the power supply phase. Failure of fan motor, drain discharge, PCB, relay, float switch activated. (Pipe clogging, excessive refrigerant, innert gas mixing, fan motor locking at cooling operation)
3	–	o	o	Transmission	Transmission alarm (Not outdoor unit detected)	Loose, disconnected, broken or short-circuited connector
4	–	o	–		Abnormal transmission between inverter PCB and control PCB	Transmission failure between inverter PCBs. (Loose Connector, Wire Breaking, Blowout of Fuse).
5	–	o	–	Power supply	Reception of abnormal operation code for detection of power source phase	Power source with abnormal wave pattern. Main power supply phase is reversely connected or one phase is not connected.
6	–	o	–	Voltage	Excessively low voltage or excessively high voltage for the inverter	Voltage drop in power supply. Incorrect wiring or insufficient capacity of power supply wiring.
7	–	o	–	Cycle	Decrease in discharge gas superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnected Connector).
8	–	o	–		Excessively high discharge gas temperature at the top of compressor	Insufficient refrigerant charge, refrigerant leakage. Expansion valve closed or clogged.
10	–	–	- / o	Indoor	Domestic hot water temperature (THMDHWTH2) top thermistor anomaly	Loose, disconnected, broken or short-circuited connector
11	–	–	o	Indoor	Water inlet temperature (THMwi) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
12	–	–	o	Indoor	Water outlet temperature (THMwo) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
13	–	–	o	Indoor	Indoor liquid pipe temperature (THML) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
14	–	–	o	Indoor	Indoor gas pipe temperature (THMG) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
15	–	–	(o)	Indoor	Water outlet Circuit 2 (mixing circuit) temperature (THMWO2) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
16	–	–	(o) / o	Indoor	Water DHW (THMDHWT / THMDHWT1) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
17	–	–	(o)	Indoor	Auxiliary temperature sensor 2 (THMAUX2) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
18	–	–	(o)	Indoor	Auxiliary sensor 1 thermistor anomaly (THMAUX1)	Loose, disconnected, broken or short-circuited connector
19	–	–	o	Indoor	Water Plate HEX pipe (THM_{WOHP}) thermistor anomaly	Loose, disconnected, broken or short-circuited connector
20	–	o	–	OU sensor	Thermistor for discharge gas temperature (THM9) anomaly	Incorrect wiring, disconnected wiring, broken cable, short circuit.
21	–	o	–		High pressure sensor	
22	–	o	–		Thermistor for outdoor ambient temperature (THM7) anomaly	
24	–	o	–		Thermistor for evaporation or condensation temperature (THM8) anomaly	Incorrect wiring, disconnected wiring, broken cable, short circuit.

Alarm Code	Retry stop code	OU	YUTAKI S / SC	Origin	Detail of Anomaly	Main Factors
25	–	–	(o)	Indoor	Auxiliary sensor 3 thermistor (THMAUX3) anomaly	Loose, disconnected, broken or short-circuited connector
26	-	-	o	Indoor	Water pressure sensor (WPS) anomaly	Incorrect wiring, disconnected wiring, broken cable, short circuit.
31	–	o	–	System	Incorrect capacity setting or combined capacity between outdoor and indoor units	Incorrect Capacity Code Setting, Excessive or Insufficient Indoor Unit Total Capacity Code.
35	–	o	–		Incorrect indoor unit address setting	
36	–	o	–		Incorrect indoor unit combination	
38	–	o	–		Anomaly at picking up circuit for protection (outdoor unit)	Failure of indoor unit PCB, incorrect wiring, connection to PCB in indoor unit.
40	–	–	o	Indoor	Incorrect unit controller setting	Current Unit controller configuration does not allow proper operation
45	–	o	–	Protective device	Activation of the safety device from excessively high discharge pressure	Overload (obstruction of HEX, short circuit) mixture of inert gas, Excessive Refrigerant.
47	–	o	–		Activation of the safety device from excessively low suction pressure (protection from vacuum operation)	Shortage or leakage of refrigerant, piping clogging, expansion valve close-locked, fan motor locked.
48	–	o	–		Activation of overcurrent protection	Overload, overcurrent. Failure of Inverter PCB, heat exchanger clogged, locked compressor. EVI/EVO failure.
51	–	o	–	Inverter	Abnormal operation of the current sensor	Incorrect wiring of current sensor. Failure of control PCB or Inverter PCB.
53	–	o	–		Protection of the Inverter PCB	Inverter module (IPM, DIP-IPM) and Inverter PCB anomaly. Failure of compressor, clogging of heat exchanger.
54	–	o	–		Anomaly of inverter fin temperature	Heat Exchanger Clogging. Fan Motor Failure.
55	–	o	–		Anomaly of inverter module	Failure of DIP-IPM, IPM or Inverter PCB.
57	–	o	–	Outdoor	Anomaly of fan motor protection	Anomaly of fan motor protection (DC fan motor)
5b	–	o	–	Outdoor fan	Activation of over current protection	Fan consumption anomaly
5c	–	o	–	Outdoor fan	Anomaly in current detection circuit	Anomaly in fan current detection circuit
70	P70	–	o	Indoor	Hydraulic low flow & water pump malfunction	Water flow is not detected in the hydraulic cycle or Pump defective
72	–	–	o	Indoor	Thermostat Heater Alarm	High temperature is detected in Electric Heater
73	–	–	(o)	Indoor	Mixing overheating limit protection for Mixed circuit.	Circuit 2 supply temperature > Target temperature + offset
74	P74	–	o	Indoor	Unit overheating limit protection	Two > Tmax +5K
75	–	–	o	Indoor	Freeze Protection by cold water inlet / outlet temperature detection	
76	–	–	o	Indoor	Freeze Protection Stop by indoor liquid or gas temperature thermistor	
77	–	–	(o)	Indoor-Unit controller	Intelligent wireless receiver communication failure	No Open therm/H-LINK communication for a continuous period of 10 minutes.
78	–	–	(o)	Indoor - Unit controller	RF communication failure	There is no communication for 1 hour with on or two RF receives which are bound to the RF-Bridge.
79	–	–	o	Indoor - outdoor	Unit capacity setting error	There is no concordance between indoor outdoor unit capacity
80	–	–	(o)	Indoor- Unit controller	RCS H-LINK communication failure between Indoor unit and Unit controller (PC-ARFH2E)	No H-LINK communication for a continuous period of 1 minute between Indoor and Unit controller. User control by connection wiring (breaking, wiring error, etc.)

Alarm Code	Retry stop code	OU	YUTAKI S / SC	Origin	Detail of Anomaly	Main Factors
81	P81	–	o	Indoor	Momentary Power interruption or Low voltage detected	
83	P83	–	o	Indoor	Low pressure anomaly in hydraulic circuit	Water pressure is not detected in the hydraulic cycle
84	-	-	o	Indoor	High Water pressure	Water pressure > 3.6 bars
85	-	-	(o)	Indoor	Float switch Alarm	Drain pump block malfunction or drain pump not connected.
202	–	(o)	(o)	Indoor	Wrong settings of PC-ARFH2E	
203	–	(o)	(o)	Indoor	Sub PC-ARFH2E stops answering to Main PC-ARFH2E	Loose, disconnected, broken or short-circuited connector
204	–	(o)	(o)	Indoor	Indoor unit stops answering to Main PC-ARFH2E	Loose, disconnected, broken or short-circuited connector
EE	–	o	–	Compres-sor	Compressor protection	"Compressor failure. This alarm code appears when the following alarms: 02, 07, 08, 45, 47 occur three times within 6 hours."

NOTE

(o): Option configurable from Unit controller. This alarm will be displayed if the system has been configured.

o: Default. This alarm will be displayed in the Unit controller.

–: No applicable.

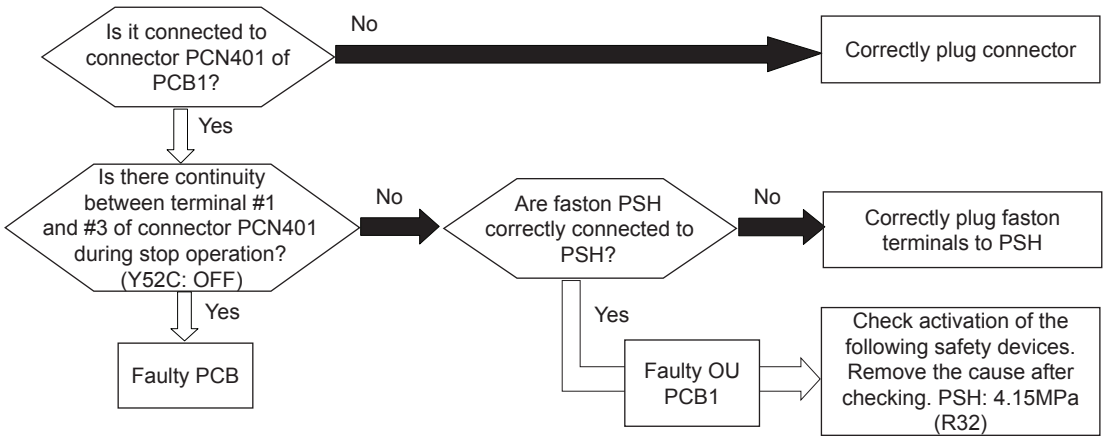
6.6 Troubleshooting by alarm code

Alarm code	02	Activation of the protection device (high pressure switch)

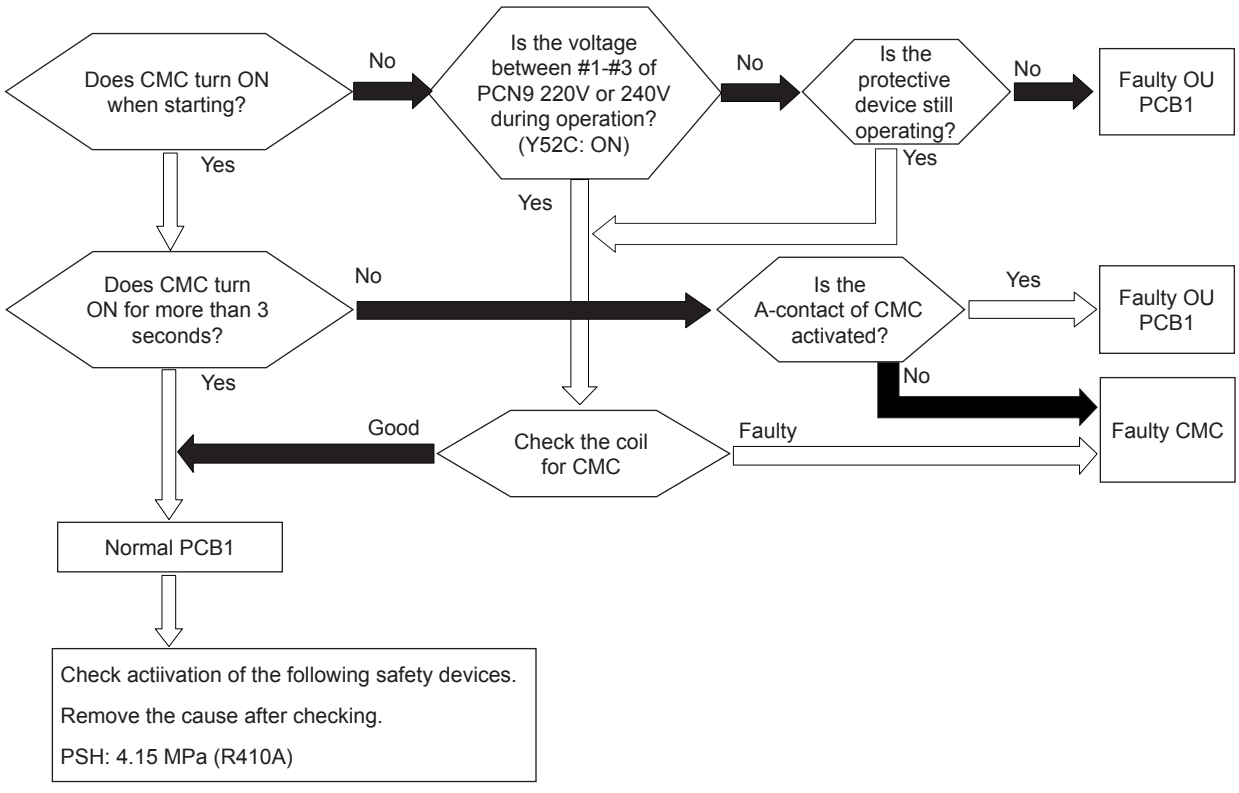
Applicable to units	
OU	S / SC
○	–

- This alarm is indicated when one of the safety devices is activated during compressor running.

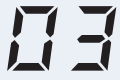
RAS-(2-3)WHVRP1



RAS-(4-6)WH(V)NPE / RAS-(8/10)WHNPE



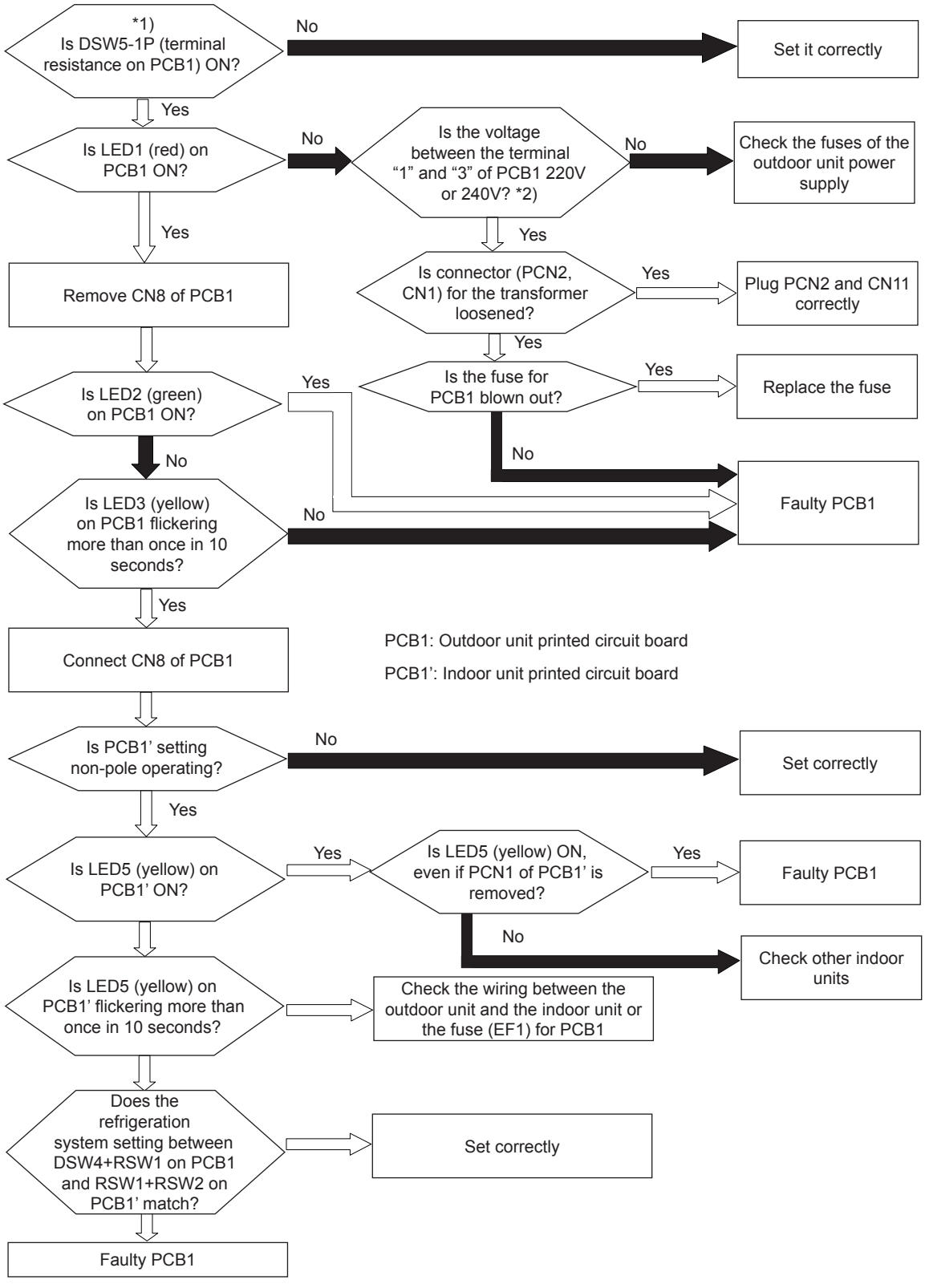
Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Activation of the high-pressure switch due to the excessively high discharge pressure (PSH)	Outdoor Unit: Insufficient Air Flow to the Heat Exchanger (Outdoor Heat Exchanger during the Cooling Process) Indoor Unit: Indoor Heat Exchanger (during the Heating Process)		Check the heat exchanger for dust or for clogging	Remove the dust or the clogging
			Check the air filter for dust	Remove the dust
			Check for any obstacles at the inlet or the outlet of the heat exchanger	Remove the obstacles
			Check the service area	Secure service area
			Check the speed (Outdoor Fan: Cooling)	Replace the fan motor if faulty
			Check the speed of the water pump	Replace the water pump if faulty
	Expansion valve malfunction or anomaly		Disconnected	Fix the looseness or reconnect the connector
			Fully closed and locked	Replace the expansion valve
			Check the operation sound of the coil	Replace the coil
			Check the Discharge Gas thermistor	Replace the thermistor
			Check the fastening of the thermistor	Re-fasten the thermistor
	Excessively High Water Temperature in the indoor unit		Calculate the heat load	Reduce the heat load or use a bigger unit
			Check minimum water flow	Provide good circulation
			Check for collapse in water circuit	Remove the short-circuited
			Check for other heat source	Stop the heat source
	Faulty High-Pressure Switch	Faulty Pressure Switch	Measure the discharge pressure. Check the continuity after the decrease of the pressure	Replace the pressure switch if faulty
		Insufficient Contacting	Measure the resistance by means of a tester	Fix the looseness. Replace the connector
		Incorrect Connection	Check the connections	Repair the connections
	Overcharged refrigerant		Check the cycle operation temp.	Charge the refrigerant correctly
	Mixture of the non-condensate gas in the refrigerant cycle		Check the air temp. and the pressure	Recharge the refrigerant after the vacuum pumping
	Clogging of the discharge piping		Check for clogging	Remove the clogging
	Liquid line stop valve or gas line stop valve is not in operation		Check the stop valves	Fully Open the stop valves
Faulty magnetic contactor switch	No power is supplied to the coil		Check connections	Set the connections properly.
	No power at the A contact		Measure the resistance using a tester	Replace the magnetic switch if it is broken

Alarm code		Abnormal transmission between the indoor unit and the outdoor unit

Applicable to units	
OU	S / SC
○	○

- This alarm is displayed when an abnormal operation is maintained for three minutes after the normal transmission between the indoor units and the outdoor unit. Also, an abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.
- Investigate the cause of the overcurrent and take the necessary action when the fuses are blown out or the breaker for the outdoor unit is activated.
- This alarm code may be indicated when the inverter or the fan motor malfunction and the outdoor unit cannot secure the power source (No indication on the 7-segment of outdoor unit PCB). In this case, surely check the inverter, fan motor and the continuity of the fuse on the circuit.

(Refer to the next page)



*1) In case that terminal resistance (DSW5-1P) is OFF when H-LINK II connection is performed.

- Set the terminal resistance to ON when CN8 is removed.
- Set the terminal resistance to OFF when CN8 is reconnected.

*2) Check item

Power supply	Faston terminal
1~ 230V 50Hz 3N~ 400V 50Hz	Between 1 and 3 of PCN1 on OU PCB

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Power failure or power is not ON		Measure the voltage by means of the tester	Supply the power
Blown out fuse for the power source or activation of the outdoor unit breaker	Short-circuit between the wires	Check the insulation material for breaks	Remove the short-circuit and replace the fuse
	Short-circuited wire to ground	Measure the insulation resistance	Remove short-circuit to ground and replace the fuse
	Faulty compressor motor	Measure the resistance between the wires and the insulation resistance	Replace the compressor and the fuse
	Failure of outdoor unit fan motor	Measure resistance between wires and insulation resistance	Replace the outdoor unit fan motor and the fuse
Blown out fuse for control circuit or activation of outdoor unit breaker	Short-circuit between the wires	Check the insulation material for breaks	Remove the short-circuit and replace the fuse
	Short-circuit of the control circuit (to ground)	Measure the insulation resistance	Remove the short-circuit and replace the fuse
	Faulty solenoid coil for the magnetic switch for the compressor motor	Measure the resistance of coil	Replace the magnetic switch and the fuse
	Failure of outdoor unit fan motor	Measure the resistance between the wires and the insulation resistance	Replace the outdoor unit fan motor and fuse
PCB1 Power circuit failure		PCB1 Measure output voltage *1)	Replace PCB1
Disconnected wires insufficient contacting or incorrect connection	Between outdoor unit and indoor unit	Check the continuity of the wires Check for looseness of the connection screws Check the terminal numbers	Replacing wires repairing and tightening the power source wiring for the screws and the correct wiring
	Power source wiring for the screws and the correct wiring outdoor unit		
Faulty PCB (outdoor unit, indoor unit)	Disconnected wires to PCB	Check the connections	Correctly connect the wires
	Faulty PCB	—	Replace PCB if faulty
Incorrect wiring	Disconnected wire; insufficient contacting	Check the continuity and the looseness of connection screws	Replacing wires, repairing and tightening the screws
	Incorrect wiring	Check the terminal numbers	Correctly connect the wires

NOTE

- **1) In the case that the end terminal resistance (DSW5-1) is set to OFF for H-LINK connection, set the end terminal resistance to ON when CN8 is disconnected. Set the end terminal resistance to OFF when CN8 is reconnected.*
- **2) Transmission Setting (SW1)*
- **3)*

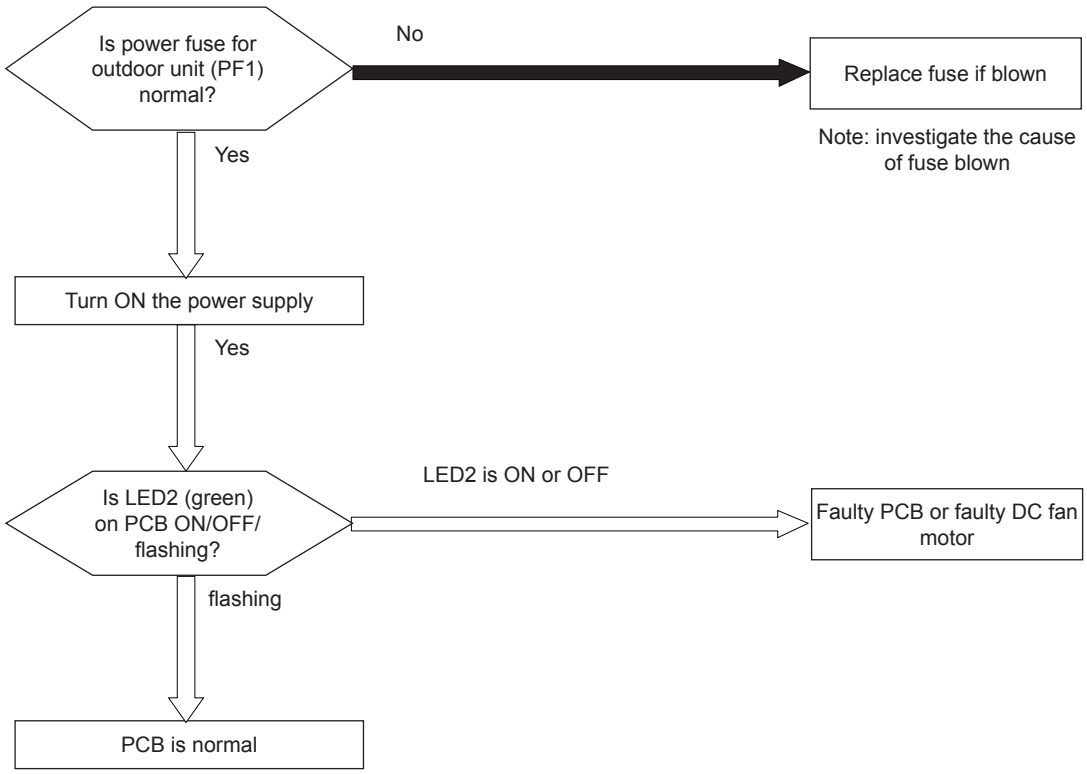
PCB1 output voltage	Voltage
Vcc 12 - GND2	12 VDC
Vcc 05 - GND1	5 VDC
Vcc 12 - GND1	12 VDC
Vcc 15 - GND1	15 VDC
Vcc 24 - GND1	24 VDC
Vcc 12T - GND1	12 VDC

Alarm code	04	Abnormal transmission between inverter and RASC unit PCB (RAS-(2-3)WHVRP1)

Applicable to units	
OU	S / SC
○	–

- This alarm is displayed when the abnormal operation is maintained for 30 seconds after the normal transmission between the outdoor unit PCB1 and inverter PCB2. Also, the abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.

RAS-(2-3)WHVRP1

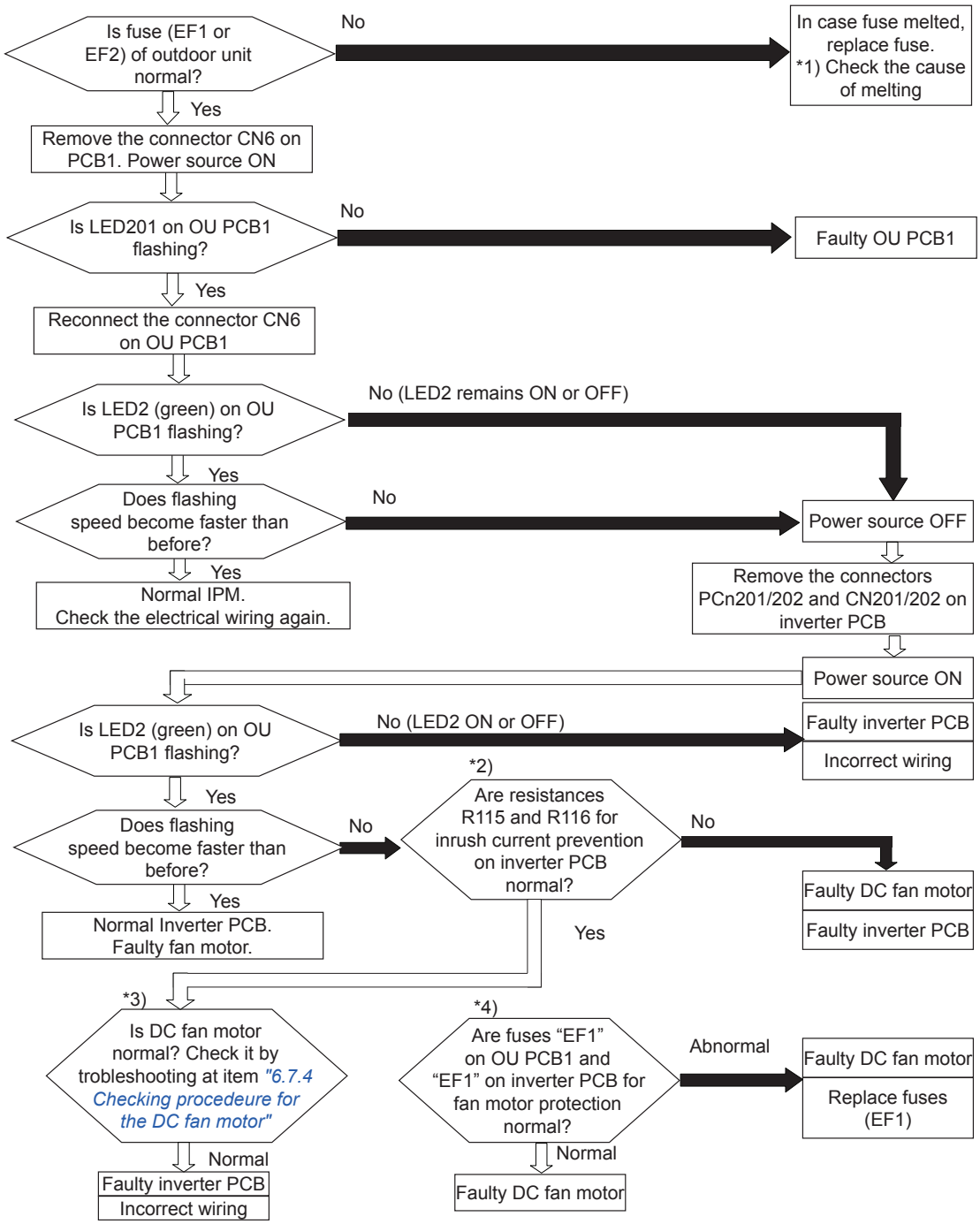


PCB1: Control PCB in outdoor unit

Alarm code	04	Abnormal transmission between inverter and RASC unit PCB (RAS-(4-6)WH(V)NPE / RAS-(8/10)WHNPE)

Applicable to units	
OU	S / SC
○	–

RAS-(4-6)WH(V)NPE / RAS-(8/10)WHNPE



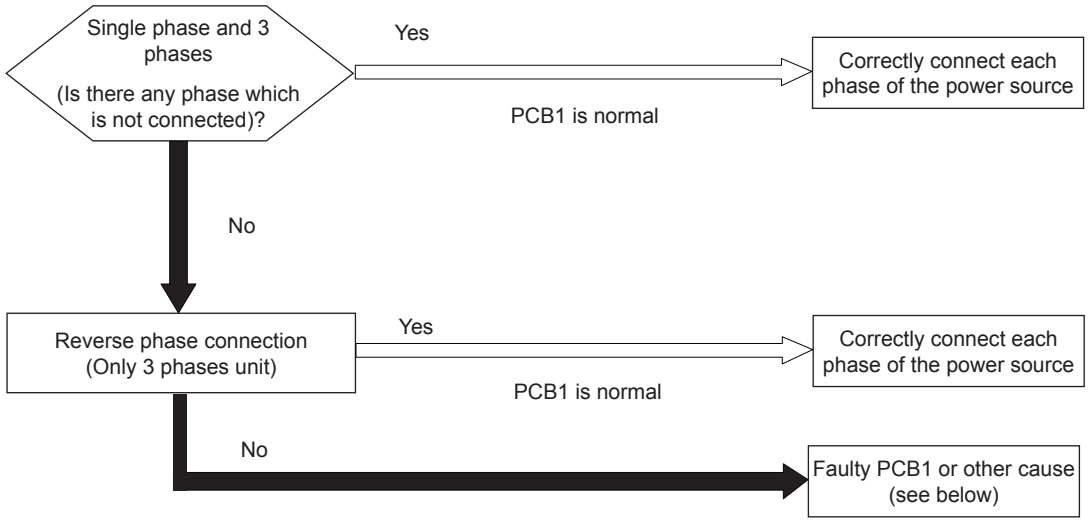
NOTE

- **1): Check to ensure Fan Motor troubleshooting. If not, faulty Fan Motor may damage the normal IPM.*
- **2): Surely perform the troubleshooting of the resistance for inrush current prevention (R115/R116) on inverter PCB. If the resistance for inrush current prevention (R115/R116) fails, the abnormal transmitting occurs.*
- **3): Surely perform the troubleshooting of DC fan motor according to section "6.7.7 Checking procedure for other parts". If the DC fan motor fails, the normal inverter PCB may be damaged.*
- **4): Perform the troubleshooting of the fuses “EF1” on OU PCB1 and “EF1” on inverter PCB for fan motor protection. If the fuses for fan motor protection fail, DC fan motor is not operated normally.*

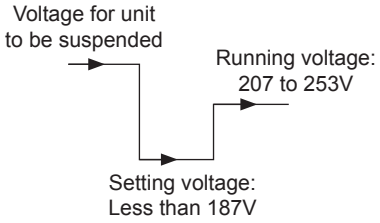
Alarm code	05	Reception of abnormal operation code for detection of power source phase

Applicable to units	
OU	S / SC
○	–

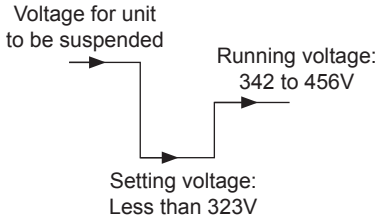
- This alarm is displayed when the main power source phase is reversely connected or one phase is not connected.



RAS-(2-3)WHVRP1 and RAS-(4-6)WHVNPE



RAS-(4-10)WHNPE



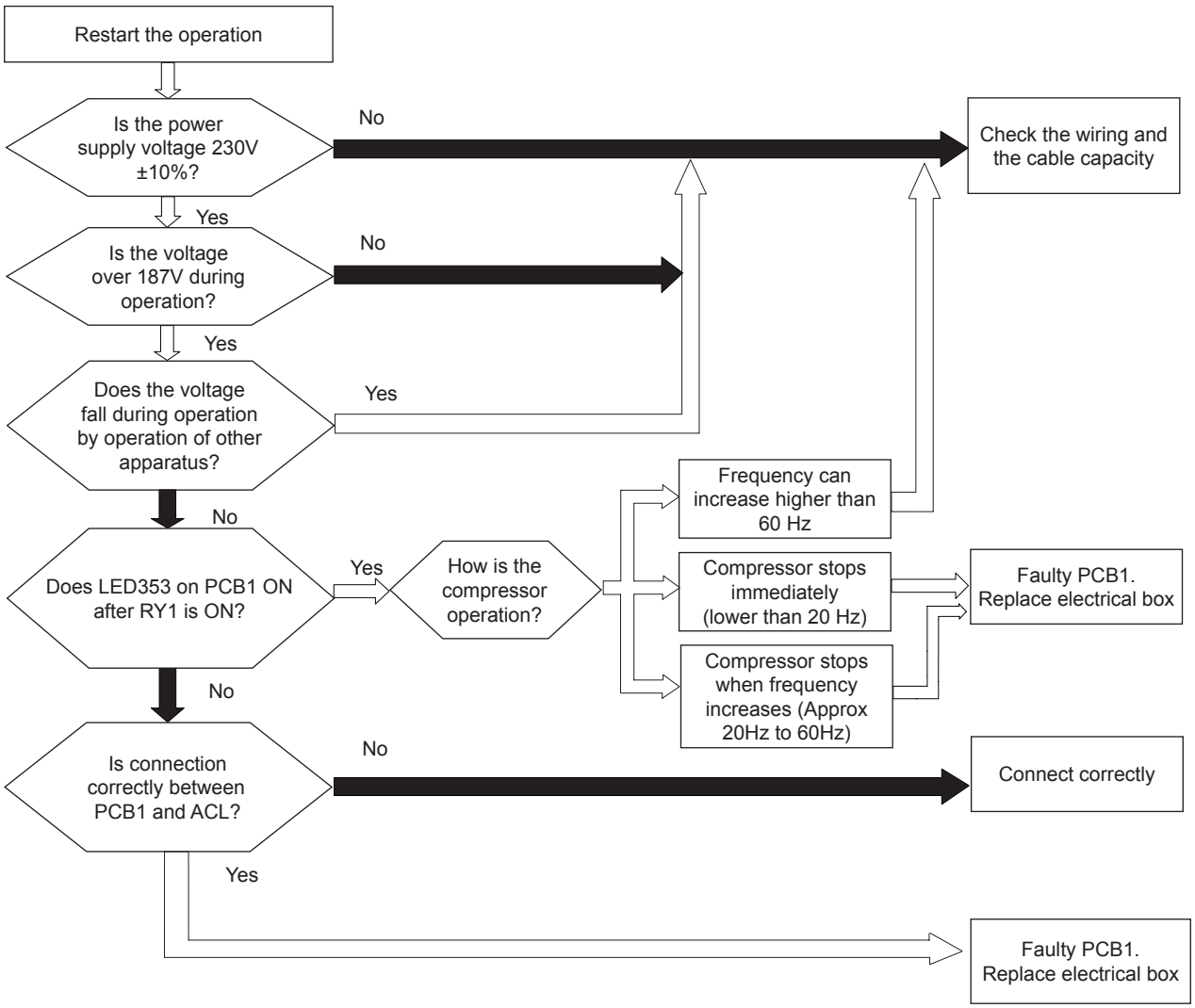
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Activation of reverse phase sensor in the outdoor unit	Reverse or single phase	Check it according to the electrical wiring	Replacing wires, repair, tightening screws or correct wiring
	Faulty outdoor unit PCB	-	Replace PCB if faulty

Alarm code	06	Excessively low voltage or excessively high voltage for the inverter (RAS-(2-3)WHVRP1)

Applicable to units	
OU	S / SC
○	–

RAS-(2-3)WHVRP1

- This alarm code is displayed when the voltage between terminal “P” and “N” of Inverter is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed. The alarm code “06.” Means fan controller Abnormal Operation.



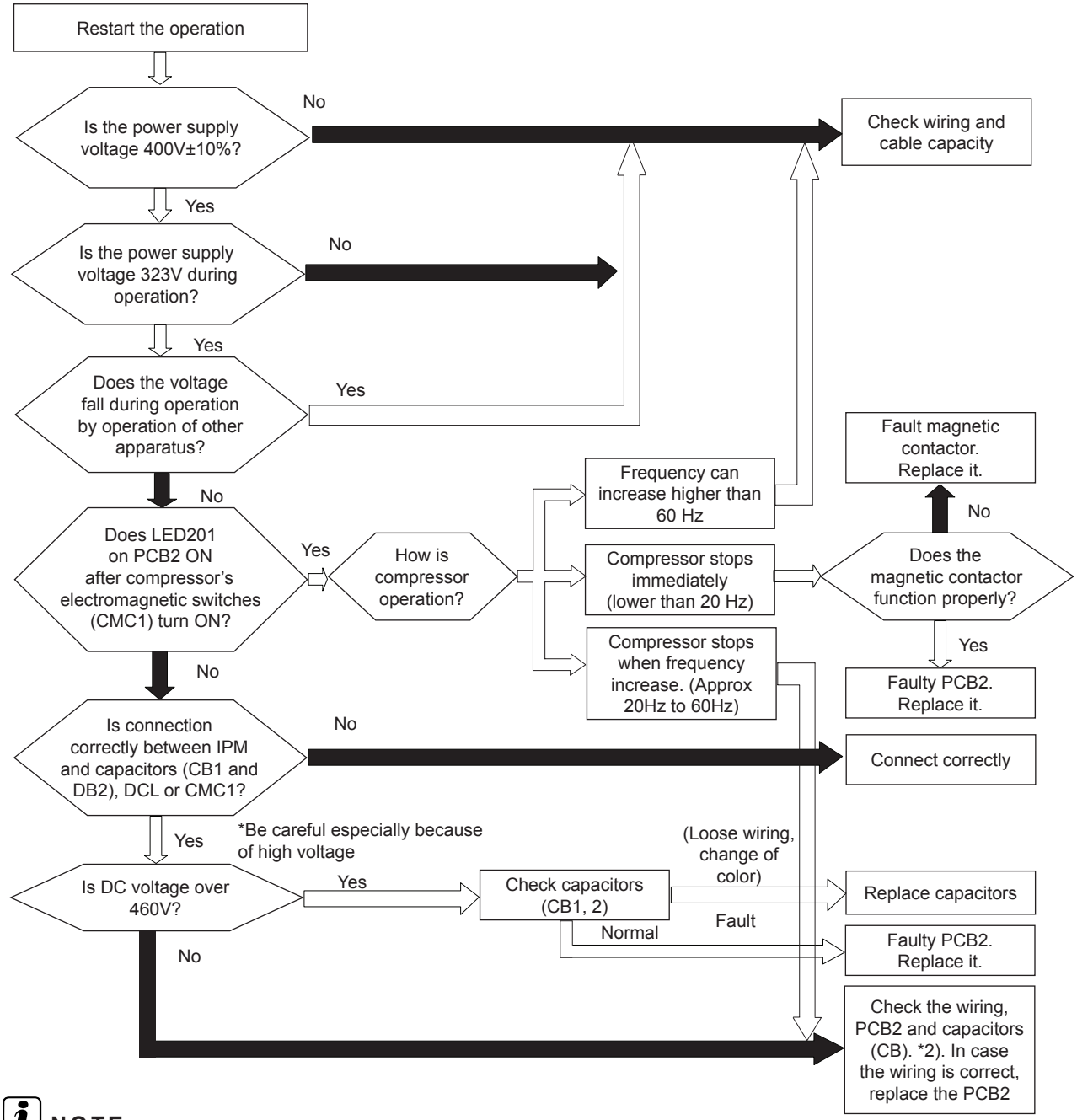
NOTE

Only replace electrical box when LED is OFF.

Alarm code	06	Excessively low voltage or excessively high voltage for the inverter (RAS-(4-6)WH(V)NPE / RAS-(8/10)WHNPE)

Applicable to units	
OU	S / SC
○	–

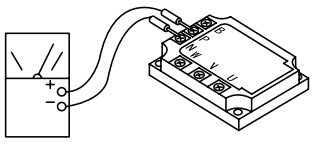
RAS-(4-6)WH(V)NPE / RAS-(8/10)WHNPE



NOTE

- *The indicated voltage is for three phase models. The power supply voltage for single phase models is 220V and 187V during operation.*
- **1): If capacitor has high voltage, perform the high voltage discharge work refer to the item "6.7.7 Checking procedure for other parts"*
- **2): Regarding replacing or checking method for the inverter PCB, refer to the item ""6.7.7 Checking procedure for other parts"*

PCB1: Control PCB in outdoor unit
PCB2: Inverter PCB in outdoor unit



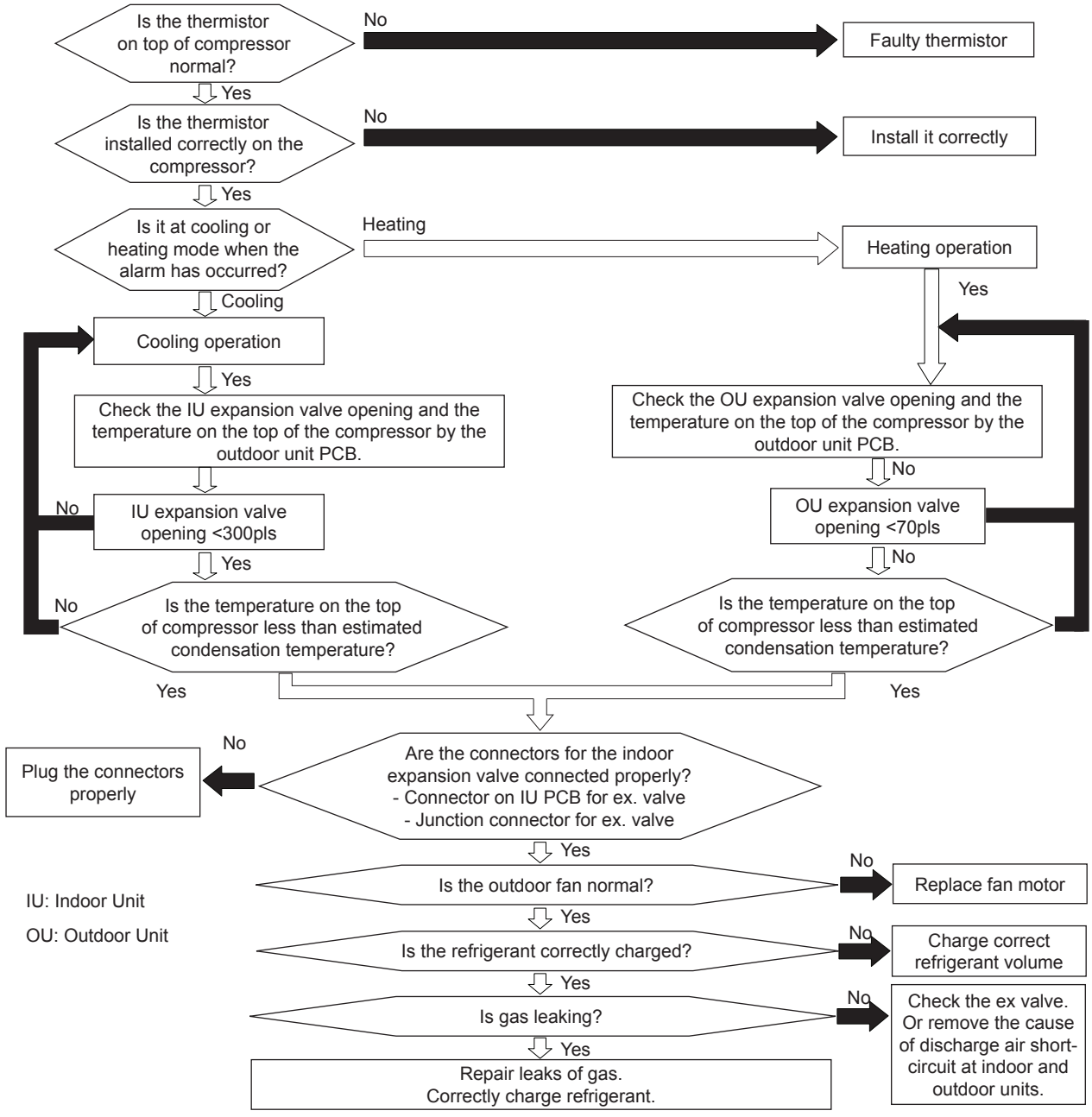
Direct current
Measuring position
Measuring range: DC1000V

Alarm code	07	Decrease of discharge gas superheat

Applicable to units	
OU	S / SC
○	–

This alarm code is indicated as follows:

- The temperature on the top of the compressor is less than the target and also the IU expansion valve opening is under 300pls at cooling operation for 30 minutes.
- The temperature on the top of compressor is less than the target and also the OU expansion valve opening is under 70 pls at heating operation for 30 minutes.
- The compressor is stopped and then the retry operation is performed after 30 minutes.

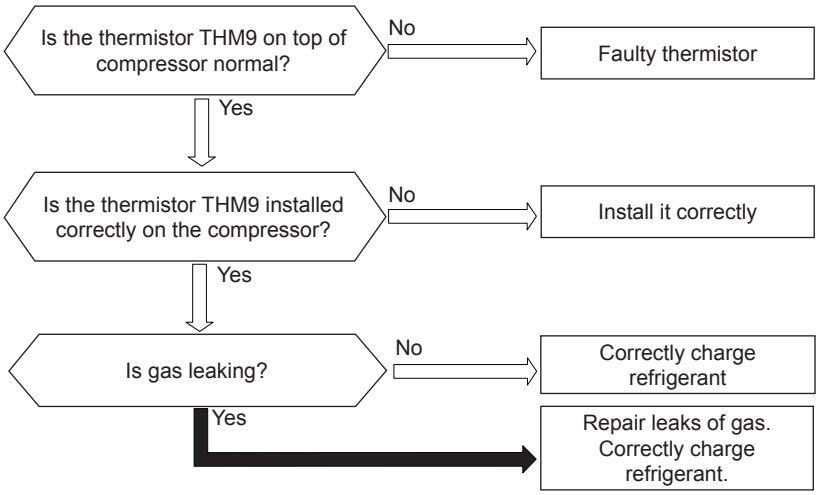


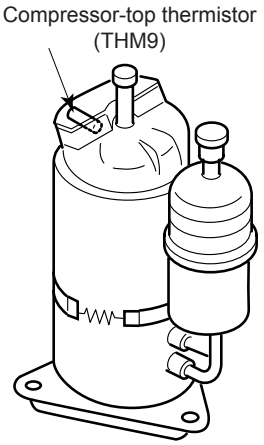
Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Decrease of discharge gas superheat	Refrigerant cycle is different from the electrical system		Check refrigerant cycle and the electrical system	Repair wiring
	Overcharged refrigerant		Measure pressure	Correctly charge refrigerant
	Faulty Expansion Valve		Check expansion valve. Refer to *"6.7.6 Checking procedure for the electronic expansion valve for indoor and outdoor units"*	Replace expansion valve if faulty.
	Faulty PCB	Fault	Replace PCB and check operation	Replace PCB if faulty
		Disconnected wires for expansion valve control	Check connections	Repair wiring connections
	Faulty discharge gas thermistor	Fault	Measure resistance	Replace thermistor if faulty
		Incorrect mounting	Check mounting state	Correctly mount thermistor
		Incorrect connection	Check connections	Remove looseness, replace connector or repair connections.

Alarm code	08	Excessively high discharge gas temperature at the top of compressor

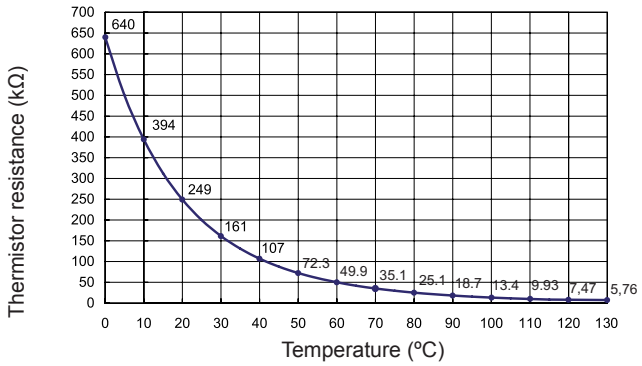
Applicable to units	
OU	S / SC
○	–

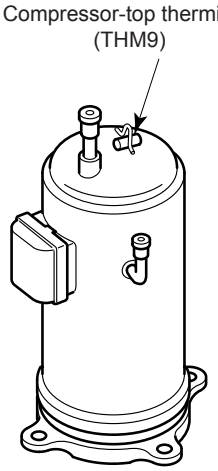
- The alarm appears during cooling operation when the compressor-top thermistor temperature remains at Tdc1 or above for 10 minutes, or at Tdc2 or above for 5 seconds.
- The alarm appears during heating operation when the compressor-top thermistor temperature remains at Tdh1 or above for 10 minutes, or at Tdh2 or above for 5 seconds.





Thermistor resistance characteristics





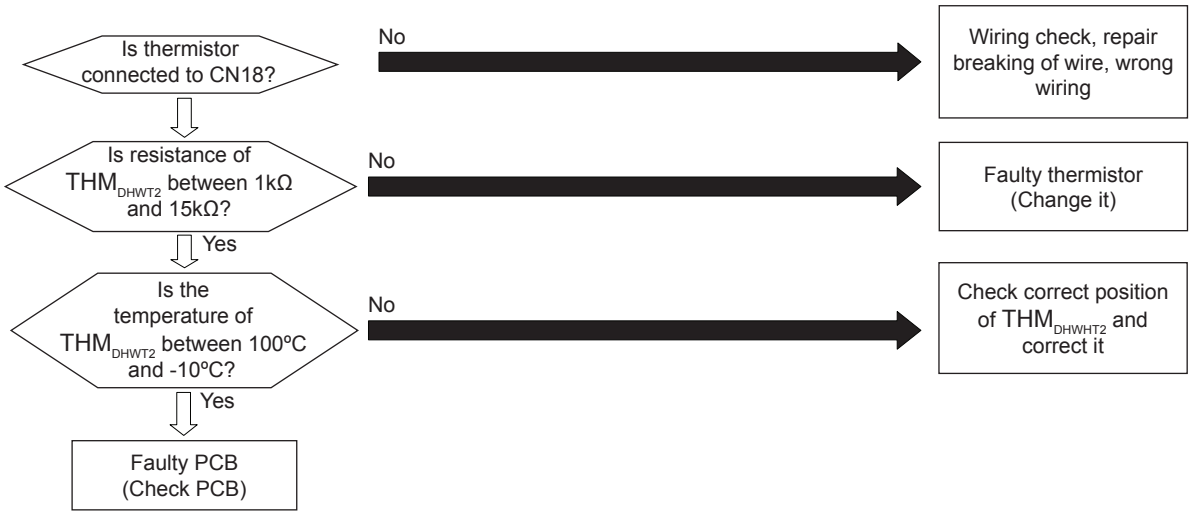
◆ Limits of temperature

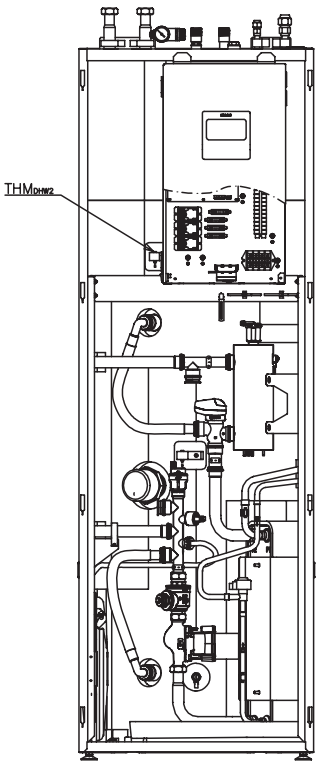
Outdoor capacity	Tdc1	Tdc2	Tdh1	Tdh2
RAS-(2-3)WHVRP1	115	125	115	125
RAS-(4-6)WHVNPE				
RAS-(4-6)WHNPE	127	135	120	135
RAS-(8-10)WHNPE				

Alarm code	10	Domestic hot water temperature top thermistor (THM_{DHWT2}) anomaly

Applicable to units	
OU	S / SC
–	- / o

- This alarm code is displayed when the thermistor is short-circuited (greater than 100ºC) or cut (less than -10ºC) when DHW is enabled.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





RWD-(2.0-6.0)(N/R)W1E-200S(-K)

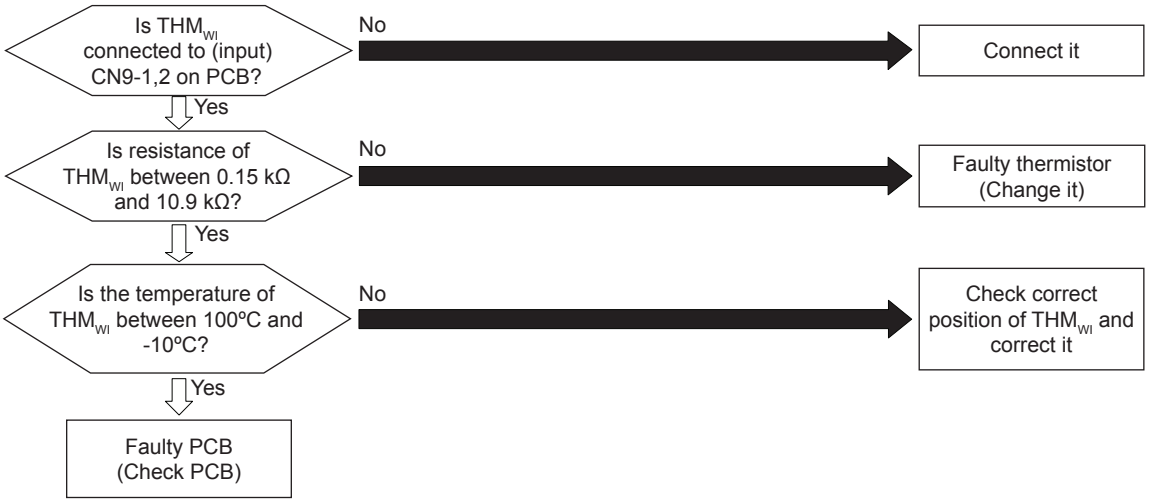
NOTE

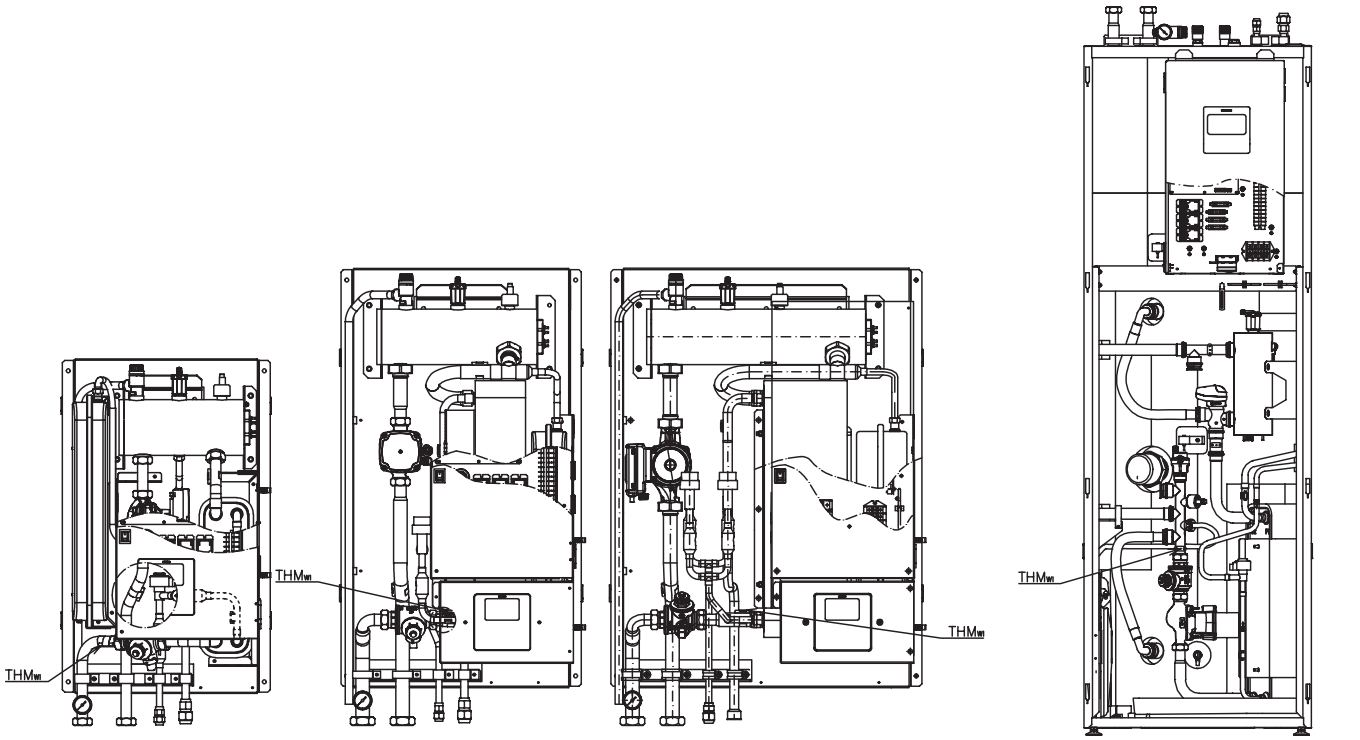
For more information refer to "4. Electrical checks of the main parts"

Alarm code	11	Water inlet temperature thermistor (THM_{WI}) anomaly

Applicable to units	
OU	S / SC
–	○

- This alarm code is displayed when the thermistor is short-circuited (≥ 100ºC) or cut (≤ -10ºC) during the cooling process or the heating process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





RWM-(2.0-3.0)R1E RWM-(4.0-6.0)N1E RWM-(8.0-10.0)N1E RWD-(2.0-6.0)(N/R)W1E-200S(-K)

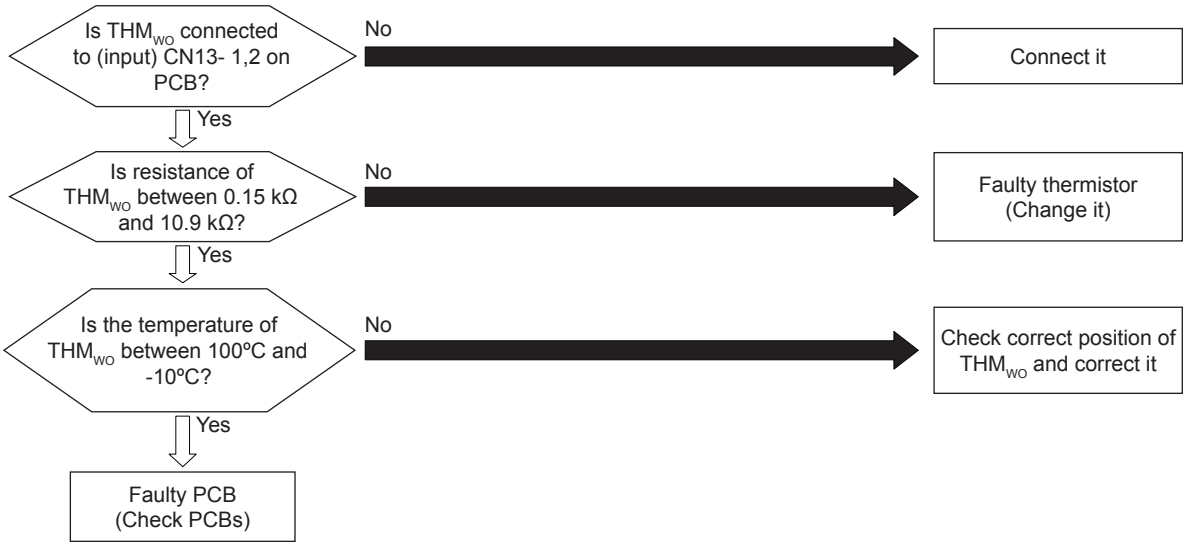
NOTE

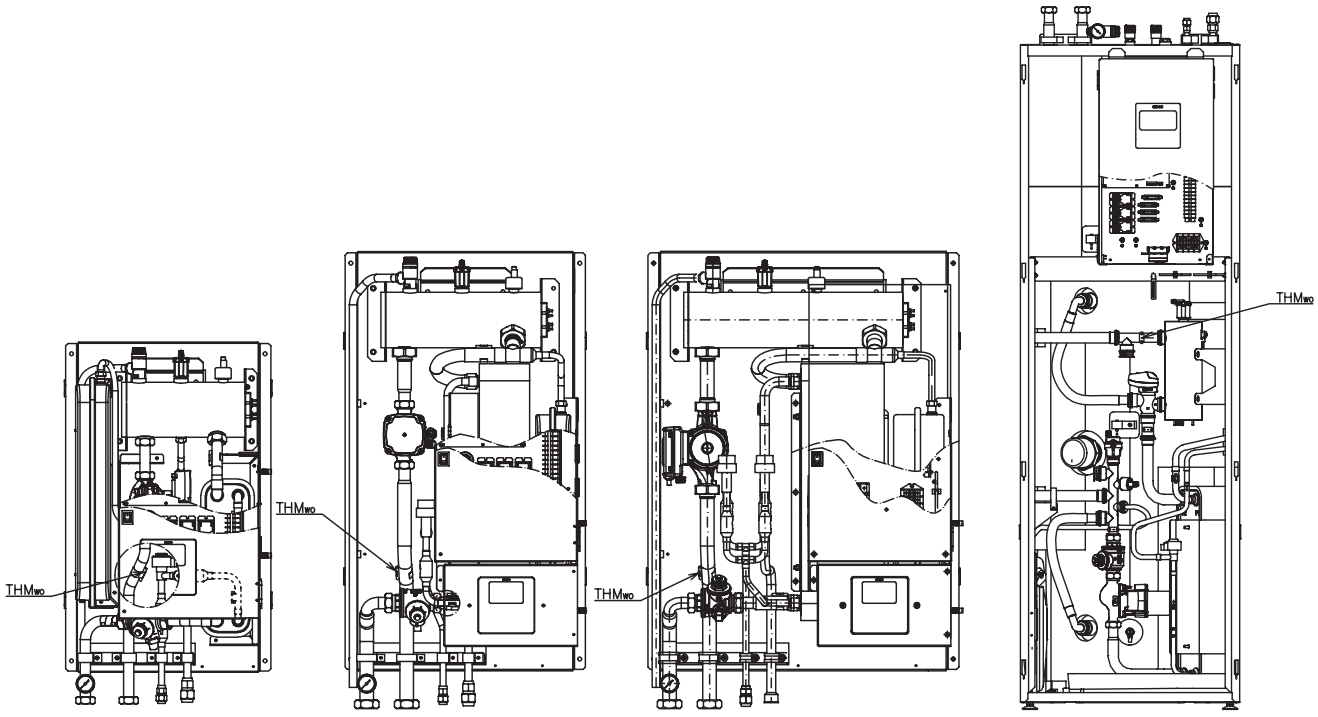
For more information refer to "4. Electrical checks of the main parts"

Alarm code	12	Water outlet temperature thermistor (THM_{WO}) anomaly

Applicable to units	
OU	S / SC
–	○

- This alarm code is displayed when the thermistor is short-circuited (≥ 100ºC) or cut (≤ -10ºC) during operation process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm





RWM-(2.0-3.0)R1E RWM-(4.0-6.0)N1E RWM-(8.0-10.0)N1E RWD-(2.0-6.0)(N/R)W1E-200S(-K)

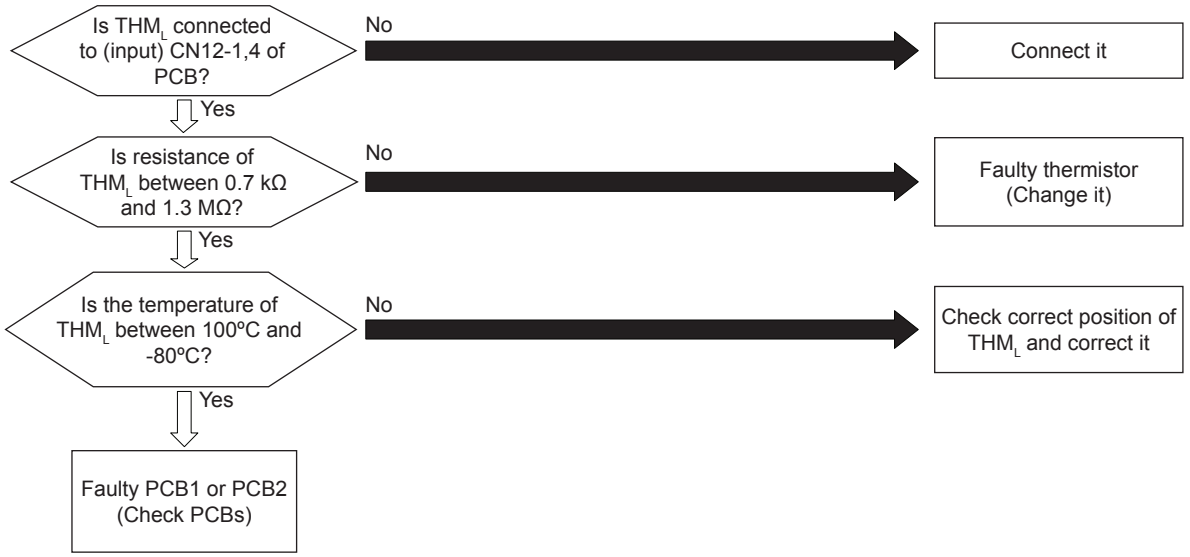
NOTE

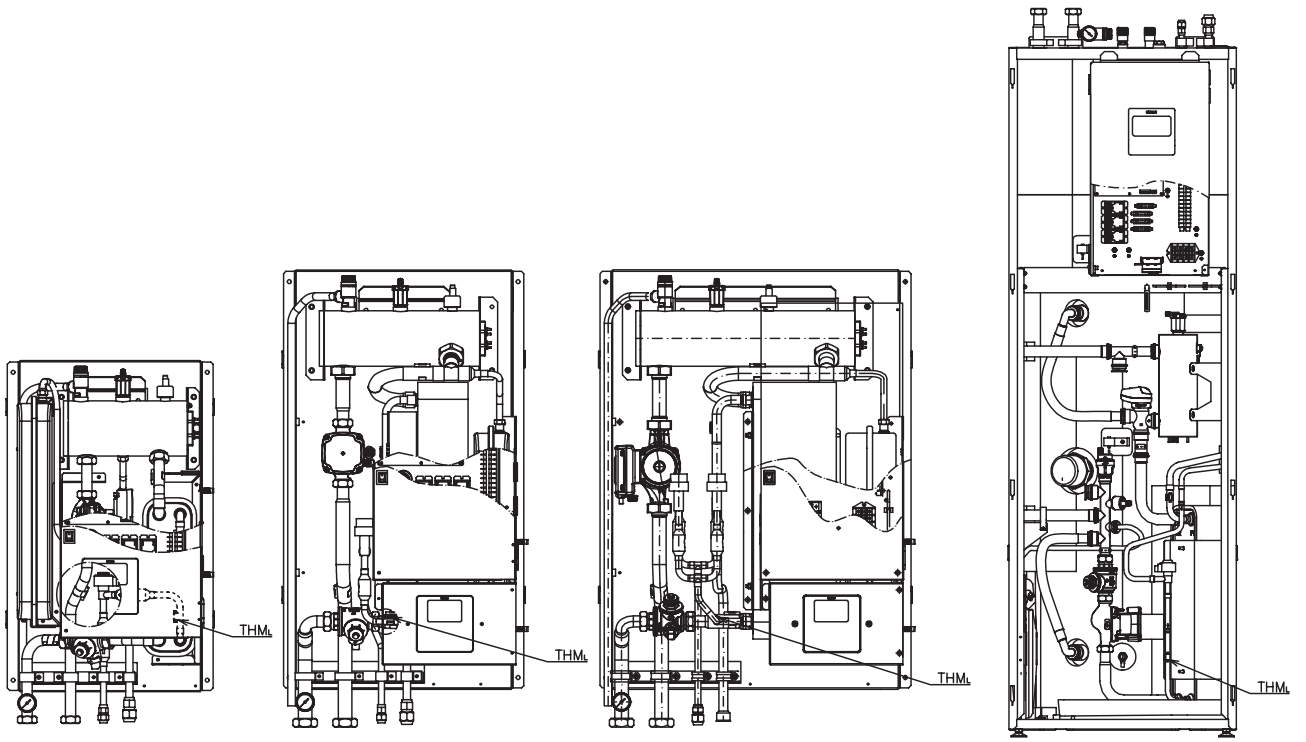
For more information refer to "4. Electrical checks of the main parts"

Alarm code	13	Indoor liquid pipe refrigerant temperature (THM_L) thermistor anomaly

Applicable to units	
OU	S / SC
–	○

- This alarm code is displayed when the thermistor is short-circuited (≥ 100ºC) or cut (≤ -80ºC) during operation process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





RWM-(2.0-3.0)R1E RWM-(4.0-6.0)N1E RWM-(8.0-10.0)N1E RWD-(2.0-6.0)(N/R)W1E-200S(-K)

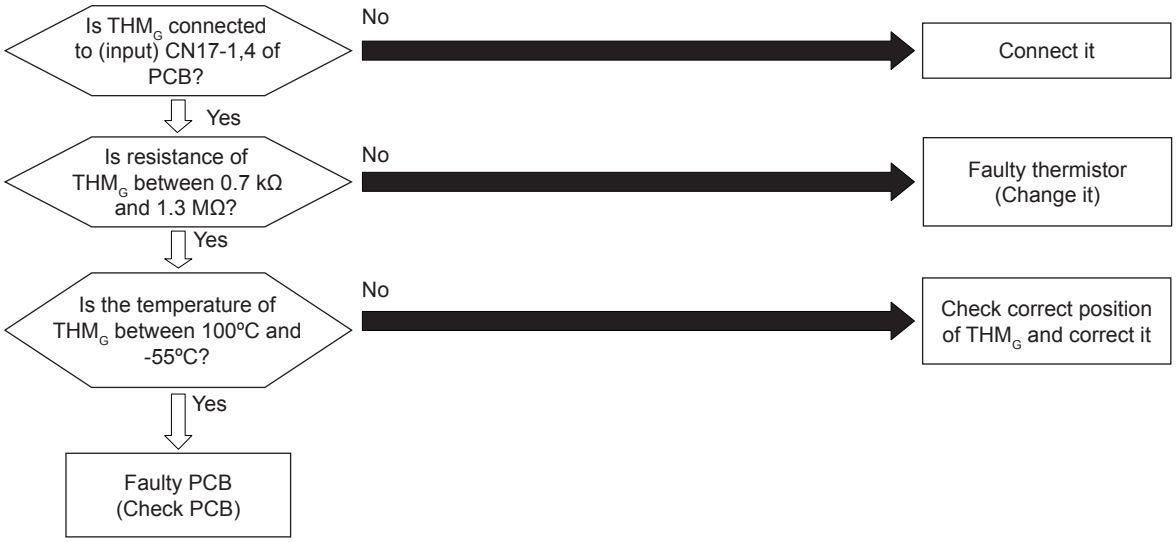
NOTE

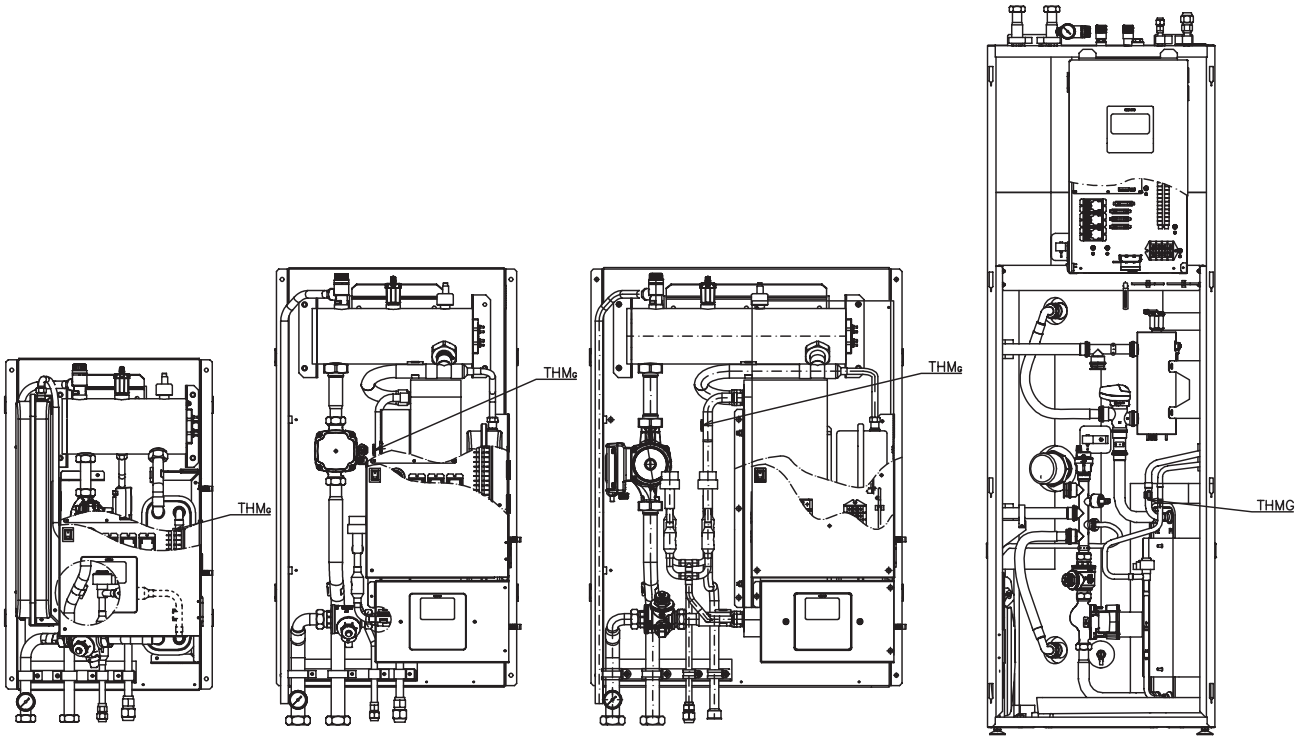
For more information refer to "4. Electrical checks of the main parts"

Alarm code	14	Indoor gas pipe refrigerant temperature (THM_G) thermistor anomaly

Applicable to units	
OU	S / SC
–	○

- This alarm code is displayed when the thermistor is short-circuited (≥ 100ºC) or cut (≤ -55ºC) during operation process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





RWM-(2.0-3.0)R1E RWM-(4.0-6.0)N1E RWM-(8.0-10.0)N1E RWD-(2.0-6.0)(N/R)W1E-200S(-K)

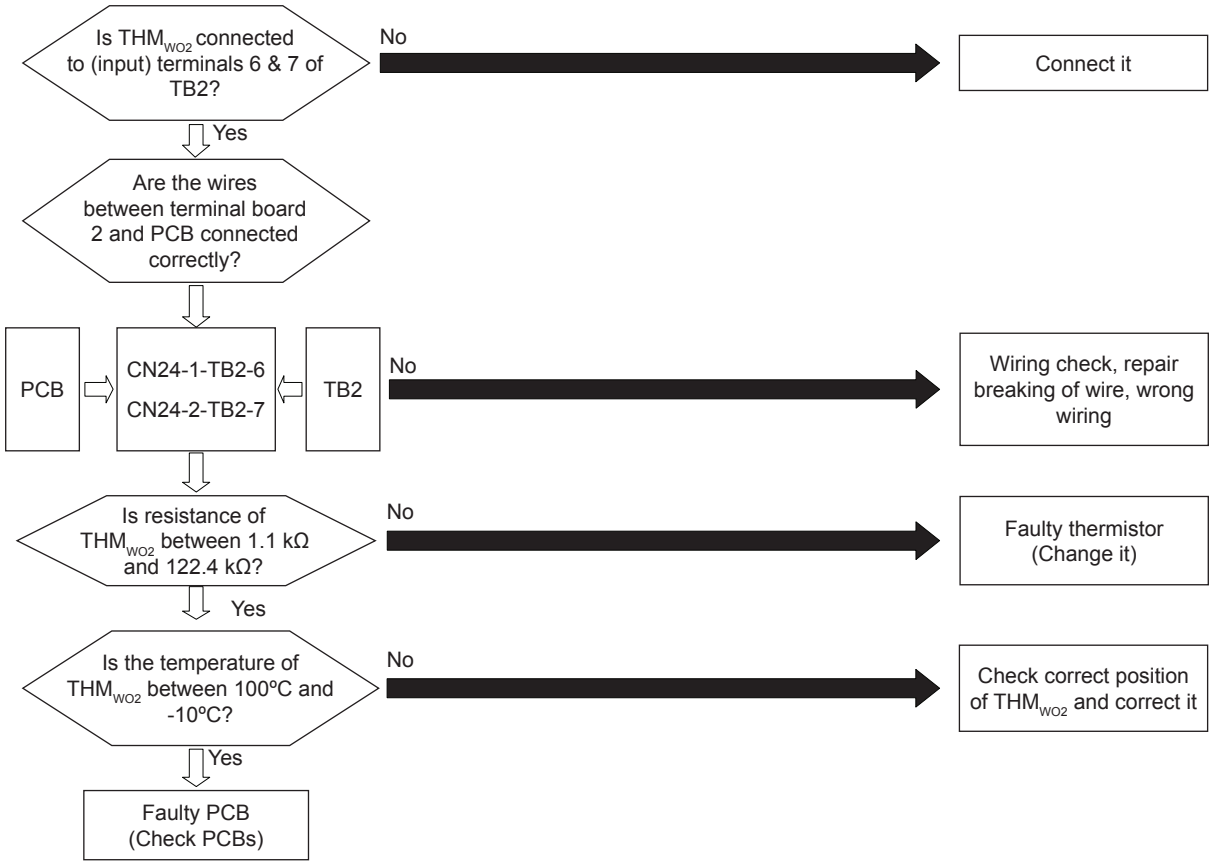
NOTE

For more information refer to "4. Electrical checks of the main parts"

Alarm code	15	Water outlet circuit 2 (mixing circuit) temperature thermistor (THM_{WO2}) anomaly

Applicable to units	
OU	S / SC
–	(○)

- This alarm code is displayed when the thermistor is short-circuited (≥ 100ºC) or cut (≤ -10ºC) during operation process.
- This alarm forces tall operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



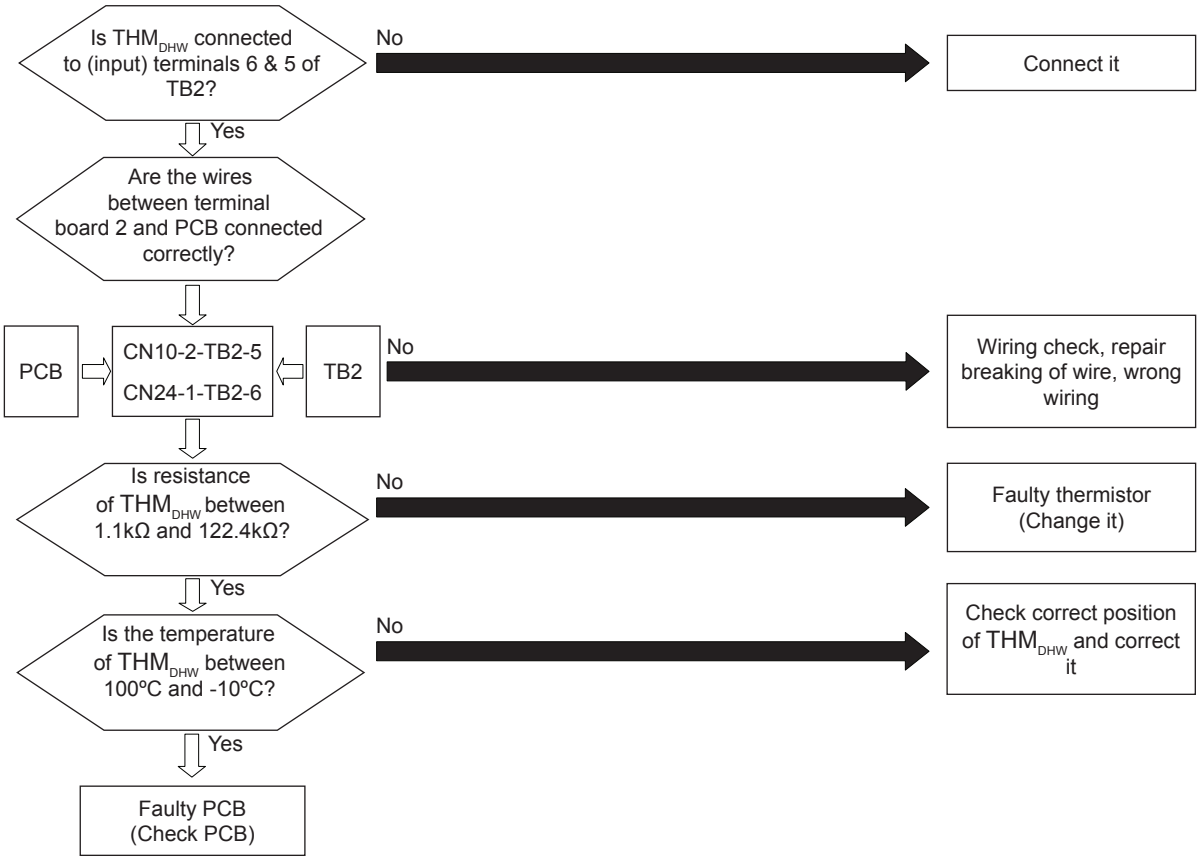
NOTE

For more information refer to "4. Electrical checks of the main parts"

Alarm code	16	Domestic hot water temperature thermistor (THM_{DHW}) anomaly (RWM-(2.0-10.0)(N/R)1E)

Applicable to units	
OU	S / SC
–	(○) / o

- This alarm code is displayed when the thermistor is short-circuited (greater than 100ºC) or cut (less than -10ºC) when DHW is enabled.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



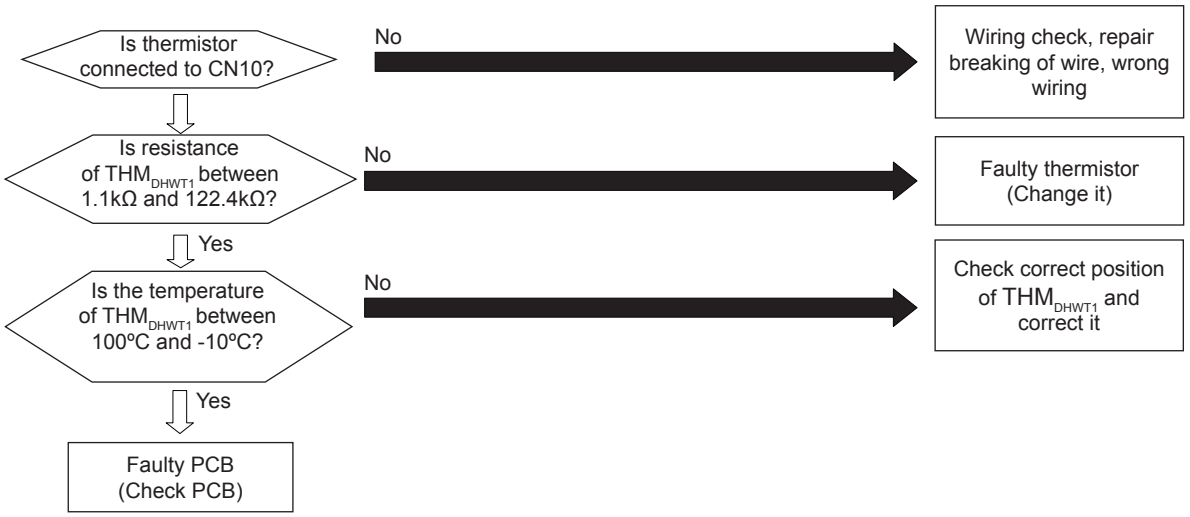
NOTE

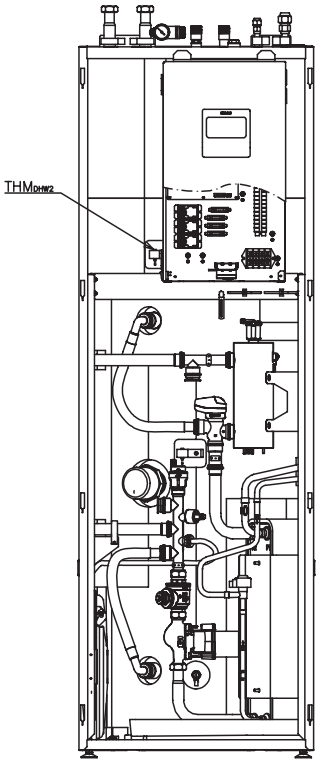
For more information refer to "4. Electrical checks of the main parts"

Alarm code	16	Domestic hot water temperature thermistor (THM_{DHWT1}) anomaly (RWD-(2.0-6.0)(N/R)W1E-200S(-K))

Applicable to units	
OU	S / SC
–	(○) / o

- This alarm code is displayed when the thermistor is short-circuited (greater than 100ºC) or cut (less than -10ºC) when DHW is enabled.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





RWD-(2.0-6.0)(N/R)W1E-200S(-K)

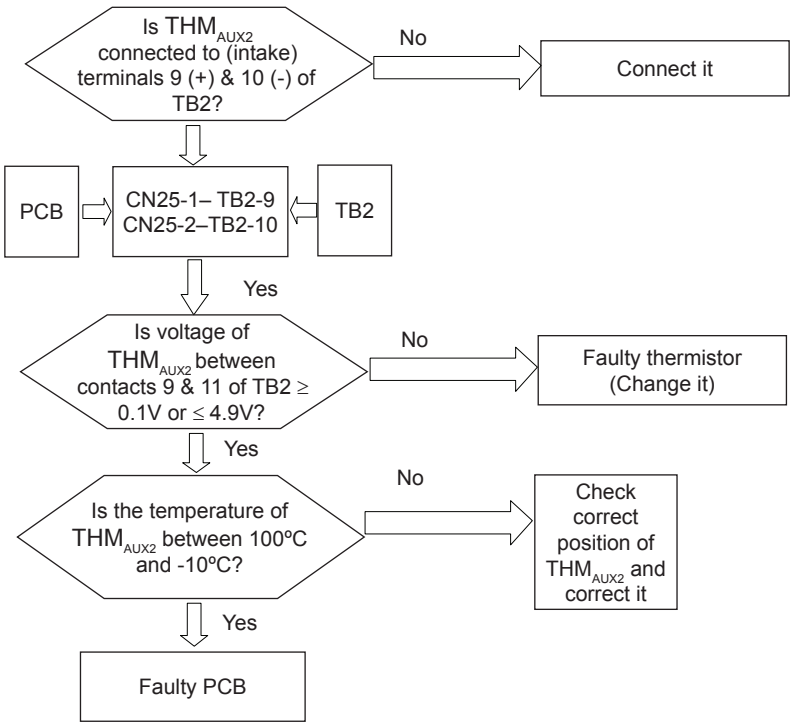
NOTE

For more information refer to "4. Electrical checks of the main parts"

Alarm code	17	Auxiliary temperature sensor 2 (THM_{AUX2}) anomaly

Applicable to units	
OU	S / SC
–	(○)

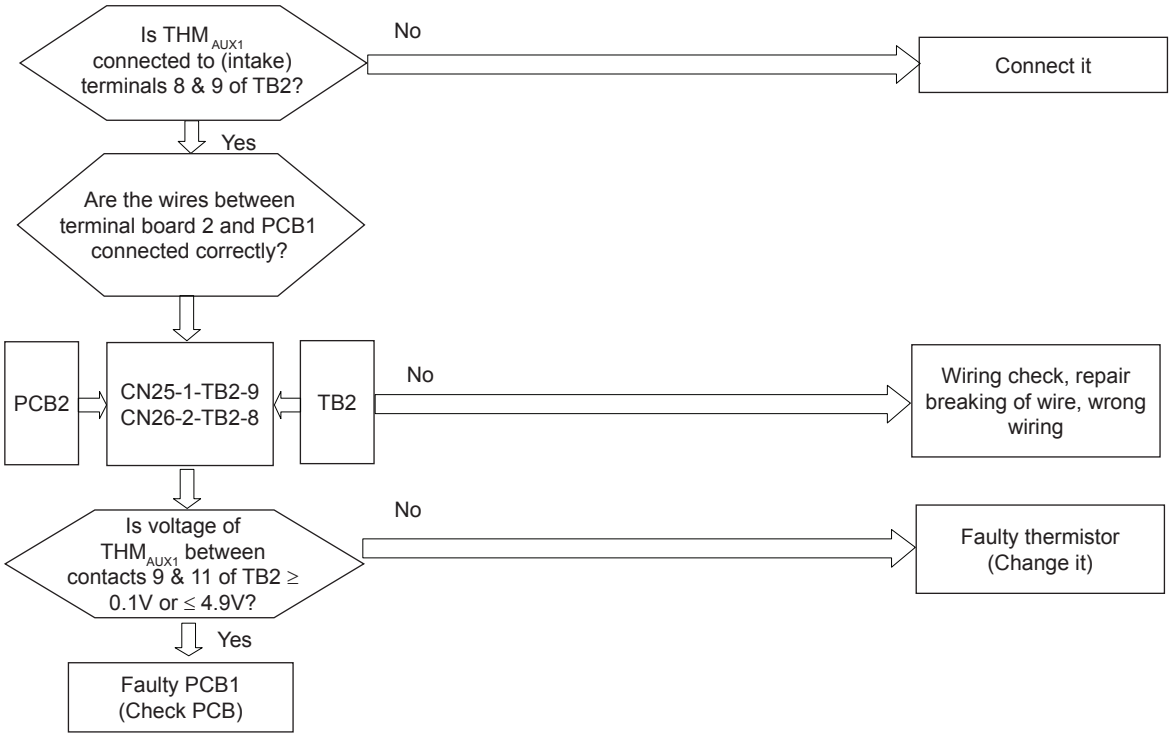
- This alarm code is displayed when a sensor anomaly is detected. The detection of anomaly is activated when the read voltage is lower than 0.1V or higher than 4.9V during operation process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



Alarm code	18	Auxiliary temperature sensor 1 (THM_{AUX1}) thermistor anomaly

Applicable to units	
OU	S / SC
–	(○)

- This alarm code is displayed when a sensor anomaly is detected. The detection of anomaly is activated when the read voltage is lower than 0.1V or higher than 4.9V during operation process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.

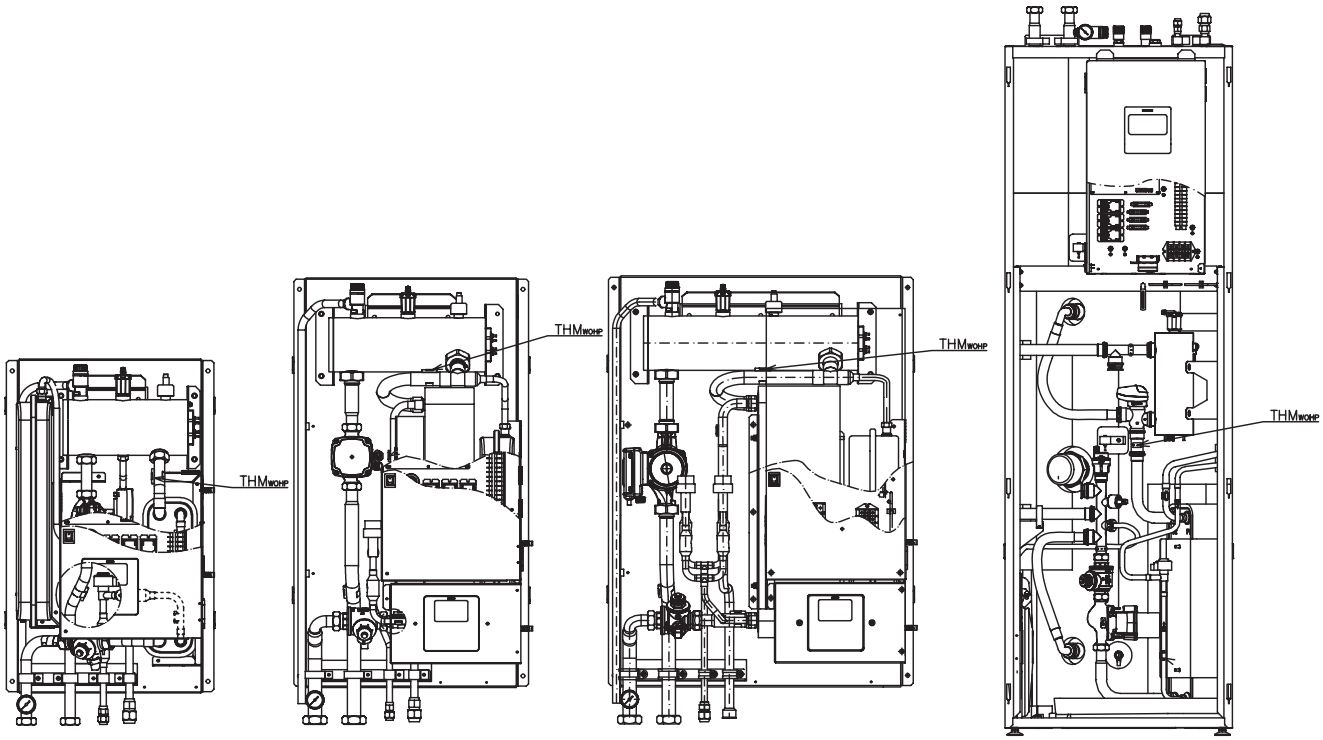


Alarm code	19	Water Plate HEX pipe (THM_{WOHP}) thermistor anomaly

Applicable to units	
OU	S / SC
–	○

- This alarm code is displayed when the thermistor is short-circuited (≥ 100ºC) or cut (≤ -10ºC) during the cooling process or the heating process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





RWM-(2.0-3.0)R1E RWM-(4.0-6.0)N1E RWM-(8.0-10.0)N1E RWD-(2.0-6.0)(N/R)W1E-200S(-K)

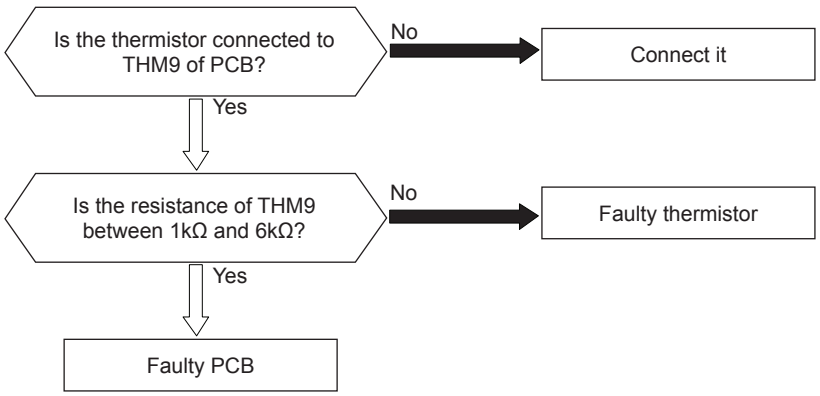
NOTE

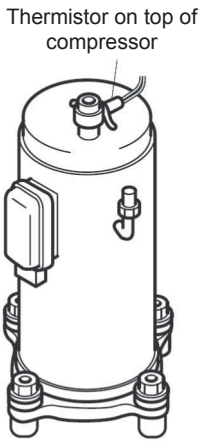
For more information refer to "4. Electrical checks of the main parts"

Alarm code	20	Thermistor for discharge gas temperature (THM_9) (compressor thermistor) anomaly

Applicable to units	
OU	S / SC
○	–

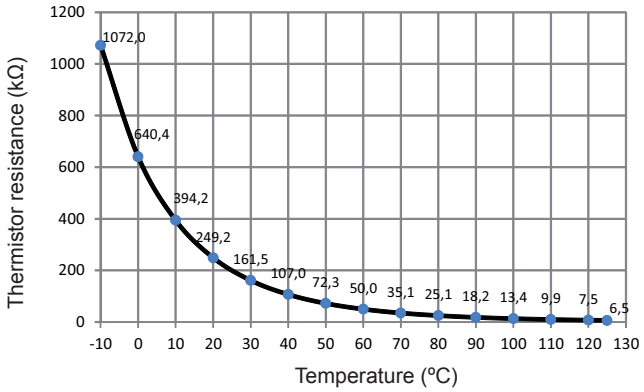
- This alarm code is indicated when the thermistor is short-circuited (less than 1 kΩ) or cut (higher than 640 kΩ) during the cooling or the heating process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty top of compressor thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB1	Repair wiring and connections
Faulty PCB1		Replace PCB1 and check operation	Replace PCB1 if faulty

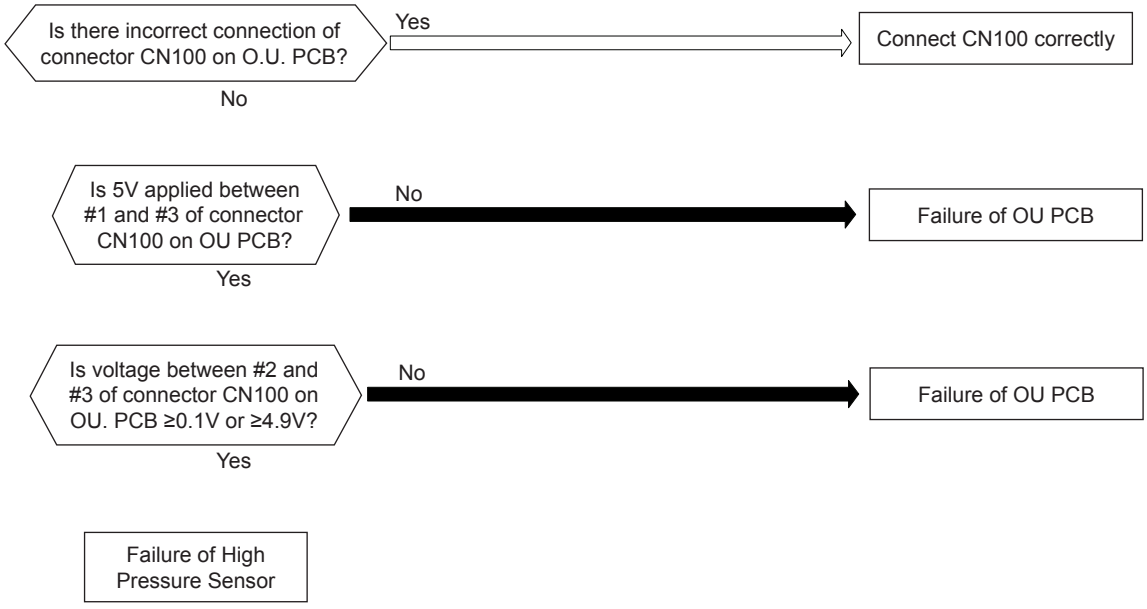
Thermistor resistance characteristics



Alarm code	21	Abnormality of High Pressure Sensor

Applicable to units	
OU	S / SC
○	–

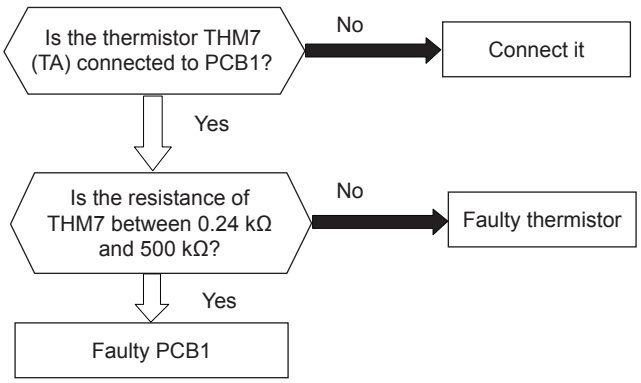
- This alarm code is displayed when output voltage of the high pressure sensor decreases to 0.1V or less, or increases to 4.9V or more during operation.
- The alarm code is displayed on the wired controller of the indoor unit.
- The unit should be stopped to release the alarm.

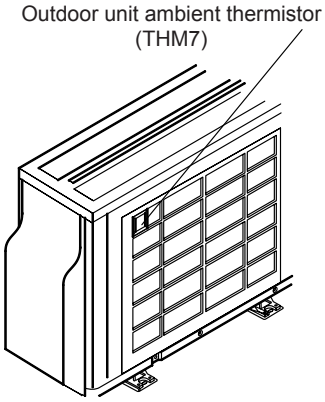


Alarm code	22	Abnormal operation of the thermistor for the outdoor temperature (THM_7) (outdoor unit ambient thermistor)

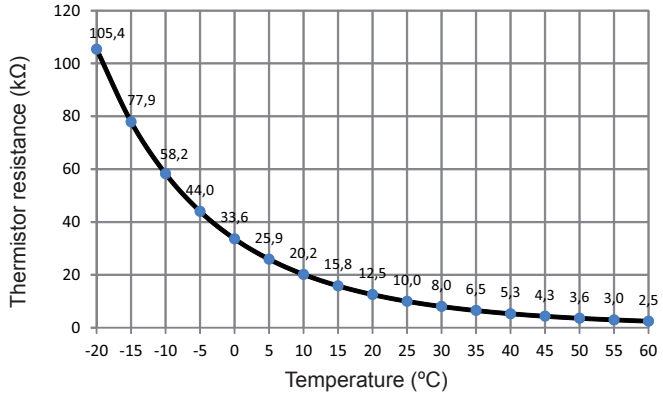
Applicable to units	
OU	S / SC
○	–

- This alarm code is displayed when the thermistor is short-circuited (less than 0.2 kΩ) or cut (greater than 500 kΩ) during the operation.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





Thermistor resistance characteristics



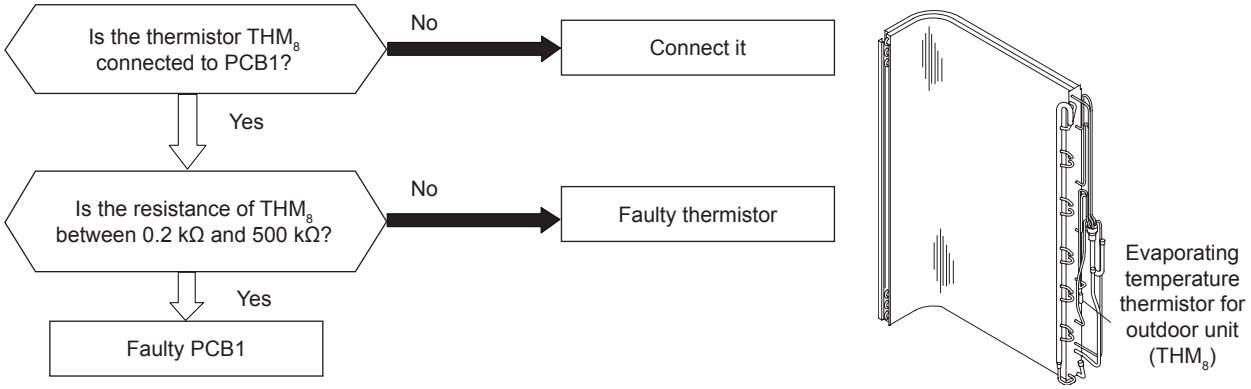
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the outdoor unit ambient	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB	Repair wiring and connections
Faulty PCB		Replace PCB and check operation	Replace PCB if faulty

Alarm code	24	Abnormal operation of the thermistor for the evaporating / condensing temperature during the heating process (outdoor unit) (THM_8)

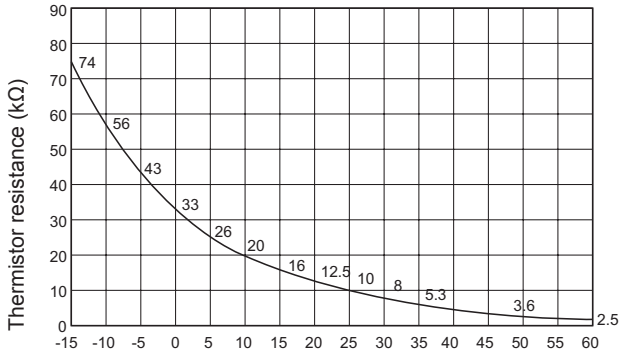
Applicable to units	
OU	S / SC
○	–

- The evaporating / condensing thermistor during the heating process is attached to the heat exchanger as shown in the figure below. If this thermistor is faulty, such as short-circuit (less than 0,2kΩ) or cut (more than 500kΩ) during eight minutes continuously, this alarm is displayed. The position is indicated below.

- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the evaporating / condensing temperature during heating	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect Connection	Check the wiring to PCB	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty

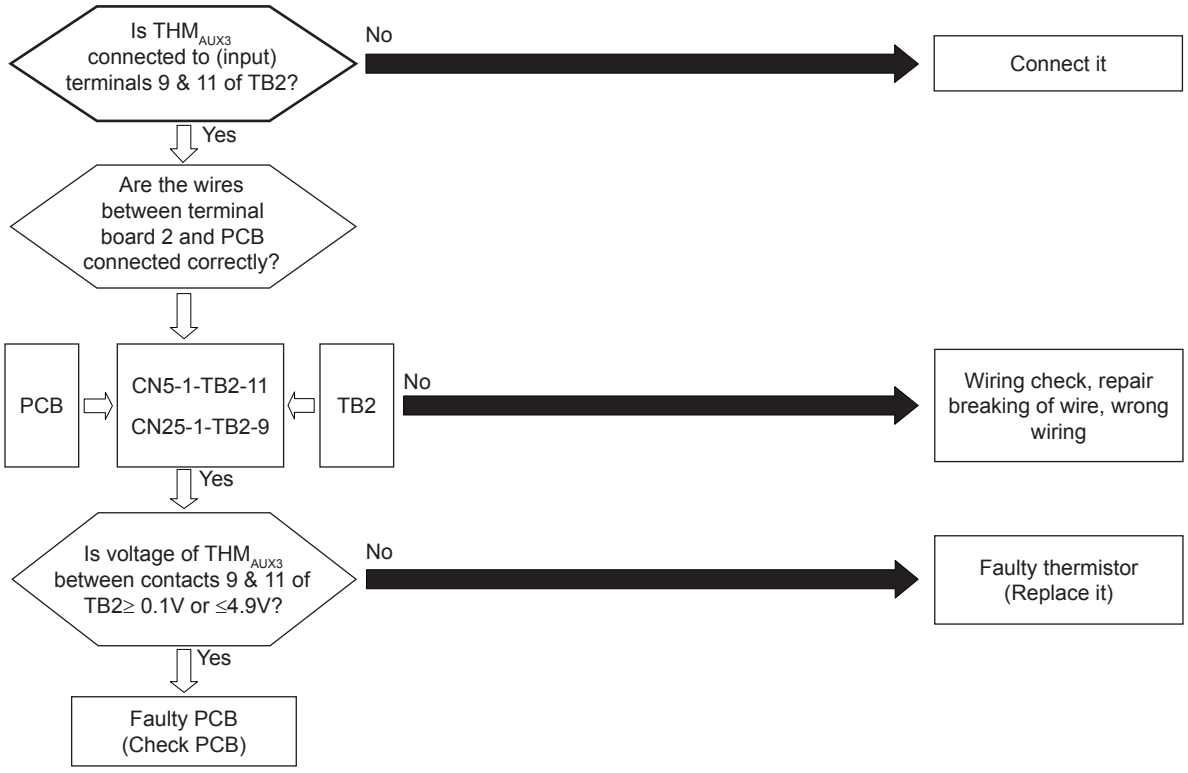


THM_8 (Evaporating thermistor)

Alarm code	25	Auxiliary sensor 3 thermistor (THM_{AUX3}) anomaly

Applicable to units	
OU	S / SC
–	(○)

- This alarm code is displayed when a thermistor anomaly is detected. The detection of anomaly is activated when the read voltage is lower than 0.1V or higher than 4.9V during operation process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



Alarm code	26	Water pressure sensor (WPS) anomaly

Applicable to units	
OU	S / SC
–	○

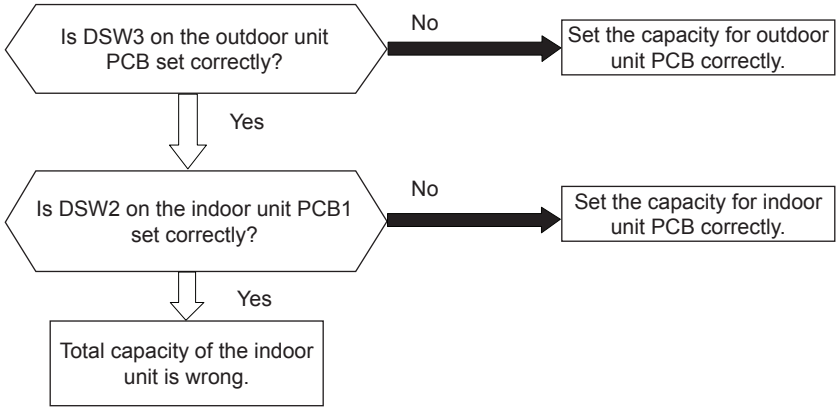
- This alarm code is displayed when a anomaly is detected on the pressure sensor. The detection of anomaly is activated when the read voltage is lower than 0.5V or higher than 3.5V during operation process.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



Alarm code	31	Incorrect capacity setting or combined capacity between indoor unit and outdoor unit

Applicable to units	
OU	S / SC
○	–

- This alarm code is indicated when the undefined setting is set to DSW3 on the outdoor unit PCB or to DSW2 on indoor unit PCB1.
- This alarm code is indicated when the total indoor unit capacity is not equal to the combined outdoor unit capacity. Outdoor unit capacity setting is not correct.
- Outdoor unit capacity setting is not correct
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Incorrect capacity setting of outdoor unit		Check capacity setting on outdoor unit PCB.	Correctly set the dip switch, DSW3.
Incorrect capacity setting of indoor unit		Check capacity setting on indoor unit PCB1.	Correctly set the dip switch, DSW2.

NOTE

- *In case of H-LINK system, this alarm code is indicated when DSW4, RSW1 (for refrigerant system setting) on the outdoor unit PCB and DSW5, RSW2 (for refrigerant system setting) on the indoor unit PCB are incorrectly set.*
- *In this case, set correctly DSW4, RSW1, DSW5 and RSW2 after turning OFF main switch.*

Alarm code		Incorrect indoor unit

Applicable to units	
OU	S / SC
○	–

- The alarm code appears from 3 to 5 minutes after the outdoor unit power activation if any inconsistency according to capacity is detected between indoor unit and outdoor unit. This applies when indoor unit capacity has no coincidence with outdoor unit capacity
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.

Alarm code		Indoor unit combination error

Applicable to units	
OU	S / SC
○	–

- This alarm code is indicated in case that there is at least 1 indoor unit of a model other than GP (supporting R32 refrigerant) among the connected indoor units
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.

Alarm code	38	Anomaly at picking up circuit for protection (outdoor unit)

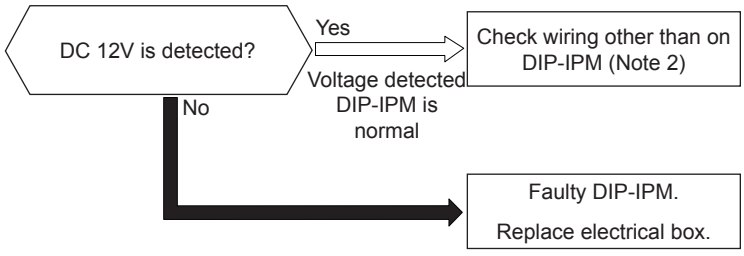
Applicable to units	
OU	S / SC
○	–

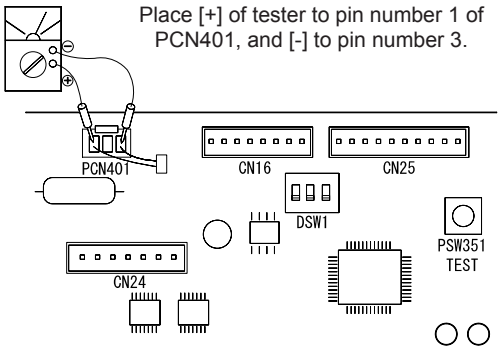
RAS-(2-3)WHVRP1

- The alarm code appears in case that any of the following is fulfilled
  - In case that there is no PSC (63H) input signal for 5 continued seconds and more than 2 seconds have passed after switch OFF.
  - In case that "Anomaly of the detection circuit for protection (itc=19)" is received from the inverter microcontroller.

Place the tester as shown in the diagram below to check the connector of PCN401. The connector shall remain inserted. DC12V will constantly be detected and disturb the diagnosis if the connector of PCN401 is pulled out.

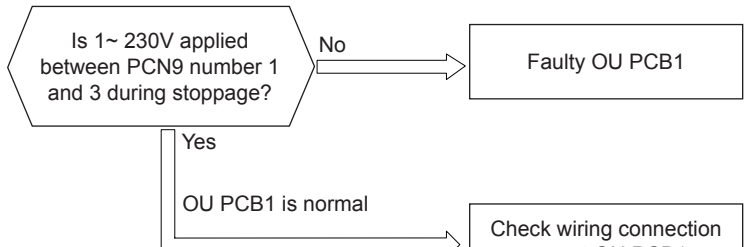
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



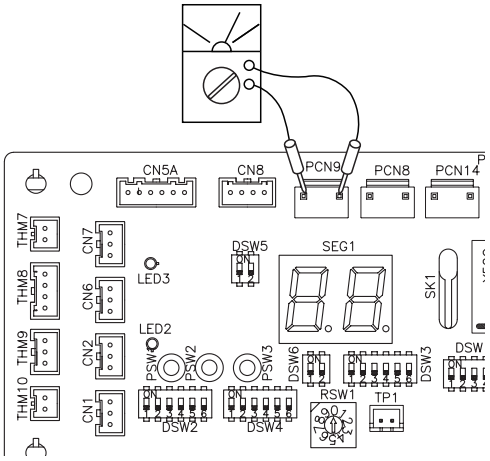


RAS-(4-6)WH(V)NPE / RAS-(8/10)WHNPE

The alarm code appears if 1~ 230V is supplied to the connector on the outdoor unit PCB while Y52C (compressor relay opened) is OFF or CMC1 (magnetic contactor for compressor) is open.

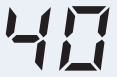


	Connector number for check
Connector	PCN9
Pin number	1 and 3



NOTE

- *This alarm may appear if the Faston terminal of the high pressure switch (63H1) is improperly connected or damaged (open-circuit fault) when the operation is started. Besides this, check also Alarm Code: 02 Activation of Outdoor Unit Protection Device.*
- *This alarm code may appear at the beginning of the operation if high pressure switch (PSH) is incorrectly connected or fail (open fault). See also alarm 02.*

Alarm code		Incorrect unit controller setting

Applicable to units	
OU	S / SC
–	○

- This alarm is displayed when an abnormal setting of the unit controller is detected after 30 seconds.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- To release the alarm the unit should be stopped or no incorrect setting should be detected.

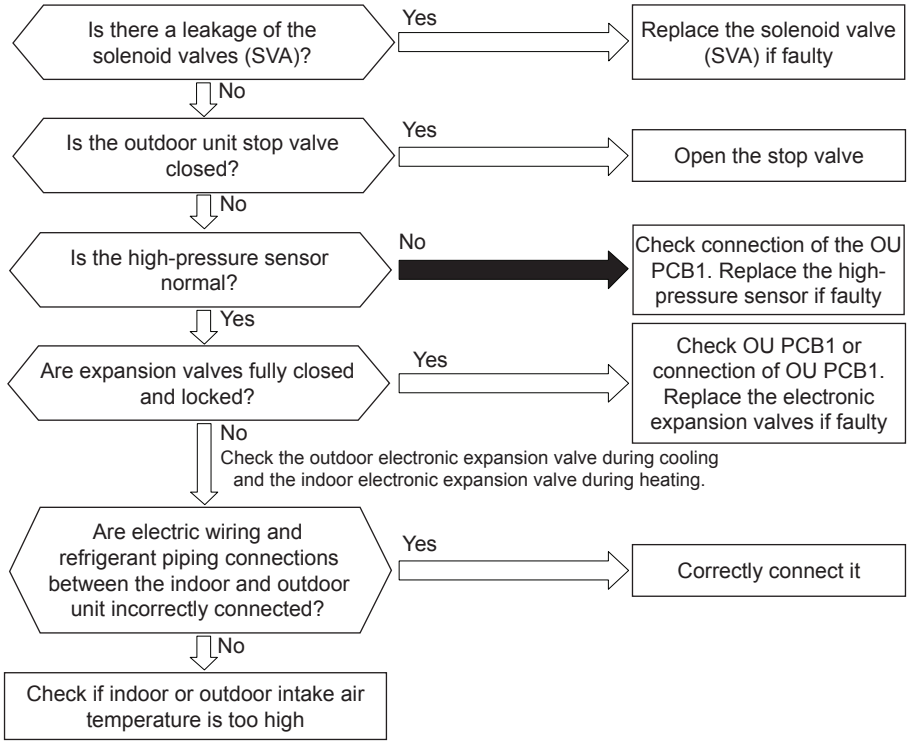
The incorrect settings detected for this alarm to be displayed are explained below:

- T_{WO3} needs to be used and it is not configured. T_{WO3} needs to be used in following conditions:
  - Boiler operation (serial or parallel) is configured.
  - DSW5-4 is ON.

Alarm code	45	Activation of the safety device from excessively high discharge pressure

Applicable to units	
OU	S / SC
○	–

- When the compressor is operated with the discharge pressure (Pd) higher than 3.8MPa for 1 minute, the retry operation is performed 3 minutes after all compressors are stopped. Thereafter, this alarm code is indicated when above anomaly is detected twice in 30 minutes.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.

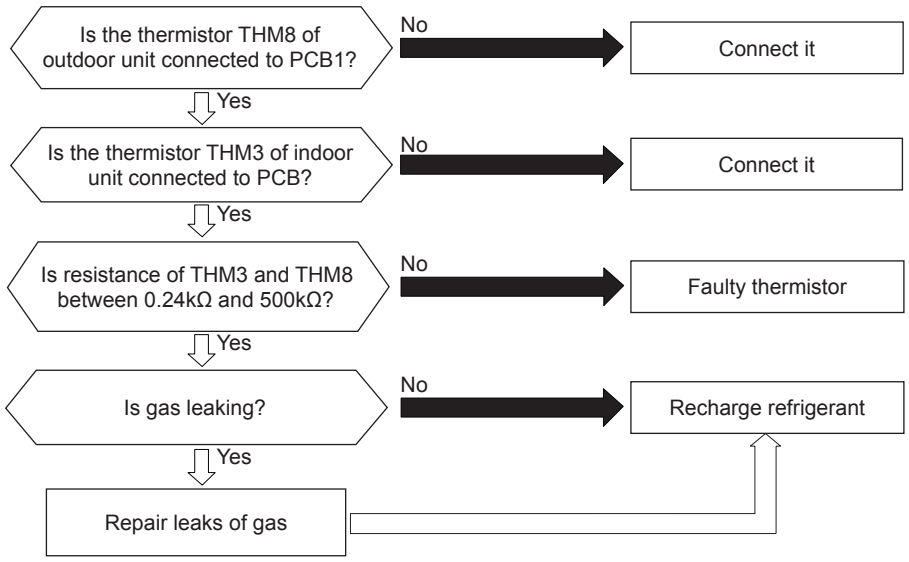


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Excessively high discharge pressure	Leakage of solenoid valve (SVA)	Check the outlet temperature of solenoid valve (SVA)	Check connection. Replace solenoid valve (SVA) if faulty
	Closed stop valve	Check stop valve	Open stop valve
	Abnormal high pressure sensor	Check connecting condition and output voltage “CN100” (on OU PCB1) for high pressure sensor	Replace high pressure sensor if faulty
	Excessively high temperature of inlet air for outdoor unit or indoor unit	Check thermistor for indoor unit and outdoor unit inlet air temperature	Replace the inlet air thermistor if faulty
	Incorrect connection between indoor unit and outdoor unit	Check electrical system and refrigerant cycle system	Correctly connect
	Locked expansion valve with fully closed	Check condition of connector “CN100” on OU PCB1	Repair connector for OU PCB1 or expansion valve. Replace if faulty

Alarm code	47	Activation of the safety device from excessively low suction pressure (protection from vacuum operation)

Applicable to units	
OU	S / SC
○	–

- In the case that the evaporating temperature (Cooling: Liquid Refrigerant Piping Temperature of Indoor Unit, Heating: Evaporating Temperature of Outdoor Unit) is lower than -37 ºC (250~350 kΩ) and the thermistor on top of compressor is higher than 90 ºC for 10 minutes, retry operation is performed 3 minutes after compressor stoppage. However, when the state occurs more than 3 times including 3 in one hour, this alarm code is indicated.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.

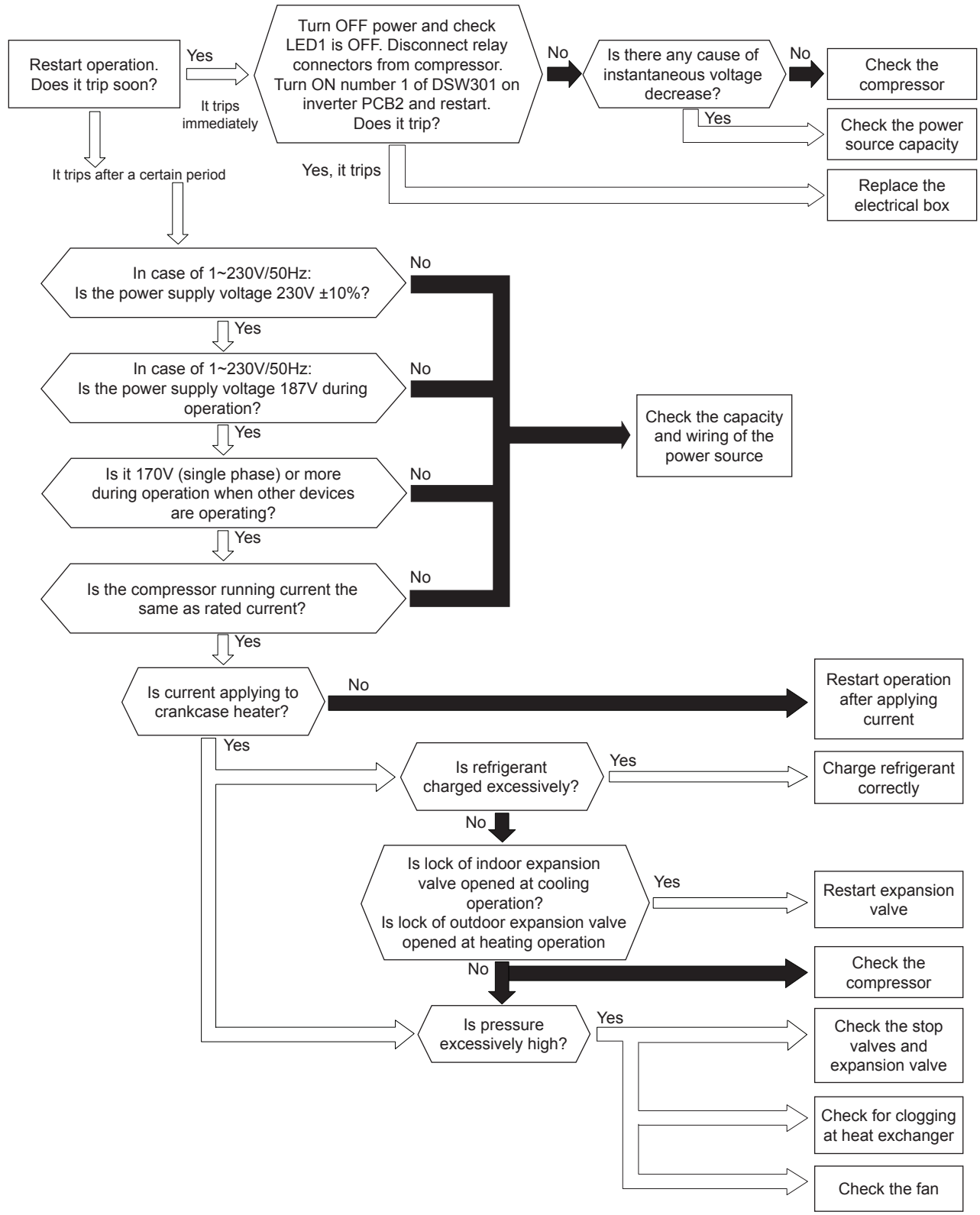


Phenomenon	Cause	Check item	Action (Turn OFF Main Switch)
– Faulty indoor unit liquid refrigerant temperature thermistor – Faulty outdoor unit evaporating temperature thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB (Outdoor Unit, Indoor Unit)		Replace PCB and check the operation.	Replace PCB if faulty.
Excessively low suction pressure (in vacuum)	Liquid line stop valve is not open before operation	Check stop valve.	Fully open stop valve.
	Faulty or malfunction of expansion Valve	Check for clogging.	Remove clogging.
		Check connecting wiring and connectors.	Replace connector.
		Check operating sound from coil.	Replace coil.
		Check discharge gas thermistor.	Replace thermistor.
		Check attaching state of discharge gas thermistor.	Reattach thermistor.
	Refrigerant Leakage	Check each temperature and pressure.	Charge refrigerant after vacuum pumping.
		Check gas leakage part.	Correctly charge refrigerant after repairing gas leakage.
Faulty outdoor fan at heating operation	Faulty outdoor fan motor	Measure coil resistance and insulating resistance.	Replace outdoor fan motor if faulty.

Alarm code	48	Overcurrent protection activation (RAS-(2-3)WHVRP1)

Applicable to units	
OU	S / SC
○	–

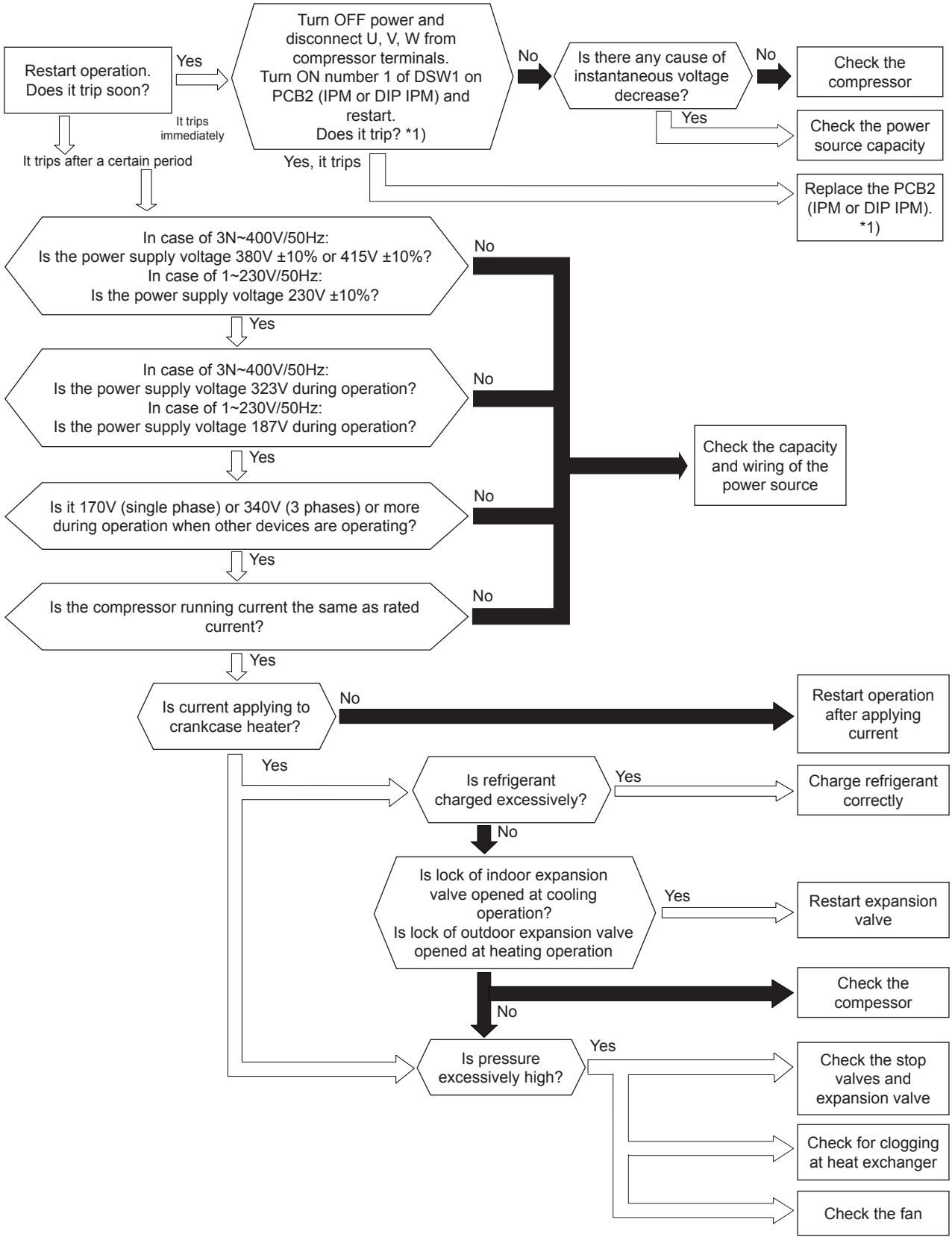
RAS-(2-3)WHVRP1



Alarm code	48	Overcurrent protection activation (RAS-(4-6)WH(V)NPE and RAS-(8/10)WHNPE)

Applicable to units	
OU	S / SC
○	–

RAS-(4-6)WH(V)NPE and RAS-(8/10)WHNPE

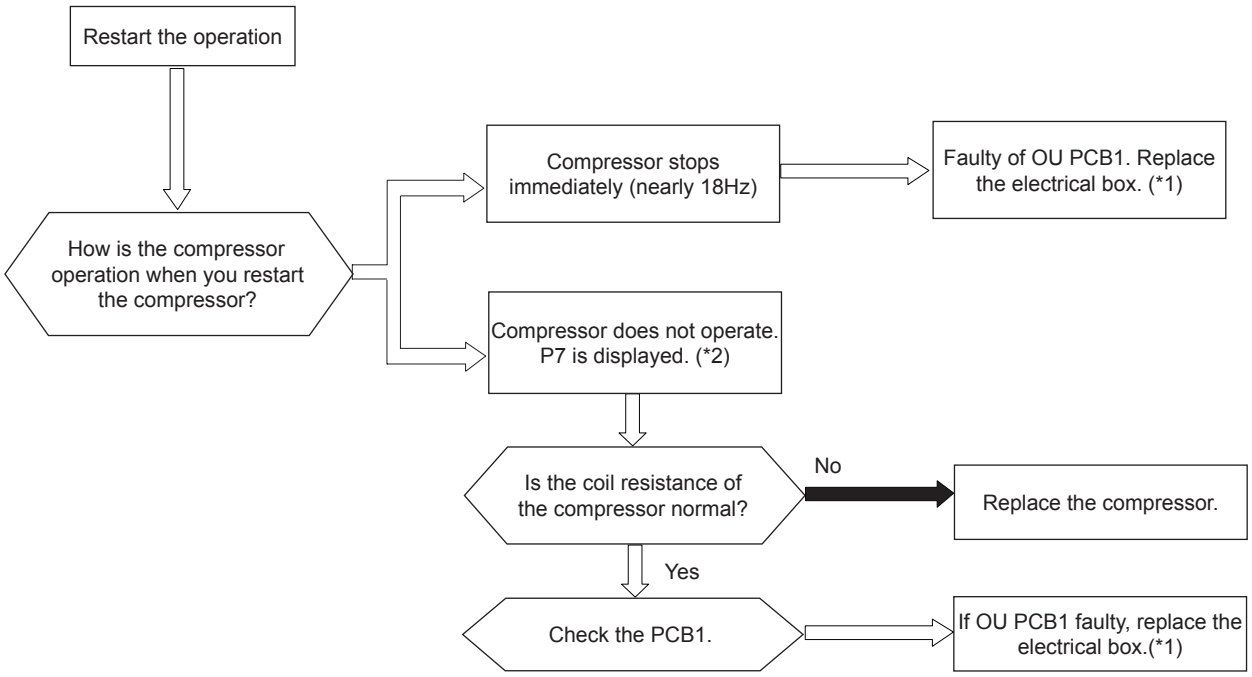


Alarm code	51	Abnormal operation of the current sensor (RAS-(2-3)WHVRP1)

Applicable to units	
OU	S / SC
○	–

RAS-(2-3)WHVRP1

- This alarm code is displayed when the current transformer is abnormal (0 A detection or 3 A alarm condition) and the alarm has more than three occurrences in 30 minutes.
- Condition of activation:
  - When the frequency of compressor is maintained at 6 to 10Hz (3HP) after compressor is started, one of the absolute value of running current at each phase is ≤ 1.5A.
  - Before the compressor is operated (at the end of control position) the current wave value is less than 3.0 A.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



NOTE

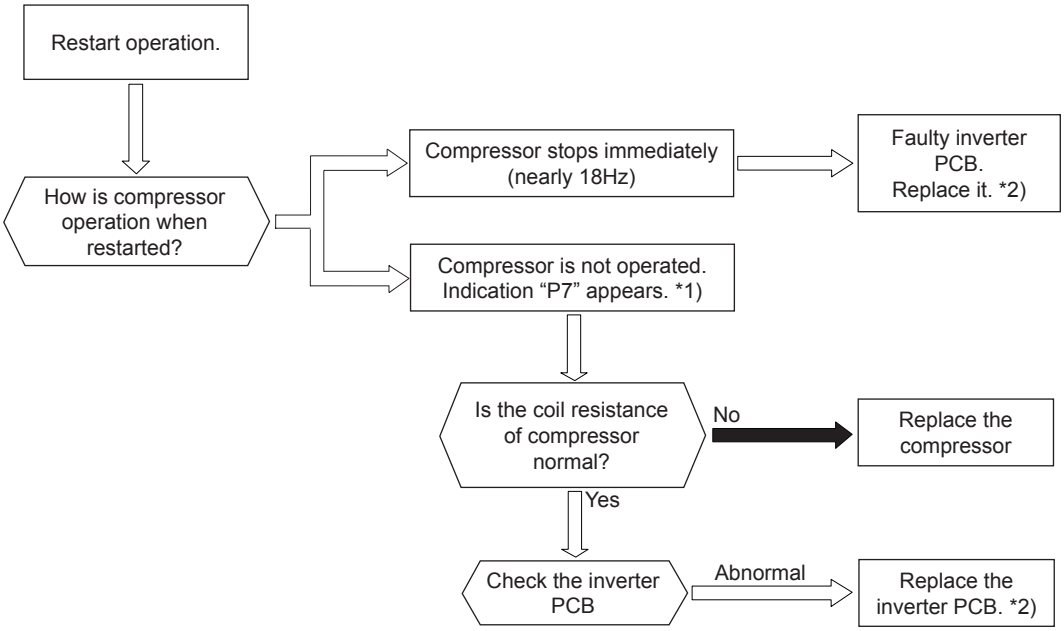
- *(*1): Make sure LED1 is OFF.*
- *(*2): P7 is shown at 7-segment on the outdoor unit PCB1.*

Alarm code	5 1	Abnormal operation of the current sensor (RAS-(4-6)WH(V)NPE & RAS-(8/10)WHNPE)

Applicable to units	
OU	S / SC
○	–

RAS-(4-6)WH(V)NPE & RAS-(8/10)WHNPE

- This alarm code is displayed when the current transformer is abnormal (0 A detection or 5 A alarm condition) and the alarm has more than three occurrences in 30 minutes.
- Condition of Activation:
  - When the frequency of the compressor is maintained at 15~18 Hz after the compressor is started, one of the absolute values of the running current at each phase U+, U-, V+ and V- is less than 1.5 A (including 1.5A)
  - Before the compressor is operated (at the end of position control), the current wave value is less than 5.0 A.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



NOTE

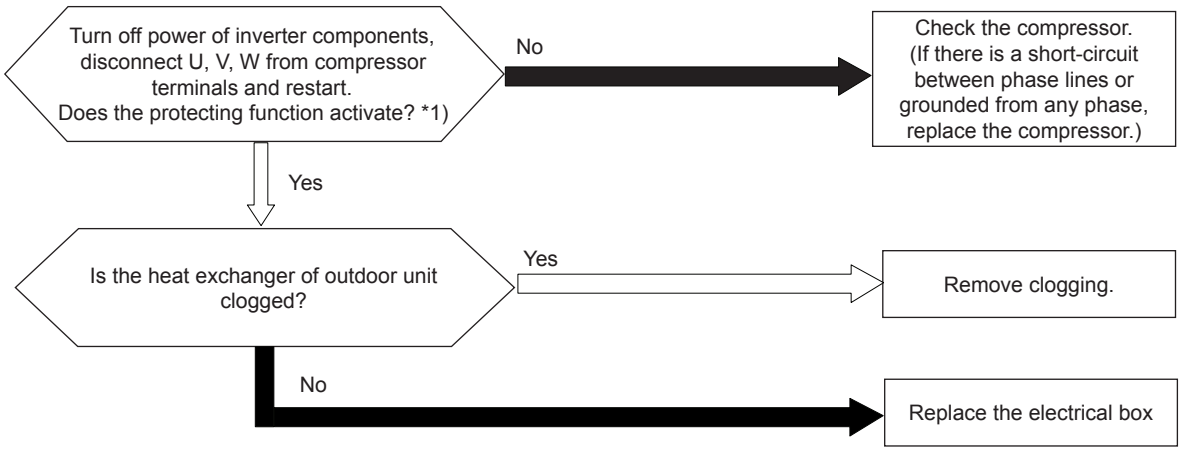
- **1) P7 is shown at 7-segment on the outdoor unit PCB.*
- **2) Perform the high voltage discharge work by referring to the item "6.7.7 Checking procedure for other parts" before checking and replacing the inverter parts.*

Alarm code	53	Protection of the inverter PCB (RAS-(2-3)WHVRP1)

Applicable to units	
OU	S / SC
○	–

RAS-(2-3)WHVRP1

- ISPM has a detection function of the abnormal operation. This alarm is displayed when the ISPM module detects the abnormal operation 7 times or more than 7 times in 30 minutes. The retry operation is performed six times.
- Condition of activation:
  - The abnormal current to the ISPM, such as short-circuited, grounded, overcurrent or control voltage decrease.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



NOTE

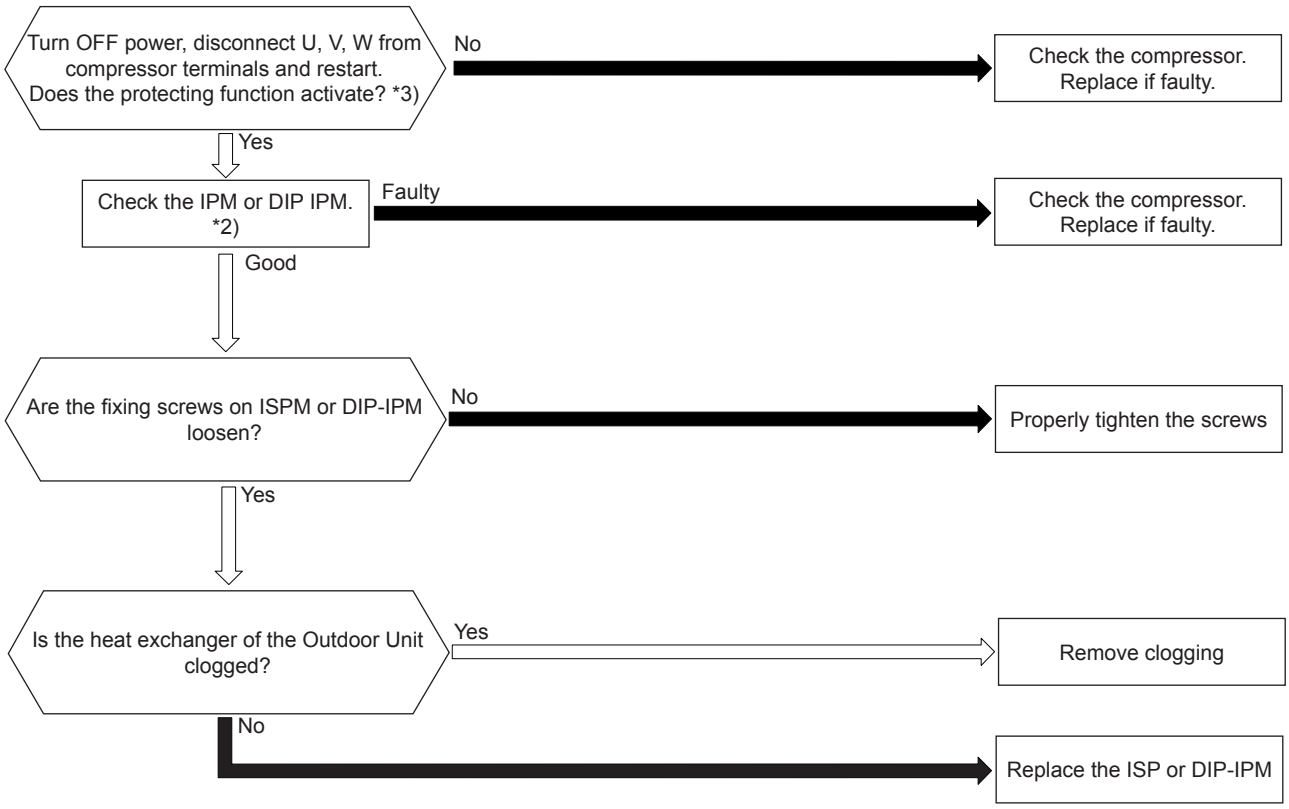
- **1) Ensure that the LED1 of inverter PCB (PCB2) is OFF. Then, set the DSW1 pin #1 on inverter PCB (PCB2) to ON when you are restarting with the terminals of the compressor disconnected. After the troubleshooting, set the DSW1 pin #1 to OFF.*
- *When the alarm code "53" is indicated, the outdoor fan motor (DC motor) ensure that DC fan motor is checked according to the item "6.7 Checking procedure for main parts". Check other main parts in all cases. If there is a malfunction in DC fan motor, it may cause damage to the inverter PCB.*

Alarm code	53	Protection of the inverter PCB (RAS-(4-6)WH(V)NPE and RAS-(8/10)WHNPE)

Applicable to units	
OU	S / SC
○	–

RAS-(4-6)WH(V)NPE and RAS-(8/10)WHNPE

- IPM or Dip IPM and PCB2 have detecting function of anomaly. This alarm is indicated when the transistor module detect the anomaly 7 times in 30 minutes including 7. Retry operation is performed up to the occurrence of 6 times.
- Condition of activation:
  - The abnormal current such as short circuited, grounded or the overcurrent occurs at the transistor module.
  - The temperature at transistor module increases abnormally.
  - The control voltage decreases.
  - The angle difference between the shaft in compressor and the shaft in the control program exceeds +60deg.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.

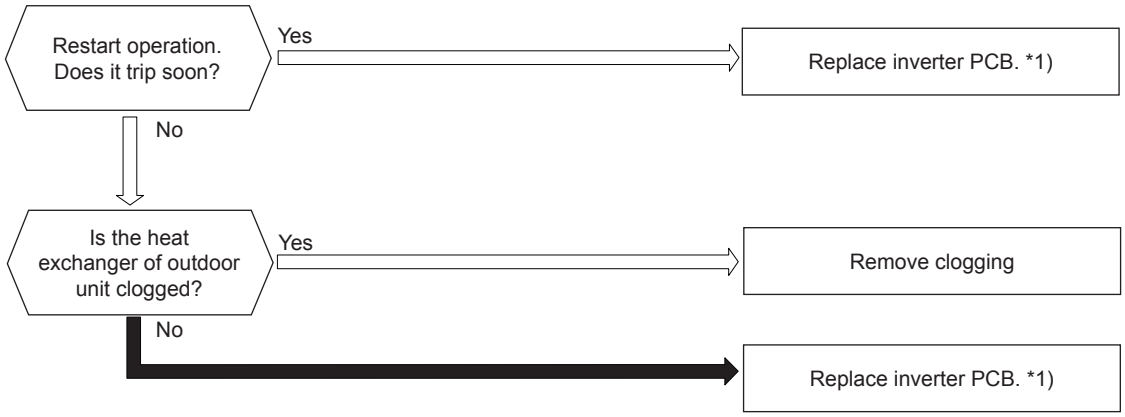


Alarm code	54	Anomaly of the inverter fin temperature (RAS-3WHVRP1)

Applicable to units	
OU	S / SC
○	–

RAS-3WHVRP1

- This alarm code is indicated after the operation is stopped when the following conditions occur three times within 30 minutes. The retry operation is performed twice.
- Conditions of activation:
  - When the temperature of the thermistor for inverter fin exceeds 80 °C (RAS-3WHVRP1)
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



NOTE

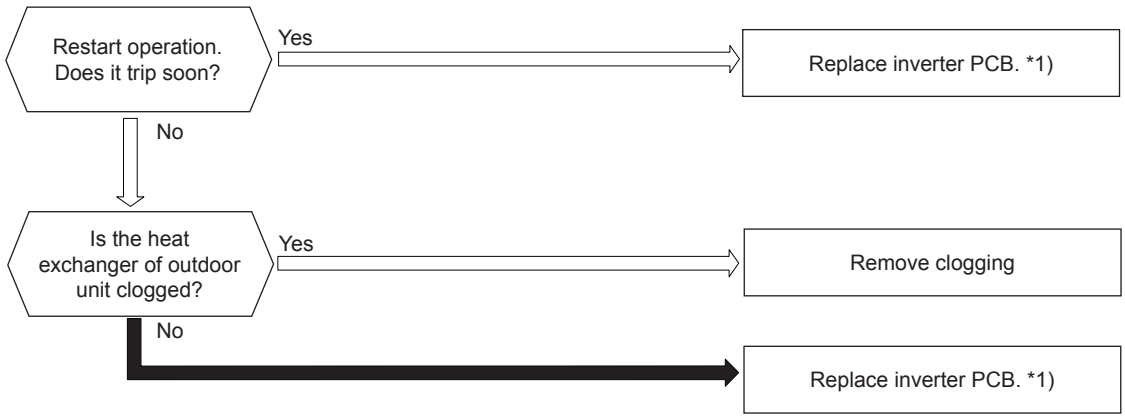
1): Perform the high voltage discharge work by referring to the item "6.7.7 Checking procedure for other parts", before checking and replacing the inverter components.*

Alarm code	54	Anomaly of the inverter fin temperature (RAS-(4-6)WH(V)NPE)

Applicable to units	
OU	S / SC
○	–

RAS-(4-6)WH(V)NPE

- This alarm code is indicated after the operation is stopped when the following conditions occur three times within 30 minutes. The retry operation is performed twice.
- Conditions of activation:
  - When the temperature inside the transistor module exceeds 90 °C (RAS-(4-6)WH(V)NPE).
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



NOTE

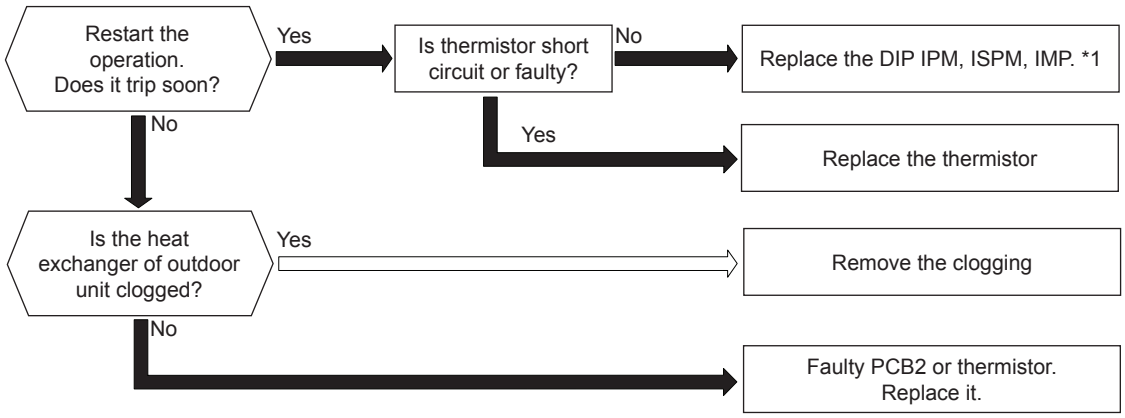
1): Perform the high voltage discharge work by referring to the item "6.7.7 Checking procedure for other parts", before checking and replacing the inverter components.*

Alarm code	54	Anomaly of the inverter fin temperature (RAS-(8-10)WHNPE)

Applicable to units	
OU	S / SC
○	–

RAS-(8-10)WHNPE

- This alarm code is indicated after the operation is stopped when the following conditions occur three times within 30 minutes. The retry operation is performed twice.
- Condition of activation:
  - When the temperature of the thermistor for inverter fin exceeds 100ºC.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



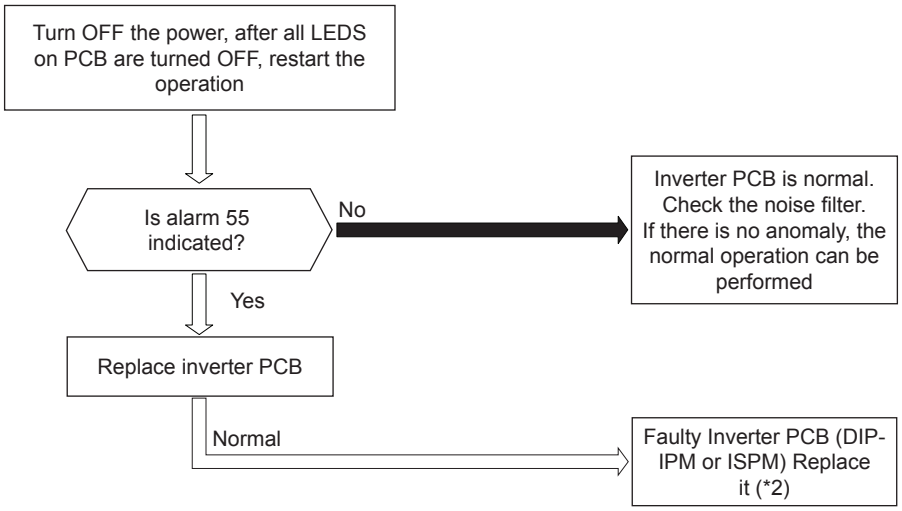
NOTE

1): Perform the high voltage discharge work by referring to the item "6.7.7 Checking procedure for other parts", before checking and replacing the inverter components.*

Alarm code	55	Anomaly of inverter module

Applicable to units	
OU	S / SC
○	–

- Actual frequency from Inverter PCB is less than 10 Hz (after inverter frequency output form PCB1 to Inverter PCB).
- This alarm is displayed when it occurs 3 times in 30 minutes. Retry operation is performed up to the occurrence of 2 times.
- Condition of Activation:
  - This alarm is indicated when Inverter PCB is not performed normally.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



NOTE

When the excessive surge current is applied to the unit due to lighting or other causes, this alarm code or the cause code of inverter stoppage (Itc=11) will be indicated on the 7-segment display on OU PCB1 and the unit can not be operated. In this case, check to ensure the surge absorber (SA) on the PCB1 for RAS-(2-3)WHVRP1 and on noise filter (NF1) for RAS-(4-6)WH(V)NPE and RAS-(8-10)WHNPE. The surge absorber may be damaged if the inner surface of the surge absorber is changed to black. If the surge absorber is damaged, replace the noise filter. If the surge absorber does not have anomaly, turn OFF the power source once and wait until turning OFF all LEDS on inverter PCB for approx. 5 min. Then, turn ON again.

Alarm code	57	Anomaly of fan motor protection (DC fan motor)

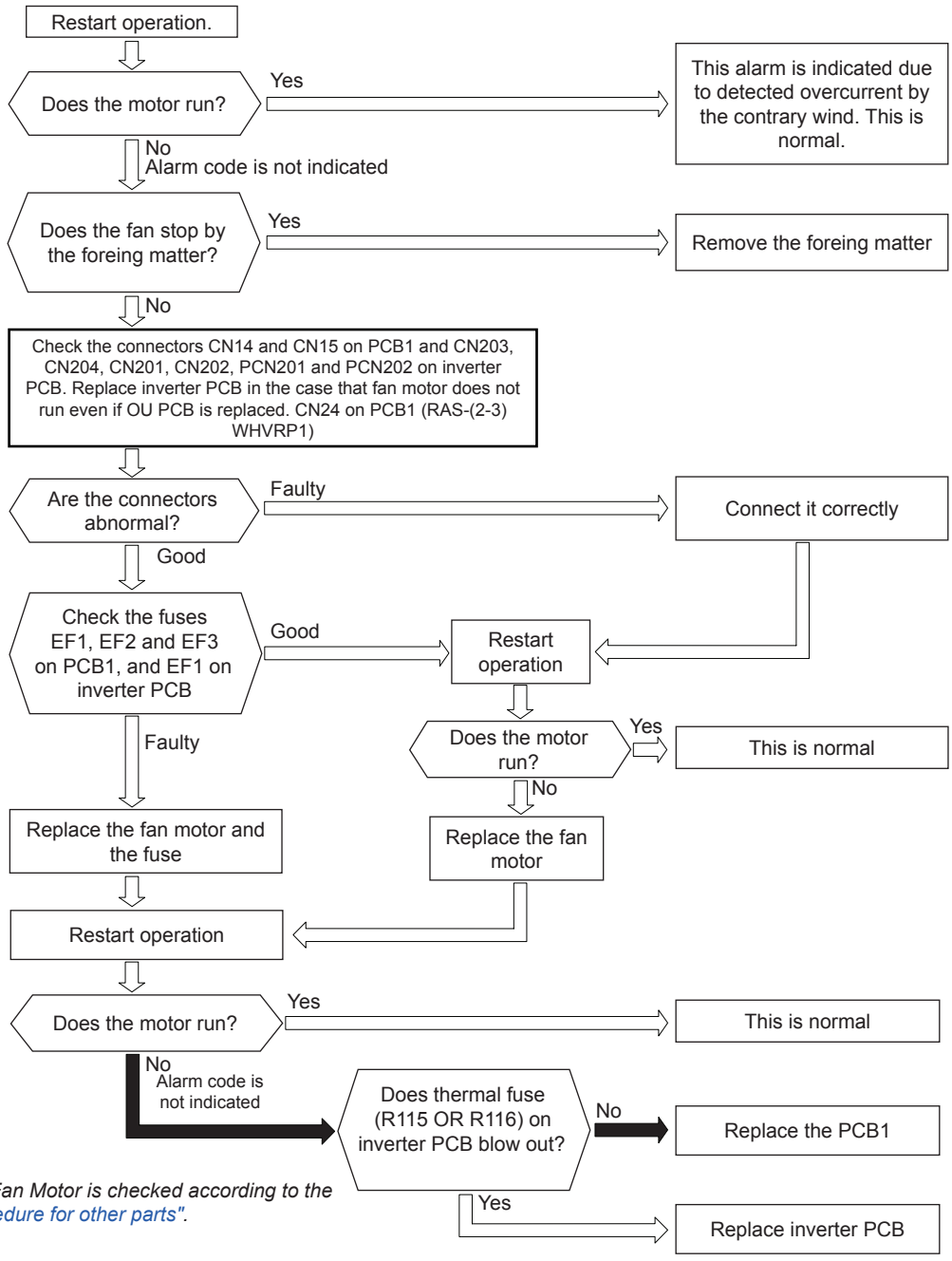
Applicable to units	
OU	S / SC
○	–

For RAS-(2-3)WHVRP1

- This alarm is indicated when the revolution pulse output from the fan motor is lower than 20min-1 during 30 seconds and it stops. Regarding stops, when less than 35 seconds have passed since fan start up, after the first anomaly is detected, if its occurs 4 times more within 5 minutes, it stops and alarm is displayed.

For RAS-(4-6)WH(V)NPE and RAS-(8/10)WHNE

- This alarm is indicated when the revolution pulse output from the fan motor is 10 rpm or less and the reverse revolution signal is detected. The fan motor is stopped once, and restarted after 10 seconds.
- If it occurs more than 10 times in 5 minutes after the first anomaly occurs, this alarm is indicated. The anomaly occurs when the fan motor is stopped by slugging.



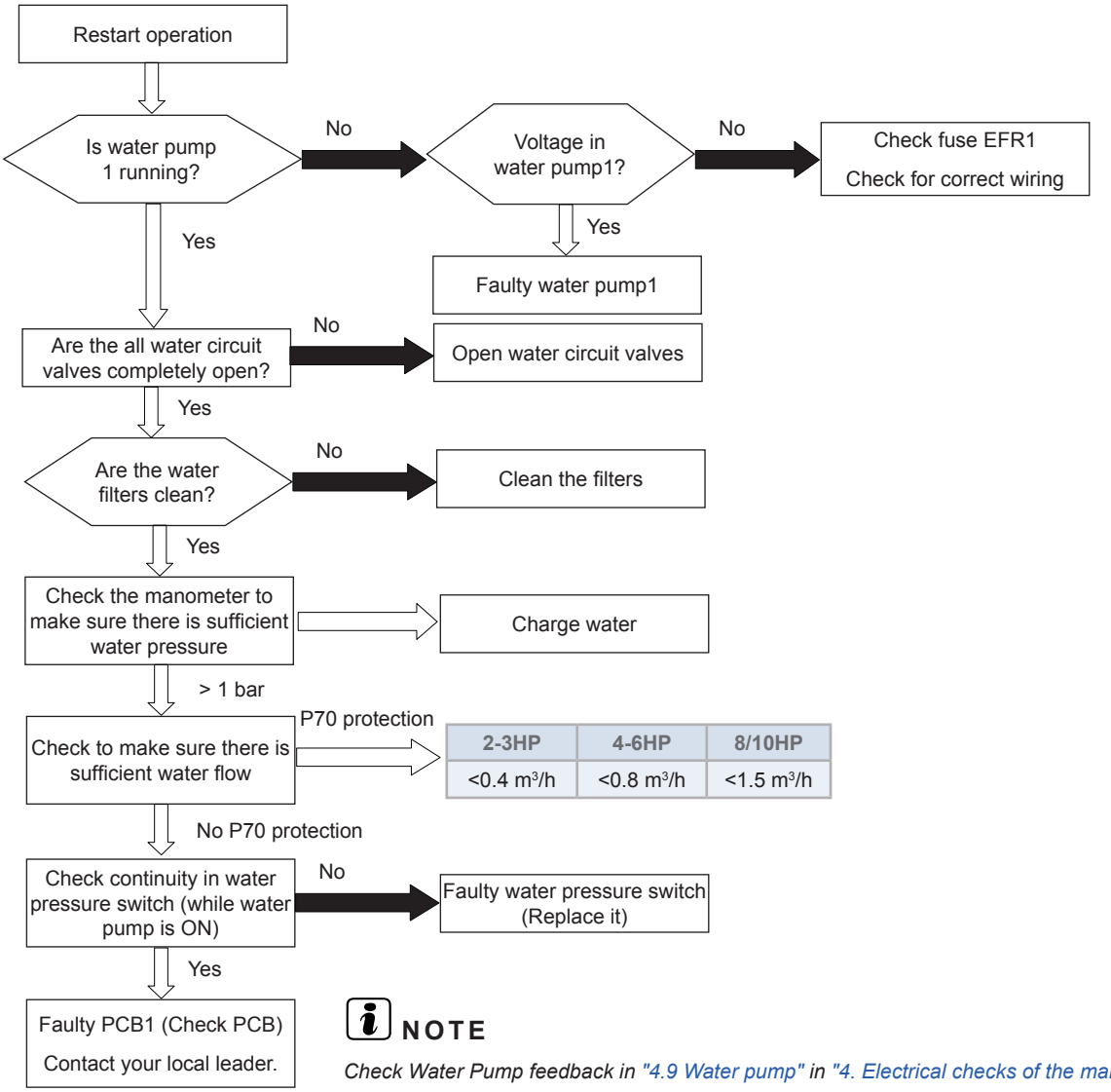
NOTE

Check to ensure that DC Fan Motor is checked according to the item "6.7.7 Checking procedure for other parts".

Alarm code	70	Hydraulic low flow alarm and water pump malfunction

Applicable to units	
OU	S / SC
–	○

- This alarm is displayed when there is a low flow anomaly in the hydraulic system for 60 seconds
- The anomaly is detected when there is a pump operation requested and DSW3-2 is OFF.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



NOTE

Check Water Pump feedback in "4.9 Water pump" in "4. Electrical checks of the main parts"

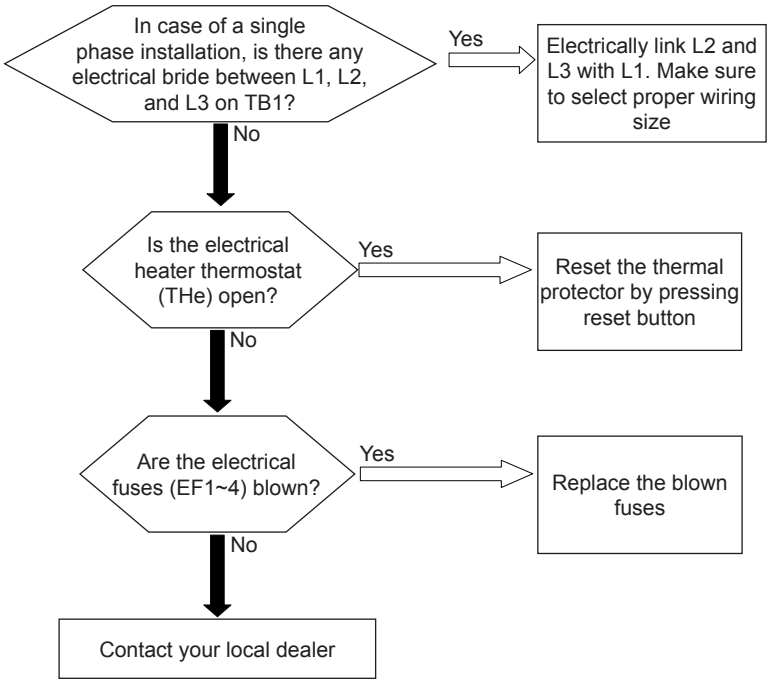
Alarm control procedure:

- Perform retry operation for 1 minute the first time (Seven-segment shows P70) and keep Outdoor and Indoor Unit running (except Electrical Heater). After 1 minute has passed (P70), Switch Stop status OFF for Outdoor and Indoor Units.

Alarm code	72	Thermostat Heater Alarm

Applicable to units	
OU	S / SC
–	○

- This alarm is displayed when the temperature inside the heater exceeds the safety temperature.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.



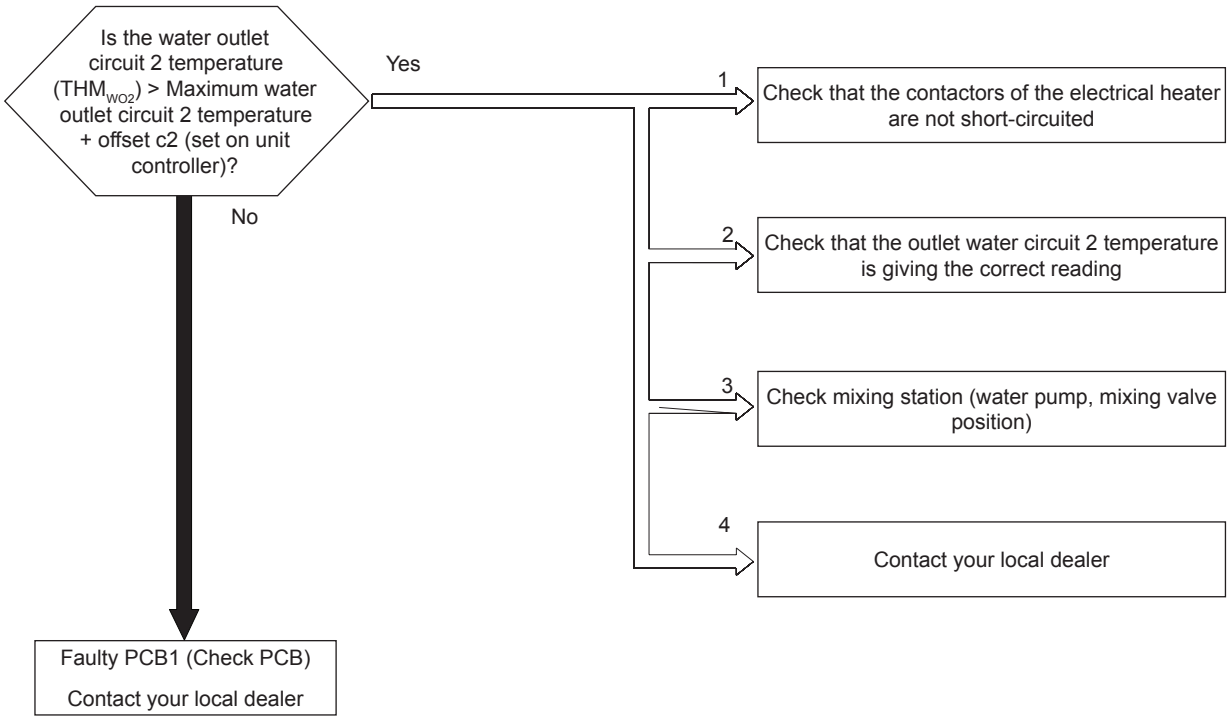
Alarm control procedure:

- Switch OFF Outdoor and Indoor Units
- Electrical Heater Disabled
- Water pumps continues running up to water <55ºC.

Alarm code	73	Mixing overheating limit protection for mixed circuit (only if circuit 2 is enabled)

Applicable to units	
OU	S / SC
–	(○)

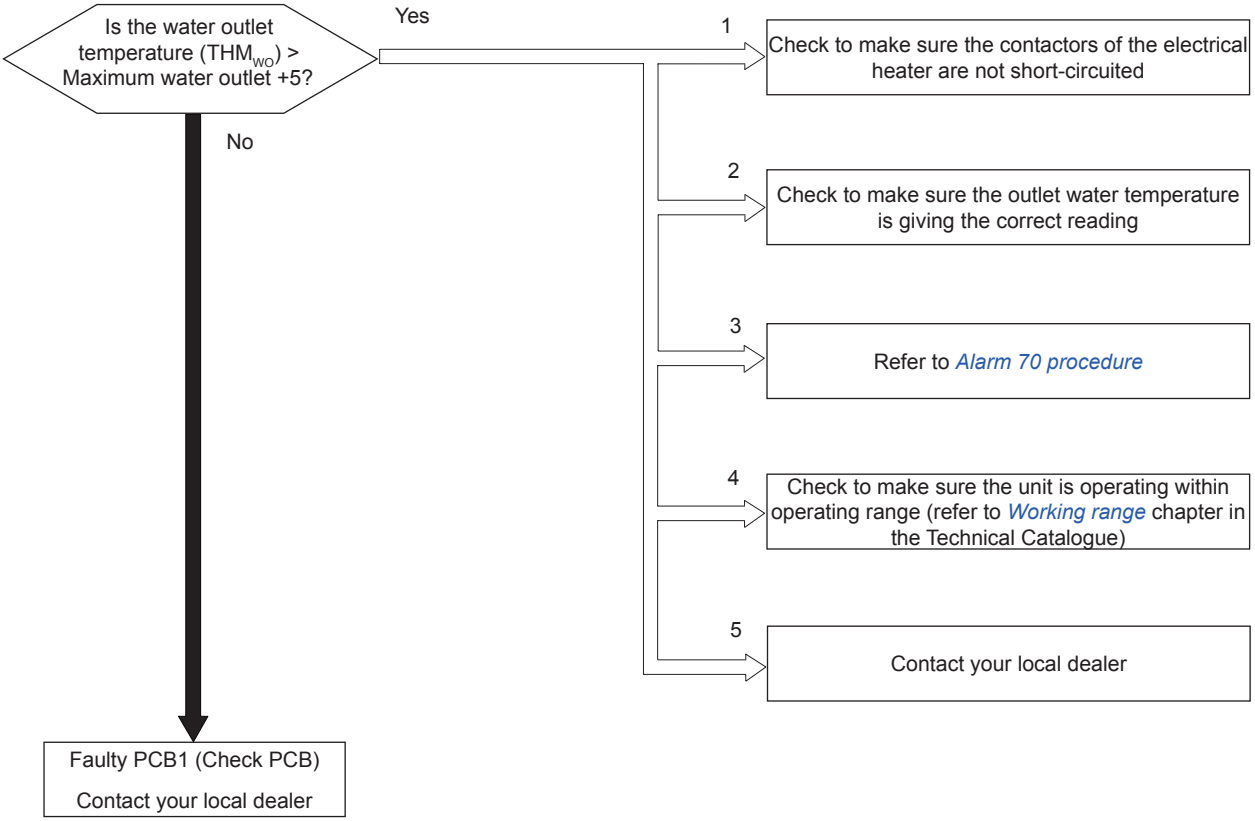
- This alarm code is displayed when temperature of circuit 2 is higher than a determined offset from the maximum water temperature value set for circuit 2 by installer configuration, for 20 seconds.
- This alarm forces all operations to stop, except water pump (Water pump 2 will also be stopped).
- The unit should be stopped to release the alarm.



Alarm code	74	Unit overheating limit protection

Applicable to units	
OU	S / SC
–	○

- This alarm code is displayed when water supply temperature (Two) is 5ºC more than maximum water circuit temperature for 20 seconds.
- This alarm forces all operations to stop (Outdoor & Indoor Units), except water pump.
- The unit should be stopped to release the alarm.



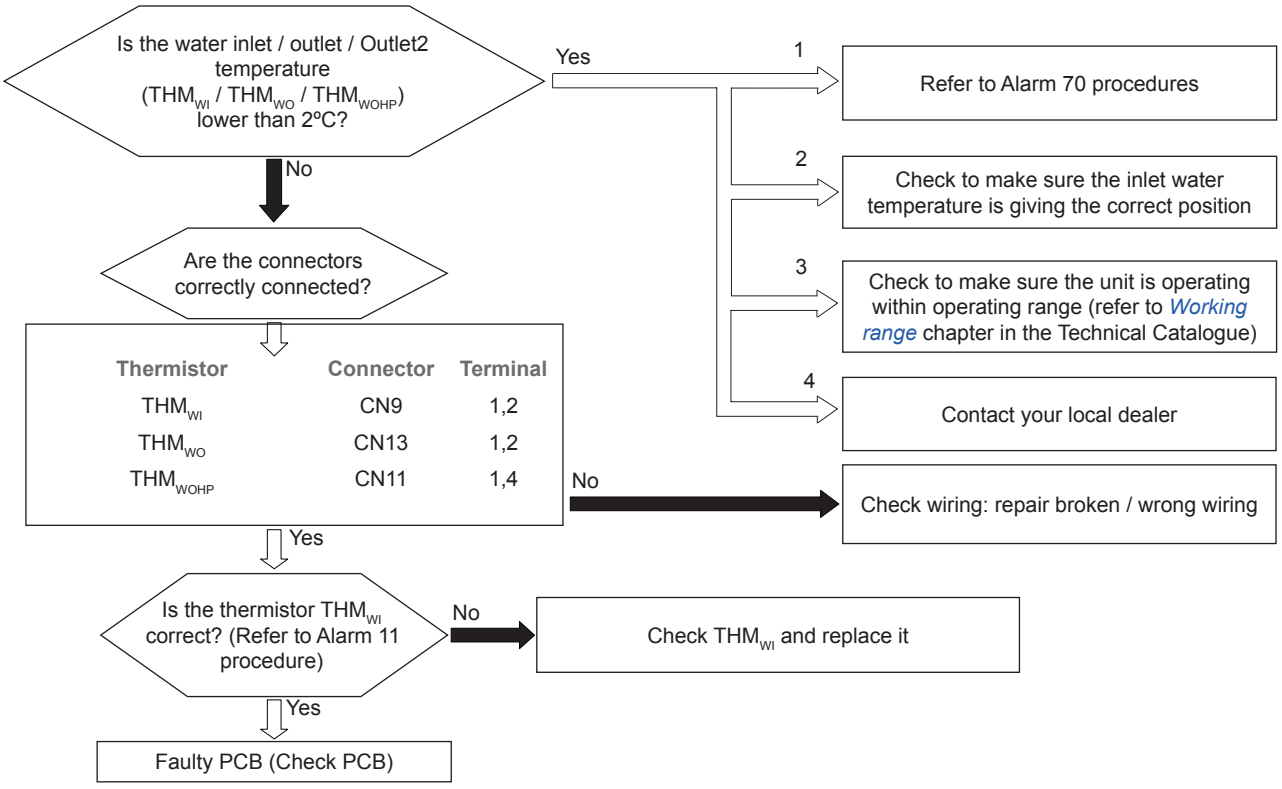
Alarm control procedure:

- Perform retry operation for 6 minutes the first time (Seven-segment shows P74) and keep Outdoor and indoor unit running (except Electrical Heater). After 6 minutes have passed (P74), Switch Stop status OFF for Outdoor and Indoor Units.
  - Switch water pump 1 to OFF (if water outlet < 55ºC).
  - Mixing valve closed.

Alarm code	75	Freeze Protection by cold water inlet / outlet temperature detection

Applicable to units	
OU	S / SC
–	○

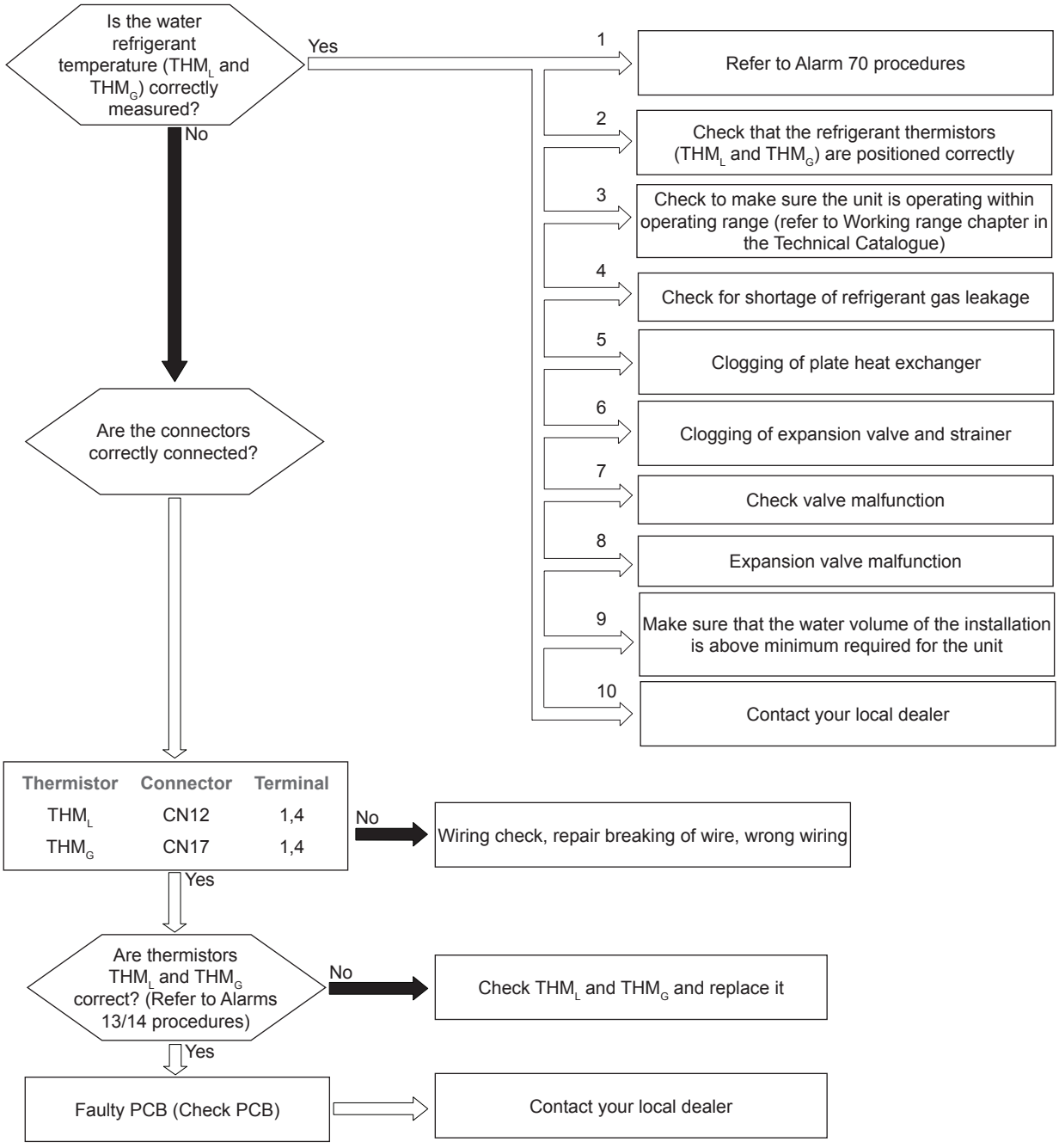
- The alarm code is displayed on the unit controller.
- This alarm code is displayed when the water inlet temperature is ≤ 2ºC during 30 seconds.
- This alarm forces all operations to stop, except water pump.
- The unit should be stopped to release the alarm.



Alarm code	76	Freeze Protection Stop by indoor liquid temperature thermistor

Applicable to units	
OU	S / SC
–	○

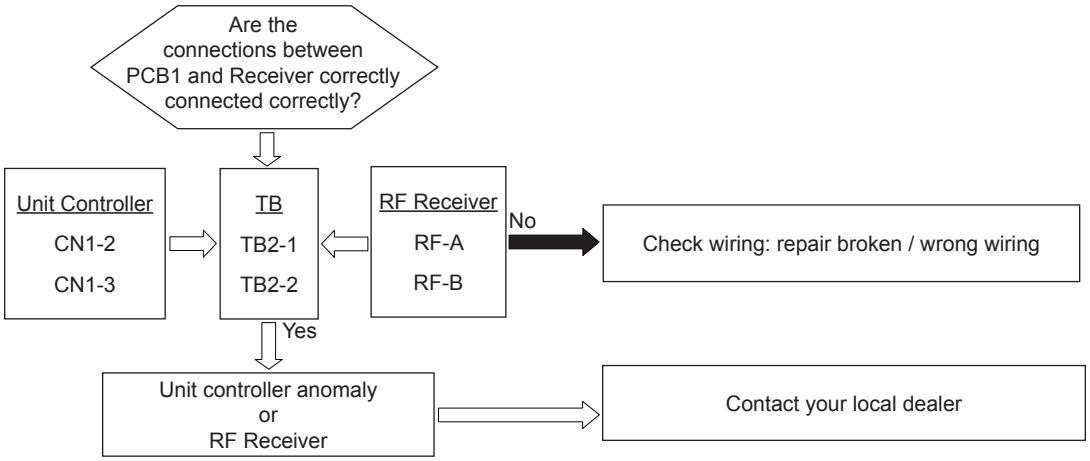
- The alarm code is displayed on the Unit controller.
- This alarm code is displayed when 2 conditions are detected:
  - Condition 1: Gas or Liquid temperature ≤ -10ºC and Two <6ºC, during 30 seconds.
  - Condition 2: Gas or Liquid temperature ≤ -20ºC, during 30 seconds
- This alarm forces all operations to stop, except water pump.
- The unit should be stopped to release the alarm.



Alarm code	77	Intelligent wireless receiver communication failure (Only with intelligent thermostat accessory)

Applicable to units	
OU	S / SC
–	(○)

- This alarm code is displayed when an Intelligent thermostat is installed (and selected as Wireless on the Unit controller menu) and there is no communication for a continuous period of 10 minutes.
- This alarm forces all operations to stop, except water pump.
- The alarm is released when the communication is restored.



Alarm control procedure:

The control will continue in normal operation with the following fixed Opentherm values:

- Circuit 1: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point.
- Circuit 2: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point.
- Indicates alarm to Unit controller.

Alarm code	78	RF communication failure (Only with intelligent thermostat accessory)

Applicable to units	
OU	S / SC
–	(○)

- This alarm code is displayed when an Intelligent thermostat is installed (and selected as Wireless on the Unit controller controller menu) and there is no communication for 1 hour or two Room thermostat devices that are bound to the RF-bridge.
- This alarm forces all operations to stop, except water pump.
- The unit should be stopped to release the alarm.

Alarm control procedure:

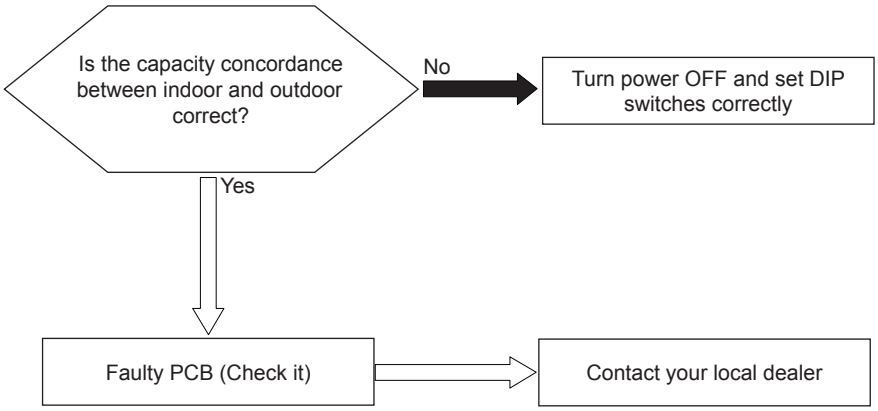
The control will continue in normal operation with the following fixed Opentherm values:

- Circuit 1: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point
- Circuit 2: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point
- Control will not obey the thermostat time programme and OFF function.

Alarm code	79	Unit capacity setting error

Applicable to units	
OU	S / SC
–	○

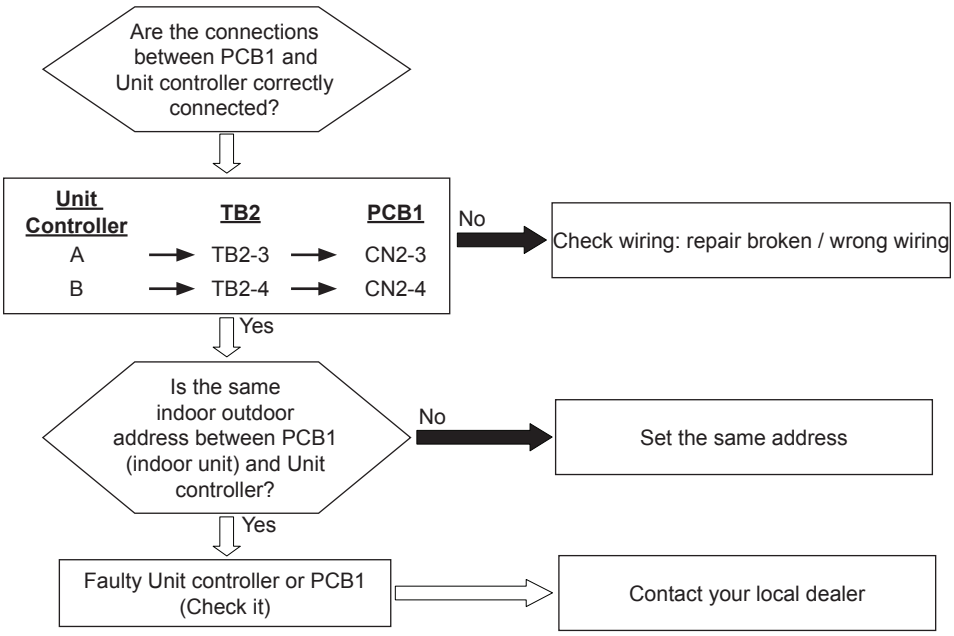
- The alarm code is displayed on the Unit controller when there is a constant detection of no concordance between indoor and outdoor unit capacity (for capacity settings over 3HP).
- This alarm forces all operations to stop.
- To release the alarm the capacity correspondence between indoor and outdoor unit must be fix or the unit must be stopped.



Alarm code	80	RCS H-LINK communication failure between Indoor unit and Unit controller (PC-ARFH2E)

Applicable to units	
OU	S / SC
–	○

- The alarm code is displayed on the unit controller when there is no communication between indoor unit PCB and the unit controller for 90 seconds.
- This alarm forces all operations to stop.
- The unit should be stopped to release the alarm.



Alarm code		Momentary power interruption or Low voltage detected

Applicable to units	
OU	S / SC
○	○

- This alarm is displayed to indicate a momentary power interruption or a low voltage detected during compressor operation.

A brief power interruption (which may not cause the reset of the microcomputer), may cause, instead, the relay Y52C or the CMC (Contactor for Compressor Motor) to release. Abnormal conditions kept for more than 60 seconds is considered a "Critical power supply problem", since no power is detected but microprocessor is still operating. In this case, Alarm 81 is recorded.

- A power interruption shorter than 2 seconds is considered a "Momentary Power Interruption. In this case, a Control for recovery from "Momentary power interruption is performed.
- A power interruption longer than 3 seconds is considered a "Power failure" and the unit is stopped as a normal stop. In this case no alarm is displayed.
- This alarm forces all operations to stop and force all digital outputs to an OFF state.
- The alarm is released when anomaly conditions are not detected for more than 10 seconds (power restored).

Alarm code		Low pressure anomaly in hydraulic circuit

Applicable to units	
OU	S / SC
–	○

YUTAKI S

- This alarm is displayed when a excessive low pressure is detected in the hydraulic circuit for more than 60 seconds and a pump operation is still requested.
- This alarm forces all operations to stop (Outdoor & Indoor units).
- The unit should be stopped to release the alarm.

YUTAKI S COMBI

- This alarm is displayed when water pressure in the hydraulic circuit is below 0.5 bar for more than 60 seconds and a pump operation is still requested.
- This alarm forces all operations to stop (Outdoor & Indoor units).
- The unit should be stopped to release the alarm and water pressure on the system shall be > 0.9 bar.

Alarm code		High water pressure

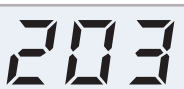
Applicable to units	
OU	S / SC
–	○

- This alarm is triggered in case water pressure measured by the pressure sensor ≥ 3.7 bar
- This alarm forces all operations to stop (Outdoor & Indoor units).
- The unit should be stopped to release the alarm.

Alarm code		Wrong settings of PC-ARFH2E

Applicable to units	
OU	S / SC
–	(○)

- This alarm is displayed when a wrong settings of PC-ARFH2E is detected: More than 1 Main, or more than one PC-ARFH2E controlling same circuit as Room thermostat).
- Alarm recovery: After a proper configuration of the PC-ARFH2E and launching a "Check RT address" from the PC-ARFH2E Main.

Alarm code		Sub PC-ARFH2E stops answering to Main PC-ARFH2E

Applicable to units	
OU	S / SC
–	(○)

- This alarm is displayed when a Sub PC-ARFH2E stops answering to Main PC-ARFH2E for more than 3 minutes or when 2 Sub PC-ARFH2E are controlling the same circuit.
- Alarm recovery:
  - In case of an alarm detected because of a lost communication, the alarm is recovered when communication is established again.
  - In case of a configuration of 2 thermostats but only 1 is installed, it is required to launch a "Check RT addres" from the PC-ARFH2E Main.

Alarm code		Indoor unit stops answering to Main PC-ARFH2E

Applicable to units	
OU	S / SC
–	(○)

- This alarm is displayed when an indoor unit stops answering to Main PC-ARFH2E for more than 3 minutes.
- Alarm recovery: When the communication is established again the alarm is recovered.

Alarm code		Central Alarm, no Central message

Applicable to units	
OU	S / SC
–	(○)

- This alarm is displayed there is no messages from the central for more than 30 seconds.
- Alarm recovery: When the communication is established again the alarm is recovered.

Alarm code	EE	Compressor protection

Applicable to units	
OU	S / SC
○	–

- This alarm code is displayed when one of the following alarms occurs three times within six hours. If the outdoor unit operates continuously without removing the cause of the alarm, the compressor may be seriously damaged.

Alarm code	Content of anomaly
02	Tripping of protection device in outdoor unit
07	Decrease in discharge gas superheat
08	Increase in discharge gas temperature
41	High pressure switch overload
42	Heating overload
47	Low pressure decrease protection activating

NOTE

These alarms can be checked using the check mode 1. The action indicated in each alarm chart must be followed. These alarms have to be cleared by turning OFF the main switch of the system. **Pay special attention before starting. There is a possibility of causing serious damages to the compressor.**

Alarm code	b0	Incorrect setting of unit model

Applicable to units	
OU	S / SC
○	–

- This alarm code is indicated in the following condition. Check the unit model code setting (DSW4) of IU PCB after turning OFF the power source.

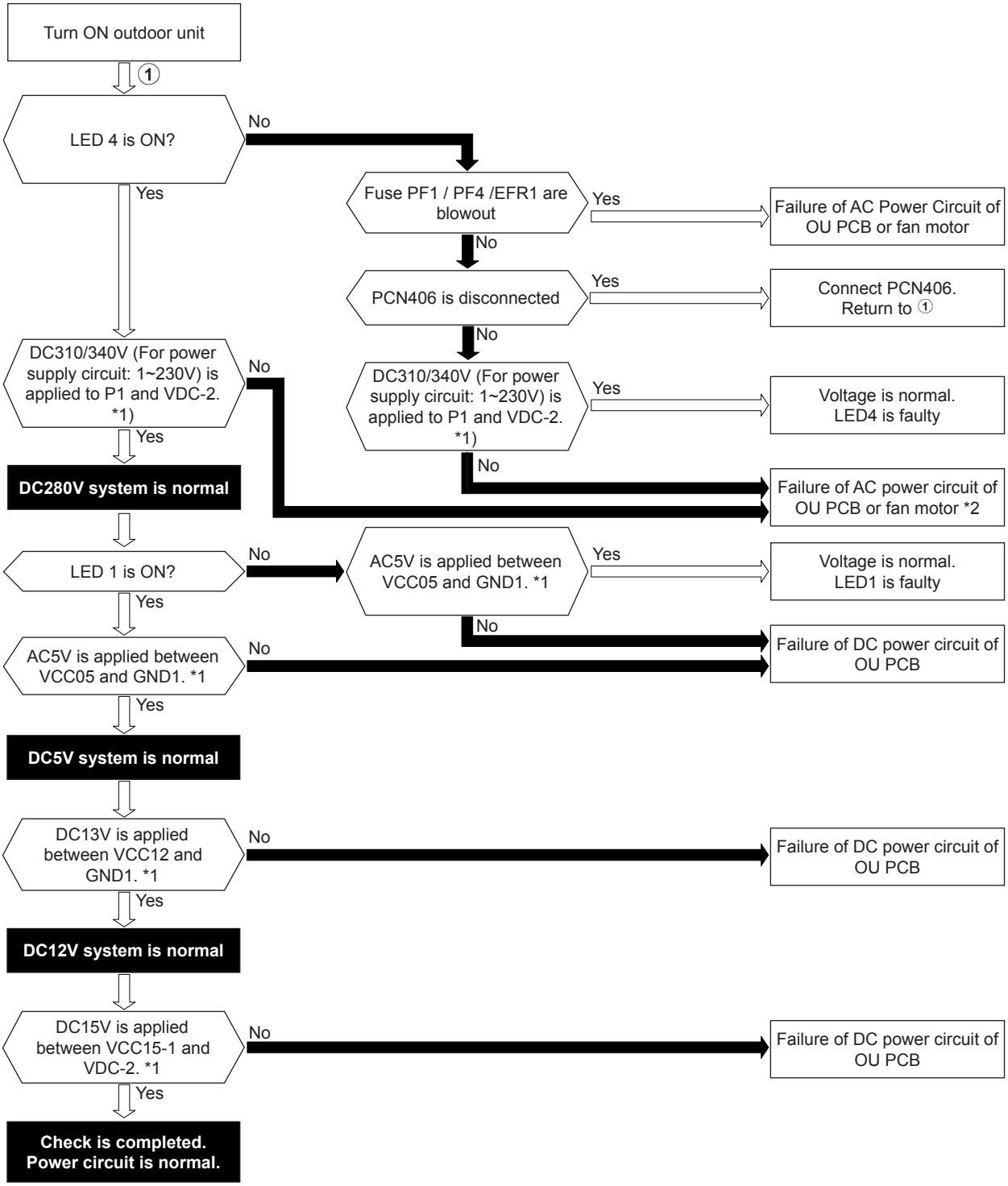
Condition	Action
The unit model code setting (DSW4) is not set (all pins are “OFF”), or is set for the incorrect indoor unit type.	Set DSW4 correctly according to the dip switch setting in “Installation and Operation Manual”.

6.7 Checking procedure for main parts

6.7.1 Checking procedure for the PCB

PCB1 ref. CC0007567C-1 for RAS-(2-3)WHVRP1

PCB1 ref. PO101 for RAS-(4-10)WH(V)NPE)



NOTE

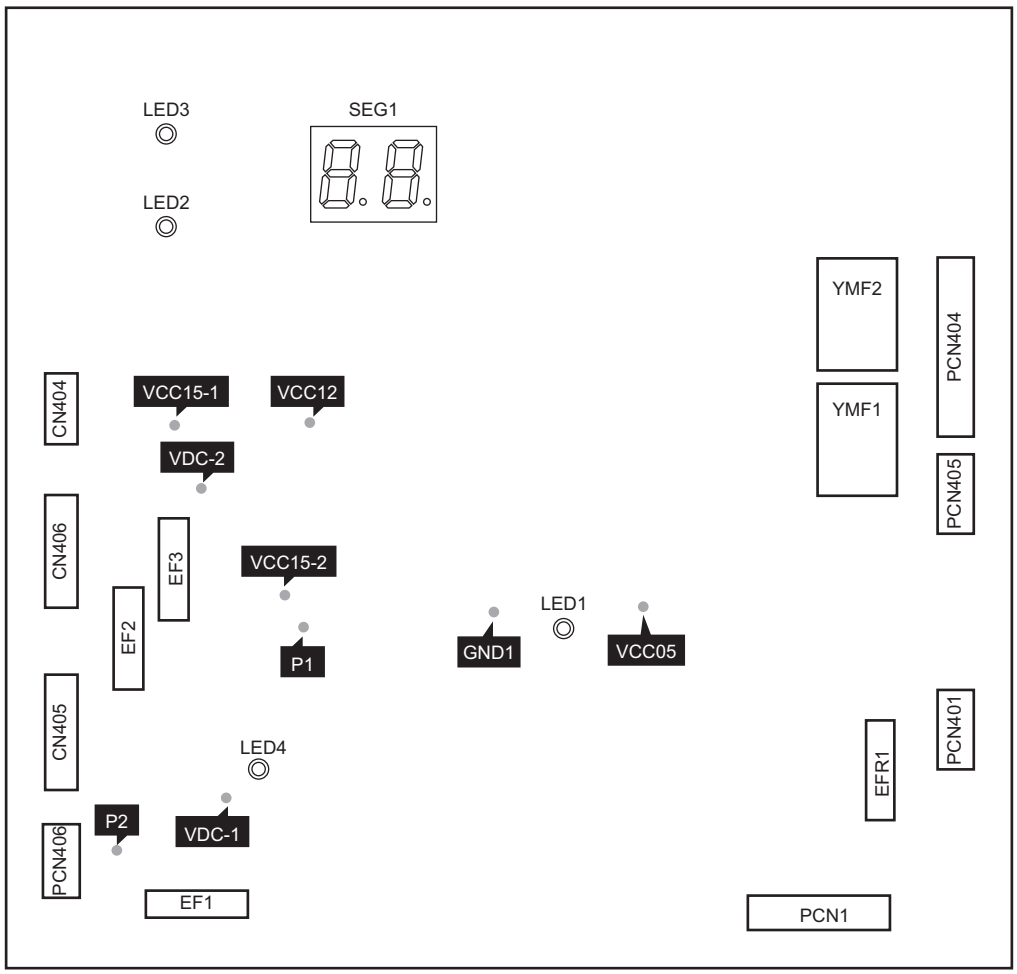
- **1) The following table shows the check points and the normal range of voltage in the case that the voltage on the outdoor unit PCB is measured with a circuit tester. The setting of the circuit tester shall be set within the DC voltage measurement range when the following voltages are measured.*
- **2) If 230V / 400V is present in DIP-IPM terminals R-S / R-S-T, DIP-IPM may be faulty. Alarm 03 may be shown in this case.*

Check Point		Normal Range (V)
(+) Side of Tester	(-) Side of Tester	
P1	VDC-2	Approx. 311VDC
VCC15-1		13.5VDC ~ 16.5VDC
VCC05	GND1	4.5VDC ~ 5.5VDC
VCC12		11.9VDC ~14.3VDC

⚠ CAUTION

- *Do not apply the test lead to unspecified check points when measuring the voltage with a circuit tester. Otherwise, it may cause a failure of the outdoor unit PCB and the circuit tester.*
- *When measuring the voltage with a circuit tester, the setting of the circuit tester shall be set within the DC voltage measurement range. If the setting is not correct, it may cause a failure of the outdoor unit PCB and circuit tester.*

Position of the check points in the Outdoor Unit Printed Circuit Board (PCB1 ref PO101)



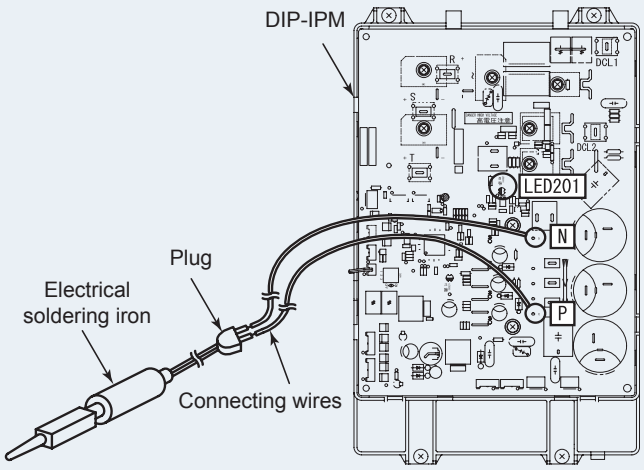
6.7.2 Checking procedure for the DIP-IPM inverter (only for RAS-(4-10)WH(V)NPE)

◆ RAS-(4-6)WH(V)NPE

High voltage discharge work for replacing parts

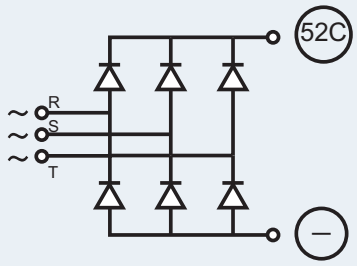
⚠ CAUTION

Electrical hazard. Risk of electrical shock. Perform this high voltage discharge work to avoid an electric shock.

1 Turn OFF the main switches and wait for three minutes. Make sure that no high voltage exists. If LED201 is ON after start-up and LED201 is OFF after turning OFF power source, the voltage will decrease lower than DC50V. 2 Connect connecting wires to an electrical soldering iron. 3 Connect the wires to terminals, P and N on DIP-IPM. (The discharge voltage can perform even when connecting the wires to terminals #1(P) and #3(N) of connector “PCN201”) => Discharging is started, resulting in hot soldering iron. Pay attention not to short-circuit between terminal P(+) and N(-). 4 Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.	

Inverter module checking procedure

Rectifier circuit of inverter PCB

Internal circuit of rectified part of DIP-IPM. Remove all the terminals of the inverter PCB before checking. Non-faulty if [1] – [8] are checked and satisfied. Measure with 1 kΩ range of a tester.	

NOTE

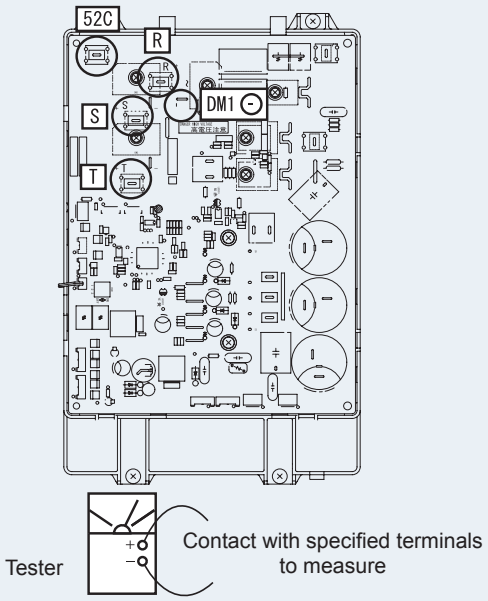
DO NOT use a digital tester.

1 Touch [+] side of the tester to DIP-IPM 52C terminal, and [-] side to DIP-IPM R, S and T terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

2 Contrary to [1], touch [-] side of the tester to DIP-IPM 52C terminal, and [+] side to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 100 kΩ or greater.

3 Touch [-] side of the tester to [-] side of DIP-IPM DMI (soldered part), and [+] side of the tester to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

4 Contrary to [3], touch [+] side of the tester to [-] side of DIP-IPM DMI, and [-] side of the tester to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 100 kΩ or greater.

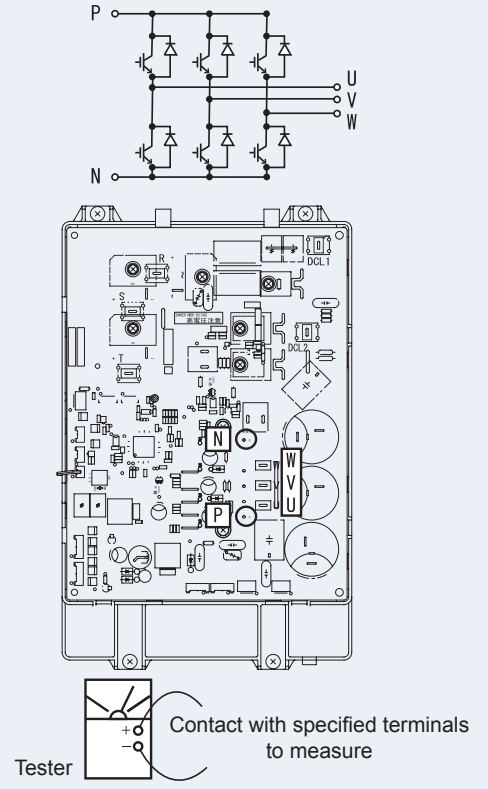


5 Touch [+] side of the tester to [P] of DIP-IPM (soldered part), and [-] side to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

6 Contrary to [5], touch [-] side of the tester to [P] of DIP-IPM (soldered part), and [+] side to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 30 kΩ or greater (resistance gradually increases during measurement).

7 Touch [-] side of the tester to [N] of the inverter (soldered part), and [+] side to the inverter U, V, W terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

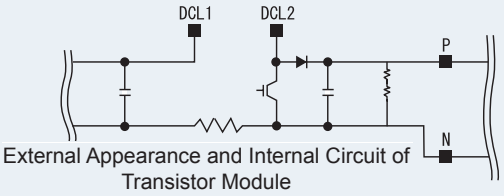
8 Contrary to [7], touch [+] side of the tester to [N] of DIP-IPM (soldered part), and [-] side to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 30 kΩ or greater (resistance gradually increases during measurement).



ACT circuit of inverter PCB

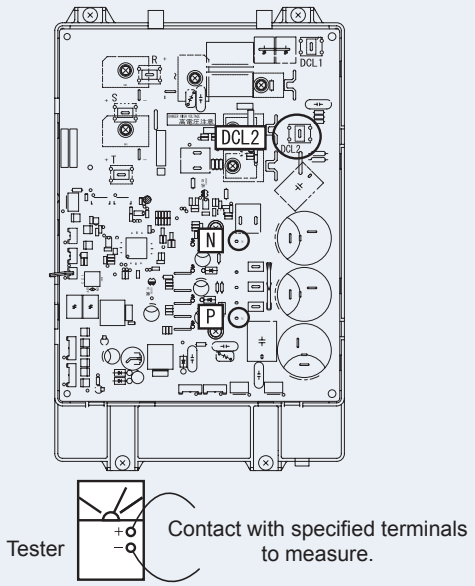
Internal circuit of ACT part of inverter module

Non-faulty if [9] – [13] are checked and satisfied (measure with 1 kΩ range of a tester).



NOTE

DO NOT use a digital tester.

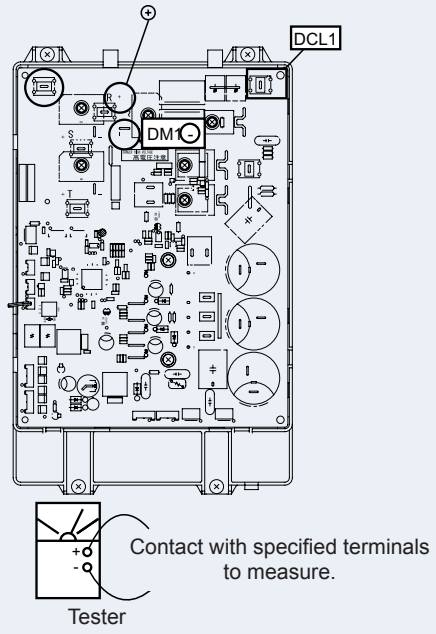
9 Check items [1] – [8]. 10 Touch [+] side of the tester to DIP-IPM DCL2 terminal, and [-] side to [P] of ISPM/DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 100 kΩ or greater 11 Contrary to [10], touch [-] side of the tester to DIP-IPM DCL2 terminal, and [+] side to [P] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 1 kΩ or greater. 12 Touch [+] side of the tester to DIP-IPM DCL2 terminal, and [-] side to [N] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 100 kΩ or greater. 13 Contrary to [12], touch [-] side of the tester to DIP-IPM DCL2 terminal, and [+] side to [N] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 10 kΩ or greater (resistance gradually increases during measurement).	

Checking Method of Resistance for Inrush Current Prevention (Built-in Thermal Fuse)

(Measure the resistance under 1 kΩ range of a circuit tester.)

NOTE

DO NOT use a digital tester.

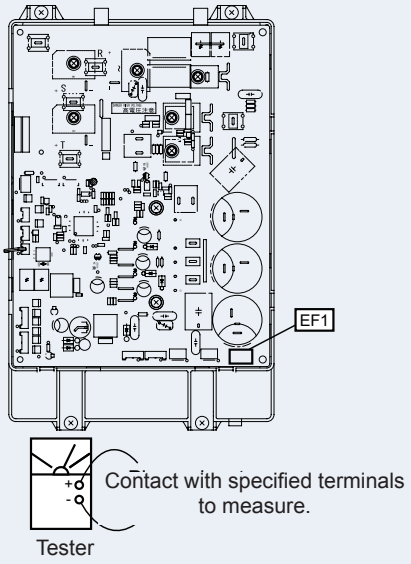
By placing the ⊕ side of tester to the ⊕ side of DM1 (soldering portion) on inverter PCB and the ⊖ side of tester to DCL1 on inverter PCB, measure the resistance. If the resistance is around 500Ω, it is normal. If the resistance is 0Ω or infinity Ω, it is abnormal.	

Checking Method of Fuse for fan motor protection (EF1)

(Measure the resistance under 1 kΩ range of a circuit tester.)

NOTE

DO NOT use a digital tester.

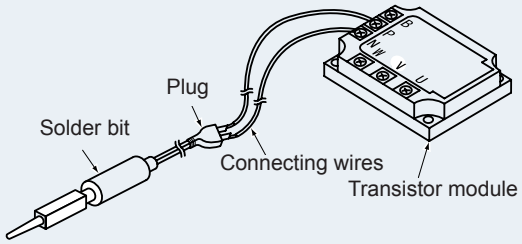
By placing the ⊕ and ⊖ side of tester to EF1 on inverter PCB, measure the resistance. If the resistance is 0Ω, it is normal.	

◆ RAS-(8-10)WHNPE

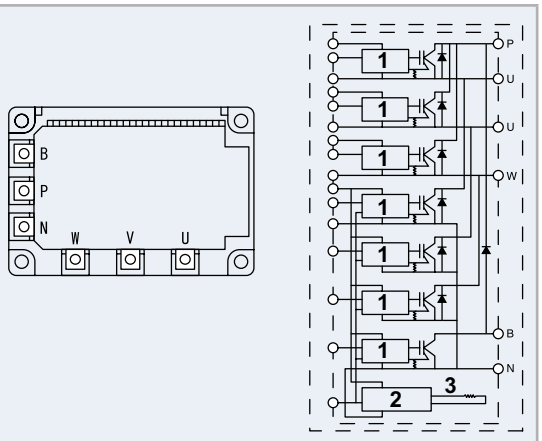
High voltage discharge work for replacing parts

CAUTION

Electrical hazard. Risk of electrical shock. Perform this high voltage discharge work to avoid an electric shock.

1 Turn OFF the main switches and wait for three minutes. Check to ensure that no high voltage exists. If LED2 is ON after start-up and LED2 is OFF after turning OFF power source, the voltage will decrease lower than DC50V. 2 Connect connecting wires to an electrical solder bit. 3 Connect the wires to terminals, P and N on IPM. => Discharging is started, resulting in hot solder bit. Pay attention not to short-circuit between terminal P and N. 4 Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.	

Transistor module checking procedure

Outer Appearance and Internal Circuit of Transistor Module 1. Drive circuit. 2. Overheating protection circuit. 3. Sensor.	

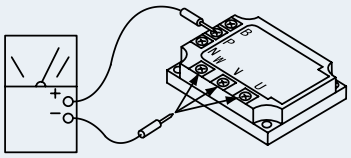
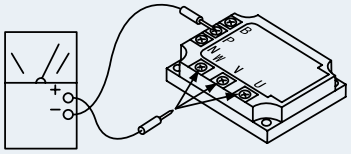
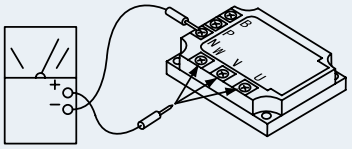
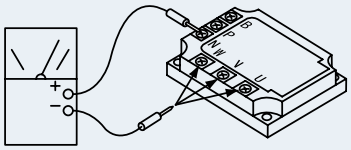
Procedure:

Remove all the terminals of the transistor module before check. If items [1] – [4] are performed and the results are satisfactory, the transistor module is normal.

Measure it under 1kΩ range of a tester.

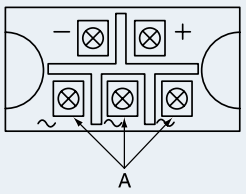
NOTE

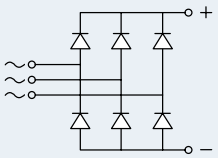
DO NOT use a digital tester.

1 By touching the + side of the tester to the P terminal of transistor module and the - side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to 5kΩ, it is normal.	
2 By touching the - side of the tester to the P terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100kΩ, it is normal.	
3 By touching the - side of the tester to the N terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to 5kΩ, it is normal.	
4 By touching the + side of the tester to the N terminal of transistor module and the - side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100kΩ, it is normal.	

Diode module checking procedure

Outer appearance and internal circuit of diode module:



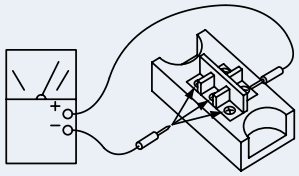
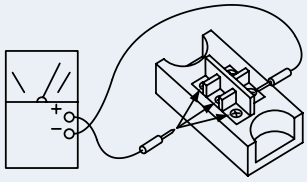
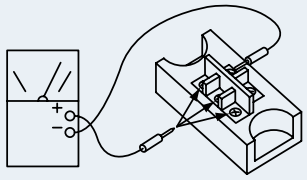
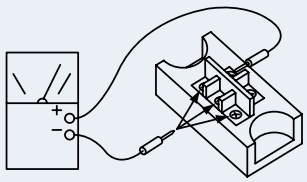


If items [1] – [4] are performed and the results are satisfactory, the diode module is normal.

Measure it under 1kΩ range of a tester.

NOTE

DO NOT use a digital tester.

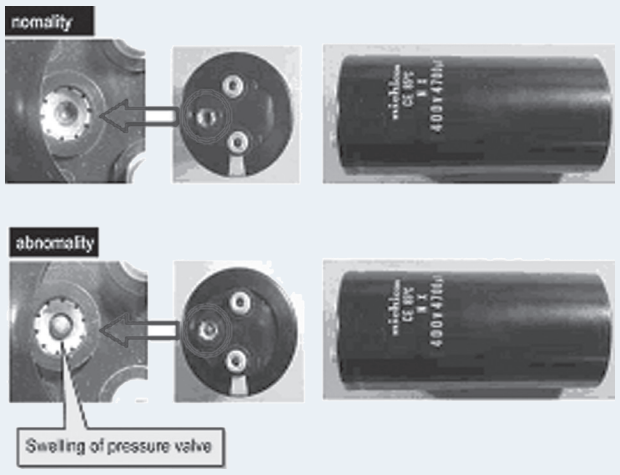
1 By touching the + side of the tester to the + terminal of diode module and the - side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are from 5 to 50kΩ, it is normal.	
2 By touching the - side of the tester to the + terminal of diode module and the + side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are greater than 500kΩ, it is normal.	
3 By touching the - side of the tester to the - terminal of diode module and the + side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are from 5 to 50kΩ, it is normal.	
4 By touching the + side of the tester to the - terminal of diode module and the - side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are greater than 500kΩ, it is normal.	

6.7.3 Checking procedure for the capacitors CB1 & CB2 (only for RAS-(4-10)WH(V)NPE)

DANGER

- ***Electrical hazard. Risk of serious injuries or death.***
- ***Before installing the electrical wiring or before performing a periodical check, turn OFF the main switch of the unit. For safety reasons, be sure that the fan is stopped.***
- ***Prevent from touching the capacitors' terminals. High voltage should be present before discharging them.***
- ***Turn off the unit and wait for the LED 201 to be off before touching the components.***

If it's possible, check the capacitance of each capacitor : 4700µF ± 20% (between 3760µF to 5640µF).

A visual check of the pressure valve of capacitors must be done to ensure it's integrity.	

NOTE

It is not recommended to check tension.

PN = Power source x √2, PC=CN is nearly equal to PN/2.

R1 & R2:

1 If the value is different:
   - Capacitor could be damaged by overload.
   - 04 alarm could be displayed if low supply voltage (CN) for ISPM control part is present.

2 R1 = 9.5Ω & R2 = 14.0Ω. If these values are different, the capacitors will be not properly charged.

Resistance between P1 & TB3 = 2kΩ (white resistance in the ISPM).

In case that Mg. SW 52C (CMC1) is not ON, the compressor current will travel through these resistances, and they will be broken. Mg. SW 52C (CMC1) should be checked. Check the resistance between the primary and secondary terminal where the contact point is melted for Mg. SW 42C. If there is continuity, the contact is melted and 52C is broken (NG).

Reactor resistance can be messured between TB3 and RB = 0,2Ω. Checking this component is not necessary.

NOTE

- *Noise filter does not affect ISPM directly, so is not necessary to check it when ISPM fails.*
- *Both digital or analog testers are valid to check the values.*

6.7.4 Checking procedeure for the DC fan motor

When ISPM/DIP-IPM is faulty and Alarm 03, 04 or 53 appears, the fan motor may also be damaged. To prevent ISPM/DIP-IPM damage which may result from operation combined with a faulty fan motor, check also if the fan motor is not damaged when ISPM/DIP-IPM is replaced.

⚠ CAUTION

- ***Turn OFF main power before start working.***
- ***Working and checking with the power ON may disturb correct diagnosis and may result in failure.***

Models with DC motor(s)	Number of motors
RAS-(2-3)WHVRP1	1 Piece
RAS-(4-6)WH(V)NPE RAS-(8-10)WHNPE	2 Pieces

Procedure in case of error diagnosis

1 Remove fan motor connectors for DC fan motor from the control PCB, ISPM or DIP-IPM and turn the fan motor shaft by hand.

Normal	Fan motor shaft turns smoothly
Normal	The fan motor shaft turns smoothly.
Faulty	No continuous rotary torque movement felt when turning the motor by hand. This occurs because the internal magnet of the fan motor breaks the movement when the internal electronic circuit of the fan motor has a short-circuit fault.

2 Measure the fan motor resistance:

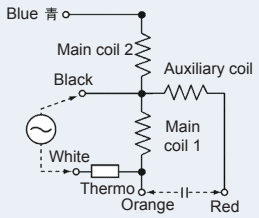
Measurement procedure	
Remove the fan motor connector from the control PCB, ISPM or DIP-IPM.	
Connect the black test lead of the tester to the black wire pin of the fan motor connector.	
Connect the red test lead to the wire connector pin to be checked.	
Results	
Normal	Observed values will be close to the normal values in the table below.
Faulty	Obbserved values will be deviated from the normal values in the table below. (Generally, an open-circuit fault shows ∞, and a short-circuit fault shows several Ω - kΩ).Internal electronic circuit fault of the fan motor including short-circuit and breakage can be checked.

Model	Motor model	Wire color for checking (Normal value)			
		Red-black	White-black	Yellow-black	Blue-black
RAS-(2-3)WHVRP1	FPD10U40S-902	-	1MΩ or greater	-	1MΩ or greater
RAS-(4-6)WHVNPE	SIC-61FW-D858	1MΩ or greater	-	-	1MΩ or greater
RAS-(4-6)WHNPE	EQDW04AHT	∞	-	∞	-
RAS-(8-10)WHNPE	SIC-81FW-8183	1MΩ or greater	-	-	1MΩ or greater

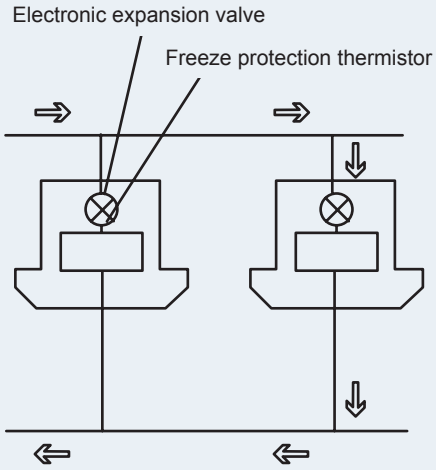
NOTE

Values are shown for referential purpose. While actual values may vary depending on the type of the tester, any tester can be used to determine any short-circuit or breakage based on ∞ or several Ω or 0 Ω or ∞.

6.7.5 Checking procedure for the AC fan motor (only for RAS-(4-10)WH(V)NPE)

Part name	Fan motor rated capacity	Wiring diagram	Lead wire colour	Resistance (Ω) (at 20ºC)
Fan motor (1 piece (lower))	KFC6S-201SB5P 200W		Black-White Black-Blue Black-Red	21.6+-10% 32.1+-10% 24.4+-10%

6.7.6 Checking procedure for the electronic expansion valve for indoor and outdoor units

<table>
<tr><th></th><th>Indoor unit electronic expansion valve</th><th>Outdoor unit electronic expansion valve</th></tr>
<tr><td>Locked with fully closed</td><td>Check the liquid pipe temperature during the heating process. It is abnormal if the temperature does not increase.</td><td>It is abnormal if the liquid pipe pressure does not increase during the pump down process.</td></tr>
<tr><td>Locked with slightly open</td><td rowspan="2">It is abnormal under the following condition:
The temperature of the freeze protection thermistor becomes lower than the suction air temperature when the unit which is under chechink stops and the other units are under the pump down process.
  </td><td>It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the pump down process starts.</td></tr>
<tr><td>Locked with fully open</td><td>It is abnormal under the following conditions: after the heating process for more than 30 minutes, the discharge gas temperature of the compressor is not 10°C higher than the condensing temperature and there is no other faults, such as an excessive charge of refrigerant and others.</td></tr>
</table>

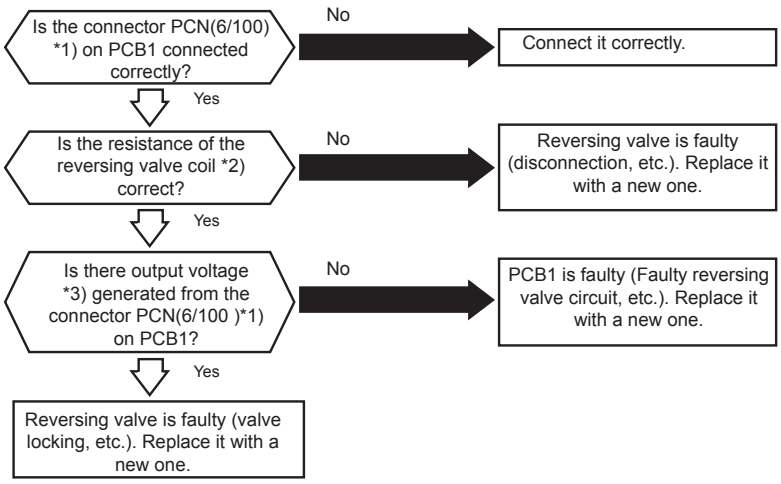
6.7.7 Checking procedure for other parts

Resistance (Ω)

Part name	Model code	Resistance (Ω)
Solenoid Valve Coil	SR10D	1250 (at 20ºC)
Reversing Valve Coil (4-way solenoid valve)	VHV-01AP552B1	1473 (at 20ºC)
	STF-G01AG579A1	950 (at 75ºC)
	STF-H01AI1870A1	1800 (at 20ºC)
Compressor	EU1114D9	1.138 (at 75ºC)
	EU140XA2	1.138 (at 75ºC)
	EU180XA1	1.138 (at 75ºC)
	2YC45KXD	0.644 at 20 ºC
	EU260X(C1/D2)	0.490/1.650 (at 20 ºC)
	E402HHD-36(A/D)2	0.460/1.839 (at 75 ºC)
	HB36PHD-(A1/D1)S2	0.434/1.763 (at 75 ºC)
	DA50PHD-D1SE2	0.396 (at 75 ºC)
	DA65PHD-D1SE2	0.320 (at 75 ºC)
Magnet Contactor	FC-0/SP	1150 (at 20ºC)

◆ Checking procedure for the reversing valve

Troubleshooting



Output voltage

	Reversing valve ON	Reversing valve OFF
Test lead (+side)	pin 1	pin 3
Test lead (-side)	pin 3	pin 1
Range of voltaje	325 VDC	163 VDC

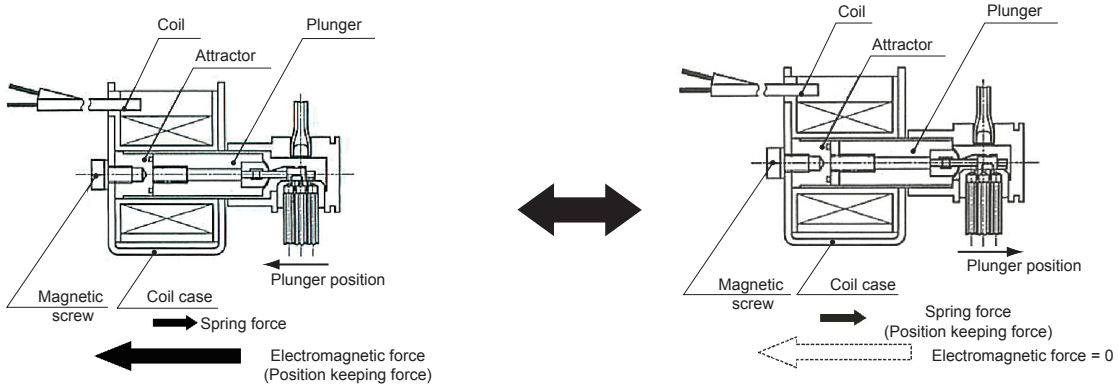
NOTE

The values may differ depending on testers. Appropriate output voltage is 70~339VDC

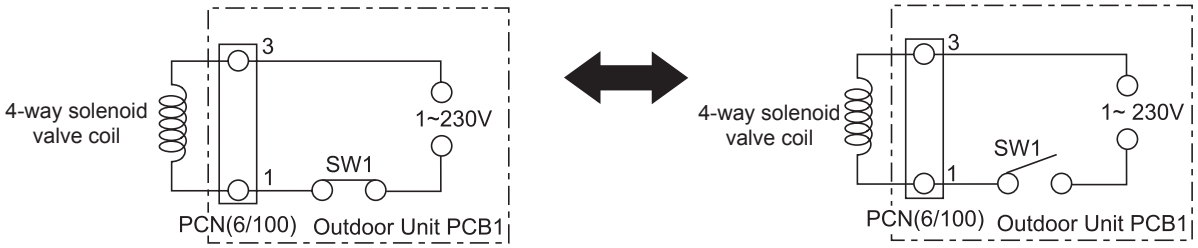
◆ Actions of 4-way solenoid valve

Monostable solenoid operation type (only for RAS-(4-10)WH(V)NPE)

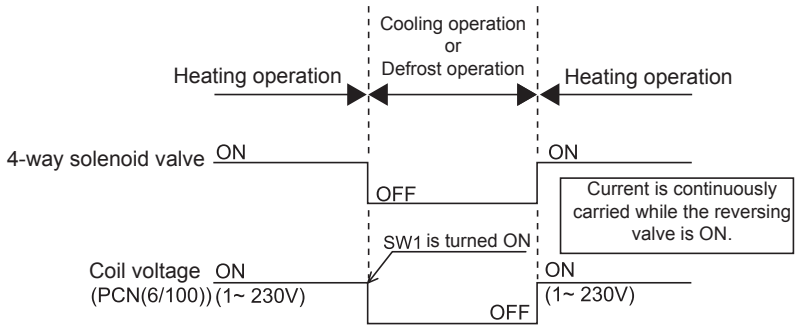
Operation Mode: Heating Reversing Valve Coil: ON	Operation Mode: Cooling Reversing Valve Coil: OFF
Electric Current Applied Current is applied to the reversing valve coil and so attraction is generated. The plunger position is kept by the electromagnetic force.	No Electric Current Applied No current is applied to the reversing valve coil and so no attraction is generated. The plunger position is kept by spring force.



Electrical circuit

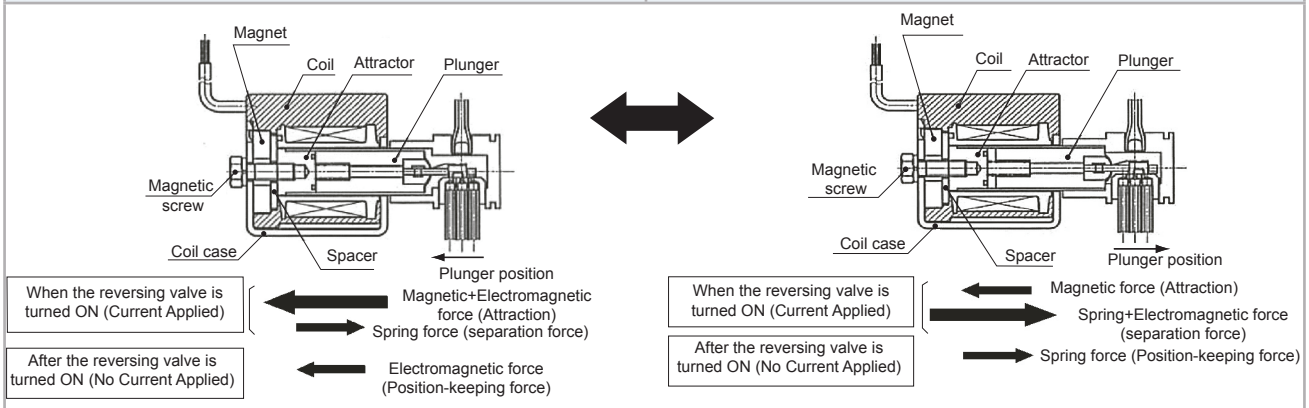


Time Chart



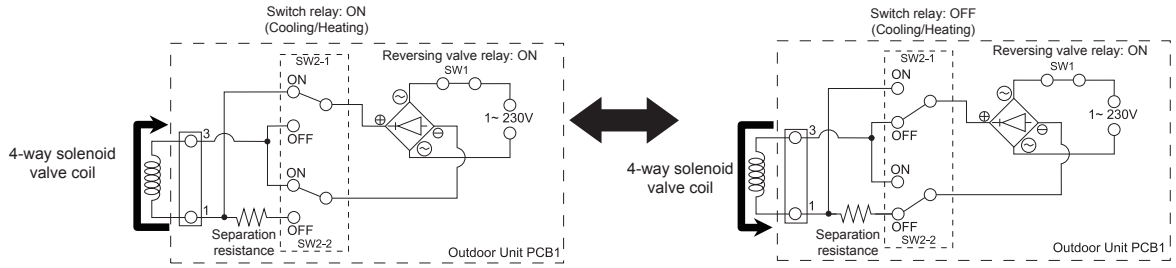
Bistable solenoid operation type (pulse-activated)

Operation Mode: Cooling → Heating Reversing Valve: OFF → ON	Operation Mode: Cooling → Heating Reversing Valve: OFF → ON
When current is applied to the reversing valve coil, an electromagnetic force headed in the same direction as the magnetic force is generated, and the valve is turned ON by their attraction. After the valve is turned ON, the plunger position is kept by magnetic force with no current applied.	When current is applied to the reversing valve coil, an electromagnetic force headed in the direction opposite to the magnetic force is generated, and the valve is turned OFF by their separation force. After the valve is turned OFF, the plunger position is kept by spring force.

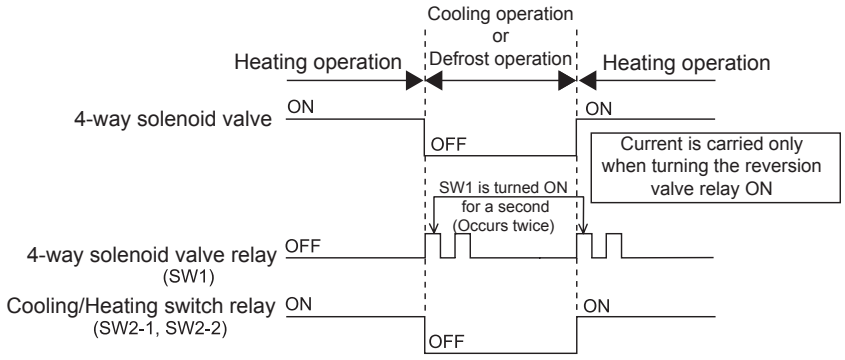


Electrical circuit

When the reversing valve relay is turned ON, current is applied to the coil. After the reversing valve relay is turned OFF, no current is applied.	When the reversing valve relay is turned ON, current is applied to the coil. After the reversing valve relay is turned OFF, no current is applied.



Time Chart



6.7.8 Check list on compressor

Check list on compressor		
Client:_____	Model: _____	Date: _____
Serial Nº: _____	Production date: _____	Checker: _____

No.	Check item	Check method	Result	Remarks
1	Is THM9 correctly connected? THM9: discharge gas thermistor	1. Is wire of thermistor correctly connected by viewing? 2. Check to ensure the 7-segment indication of Td when compressor is operating. Td: temperature of THM9		
2	Is thermistor THM9 disconnected?	1. Check to ensure that thermistor on the top of compressor is correctly mounted by viewing? 2. Check to ensure that actually measured temperature is the same as the indication during check mode.		
3	Is current sensor faulty?	1. Check to ensure that indication A1 and A2 are 0 during compressor stopping. 2. Check to ensure that indication A1 and A2 are not 0 during compressor running.		
4	Is current sensing part on PCB2 faulty?			
5	Is the direction of current sensor (CTU, CTV) reverse?	Check the direction => by viewing.		
6	Are power source wires, U and V inserted correctly into current sensor?	Check to ensure that wires are correctly inserted		
7	Is expansion valve (MV1) correctly connected?	Check to ensure that MV1 to CN5A is correctly connected		
8	Is exp. valve coil (MV1) correctly connected?	Check to ensure that each coil is correctly mounted on the valve.		
9	Are the refrigeration cycle and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one refrigerating cycle only from the outdoor unit.		
10	Is opening of expansion valve completely closed (locked)?	Check the following by the check mode of outdoor units. 1. Liquid pipe temperature (TL) < Control information B2 during cooling operation 2. Liquid pipe temperature (TL) > Control information B2 during heating operation		
12	Are the contacts for compressor magnetic switch CMC1 faulty?	Check the surface of each contact (L1, L2 and L3) by viewing.		
13	Is there any voltage anomaly among L1-L2, L2-L3 and L3-L1?	Check to ensure that voltage imbalance is smaller than 3%. Please note that power source voltage must be within 380V or 220V+10%.		
14	Is the compressor oil acidified during compressor motor burning?	Check to ensure that the oil color is not black.		

◆ Additional Information for “Check list on compressor”

Check item	Additional information (mechanism of the compressor failure)
1 & 2	The liquid refrigerant return volume to the compressor is controlled by the discharge gas temperature Td when compressor is operating. If Td thermistor is disconnected, the liquid refrigerant return volume will become small by detecting the temperature even if the actual discharge gas temperature is high. Therefore, this abnormal overheating by detecting the temperature operation will result in insulation failure of the motor winding.
3 & 4	Overcurrent control (operating frequency control) is performed by detecting current by the PCB2. In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
5 & 6	The current sensor checks phase and adjusts output electrical wave in addition to the above mentioned items. If fault occurs, the output electrical wave becomes unstable giving stress to the motor winding, resulting in winding insulation failure.
7 &8	During a cooling operation, SH is controlled by MV of each indoor units. During a heating operation, Td is controlled by MV1. If expansion valves are incorrectly connected, correct control is not available, resulting in compressor seizure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
9	If the refrigeration cycle and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
10	If the expansion valve and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
11	The compressor may be locked due to the liquid return operation during the cooling operation.
12	In the case that the contacting resistance becomes big, voltage imbalance among each phase will cause abnormal overcurrent.
13	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
14	In the case, it will result in motor burning or compressor seizure.

7. Maintenance notes

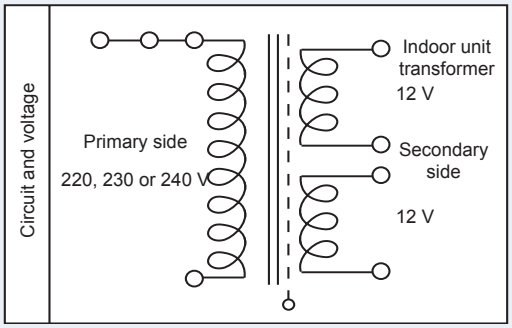
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7.1 General notes

7.1.1 Checking the power source and the wiring connection

Check the following items in the case of abnormal operation:

No.	Check item	Procedure
1	Is the breaker of the fuse cut out?	Check the secondary voltage of the breaker and the fuse by means of a tester.
2	Is the secondary power source on the transformer correct?	Disconnect the secondary side of the transformer and check the voltage by means of a tester. 
3	Is the wiring loosened or incorrectly connected?	Check the wiring connection on the PCB. • Thermistor connectors • Connector of the Unit controller cable • Each connector in a high-voltage circuit Check the connectors according to the **electrical wiring** diagram.

7.1.2 Burnt-out compressor due to an insufficient refrigerant charge

Question and answer for the field work

Example 1: Burnt-out compressor due to an insufficient refrigerant charge	
Phenomenon	After commissioning the alarm code “08” sometimes occurred and the compressors were burnt out after operating for two months.
Cause	The refrigerant piping work was performed during the summer season. The additional refrigerant was not sufficiently charged from the discharge gas side. This insufficient refrigerant charge resulted in the overheating of the discharge gas and the oil deterioration which was finally due to the separated operation despite the alarm code “08”.
Countermeasure	1 The compressor was replaced with a new compressor. 2 The correct refrigerant amount was charged according to the refrigerant piping length.
Remarks	Additional refrigerant charge: Open the liquid stop valves slightly when you charge the additional refrigerant from the check joint of the liquid stop valves (the discharge gas side) during the cooling process. If the liquid stop valve is fully open it is difficult to charge the additional refrigerant. Do not charge the refrigerant from the gas stop valve.

7.1.3 Not cooling well due to insufficient installation space for the outdoor unit

Question and answer for the field work

Example 5: Not cooling well due to insufficient installation space for outdoor unit	
Phenomenon	Cooling operation was well performed through the intermediate season. However the cooling operation was not well available when the outdoor temperature was higher than 35 °C.
Cause	As the outdoor units were installed without a sufficient installation space the hot discharge air from other outdoor units was circulated. In this case though the outdoor temperature was 35 °C the actual suction air temperature was nearly 50 °C and protection system from excessively high suction pressure was activated the frequency of the compressor was decreased and the cooling capacity was also decreased accordingly. As the outdoor units in-line were installed back to back with a certain distance between each outdoor unit’s back the hot discharged air from other outdoor units was circulated.
Countermeasure	Ensure that sufficient space should be secured for multi-row and multiple-installation.

7.2 Maintenance work

⚠ CAUTION

- *All inspections and checks of the outdoor unit and indoor unit have to be carried out by a licensed technician and never by the user itself.*
- *Before any inspection and check the unit main power supply has to be switched OFF.*
- *Wait minimum 10 minutes or more from all power supply have been turned OFF.*
- *Take care with the crankcase heater. It could operate even when compressor is OFF.*
- *Take care with the electrical box components. Some of them could remain hot after switch OFF the unit.*

NOTE

All these maintenance operations must be done with appropriate materials and following this manual.

7.2.1 Outdoor unit

1 Fan and fan motor
- Lubrication: All the fan motors are pre-lubricated and sealed at the factory. Therefore no lubrication maintenance is required.
- Sound and vibration: Check for abnormal sounds and vibrations.
- Rotation: Check the clockwise rotation and the rotating speed.
- Insulation: Check the electrical insulation resistance.

2 Heat exchanger
- Clog: Inspect the heat exchanger at regular intervals and remove any accumulated dirt and any accumulated dust from the heat exchanger. You should also remove other obstacles such as the growing grass and the pieces of paper which might restrict the airflow.

3 Refrigerant piping connection
- Leakage: Check for the refrigerant leakage at the piping connection between the outdoor and the indoor unit.
- Pressure: Check the refrigerant pressure using the check joints of the outdoor unit.

4 Cabinet
- Stain: Check for any stain and remove it cleaning if it is the case.
- Fixing screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws.
- Insulation material: Check for any peeled thermal insulator on the cabinet. Repair the thermal insulator.

5 Electrical equipment
- Activation: Check for an abnormal activation of the magnetic contactor, the auxiliary relay, the PCB and others.
- Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter and other items. Check the electrical insulation resistance.

6 Control device and protection device
- Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point listed in the Installation and operation manual.

7 Compressor
- Sound and vibration: Check for abnormal sounds and vibrations.
- Activation: Check that the voltage drop of the power supply line is within 15% at the start and within 2% during the operation.

8 Reverse valve
- Activation: Check for any abnormal activation sound.

9 Strainer
- Clog: Check that there is no temperature difference between both ends.

10 Ground wire
- Ground line: Check for the continuity to earth.

11 Oil heater (Crankcase heater of the compressor)
- Activation: You should activate the oil heater at least twelve hours before the start-up by turning ON the main switch.

7.2.2 Indoor unit

◆ General procedure

To ensure good operation and reliability of the indoor unit its main parts and field wiring have to be checked periodically.

The following checks have to be done by qualified technicians at least once a year:

1 Cabinet
- Stain: Check for any stain and remove it cleaning if it is the case.
- Fixing screw: Check for any loosened screw or any lost screw. Tighten the loosened screws and replace the lost screws.
- Insulation material: Check for any peeled thermal insulator on the indoor part of the covers. Repair the thermal insulator.

2 Water piping connection
- Leakage: Check there are no water leakages neither in the inlet and outlet water connections (space heating and DHW if used), nor in the main water circuit nor the tank connections. Check all the joints, connections and circuit elements.

NOTE

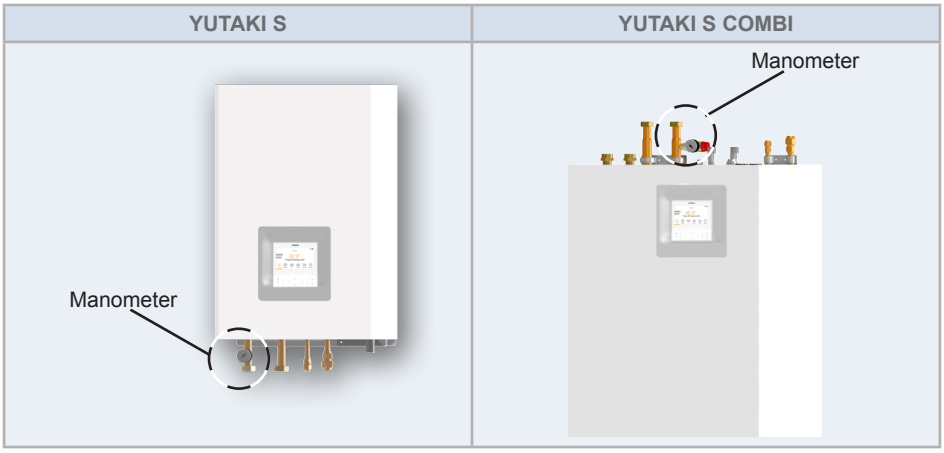
- *If leakage is detected in the inlet/outlet water connections, repair it and remember to replace the gaskets.*
- *Pay special attention to the water pipe connection placed over the electrical box.*

3 Water flow and pressure:
- Water flow:
  - Space heating: Check the water flow (m^3/h) through the unit controller in the “Heat Pump Details” of the “Operation Information” menu.
  - DHW (if used): Check whether the water circulation is correct along all the DHW circuit.
- Pressure checking:
  - Space heating: Check the water pressure using the manometer in the indoor unit. This value shall be between 1.5 and 2.0 bars approximately (1.8 bars is a proper value).

The manometer is placed at different positions according to each unit model

YUTAKI S / S COMBI

In YUTAKI S and S COMBI models, the manometer is installed factory supplied as it is shown:



4 Security water valve for DHW (if used):

- Operation: Check the correct operation of the security water valve (pressure and temperature relief valve) at the DHW inlet connection. Remember that this element must ensure that the following functions are provided: Pressure protection, non-return function, shut-off valve, filling and draining.

5 DHWTank inspection hatch

The DHW tank has an inspection hatch at the bottom. This hatch allows the inspection of the interior of the tank.

DANGER

Be careful when using this inspection hatch. There are high temperature and high pressure inside the tank. Before open it wait a reasonable time for the water to cool.

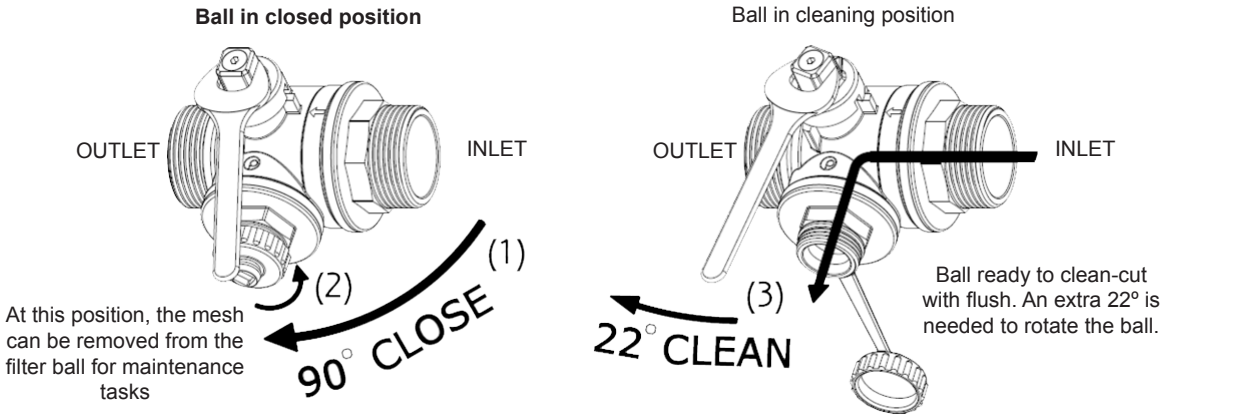
For a safe operation using the inspection hatch, proceed as it is explained in the manual of the specific unit.

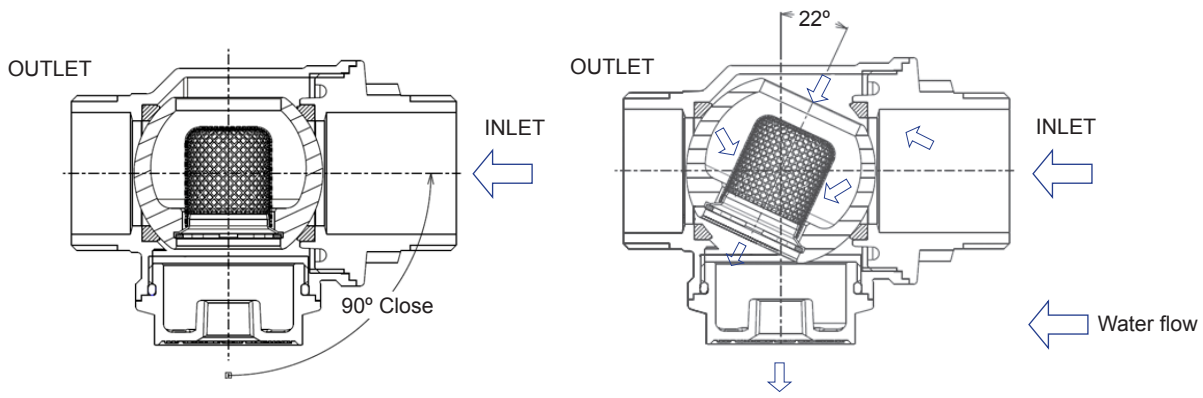
Additional hydraulic elements are necessary in the DHW circuit.

6 Filter plus

The Filter plus valve is an on-off ball valve containing an interchangeable cylindrical filter which is easy to inspect and remove for normal maintenance operations. Normally, Filter plus ball valve it is used as a shut-off valve by turning the handle 90º clockwise (1).

Filter+ ball valve makes the maintenance operations easier. Once the valve is in closed position, open the draining port tap (2) and, by turning the handle up to 22º clockwise, the water from the inlet is guided behind the filter and runs in opposite direction through the draining port (3). The water circuit can be cleaned even under full pressure, avoiding the need to drain the unit prior the cleaning process. After cleaning, simply close the draining port tap (2), and open the valve again.





NOTE

The draining port must be connected to the sewage system by means of a hose or a pipe.

⚠ CAUTION

- *Take care when draining the unit. Ensure the connection of the hose or drain pipe in order to avoid water leakage on any electrical component.*
- *The expelled water could be hot and could keep in pressure. Take care with this draining.*

7 Safety valve
- Operation: Check the correct operation of the indoor unit safety valve (pressure relief valve) on the space heating circuit. Open it manually and some water should be expelled by its connected drain pipe.

8 Air purger:
- Excessive air: Check the correct operation of the indoor unit air purger. Turn it twice at least, since there may be air in the water circuit, which needs to be expelled by this air purger.

9 Water pump:
- Pump performance curves: Check as explained in point 3 that water flow and pressure is in accordance with the Pump performance curves.
- Electrical connection: Check the correct connection of the electrical wiring of the water pump. If moisture is detected in the pump surface, revise the water pipes, since a water leakage could have been occurred.

10 Fixing points tightening:
- Check the fixing points of the indoor unit. Check the indoor unit wall support. The indoor unit has to be always in a vertical position.

11 Refrigerant piping connection
- Leakage: Check for the refrigerant leakage at the refrigerant piping connections in the indoor unit. Check the different connections of the plate heat exchanger.

12 Electrical equipment
- Activation: Check for an abnormal activation of the magnetic contactor, the relay, the PCBs and others.
- Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter and other items. Check the electrical insulation resistance.

13 Control device and protection device
- Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point listed in the Service Manual.

14 Ground wire
- Ground line: Check for the continuity to earth in the main electrical components.

◆ Descaling (S/SCOMBI)

Water quality and set temperature can affect the scale production and it can deposit on the surface of the plate heat exchanger, restricting the heat exchange and the good operation of the unit.

NOTE

Descaling should be necessary periodically at certain intervals depending on the supplied water quality.

Check the scale level when proceeding maintenance to ensure reliability of the unit.

If necessary, proceed with descaling:

1 Switch OFF the main power supply of the indoor unit.
2 Empty the indoor unit water as explained in “Draining” procedure.
3 Proceed with descaling of the plate heat exchangers.
4 Ensure that the water quality remains compliant with the EU council directive 98/83 EC.

◆ Draining

NOTE

Draining operation is unique for each model. Refer to the instructions detailed below.

Draining operation for YUTAKI S

YUTAKI S models have no drain port factory supplied. It must be considered the installation of a drain port after the shut-off valve (factory supplied) and before the water inlet of the unit when proceeding to the installation of the unit.

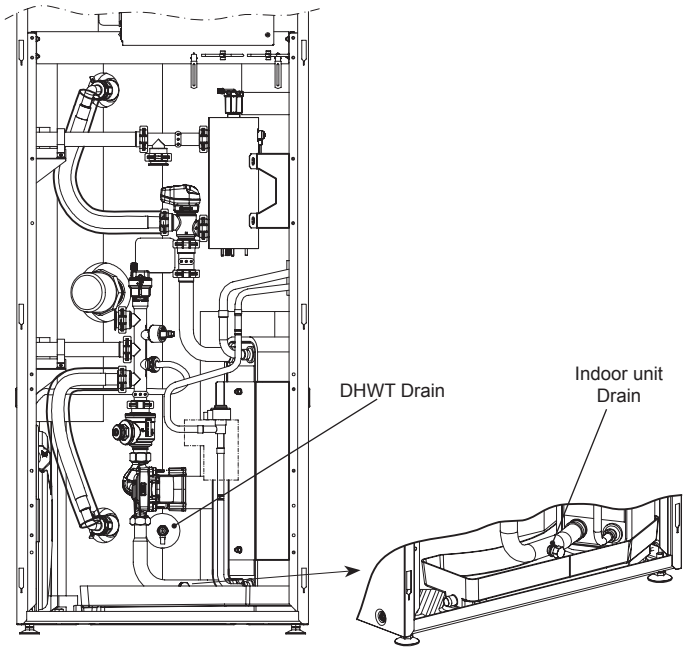
Draining operation for YUTAKI SCOMBI

Draining of the indoor unit

1 Switch OFF the main power supply of the indoor unit.
2 Close the 2 shut-off valves (factory-supplied) installed at the space heating connections (Water inlet and outlet connections).
3 Open manually the drain port for indoor unit water and collect the water into a bucket.
4 Once all the water has been drained, close again the drain port for indoor unit water.

⚠ CAUTION

When draining the indoor unit water from its drain port, the leaved water could be hot and could keep in pressure. Perform the draining procedure carefully.



Draining of the DHW circuit

1 Switch OFF the main power supply of the indoor unit.
2 Close the main DHW inlet valve (water inlet shut-off valve) in order to avoid the tank filling.
3 Open the shut-off valve of the DHW outlet to allow draining without creating a vacuum. Ensure that valve at the highest level of the DHW system is also opened.
4 Connect a drain hose to the drain port for DHW and lead the other end to the general draining.
5 Open manually the drain port for DHW and wait a long time until all the water has been removed.

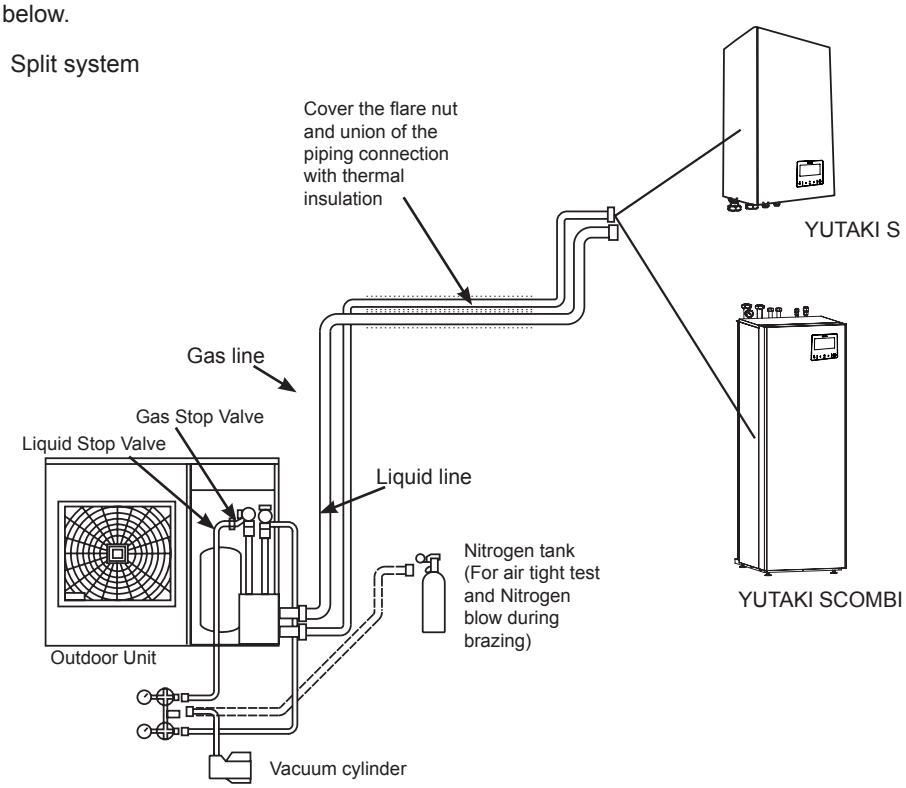
⚠ CAUTION

When draining the DHW from its drain port, the leaved water could be hot and could keep in pressure. Perform the draining procedure carefully.

◆ Evacuation and refrigerant charge

- Connect the gauge manifold using charging hoses with a vacuum pump or a nitrogen cylinder to the check joints of the liquid line and the gas line stop valve.
- Check for any gas leakage at the flare nut connection, by using nitrogen gas to increase the pressure at 4.15 MPa for outdoor units inside of the field-supplied piping.
- Operate the vacuum pump for 1 to 2 hours until the pressure decreases lower than a pressure of 756 mmHg in vacuum.
- For charging refrigerant, connect the gauge manifold using charging hoses with a refrigerant charging cylinder to the check joint of the liquid line stop valve.
- Charge the proper quantity of refrigerant according to the piping length (Calculate the quantity of the refrigerant charge).
- Fully open the gas line stop valve, and slightly open the liquid line stop valve.
- Charge refrigerant by opening the gauge manifold valve.
- Charge the required refrigerant within the difference range of ±0.5 kg by operating the system in cooling.
- Fully open the liquid line stop valve after completing refrigerant charge.
- Continue cooling operation for more than 10 minutes to circulate the refrigerant.

See the example below.



Refrigerant charge before shipment (W_0 (kg))

Outdoor unit model	W_0 (kg) R32	W_0 (kg) R410A
RAS-2WHVRP1	1.2	-
RAS-2.5WHVRP1	1.3	-
RAS-3WHVRP1	1.3	-
RAS-4WH(V)NPE	-	3.3
RAS-(5/6)WH(V)NPE	-	3.4
RAS-8WHNPE	-	5.0
RAS-10WHNPE	-	5.3

NOTE

- *Refer to the outdoor unit Installation and operation manual to charge the R410A refrigerant inside the indoor unit.*
- *Remember to supply power to the indoor unit and switch the DSW1-2 ON of its PCB1. Thereby, solenoid valves SV1 and SV2 of the indoor unit will open to allow the operation of vacuum and refrigerant charge inside the indoor unit. It is very important to remind to switch the DSW1 PIN2 to OFF when finishing the whole procedure.*

CAUTION

- *Appropriate refrigerant*
  - *The refrigerant used in each unit is identified on the specification label and manuals of the unit. HITACHI shall not be held liable for any failure, trouble, malfunction or accident caused by units illegally charged with refrigerants other than the specified one.*
- *Consequences of charging non-specified refrigerant*
  - *It may cause mechanical failure, malfunction and other accidents. It may cause operational failure of protection and safety devices of air conditioners. It may also cause lubrication failure of the sliding part of the compressor due to deterioration of refrigerant oil.*
  - *In particular, hydrocarbon refrigerants (such as propane, R441A, R443A, GF-08, etc.) are not allowed, since these are combustible and may cause major accidents such as fire and explosion in case of improper handling.*
- *Once a non-specified refrigerant has been charged, no further servicing (including draining of refrigerant) shall be performed, even in case of malfunction. Improper handling of refrigerant may be a cause of fire and explosion, and servicing in such cases may be considered an illegal act.*
- *End clients and costumers shall be informed that servicing is not approved, and the installer who charged the non-specified refrigerant shall be asked to fix the unit.*
- *HITACHI will accept no responsibility for units that have been charged with non-specified refrigerant once.*

7.3 Service and maintenance record

7.3.1 Outdoor unit

Nº	Check item	Action	Judgement	
1	Is the service area sufficient?	—	Yes	No
2	Is there a short circuit of the discharged air?	—	Yes	No
3	Any heat influence?	—	Yes	No
4	Is the ground wire connected?	—	Yes	No
5	Refrigerant piping.	—	Good	Not Good
6	Fixing the unit.	—	Good	Not Good
7	Is there any damage on the outer surface or the internal surface?	—	Yes	No
8	Checking the screw and the bolts.	Tighten if loosened.	Tightened	Not Tightened
9	Tightening the terminal screws.	Tighten all the terminal screws with a Phillips screwdriver.	Tightened	Not Tightened
10	Are the compressor terminals tightly fixed?	Push all the terminals.	Pushed	Not Pushed
11	Insulation resistance.	Measure the insulation resistance with an insulation resistance meter. Compressor and fan motor: greater than 3MΩ. Others: greater than 3MΩ.	Good	Not Good
12	Does the drain water flow smoothly?	Check the smooth flow by pouring some water.	Good	Not Good
13	Check for a leakage in the compressor.	Check for any leakage.	Good	Not Good
14	Check for a leakage in the heat exchanger.	ditto	Good	Not Good
15	Check for a leakage in the 4-way valve.	ditto	Good	Not Good
16	Check for a leakage in the check valve.	ditto	Good	No Good
17	Check for a leakage in the accumulator.	ditto	Good	Not Good
18	Check for a leakage in the strainer.	ditto	Good	Not Good
19	Check for a leakage in the electronic expansion valve	ditto	Good	Not Good
20	Check for a leakage in the piping.	ditto	Good	Not Good
21	Check the direction of the fans.	By viewing the airflow volume.	Good	Not Good
22	Voltage among each phase.	Higher than AC220V.	Good	Not Good
23	Vibration and sound.	Check the fan the compressor the piping and others.	Good	Not Good
24	Activation of each operation mode.	Check the activation of the HEAT switch, the STOP switch and the TEMP switch.	Good	Not Good
25	High-pressure cut-out switch.	Check the actual activation value.	Good	Not Good
26	Check the activation of the drain-up mechanism.	Check the activation during the cooling process.	Good	Not Good
27	Air inlet temperature of the outdoor unit DB/WB.	—	(°C)DB	(°C)WB
28	Air outlet temperature of the outdoor unit DB/WB.	—	(°C)DB	(°C)WB
29	High-pressure switch.	—	kg/cm^2G	
30	Low-pressure switch.	—	kg/cm^2G	
31	Operating voltage.	—	V	
32	Operating current.	—	A	
33	Instructions to the client for cleaning the air filter.	—	Done	Not yet
34	Instructions to the client about the cleaning method.	—	Done	Not yet
35	Instructions to the client about the operation.	—	Done	Not yet

7.3.2 Indoor unit

Nº	Check item	Action	Judgement	
1	Is the service area sufficient?	—	Yes	No
2	Any heat influence?	—	Yes	No
3	Is the ground wire connected?	—	Yes	No
4	Refrigerant piping.	—	Good	Not Good
5	Water piping.	—	Good	Not Good
6	Fixing the unit	—	Good	Not Good
7	Is there any damage on the outer surface or the internal surface?	—	Yes	No
8	Checking the screw and the bolts.	Tighten if loosened.	Tightened	Not Tightened
9	Tightening the terminal screws.	Tighten all the terminal screws with a Phillips screwdriver.	Tightened	Not Tightened
10	Insulation resistance.	Measure the insulation resistance with an insulation resistance meter and check if it is greather than 3MΩ.	Good	Not Good
11	Does the drain water flow smoothly?	Check the smooth flow by pouring some water.	Good	Not Good
12	Check for a leakage in the heat exchanger.	ditto	Good	Not Good
13	Check for a leakage in the strainers.	ditto	Good	Not Good
14	Check for a leakage in the electronic expansion valve	ditto	Good	Not Good
15	Check for a leakage in the piping.	ditto	Good	Not Good
16	Check for a leakage in the water safety valve.	ditto	Good	Not Good
17	Check for a leakage in the water pump.	ditto	Good	Not Good
18	Voltage among each phase.	Higher than AC220V.	Good	Not Good
19	Vibration and sound.	Check the pump motor.	Good	Not Good
20	Activation of each operation mode.	Check the activation of Space heating/ cooling, DHW and swimming pool and solar panel if the case.	Good	Not Good
21	Water High-pressure cut-out switch.	Check the actual activation value.	Good	Not Good
22	Water flow switch	Check the actual activation value.	Good	Not Good
23	Water manometer.	Check the correct value indication.	Good	Not Good
24	Check the activation of the air purger.	Check by increasing the pressure.	Good	Not Good
25	Check the activation of the drain-up mechanism through the safety valve.	Check the activation during work.	Good	Not Good
26	Water inlet temperature of the indoor unit.	—	(°C)DB	(°C)WB
27	Water outlet temperature of the indoor unit.	—	(°C)DB	(°C)WB
28	Water pressure switch.	—	kg/cm^{2}G	
29	Operating voltage.	—	V	
30	Operating current.	—	A	
31	Instructions to the client about the cleaning method.	—	Done	Not yet
32	Instructions to the client about the operation.	—	Done	Not yet

7.4 Service and maintenance record using the 7-segment display

7.4.1 Outdoor unit

Customer's name:				Date:	
Outdoor unit model (serial No.)		RAS-			
1. Operation mode					
2. Test run start time					
3. Data collect start time					
4. Read out data from 7-segment in outdoor unit					
4.1 Protection control code					
4.2 Total capacity of connected IU *	CP				
4.3 Input/output state of outdoor micro-computer for RAS-(2-3)WHVRP1	SC	Y52C	FAN1	Y21	YCH
		Y20A			
4.3 Input/output state of outdoor micro-computer for RAS-(4-10)WH(V)NPE	SC	52C	FAN1	FAN2	20A
		20F	21	CH	PSH
4.4 Air flow ratio	Fo				
4.5 OU expansion valve opening	Eo				
4.6 Temperature at the top of compressor	Td				
4.7 Evaporating temperature at heating	TE				
4.8 Ambient air temperature	TO				
4.9 Cause of stoppage at inverter	dr				
4.10 Inverter secondary current	A2				
4.11 OU address	nA				
4.12 IU expansion valve opening	EA				
4.13 Liquid pipe temperature of IU (Freeze protection)	LA				
4.14 Cause of IU stoppage	dA				

NOTE

- *OU: Outdoor Unit.*
- *IU: Indoor unit.*
- *FAN1, FAN2: Constant speed fan.*
- *Y52C: Compressor operation.*
- *Y21: Reversing valve (RVR).*
- *YCH: Oil heater.*
- *Y20A: Gas Bypass Circuit for Startup*
- *52C: CMC.*
- *PSH: High pressure switch.*
- *20A: Solenoid valve (SVA).*
- *20F: Solenoid valve (SFV).*
- *21: Reversing valve (RVR).*
- *CH: Oil heater.*
- **: Multiply 1/8 by the code on the 7-segment.*

7.4.2 Indoor unit

The displayed contents of the check items shown in the table below are not available for all YUTAKI range, and are displayed depending on the horsepower of the outdoor unit, and that classification indicated in brackets at the end of the table.

Customer's name:			Date:
		YUTAKI Model:	
Operation mode			
Test run start time			
Data collect start time			
Read out data from 7-segment in PCB1			
Protection control code			
Heat water temperature Setting	tH		
Cold Water temperature Setting	tC		
Water Inlet temperature (THM_{WI})	in		
Water outlet temperature (THM_{WO})	ot		
Water outlet temperature HP (THM_{WOHP})	o1		
Water outlet temperature circuit 2 (THM_{WO2})	o2		
Auxiliary temperature 1 (THM_{aux1})	A1		
DHW top sensor temperature (THM_{DHWT2}) (Only YUTAKI S COMBI)	oh.		
DHW bottom sensor temperature (THM_{DHWT1})	oh		
Auxiliary temperature 2 (THM_{aux2})	A2		
Outdoor unit ambient temperature	tA		
Auxiliary temperature 3 (THM_{aux3})	A3		
Outdoor Unit Average Ambient Temperature (2 hours)	t1		
Second Outdoor Unit Average Ambient Temperature (2 hours)	t1.		
Gas Space heating Temperature (THM_g)	tG		
Liquid Temperature (THM_l)	tL		
Water pressure (WPS) (bar)	Pr		
Discharge Gas temperature	td		
Defrosting	dF		
Cause of stoppage Compressor	d1		
Inverter Operation frequency	h1		
Indoor Expansion valve opening	E1		
Outdoor Expansion valve	Eo		
Water Pump (0-100)	PP		
Water Pump Feedback Frequency (0-100)	FF		
Water flow (m^3/h)	FP		
Compressor running current (A)	P1		
Digital Inputs (See 2*)	d1		
Digital Outputs (See 3*)	do		
Refrigerant Cycle Address	ou		
Indoor Unit Address	iu		
ROM Nº	no		
Capacity Code (See Table below 1*)	Cd		
Outdoor Capacity Code (See Table Below 1*)	Co		
Unit Type (See Table Below 1*)	CP		

NOTE

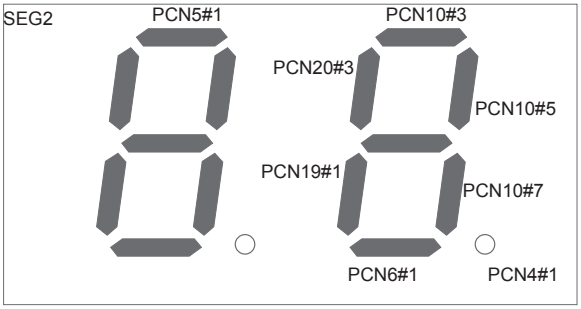
- *OU: Outdoor Unit.*

- *IU: Indoor unit.*
- *(*1): Indoor/Outdoor unit capacity code*

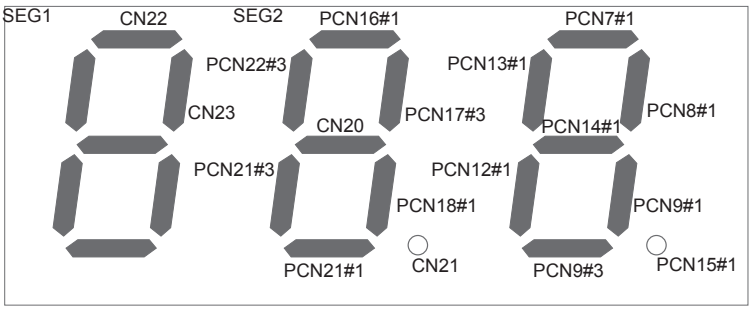
Unit	Code
YUTAKI S	1
YUTAKI SC	10

Capacity	Code
2.0 HP	14
2.5 HP	18
3.0 HP	22
4.0 HP	32
5.0 HP	40
6.0 HP	48
8.0 HP	64
10.0 HP	80

- *(*2): Contents of outdoor micro controller input status*



- *(*3): Contents of indoor micro controller output status*



7.5 Service and maintenance record by Unit controller

Sheet for main data checking by Unit controller

Customer's name:	**Date:**
OU serial Nº:	
OU Nº / alarm code:	
IU serial Nº:	
IU Nº / alarm code:	

REF	Access mode	Description	Default Value	Range	Record setting	Units
System Operation						
OPSt		Operation Status	OFF	OFF Cool D-OFF Cool T-OFF Cool ON Heat D-OFF Heat T-OFF Heat ON DHW OFF DHW ON SWP OFF SWP ON Alarm XXX (XXX= Code number)		-
HPEVI	🔧	Indoor expansion valve opening (%)	-	Variable value		%
HPEVI2	🔧		-	Variable value		%
HPEVO	🔧	Outdoor expansion valve opening (%)	-	Variable value		%
HPH4	🔧	Inverter operation frequency	-	Variable value		Hz
HPDEF	🔧	Defrosting	-	Variable value		-
HPDI	🔧	Cause of stoppage	-	Variable value		-
HPP1	🔧	Compressor running current	-	Variable value		A
PCBFirmware		Indoor PCB Firmware	-	Variable value		-
Uspec	🔧	Unit capacity	-	Variable value		HP
C2MVP	🔧	Mixing valve position (%)	-	Variable value		%
Actual Temperatures						
HPTi	🔧	Water inlet temperature	-	Variable value		ºC
HPTo	🔧	Water outlet temperature	-	Variable value		ºC
C2Two	🔧	Water outlet temperature C2 (*2)	-	Variable value		ºC
DHWt		DHW temperature (*3)	-	Variable value		ºC
SWPt		Swimming pool temperature (*4)	-	Variable value		ºC
HPTg	🔧	Gas temperature	-	Variable value		ºC
OPTa	🔧	Outdoor ambient temperature	-	Variable value		ºC
OPTa.2	🔧	Second ambient temperature	-	Variable value		ºC
OPTav		Outdoor ambient average temperature	-	Variable value		ºC
OPTav2.		Second ambient average temperature	-	Variable value		ºC
HPTd	🔧	Discharge gas temperature	-	Variable value		ºC
HPPs	🔧	Suction gas temperature	-	Variable value		ºC
C1Rt		Room temperature C1 (*6)	-	Variable value		ºC
C2Rt		Room temperature C2 (*2)	-	Variable value		ºC
Set Point						
OPst		Water temperature setting	-	Variable value		ºC
C1OTCs		Water OTC Setting Temperature (*1)	-	Variable value		ºC
C2OTCs		Water OTC Setting Temperature (*1)(*2)	-	Variable value		ºC
C1Rt		Room temperature set point C1 (*7)	-	Variable value		ºC
C2Rt		Room temperature set point C2 (*2)	-	Variable value		ºC
DHWst		DHW temperature set point	-	Variable value		ºC
SWPst		SWP temperature set point (*5)	-	Variable value		ºC

🔧: Available only for installer.

NOTE

- *(*1): Water OTC Setting T C1 and C2 will not be shown when Water calculation C1 is disabled.*
- *(*2): It will be shown only when Circuit 2 is enabled and Room thermostat is installed.*
- *(*3): DH Water Tº (DHWst) will be only shown when DHW status (DHWs) is enabled.*

- *(*4): Swimming pool T° (SWPt) will be shown only when Swimming pool status (SWP) is enabled.*
- *(*5): SWP T° set point (SWPs) will be shown only when Swimming pool status (SWP) is enabled.*
- *(*6): Room T° C1 (*C1Rt*) will be only shown when Room thermostat is installed.*
- *(*7): Room T° set point C1 (*C1Rs*) will be only shown when Room thermostat is installed.*

8. Electrical and control settings

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8.1 Electrical connection procedure

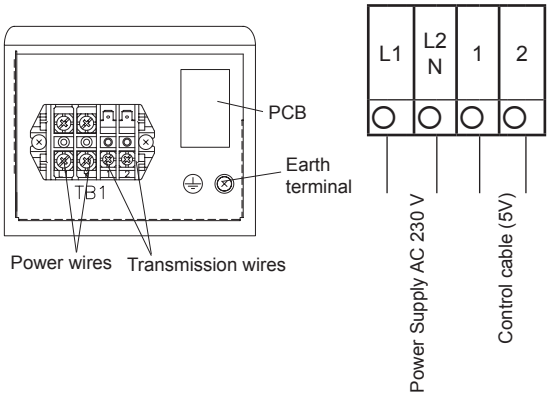
8.1.1 Split system - outdoor units

◆ Wiring connection

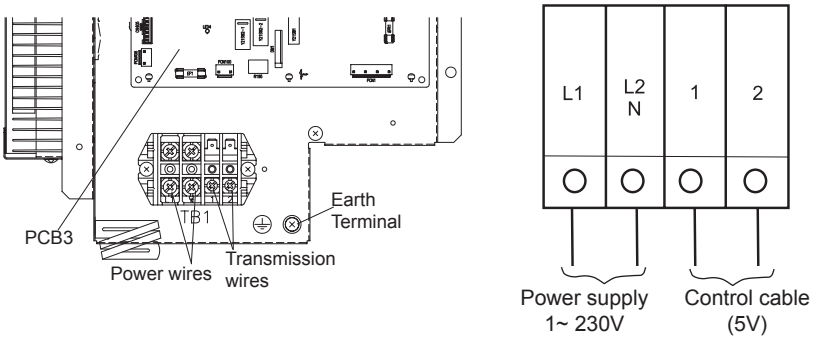
The correct electrical wiring connection for the outdoor unit is shown below.

1 Connect L1 and N (for 230V/50Hz) to the terminal board. Connect the ground wire to the plate in the electrical box.
2 Connect the wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board.

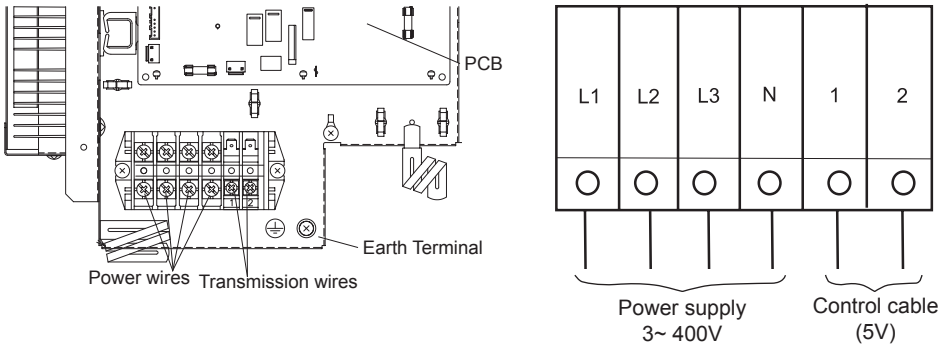
RAS-(2-3)WHVRP1



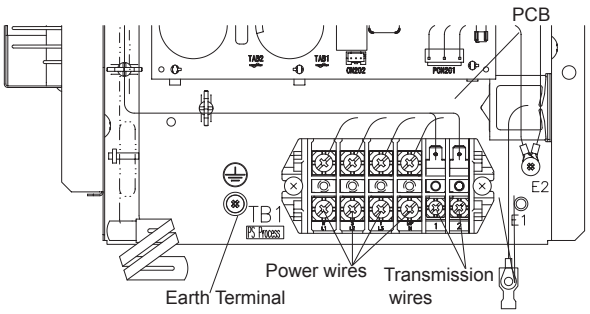
RAS-(4-6)WHVNPE

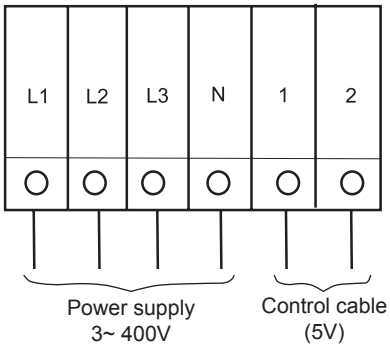


RAS-(4-6)WHNPE



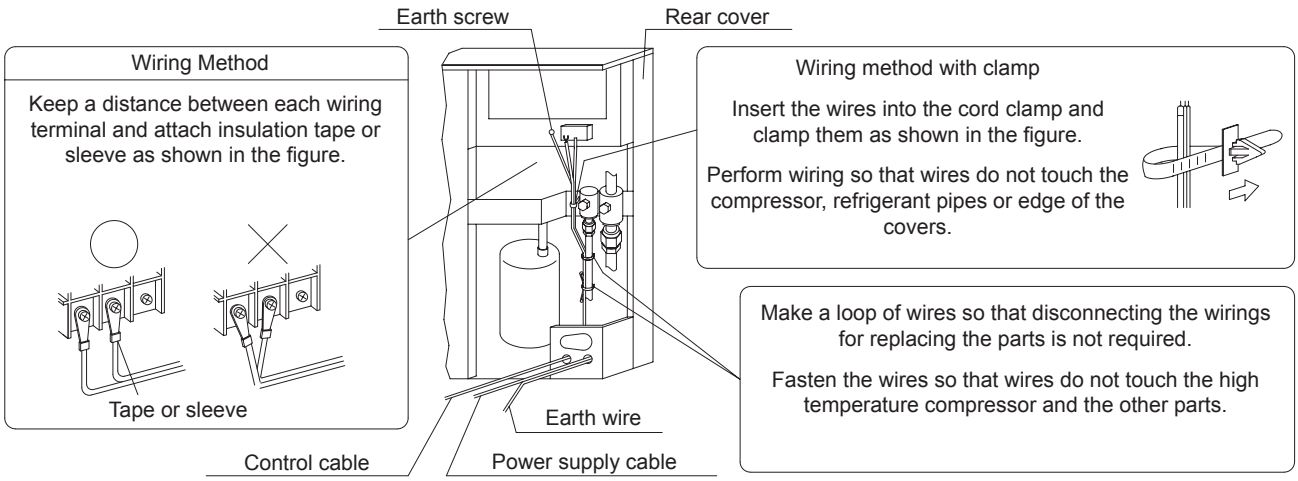
RAS-(8-10)WHNPE





3 Fix the cable with the clamp supplied in the Electrical Box to ensure strain relief.

4 When routing out cable, make sure that it does not obstruct mounting of the outdoor service cover.



8.1.2 Split system - Indoor unit

◆ Wiring connection

The correct electrical wiring connection for the indoor unit is shown below:

1 Using the appropriate cable, connect the power circuit to the appropriate terminals as shown on the wiring label and the illustration bellow.

⚠ CAUTION

Be sure to use a dedicated power circuit for the indoor unit. Never use a power circuit shared by another appliance (Outdoor unit).

2 Using the appropriate cables, connect the power source cables L1 and N (for 230V 50Hz) or L1, L2, L3 and N (for 400V 50Hz) and the ground cable to the earthing screw in the electrical box base plate.

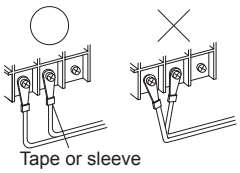
3 Connect the transmission wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board 2 (TB2).

4 Fix the cable with the clamp supplied in the Electrical Box to ensure strain relief.

5 When routing out cable, make sure that it does not obstruct mounting of the outdoor service cover

Wiring method

Keep a distance between each wiring terminal and attach insulation tape or sleeve as shown in the figure.



Wiring method with clamp

1. Insert the wires into the cord clamp and clamp them as shown in the figure.
2. Perform wiring so that wires do not touch the refrigerant pipes or edge of the covers.

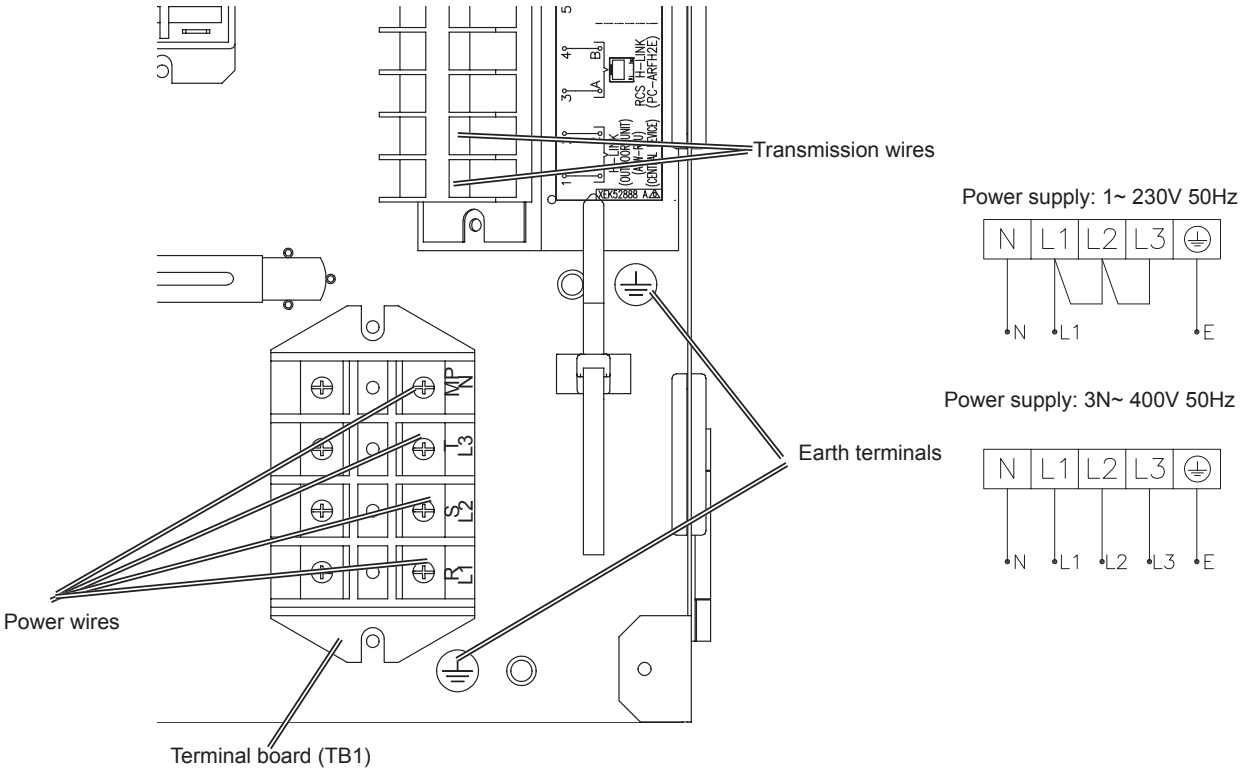


⚠ CAUTION

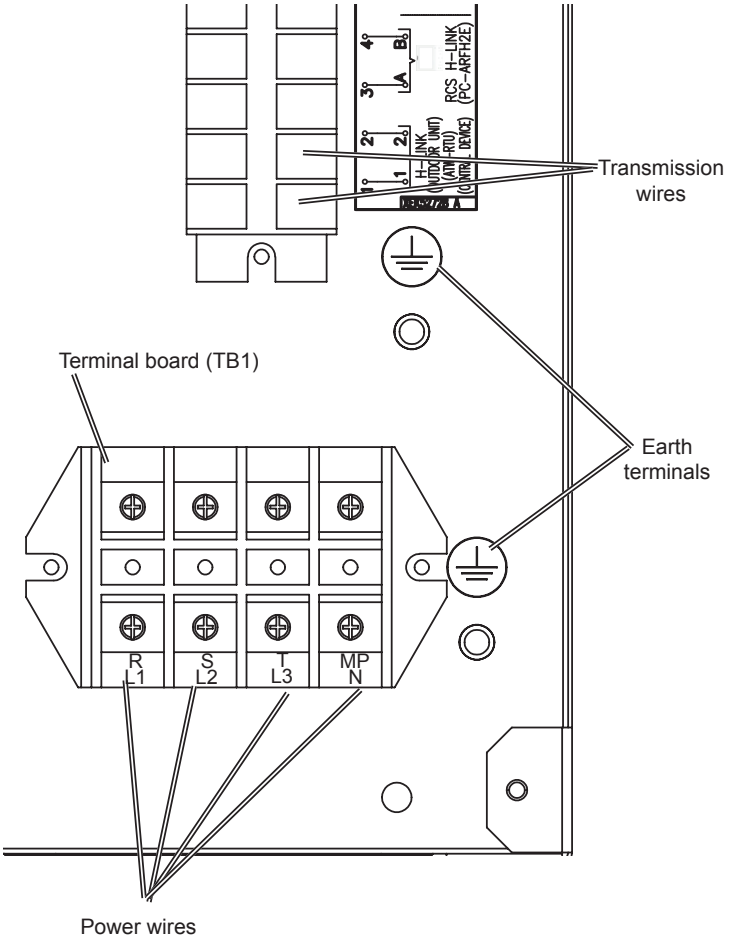


Do not use a solderless terminal when a single wire is used.
If used, it causes abnormal heating at the caulking portion of the terminal. If a single wire is used, connect the wire directly as shown in the figure.

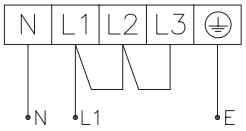
YUTAKI S



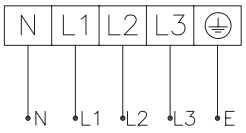
YUTAKI S COMBI



Power supply: 1~ 230V 50Hz

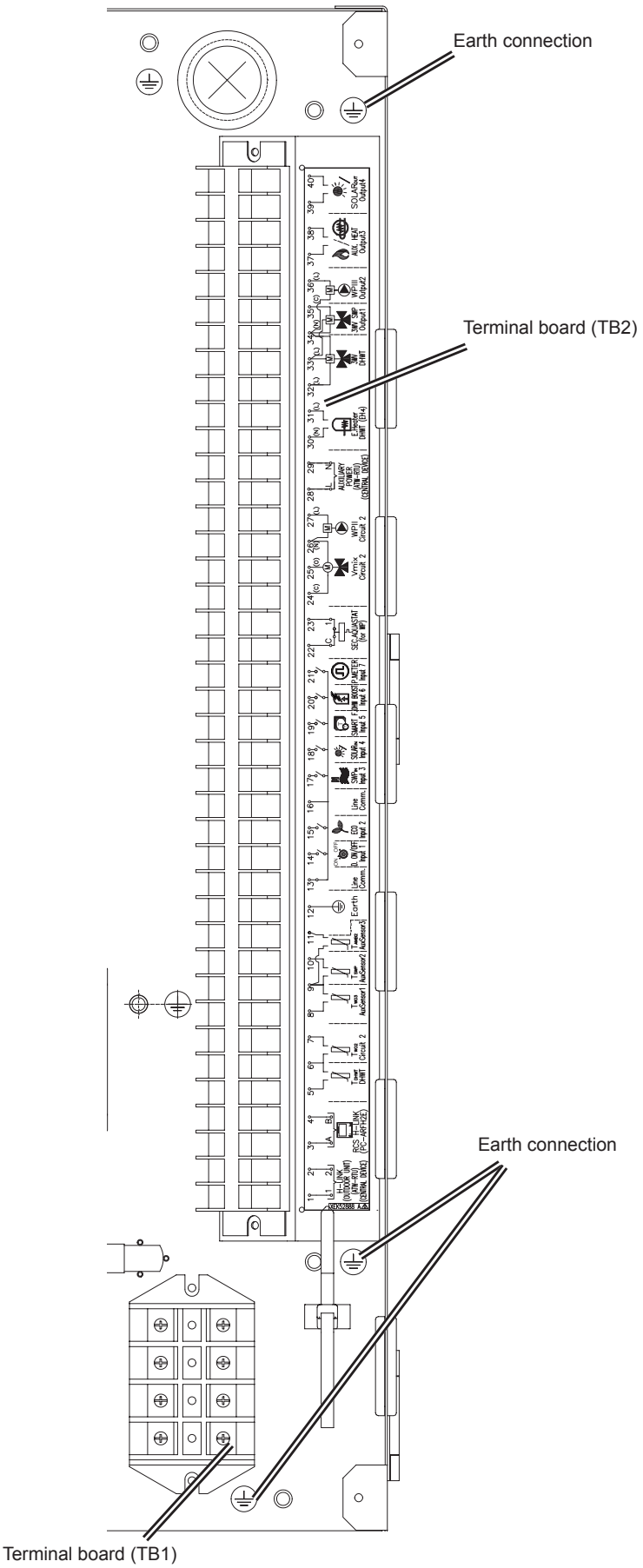


Power supply: 3N~ 400V 50Hz

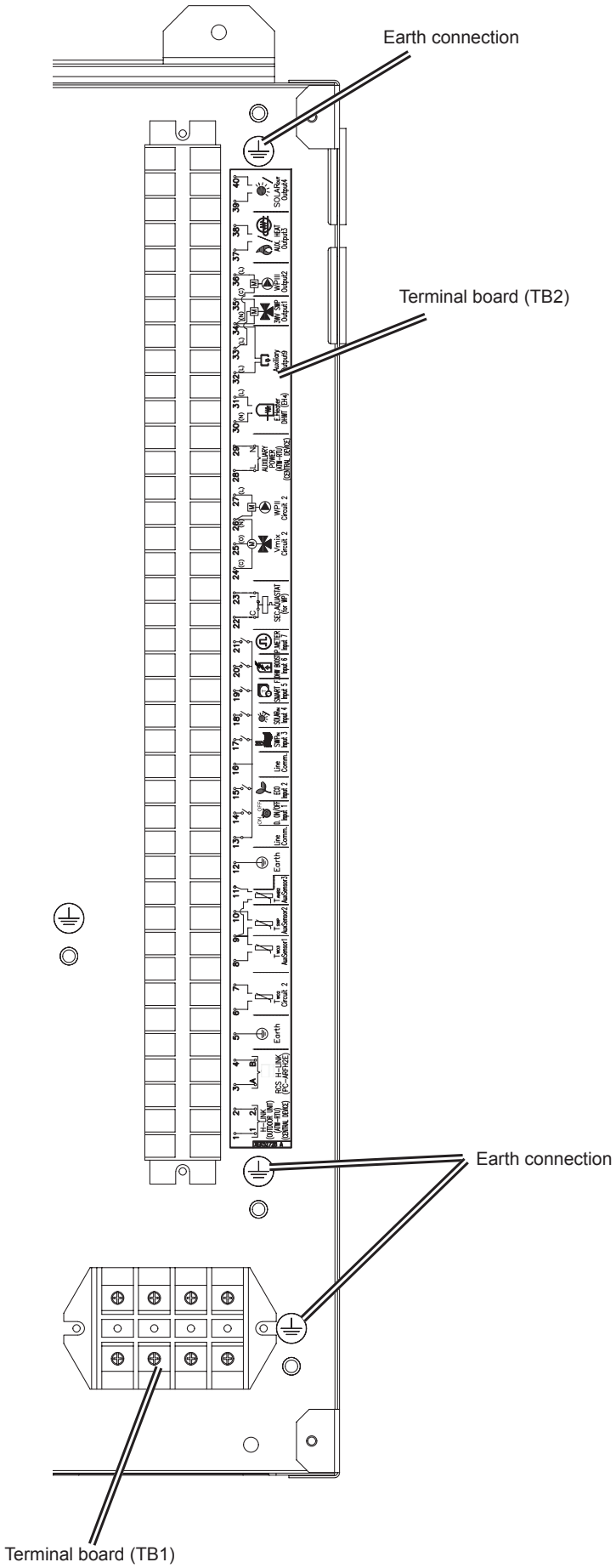


8.2 Terminal board detailed connection

8.2.1 YUTAKI S

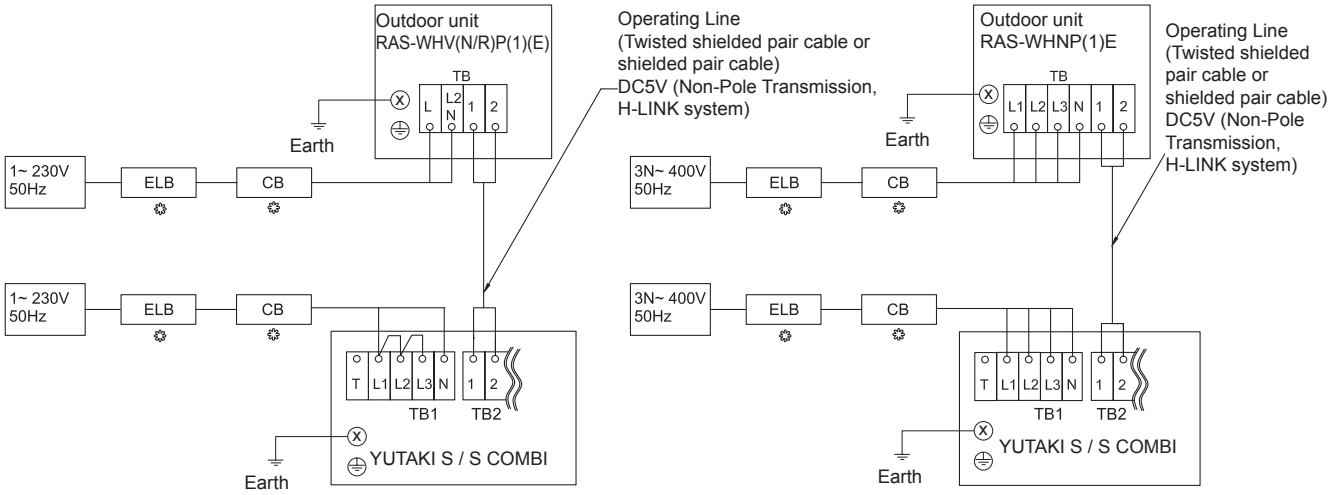


8.2.2 YUTAKI S COMBI



8.2.3 Main power supply (TB1)

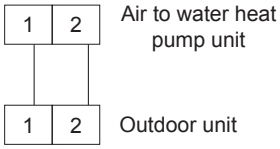
The main power connection is wired to Terminal Board 1 (TB1) as follows:



8.2.4 Indoor/Outdoor commutation cables (TB2)

The transmission is wired to terminals 1-2.

The H-LINK II wiring system requires only two transmission cables that connect to the indoor unit and the outdoor unit.



8.2.4.1 Input terminals (Default input functions)

◆ Room thermostat communication cables

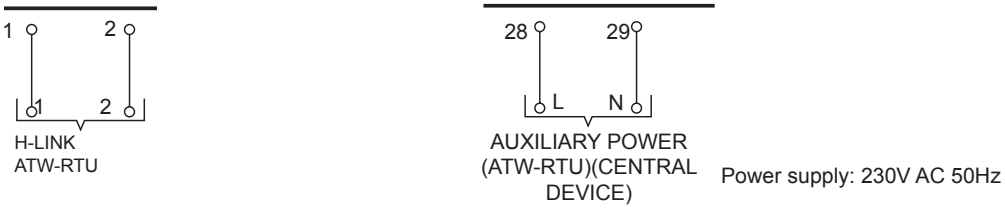
There are two different room thermostat types as accessory

Optional wireless intelligent room thermostat (TB2) ATW-RTU

Only for wireless room thermostat accessory: the receiver is connected to the polarity-free terminals1 and 2.

The Wireless room thermostat and the Intelligent receiver are already configured to communicate with each other. If the Wireless room thermostat or the Intelligent receiver is replaced or an additional second temperature circuit thermostat is added, it is necessary to rebind them as explained in the manual of the Wireless intelligent room thermostat.

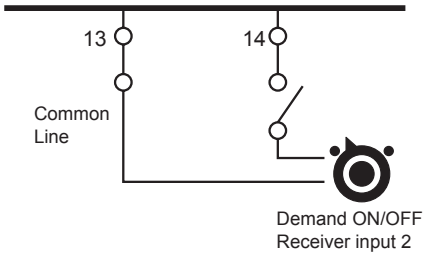
The Intelligent receiver is connected to the indoor unit table board as shown in the next picture:



Optional wireless ON/OFF room thermostat ATW-RTU-04

The heat pump system has been designed to allow the connection of a remote ON/OFF thermostat to effectively control the home temperature. Depending on the room temperature, the thermostat will turn the system to ON or OFF.

In case of setting an installation with 2 circuits (circuit 1 and circuit 2) and the same demand ON/OFF is used for both of them, remove the jumper between terminals 13 and 14 of the Terminal board 2 and connect the RF receiver as shown in the following picture.



Thermostat requirements:

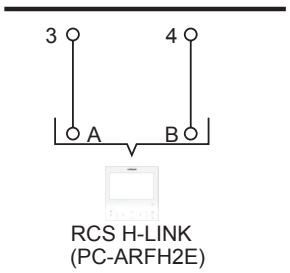
- Power supply: 230V AC
- Contact voltage: 230V

NOTE

- *If wireless intelligent thermostat is selected, optional ON/OFF thermostat has no effect.*
- *Set the configuration in the user's control. See chapter "7 Unit controller" for more information.*
- *In case of setting an installation with 2 circuits (Circuit 1 and Circuit 2) and a different Demand ON/OFF is used for each of them, please refer to "YUTAKI S" section in this chapter.*
- *Auxiliary power supply is available for thermostats and central devices (28 and 29 terminals of TB2).*

◆ PC-ARFH2E connection

In cases where another PC-ARFH2E must be connected as a second thermostat, the connections between PC-ARFH2E and the indoor unit must be done in terminals 3 and 4, as it is shown in the next picture:

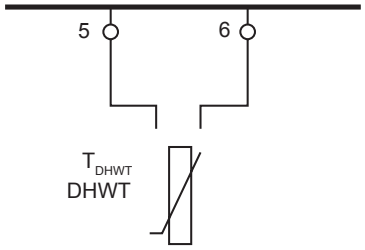


◆ DHWT Thermistor (TDHWT)

NOTE

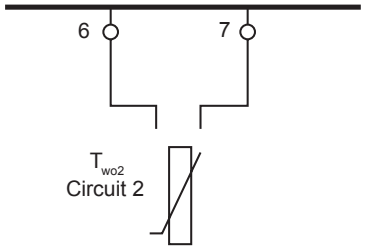
Only for YUTAKI S

For those cases in which a tank is installed as accessory, a thermistor must be installed to control the water temperature. The connection for this thermistor must be done between terminals 5 and 6 of the TB2.

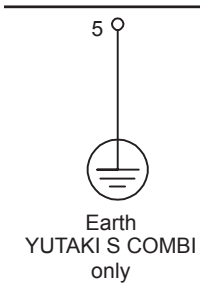


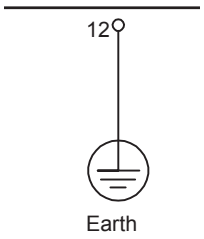
◆ Water outlet thermistor for circuit 2 (TWO2)

When the installation is configured with a second circuit the thermistor for the water outlet temperature have to be connected between terminals 6 and 7 of the terminal board 2.



◆ Earth

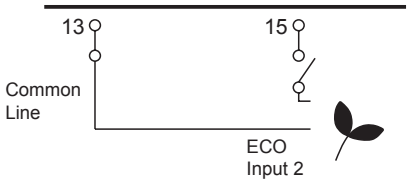




◆ ECO (Default for input 2)

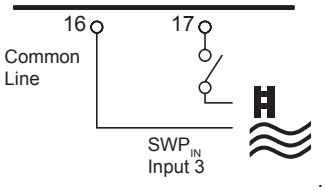
When enabled at Unit controller, both for circuit 1 and circuit 2, also for heating and cooling, this input switches the indoor unit into an ECO mode by adjusting its settings only when input is closed.

The input can come from a push button, a thermostat or any other external device with that purpose.



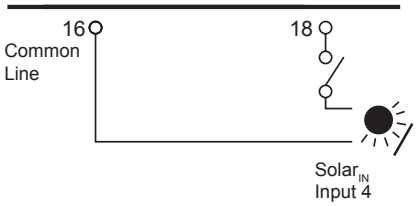
◆ Swimming pool (Default for input 3)

When it is necessary to control the temperature of the swimming pool water, a connection between the heat pump and the corresponding sensor must be done on terminals 16 and 17 at the Terminal board (input 4).



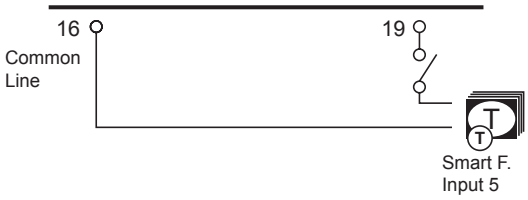
◆ Solar (Default for input 4)

This input comes from a solar panel sensor. The solar combination by input demand allows HSW to be heated by solar system when there is enough solar energy available. The connection of this input signal has to be done between terminals 16 and 18 at TB2.



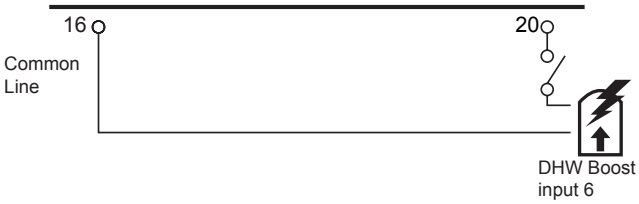
◆ Smart tariff (Default for input 5)

This function can be used to block or limit the heat pump. It allows an external Smart switch device to switch off or limit the heat pump during a period of peak electricity demand. Terminals 16 and 19 of the TB2.



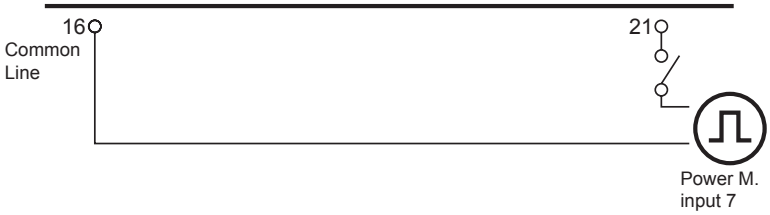
◆ DHW boost (Default for input 6)

This function allows a request for a one-time heating up of the domestic hot water temperature. The input can be sent by a push button, a NC contact and a NO contact. This input is switched on terminals 16 and 20 of the TB2.



◆ Power Meter (Default for input 7)

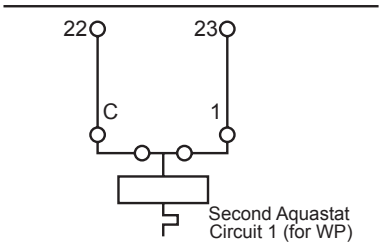
This function is used to monitor real consumption of the system by means an external power meter device connected at this input. The calculation method is done by measuring real consumption of the whole installation with one power meter device or 2 separate power meter (one for indoor unit and another one for outdoor unit.



◆ Aquastat for circuit 1

Aquastat is a security accessory to control in order to prevent high water temperature entering into floor system (Circuit 1). This devices must be connected to terminals 22 & 23 for circuit 1.

When this devices is activated because of the high temperature of the water, it stops the water pump in order to stop the flow of water to the heating floor.



NOTE

In case of YUTAKI S COMBI UK model, Domestic Hot water tank security thermostat its connected to terminals 22&23 and this funcion is not available for circuit 1.

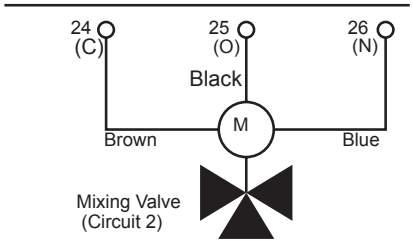
Output terminals (Default output functions)

CAUTION

Total maximum current applied for all output terminals <2.0 A

◆ Mixing valve for Circuit 2

The mixing valve is controlled to maintain the second heating temperature at the second heating temperature set point. The control system decides how much to open or close the mixing valve to achieve the desired position of the valve.



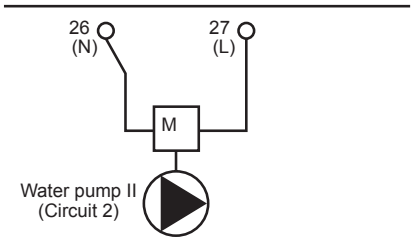
Terminal	Name	Description
24	C	Close
25	O	Open
26	N	Neutral

Valve requirements:

- Power supply: 230V AC 50Hz
- Maximum running current: 100mA

◆ Water pump 2 Circuit 2

In case of a second circuit installation (second temperature level) the secondary pump is the circulating pump for the second heating temperature.

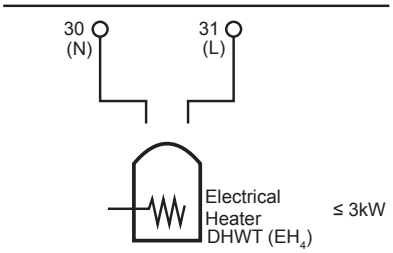


Pump requirements:

- Power supply: 230V AC 50Hz
- Maximum running current: 500mA (An auxiliary relay must be installed in case of high consumption of the water pump).

◆ Electrical heater DHWT output

In those cases where a DHW tank is installed with an electrical heater, the Air to Water heat pump can activate the electric heater of the tank when the heat pump cannot achieve the required DHW temperature by itself.

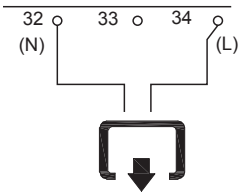


⚠ CAUTION

When using a DHW tank other than those from Hitachi, the maximum connectable heater load is 3 kW (connected to TB2 terminals 30-31).

◆ Output 9

Output for general purposes.

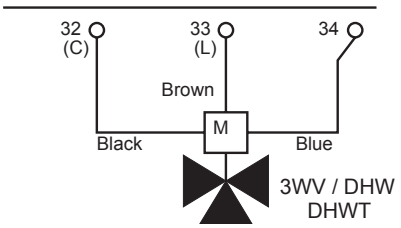


NOTE

Only for YUTAKI S COMBI

◆ 3 Way valve for DHW tank output

YUTAKI units can be used to heat DHW. The signal is used on a 3-way motorized diverting valve and to provide control of supply water flow (water flow for space heating when there is no signal, and water flow for DHW when signal is ON)



NOTE

Only for YUTAKI S

Valve requirements:

- Power supply: 230V AC 50Hz
- Maximum running current: 100mA

Output terminals (Optional output functions)

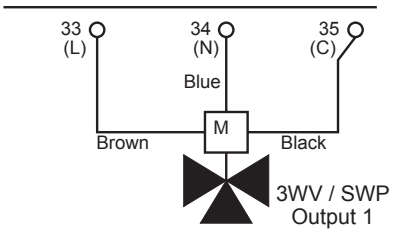
⚠ CAUTION

Total maximum current applied for all output terminals <2.0 A

◆ 3 Way valve for Swimming pool (Default for Output 1)

YUTAKI units can be used to heat the water of a swimming pool. The signal is used on a 3-way motorized diverting valve and to provide control of supply water flow for the swimming pool. This output is available when the function is enabled from the Unit controller.

Using the appropriate wiring, connect the valve cables as shown in the previous picture.

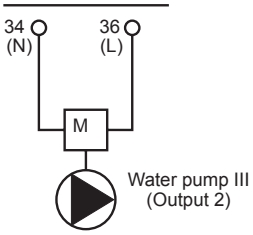


Valve requirements:

- Power supply: 230V AC 50Hz
- Maximum running current: 100mA

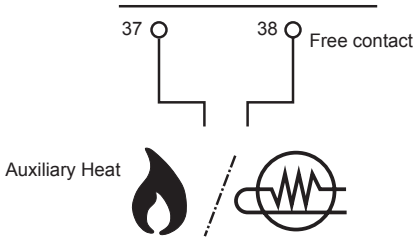
◆ Water pump 3 (Default for Output 2)

When the boiler is configured with the heat pump or needs an additional pump for the system, a hydraulic separator or buffer tank must be used to ensure a correct hydraulic balance



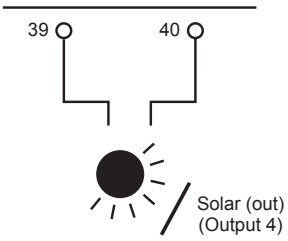
◆ Auxiliary boiler or heater (Default for Output 3)

The auxiliary boiler or heater can be used when the heat pump cannot achieve the require temperature by itself.



◆ Solar (Default for output 4)

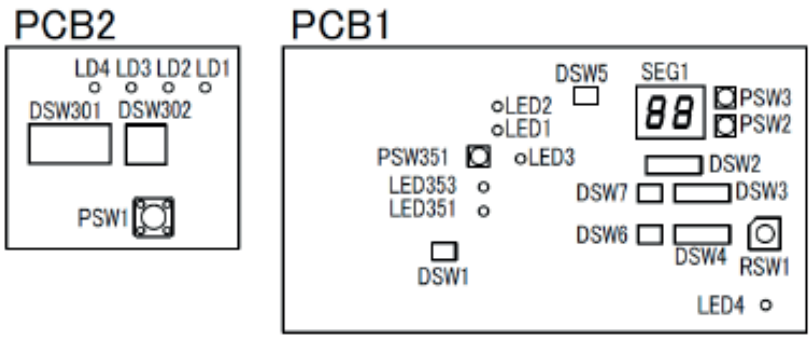
This output is used when solar mode is enabled (from Unit controller) and the temperature in the solar panel rises above the water temperature in the domestic hot water tank (DHWT). The connection between terminals 39 and 40 shall be closed in order to activate the dedicated water pump for solar panel combination.



8.3 Printed circuit board (PCB)

8.3.1 Split system - Outdoor unit

◆ RAS-(2-3)WHVRP1

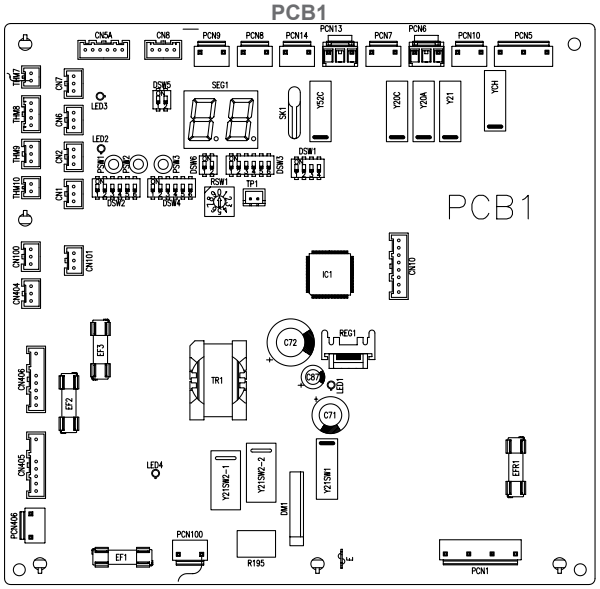


Switch indication	
DSW1	No setting required
DSW2	Function selection
DSW3	Capacity
DSW4	Ref. cycle number
DSW5	End terminal resistance
DSW6	Optional function
DSW7	Optional function
DSW1	Optional function
DSW301	Test run mode
DSW302	Pipe lenght
RSW1	Ref. cycle number
PSW1	Manual defrost operation switch. The defrost option is manually available under the forced defrost area
PSW2	Available optional function. Setting can be selected using the 7-segment display
PSW3	

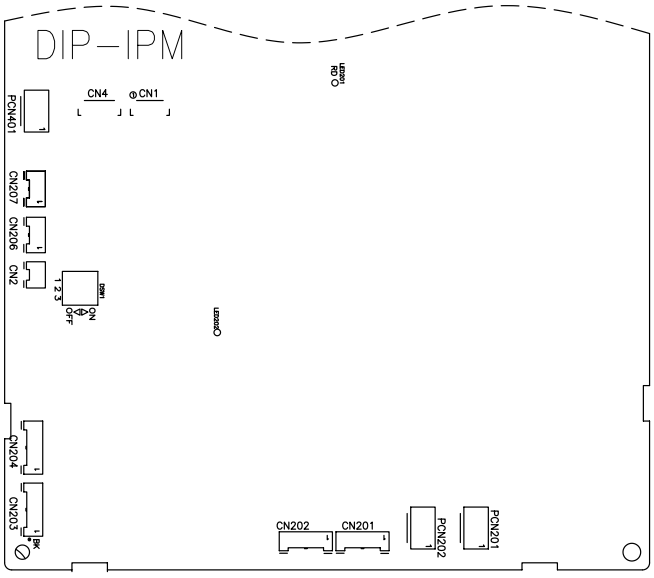
PCB1 LED indication		
LED1	Red	Power source for the PCB
LED2	Green	This LED indicates the inverter transmission status
LED3	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED4	Red	For checking 280V power source.
LD1	Red	For inspection
LD2	Red	For inspection
LD3	Red	For inspection
LD4	Red	For inspection
LED351	Red	For inspection
LED353	Red	For inspection

◆ RAS-(4-10)WH(V)NPE

PCB1



DIP-IPM



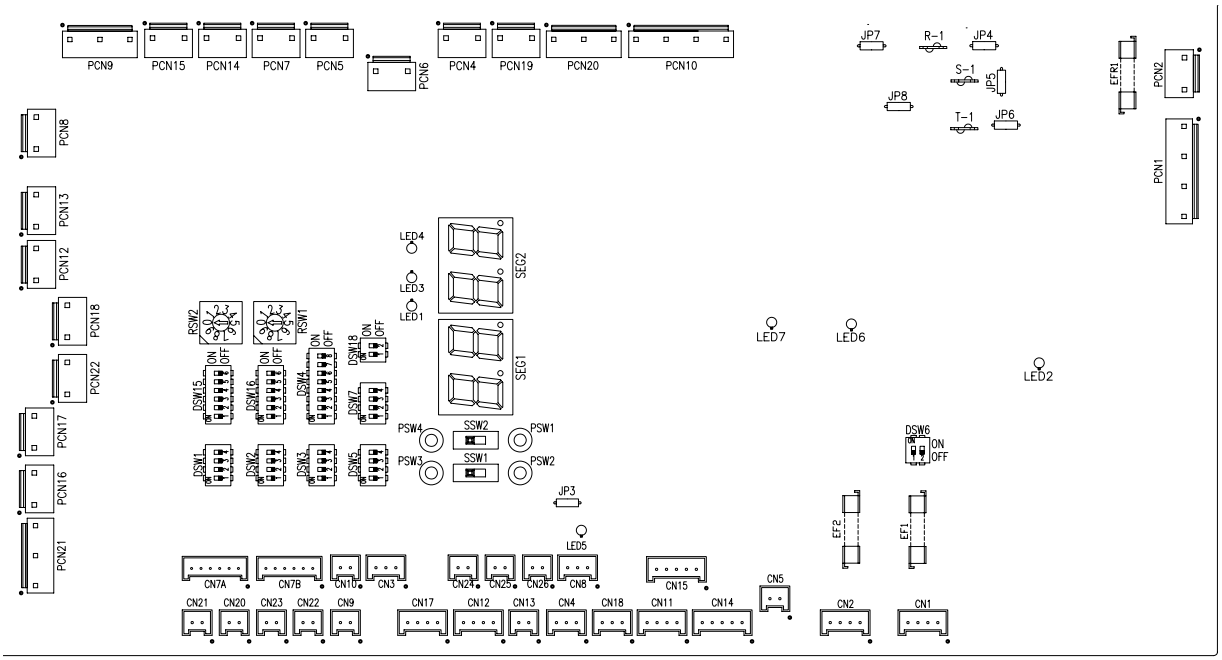
Switch indication	
DSW1 (PCB1)	Test run
DSW2	Optional function setting
DSW3	Capacity code
DSW4/ RSW1	Refrigerant system setting
DSW5	End terminal resistance
DSW6	Switch (not used)
PSW1	Switch for forced defrosting
PSW2	Switch for checking
PSW3	Switch for checking

Connector indication	
PCN1	Power supply
PCN2	PCB1 connection from outdoor to indoor unit
PCN5	Crankcase heater of compressor (oil)
PCN6	Output optional function
PCN7	Output optional function
PCN8	Pressure switch protection
PCN9	Compressor contactor
PCN13	Pressure switch control
THM7	Outdoor air temperature thermistor
THM8	Pipe evaporation temperature thermistor
THM9	Compressor discharge temperature thermistor
CN5A	Electronic expansion valve
CN6	Transmission between PCB1 and DIP-IPM
CN8	Transmission from outdoor to indoor unit
EFS1, 2	Power protection

LED indication		
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS
LED2	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED3	Green	Power source for the PCB

8.3.2 Split system - Indoor unit

YUTAKI S

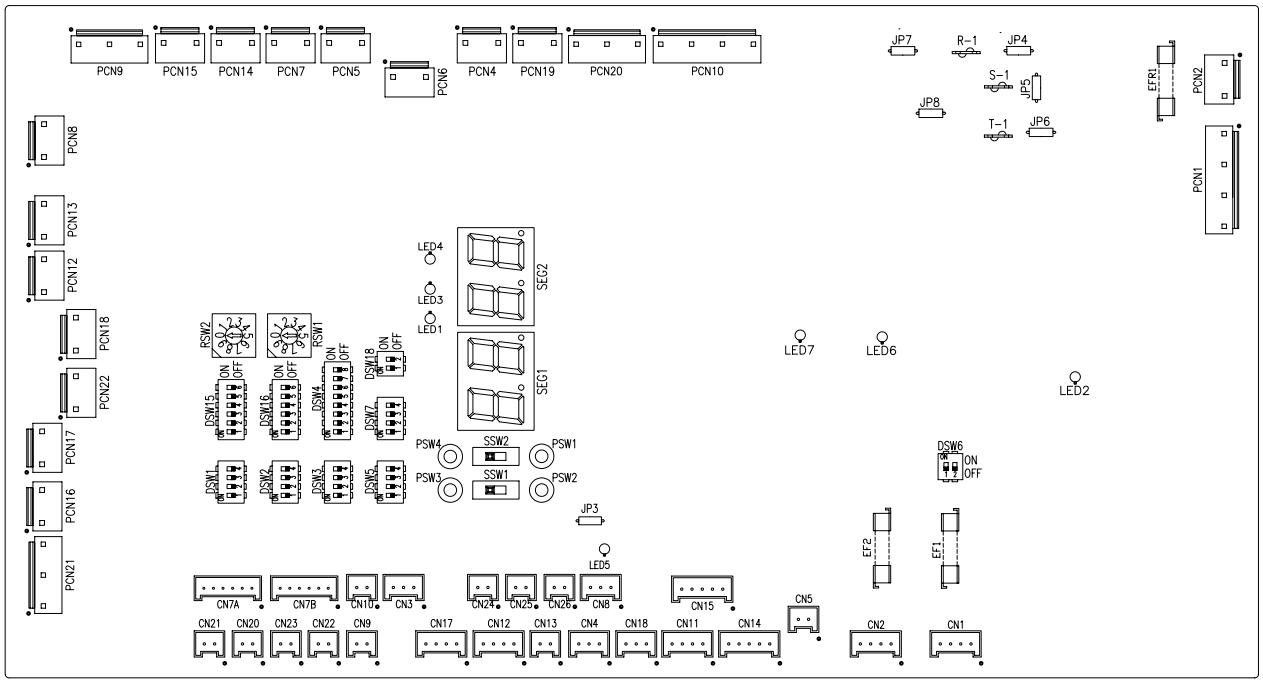


Connector Indications	
Name	Connector Nº
H-LINK communication	CN1
H-LINK RCS (PC-ARFH2E)	CN2
Pressure water sensor	CN3
Auxiliary sensor	CN5
Electronic Expansion Valve	CN7A
Electronic Expansion Valve (Only 8/10HP)	CN7B
Water inlet temperature input	CN9
DHWT water input	CN10
Outlet HP water input	CN11
Liquid pipe temperature input	CN12
Outlet water temperature input	CN13
Water pump output	CN14
Gas pipe temperature input	CN17
Auxiliary outputs signals accessory	CN20/21/22/23
Outlet water temperature input (Circuit 2)	CN24
Auxiliary thermistor input	CN25/26
Power supply	PCN1
Low water pressure switch	PCN4
Contactor switch	PCN5
Contactor heater step switch	PCN7/14
3WV	CN15
Optional input (AD input 230V)	PCN6/10/19/20
Water pump 2 output	PCN15
Waterp pump 1 / Aquastat zone 1	PCN 16
Contactor heater tank step switch (Power)	PCN5/13
Check mode	PSW1~4

Switch indication		
Function	Name	Connector No.
Operation / Display	Additional setting	DSW1
	Unit capacity setting	DSW2
	Additional setting 1	DSW3
	Additional setting 2	DSW4
	Additional setting 3	DSW5
	Terminating resistance setting H-LINK	DSW6
	Additional setting 4	DSW7
	Refrigerant address	DSW15
		RSW2
	IU address	DSW16
		RSW1
	Additional setting 5	DSW18
	Remote/Local operation	SSW1
	Cool/Heat operation	SSW2
	Terminating resistance setting H-LINK RCS	DSW8

LED indication		
Connector No.	Color	Indication
LED1	Green	Power Indication
LED2	Red	Power Indication
LED3	Red	Heat pump operation (thermo ON/OFF)
LED4	Yellow	Alarm (flickering with 1 sec interval)
LED5	Green	Not used
LED6	Yellow	H-LINK transmission
LED7	Yellow	H-LINK RCS transmission

YUTAKI S COMBI



Connector Indications	
Name	**Connector Nº**
H-LINK communication	CN1
H-LINK RCS (PC-ARFH2E)	CN2
Pressure water sensor	CN3
Auxiliary sensor	CN5
Electronic Expansion Valve	CN7A
Water inlet temperature input	CN9
DHWT1 water input	CN10
Outlet HP water input	CN11
Liquid pipe temperature input	CN12
Outlet water temperature input	CN13
Water pump output	CN14
Gas pipe temperature input	CN17
DHWT2 water input	CN18
Auxiliary outputs signals accessory	CN20/21/22/23
Outlet water temperature input (Circuit 2)	CN24
Auxiliary thermistor input	CN25/26
Power supply	PCN1
Contactor switch	PCN5
Contactor heater step switch	PCN7/14
3WV	CN15
Optional input (AD input 230V)	PCN6/10/19/20
Water pump 2 output / Aquastat zone 2	PCN15
Waterp pump 1 / Aquastat zone 1	PCN16
Contactor heater tank step switch (Power)	PCN5/13
Check mode	PSW1~4

Switch indication		
Function	**Name**	**Connector No.**
Operation / Display	Additional setting	DSW1
	Unit capacity setting	DSW2
	Additional setting 1	DSW3
	Additional setting 2	DSW4
	Additional setting 3	DSW5
	Terminating resistance setting H-LINK	DSW6
	Additional setting 4	DSW7
	Refrigerant address	DSW15
		RSW2
	IU address	DSW16
		RSW1
	Additional setting 5	DSW18
	Remote/Local operation	SSW1
	Cool/Heat operation	SSW2
	Terminating resistance setting H-LINK RCS	DSW8

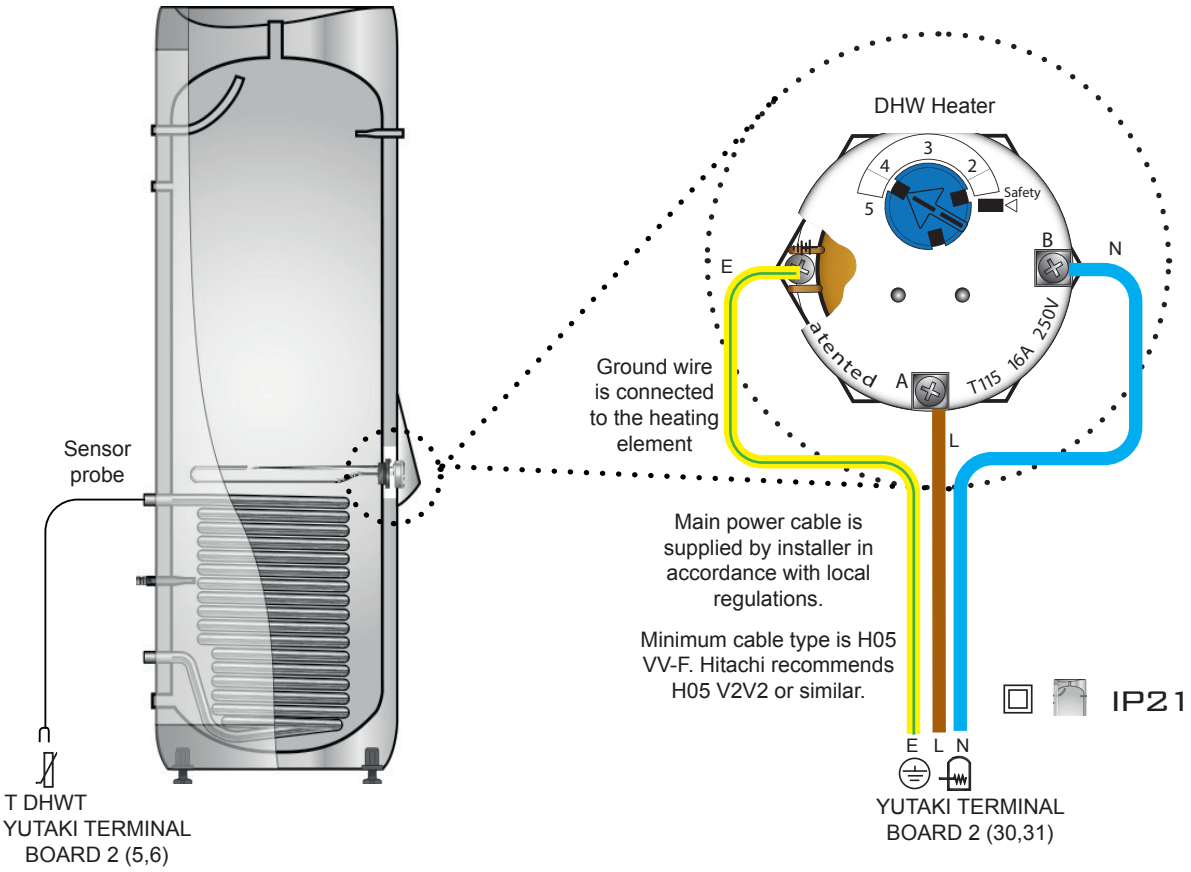
LED indication		
Connector No.	**Color**	**Indication**
LED1	Green	Power Indication
LED2	Red	Power Indication
LED3	Red	Heat pump operation (thermo ON/OFF)
LED4	Yellow	Alarm (flickering with 1 sec interval)
LED5	Green	Not used
LED6	Yellow	H-LINK transmission
LED7	Yellow	H-LINK RCS transmission

8.4 Domestic Hot Water Tank accessory

8.4.1 Electrical wiring connection

The electrical wiring connection between DHWT and YUTAKI system is as follows:

Customer connection:



8.4.2 Wire size

- Recommended minimum size for field provided wires:

Model	Power supply	Maximum current (A)	Power supply cable size	Sensor cable size
			EN60335-1	EN60335-1
DHWT	1~ 230V 50Hz	15	2.5 mm²	0.75 mm²

- Type of switches:

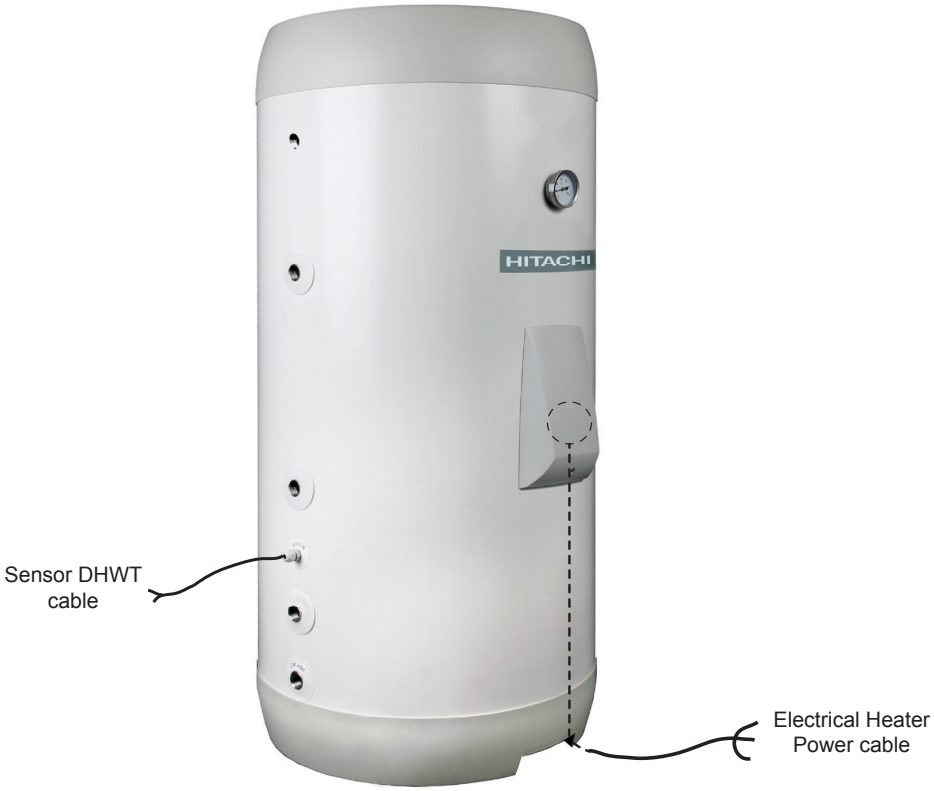
Select the main switches in accordance with the following table:

Model	Power supply	Maximum current (A)	CB (A)	ELB (nº of poles/A/mA)
DHWT	1~ 230V 50Hz	15	20	2/40/30

NOTE

- *CB: Circuit Breaker*
- *ELB: Earth Leakage Breaker*
- *Follow local codes and regulations when selecting field wires, Circuit Breakers and Earth Leakage Breakers.*
- *Use wires which are not lighter than the ordinary polychloroprene sheated flexible cord (code designation H05RN-F).*

◆ Internal wiring



8.4.3 Electric heater

The electric heater is made of Incoloy alloy 825 and complies with the European Low Voltage Directive 2006/95/EC.

It comprises a flange that holds three U-Shaped heating elements for 3.0 kW power resistances.

8.4.4 General check

1 Ensure that the field-supplied electrical components (mains power switches, circuit breakers, wires, connectors and wire terminals) have been properly selected according to the electrical data indicated. Make sure that they comply with national and regional electrical codes.
2 Electrical connection must be done by professional installer.
3 Check to ensure that the power supply voltage is within +/-10% of the rated voltage.
4 Make ensure that power supply has an impedance low enough to warranty not reduce the starting voltage more than 85% of the rated voltage.
5 Check that the earth wire is securely connected, tagged and locked in accordance with national and local codes.
6 Connect a fuse of specified capacity.
7 Check periodically the electrical connection tightening.

⚠ CAUTION

- *Check to ensure that screws for terminal block are tightly tightened.*
- *Protect the wires, drain pipe, electrical parts, from rats or other small animals. If not protected, rats may damage unprotected parts, and at the worst, a fire will occur.*
- *Wrap the accessory packing around the wires to protect the product from any condensed water and insects.*
- *Tightly secure the wires with the cord clamp inside the unit.*
- *Lead the wires avoiding any contact with water piping.*
- *Wrap the accessory packing around the wires from system controller.*

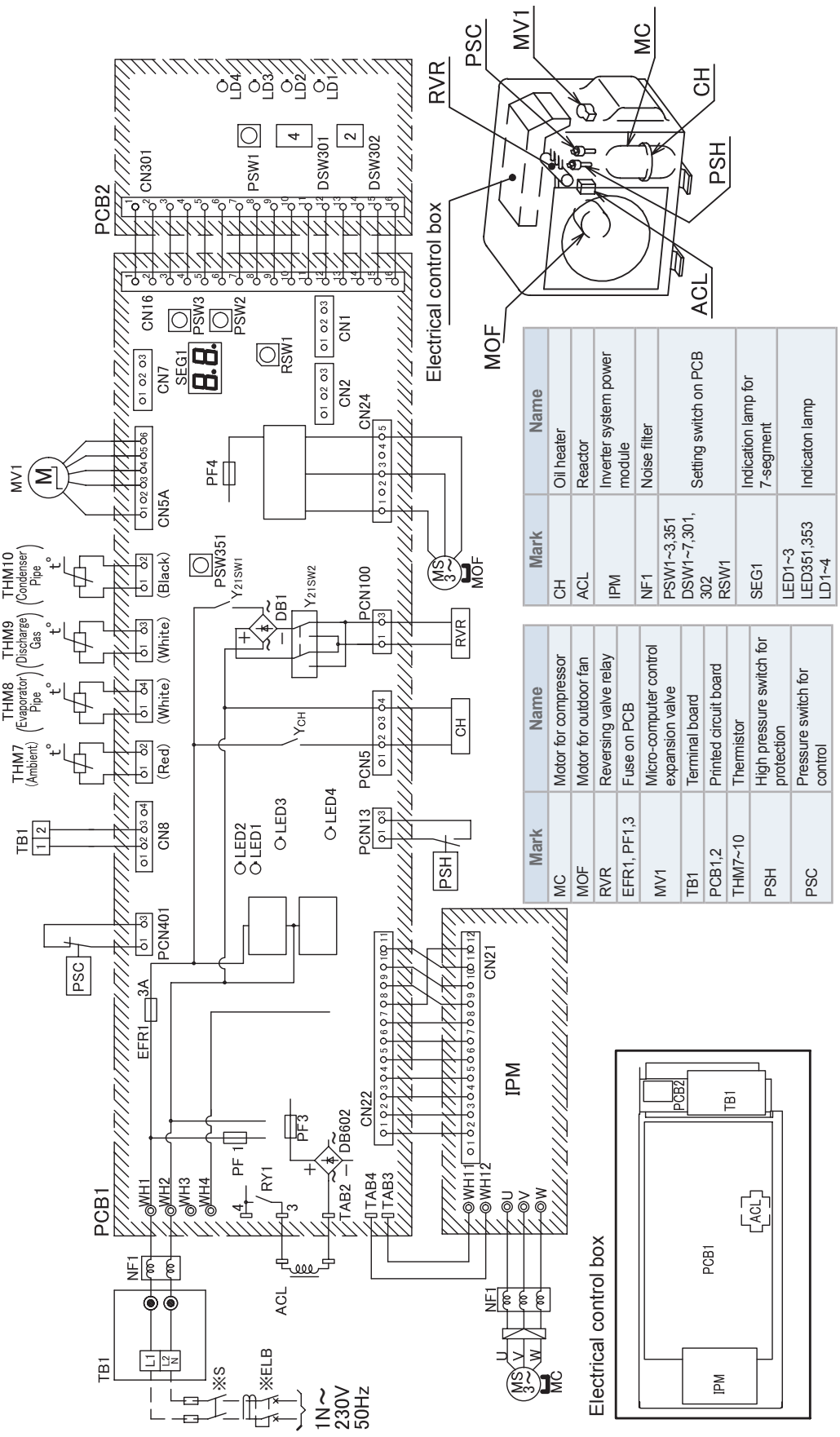
⚠ DANGER

- ***Do not connect or adjust any wiring or connections unless the main power switch is OFF.***
- ***When there are more than one power switch for ON/OFF, check and test to ensure that all are turned OFF.***

8.5 Electrical Wiring Diagrams

8.5.1 Split system - Outdoor unit

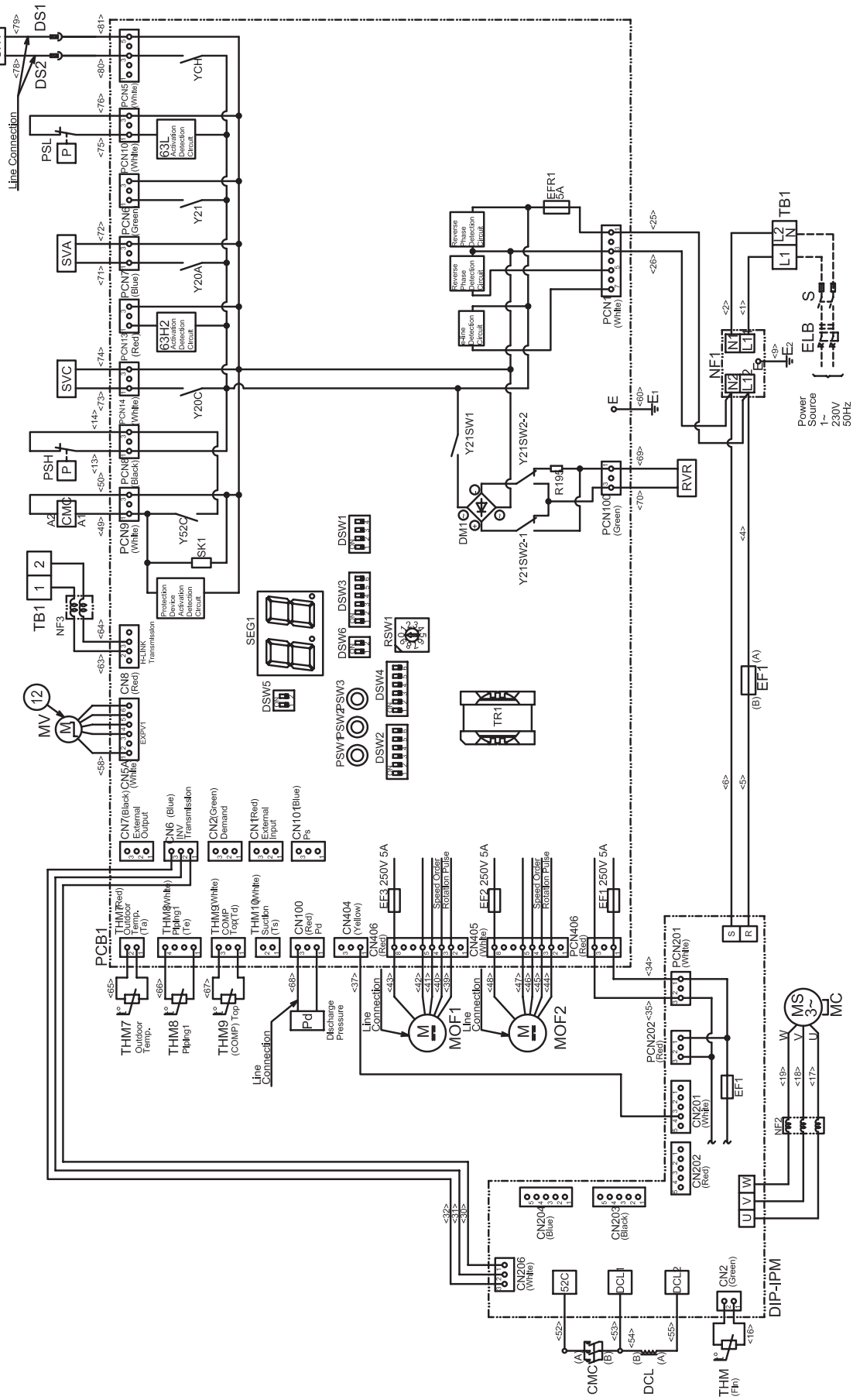
◆ **RAS-(2-3)WHVRP1 (1~ 230V 50Hz)**



Mark	Name
MC	Motor for compressor
MOF	Motor for outdoor fan
RVR	Reversing valve relay
EFR1, PF1,3	Fuse on PCB
MV1	Micro-computer control expansion valve
TB1	Terminal board
PCB1,2	Printed circuit board
THM7~10	Thermistor
PSH	High pressure switch for protection
PSC	Pressure switch for control

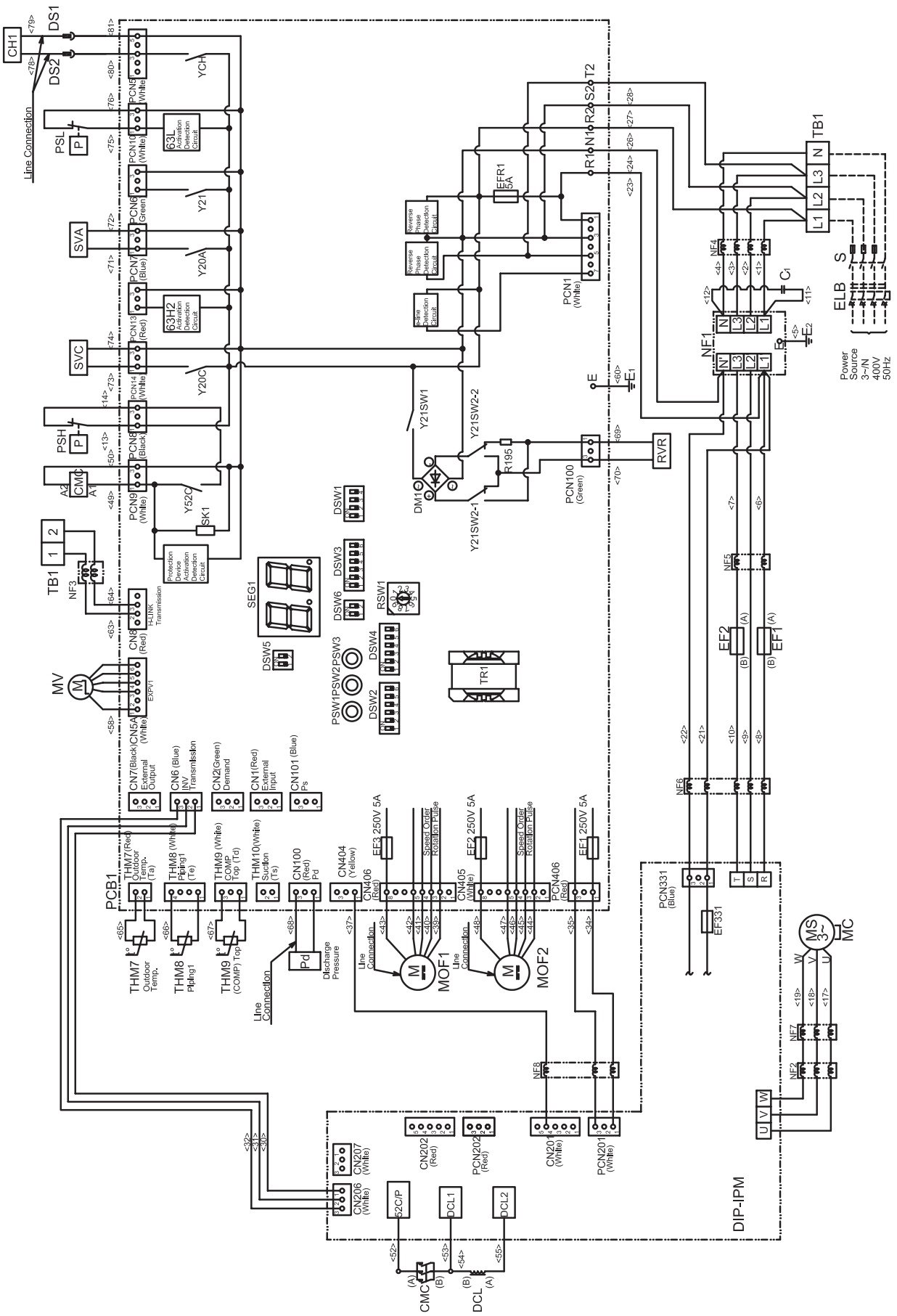
Mark	Name
CH	Oil heater
ACL	Reactor
IPM	Inverter system power module
NF1	Noise filter
PSW1~3,351 DSW1~7,301, 302 RSW1	Setting switch on PCB
SEG1	Indication lamp for 7-segment
LED1~3 LED351,353 LD1~4	Indicaton lamp

◆ RAS-(4-6)WHVNPE (1~ 230V 50Hz)



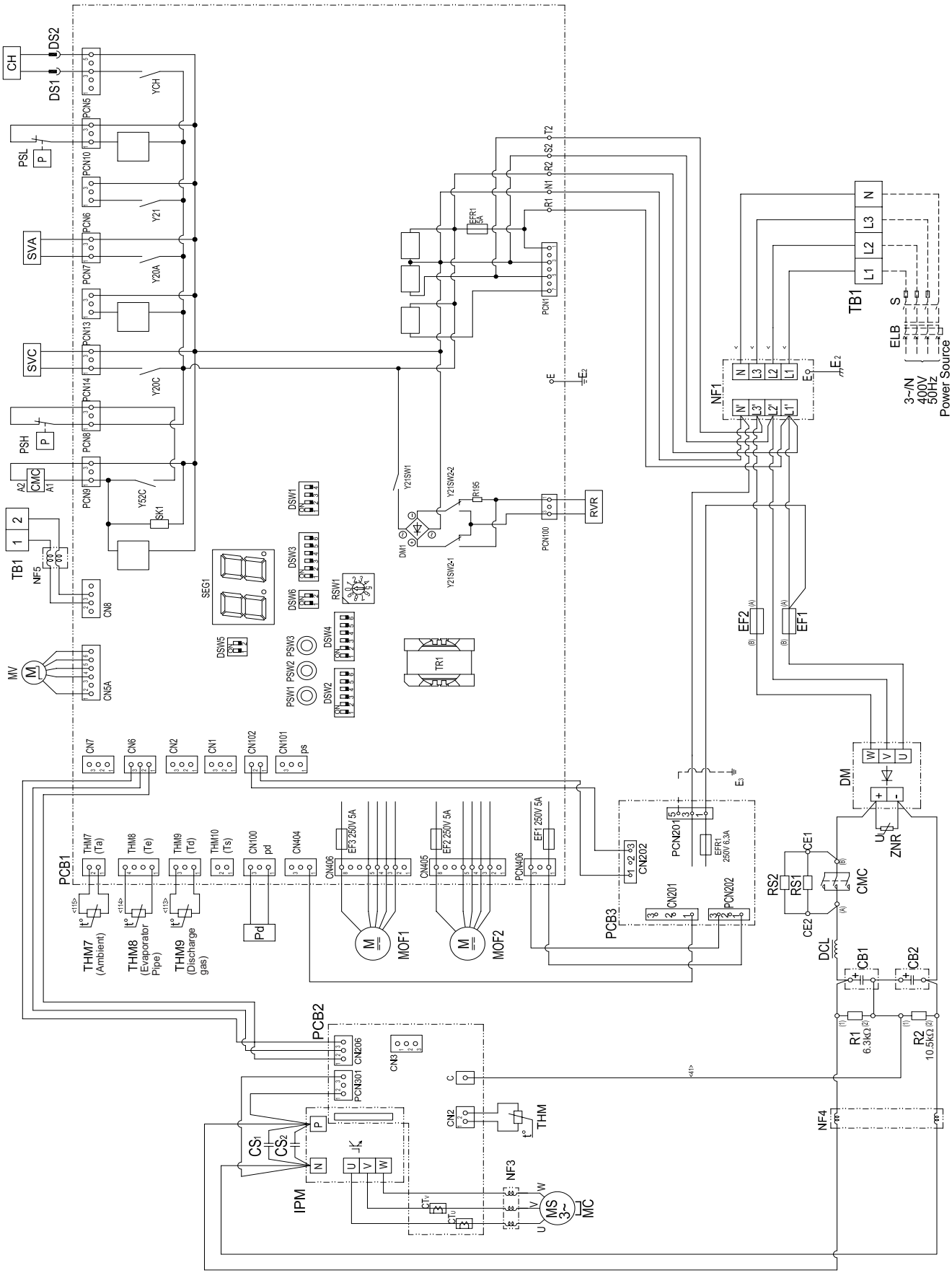
MARK	NAME
MC	Motor (for compressor use)
M0F1,2	Motor (for fan use
EF1	Power fuse
RVR	4 way solenoid valve
SVA,C	Solenoid valve
MV	Electronic expansion valve
CMC	Mag Contactor (for compressor use)
TB1	Terminal stand
TR1	Transformer
PCB1	Printed Board
EFR1	Fuse
EF1,3	Fuse
EF1	Fuse
Y52C	Aux Relay (for compressor and magnetic contactor use)
Y20A	Aux Relay (for solenoid valve use)
Y20C	Aux Relay (for solenoid valve use)
Y21SW	Aux Relay (for 4 way solenoid valve use)
YCH	Aux Relay (for oil heater use)
DM1	Diode module
THM7	Thermistor (for outdoor temperature use)
THM8	Thermistor (for piping use)
THM9	Thermistor (for TD use)
THM	Fan thermistor
Pd	Pressure sensor (discharge side)
PSH	High pressure switch (for protection)
PSL	Low pressure switch (for control)
DCL	Reactor
DIP-IPM	Inverter module
NF1-3	Noise filter
PSW1	Switch (for forced defrosting use)
PSW2	Switch (for checking use (▽))
PSW3	Switch (for checking use (△))
DSW1	Switch (for test run use)
DSW2	Switch (for aux. function setting use)
DSW3	Switch (for outdoor capacity setting use)
DSW4	Switch (for refrigerant system setting use)
DSW5	Switch
DSW6	Switch
RSW1	Switch (for refrigerant system setting use)
CH	Oil heater
DS1,2	Plug-in connector
E1,2	Earth

◆ RAS-(4-6)WHNPE (3N~ 400V 50Hz)



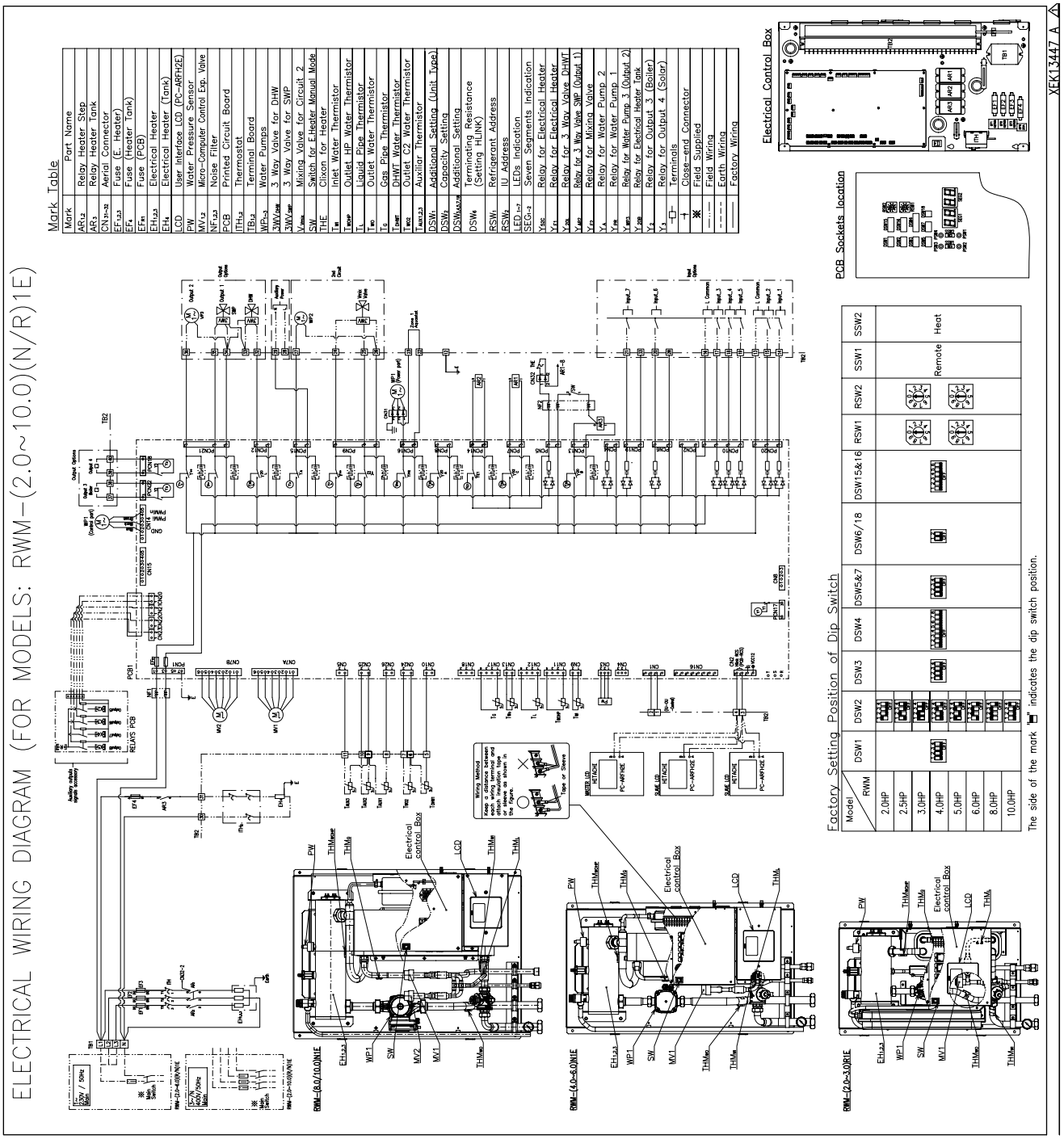
MARK	NAME
MC	Motor (for compressor use)
M0F1,2	Motor (for fan use
EF1,2	Power fuse
RVR	4 way solenoid valve
SVA,C	Solenoid valve
MV	Electronic expansion valve
CMC	Mag Contactor (for compressor use)
TB1	Terminal stand
TR1	Transformer
PCB1	Printed Board
EFR1	Fuse
EF1,3	Fuse
EF1	Fuse
Y52C	Aux Relay (for compressor and magnetic contactor use)
Y20A	Aux Relay (for solenoid valve use)
Y20C	Aux Relay (for solenoid valve use)
Y21SW	Aux Relay (for 4 way solenoid valve use)
YCH	Aux Relay (for oil heater use)
DM1	Diode module
THM7	Thermistor (for outdoor temperature use)
THM8	Thermistor (for piping use)
THM9	Thermistor (for TD use)
Pd	Pressure sensor (discharge side)
PSH	High pressure switch (for protection)
PSL	Low pressure switch (for control)
DCL	Reactor
DIP-IPM	Inverter module
NF1-8	Noise filter
PSW1	Switch (for forced defrosting use)
PSW2	Switch (for checking use (▽))
PSW3	Switch (for checking use (△))
DSW1	Switch (for test run use)
DSW2	Switch (for aux. function setting use)
DSW3	Switch (for outdoor capacity setting use)
DSW4	Switch (for refrigerant system setting use)
DSW5	Switch
DSW6	Switch
RSW1	Switch (for refrigerant system setting use)
CH	Oil heater
DS1,2	Plug-in connector
E1,2	Earth
CE1,2	Terminating connector

◆ RAS-(8/10)WHNPE (3N~ 400V 50Hz)

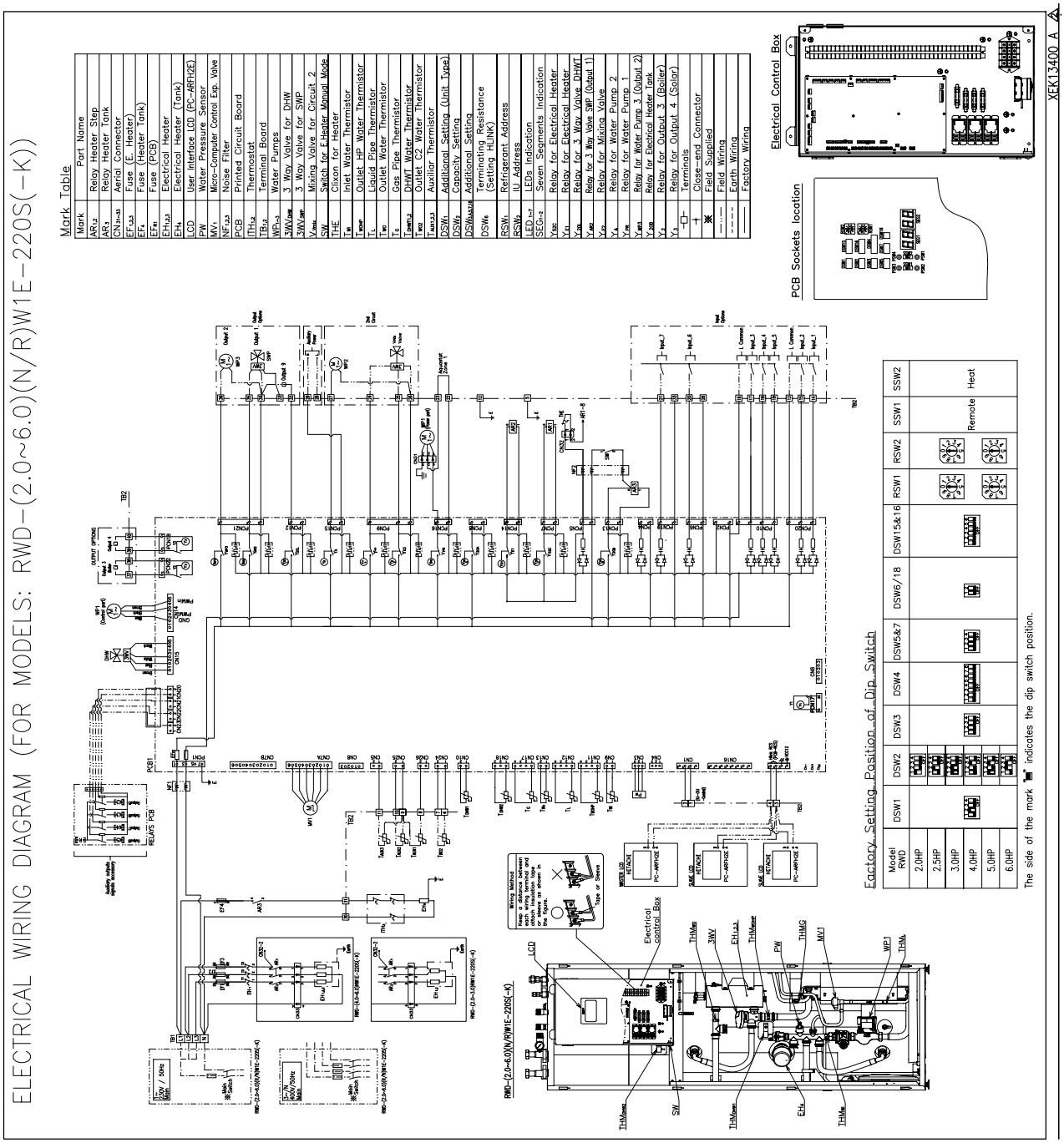


MARK	NAME
MC	Motor (for compressor use)
M0F1,2	Motor (for fan use
EF1,2	Power fuse
RVR	4 way solenoid valve
SVA,C	Solenoid valve
MV	Electronic expansion valve
CMC	Mag Contactor (for compressor use)
TB1	Terminal stand
TF1	Transformer
PCB1	Control PCB
PCB2	Inverter PCB
PCB3	Power Source PCB
EFR1	Fuse
EF1,3	Fuse
EF1	Fuse
Y52C	Aux Relay (for compressor and magnetic contactor use)
Y20A	Aux Relay (for solenoid valve use)
Y20C	Aux Relay (for solenoid valve use)
Y21SW	Aux Relay (for 4 way solenoid valve use)
YCH	Aux Relay (for oil heater use)
DM1	Diode module
THM7	Thermistor (for outdoor temperature use)
THM8	Thermistor (for piping use)
THM9	Thermistor (for TD use)
THM	Fan thermistor
Pd	Pressure sensor (discharge side)
PSH	High pressure switch (for protection)
PSL	Low pressure switch (for control)
DCL	Reactor
CB1,2	Capacitor
IPM	Inverter module
NF1-5	Noise filter
PSW1	Switch (for forced defrosting use)
PSW2	Switch (for checking use (▽))
PSW3	Switch (for checking use (△))
DSW1	Switch (for test run use)
DSW2	Switch (for aux. function setting use)
DSW3	Switch (for outdoor capacity setting use)
DSW4	Switch (for refrigerant system setting use)
DSW5	Switch
DSW6	Switch
CTu,CTv	Rheotrope Current Detector
CS1, CS2	Capacitor
ZNR	Surge Absorber
RS1,2 R1,2	Resistor
CH	Crankcase Heater
DS1,DS2	Plug-in connector
DS1,2	Plug-in connector
E1,2	Earth
CE1,2	Terminating connector

8.5.2 Split system - Indoor unit - YUTAKI S



8.5.3 Split system - Indoor unit - YUTAKI S COMBI)



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