



Air to Water Heat Pump User manual

MCM-D3E0N

- Thank you for purchasing this Samsung Product.
- Before operating this unit, please read this manual carefully and retain it for future reference.

SAMSUNG





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***Correct Disposal of This Product
(Waste Electrical & Electronic Equipment)***

(Applicable in countries with separate collection systems)

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

For information on Samsung's environmental commitments and product regulatory obligations, e.g. REACH, visit our sustainability page available via www.samsung.com

Hereby, Samsung declares that this radio equipment is in compliance with Directive 2014/53/EU and with the relevant statutory requirements in the UK. The full text of the EU declaration of conformity and the UK declaration of conformity is available at the following internet address: <http://www.samsung.com>, go to Support > Search Product Support and enter the model name.



Safety Information

This content is intended to protect the user's safety and prevent property damage. Please read it carefully for correct use of the product.

WARNING

Hazards or unsafe practices that may result in severe personal injury or death.

CAUTION

Hazards or unsafe practices that may result in minor personal injury or property damage.

FOR INSTALLATION

WARNING

The installation of this appliance must be performed by a qualified technician or service company.

- Failing to do so may result in electric shock, fire, explosion, problems with the product, or injury.

You must connect the product with rated power upon installation.

- Failing to do so may result in problems with the product, electric shock, or fire.

Do not install this appliance near a heater, inflammable material. Do not install this appliance in a humid, oily or dusty location, in a location exposed to direct sunlight and water (rain drops). Do not install this appliance in a location where gas may leak.

- Failing to do so may result in electric shock or fire.

CAUTION

Install the product on a hard and even place that can support its weight.

- If the place cannot support its weight, the product may fall down and it may cause product damage.

FOR POWER SUPPLY

WARNING

Do not bend or pull the power cord excessively. Do not twist or tie up the power cord.

- Failing to do so may result in electric shock or fire.



FOR OPERATION

WARNING

If the appliance generates a strange noise, a burning smell or smoke, unplug the product immediately and contact your nearest service centre.

- Failing to do so may result in electric shock or fire.

To reinstall the product, please contact your nearest service centre.

- Failing to do so may result in problems with the product, water leakage, electric shock, or fire.
- A delivery service for the product is not provided. If you reinstall the product in another location, additional construction expenses and an installation fee will be charged.

If the malfunction diagnosis indicator appears or malfunctions, then stop operation immediately.

- If you detect any burning smells from the product or it malfunctions, then immediately turn off the product and power, and then contact the service centre. Continuing to use the device in this state can cause electrical shock, fire, or damage to the product.

Do not attempt to repair, disassemble, or modify the product yourself.

- Failing to do so may result in electric shock, fire, product malfunction, or injury.

CAUTION

Do not allow water to enter the product.

- Failing to do so may result in fire or explosion.

Do not operate the product with wet hands.

- Failing to do so may result in electric shock.

Do not spray volatile material such as insecticide onto the surface of the product.

- As well as being harmful to humans, it may also result in electric shock, fire, or product malfunction.

Do not give a strong impact to the product and do not disassemble the product.

Do not use this product for other purposes.

Do not press the buttons with any sharp objects.

- Failing to do so may result in electric shock or part damage.

FOR CLEANING

WARNING

Do not clean the product by spraying water directly onto it. Do not use benzene, thinner, alcohol or acetone to clean the product.

- Failing to do so may result in discoloration, deformation, damage, electric shock, or fire.





Controller Operation

Operate the product by using the controller.

Operating basic modes

Select Zone 1 or 2 on the control card on the Home screen to access the zone page, and select from Auto, Cool, Heat modes.

Auto mode

Cascade controller will automatically adjust the temperature of supply water with the Auto mode for indoor heating.

NOTE

- When Water Law is active, the target supply water temperature will be determined automatically depending on the outdoor temperature: For the Heat mode, colder outdoor temperatures will result in warmer water.

Cool mode

You can adjust cooling temperature as you like with the Cool mode to cool indoor place.

- When selecting the Heat mode during the Cool mode, the Cool mode will be canceled.

Heat mode

Space heating is available with the Heat mode by providing hot water in the spring, autumn and winter.

- When selecting the Cool mode during the Heat mode, the Heat mode will be canceled.

NOTE


- When setting standard cooling & heating temperature as indoor temperature, the Auto mode cannot be selected.



Domestic Hot Water (DHW) mode

To access the DHW page, select DHW from the control card on the Home screen. Choose from the following modes: Economic, Standard, Power or Forced.

NOTE

- To operate hot water mode, you need to set the hot water function 'YES' in the field specification setting mode (#3011) of AI Home and connect the temperature sensor of hot water tank.
-  (power) for the DHW mode cannot be used when the Booster heater is not in use.
- If the Outdoor unit mode of all units is [Cooling, Heating, Hot water] and 3-way valve type is [Shared], when the Forced mode is selected, all outdoor units are forced to operate in DHW mode.

CAUTION

- By default field setting value option, this function will not be turned off automatically.
- To set a specific duration for Forced mode, adjust the field settings in AI Home.

Adjusting desired temperature

On each zone page, touch Temp and scroll up/down to adjust the temperature.

NOTE

- Temperature adjustments can be made in increments of 0.5°C or 1°C (default is 1°C).





Power Smart Features

There is a variety of useful functionality provided by the Samsung product.

Operation status

Swipe on the Home screen and select the Overview card. This allows checking the operating status of the Cascade system. The below operations can be checked on the Overview screen.

Outdoor unit

The connected outdoor unit's operating status (Working, Stopped and Error), each outdoor unit's operating mode, entering & leaving water temperatures, Energy usage, and Operation time.

General information

Outdoor temperature, Smart grid status, Demand response status, PV status, the operation status of backup boiler, backup heater and booster heater.

Quiet mode

Noise from operation can be reduced with the Quiet mode.

On the Home screen, select  > **Heat pump** > **Quiet mode**.

NOTE

- When setting the Quiet mode through a contact from the outdoor unit or setting the Automatically running in the service mode using the AI Home, the mode cannot be controlled by user entry.

Away mode

Heating can operate at low temperature while you are out with the Away mode enabled.

Swipe on the Home screen to access the Away card, and select **Away mode on**.

NOTE

- To cancel Away mode, select **Turn off Away** on the Home screen.
- A preset schedule will not be applied if Away mode is on.



SmartThings app

You will need a Samsung account to access AI Home, our network-based service that includes apps and our other smart features available through your device.

1 Checking the power connections

Check if the power is connected to the product and the access point.

2 Setting up and connecting to a Wi-Fi access point using your smartphone

1 To connect the product to a Wi-Fi network, turn on Wi-Fi at "Settings > Connections > Wi-Fi", and then select the access point to connect to

- Only alphanumeric characters are supported for wireless access point names (SSIDs).
If an SSID has a special character, rename it before connecting to it.

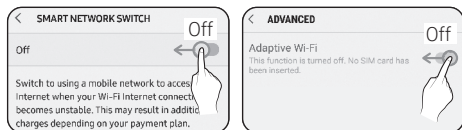


NOTE

- The Cascade Controller can only operate in a 2.4GHz environment.
Please make sure to connect to an access point with a 2.4GHz for device connection.
- The Cascade controller and each outdoor unit's Control Kit should be installed in an environment that shares the same SSID and password.
- The Mono R290 with pump model has an indoor unit PBA mounted inside the product, and a separate enclosed Single Wi-Fi kit must be installed in an environment that shares the same SSID and password.

2 Turning off "SMART NETWORK SWITCH" at "Settings > Connections > Wi-Fi" on your Smartphone

- If "SMART NETWORK SWITCH" or "Adaptive Wi-Fi" is turned off, you cannot connect to the network. Be sure to turn off these functions before connecting to the network.



NOTE

- The setup may differ depending on your smartphone model, OS version and manufacturer.

3 Checking the Internet connectivity

- After connecting to Wi-Fi, check that your smartphone is connected to the Internet.

NOTE

- A firewall may prevent your smartphone from connecting to the Internet. In this case, contact your Internet service provider for troubleshooting.



SmartThings app

3 Downloading the SmartThings app and registering your Samsung account

1 Downloading the SmartThings app

- Search for "SmartThings" on Play Store or App Store, and download the SmartThings app to your smartphone.
- If the SmartThings app is already installed on your smartphone, update it to the latest version.

NOTE

- The supporting software version of the SmartThings app is subject to change according to the OS supporting policy the manufacturer provides.
In addition, as for the SmartThings app or the functions that the app supports, the new application update policy on the existing OS version can be suspended due to usability or security reasons.
- The SmartThings app is subject to change without notice to improve usability or performance. As the mobile phone OS version is updated every year, the SmartThings is also updated continually according to the latest OS.
- If you have enquiries regarding the items mentioned above, please contact us on st.service@samsung.com.

2 Registering your Samsung account

- A Samsung account is required to use the SmartThings app. To create your Samsung account and log in to your account, follow the instructions displayed on the SmartThings app. You do not need to install an additional app.

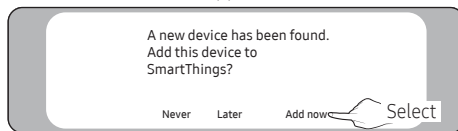
NOTE

- If you already have a Samsung account, log in to the account. When your smartphone is a Samsung device and you have a Samsung account, your smartphone is automatically logged in to your account.
- If you log in from a smartphone produced for a different country, you need to log in with its country code when you create your Samsung account, and the SmartThings app may not be used on some smartphones.

4 Connecting the SmartThings app to your product

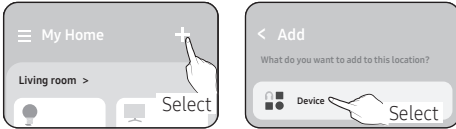
1 Selecting the product to connect to

- 1) After the SmartThings app is started, select "Add now" when a pop-up window saying that a product to connect to is found appears.



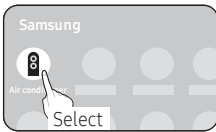


2) If the pop-up window does not appear, select "+", "Add" and then "Device".



You can add a product you want to connect to by selecting it manually.

- Select manually: Samsung > Air conditioner > Heat pump



2 Connecting the SmartThings app to your product

- Follow the instructions displayed on the SmartThings app to connect to your product.
- For information on how to use the SmartThings app, select the How To menu on the app.

NOTE

- If any pop-window appears on the top of the smartphone while connecting to your product, do not select it.
- If a Samsung account-related country error occurs during connecting to your product, log out of your current Samsung account, log in to your previous Samsung account, and then delete all devices that have been connected previously. Then, log in to your current Samsung account again, and then configure the settings.
- If a failure message appears while adding a device, see "Setting up and connecting to a Wi-Fi access point using your smartphone" on page 9. The connection may fail temporarily due to an installation location problem of the access point or other problems.
- If the number of added indoor units is incorrect after adding devices, run the tracking again and then try adding the devices again.
- For security protocols for wireless/wired access points, WPA-PSK and WPA2-PSK are recommended. For authentication methods, AES is recommended. New Wi-Fi authentication specifications and Wi-Fi non-standard authentication methods are not supported.
- If your Internet service provider permanently have registered the MAC address (a unique identification number) of your PC or modem, you may not be able to connect your product to the Internet. Contact your Internet service provider and ask how to connect devices other than your PC (such as an air conditioner and an air purifier) to the Internet.
- Since the APP version will be continuously updated, there may be differences between the operation interface in the manual and the actual APP, please refer to the actual APP operation.





Energy-saving operation

Setting a schedule

Set a schedule to have the product perform a specific operation on a set day, at a set time, for a set period. Swipe on the Home screen to display the Schedules card. Touch the "+" icon on the top right of the screen to create a schedule.

After adding a schedule, set time blocks to set the operating time/period, set the temperature/mode, and press Save to set the schedule.

NOTE

- The Schedules card on the Home screen will display a summary of the set schedule from the day before the scheduled operation.
- Touch and hold the line representing a schedule, then drag to adjust the scheduled operation time/period.
- Schedules can't be set when Away mode is on.

Energy

Connect to SmartThings via Wi-Fi to view energy consumption and energy settings on the Energy card on the Home screen.


NOTE

- Refer to page 9 on how to connect to SmartThings.
- Monthly energy consumption and the current month's energy consumption are displayed on the Energy card.
- Select an energy item on the Energy card to view a graph showing energy consumption and savings.
- The SmartThings energy service on your smart device links with the energy service on the product.
- Energy savings measurements are made by the product and can differ from actual energy savings.



Setting Options

How to set the Options

Select  on the Home screen, and select from the setting options. General Settings and Heat Pump Settings are available.

General settings

Step1	Step 2	Step 3	Description	Default
Samsung Account			Samsung account input/display	
Connections	Wi-Fi		Wi-Fi on or off	On
	Easy connection		SmartThings QR code display	
	Bluetooth			
Lock			Child lock on or off	Off
Home device notifications			Notifications on or off	On
Display	Display mode		Dark / Light	Dark
	Brightness		Screen brightness adjustment	
	Font size		Font size adjustment	
	Power saving		Power saving on or off	Off
Screen and style	Cover Screen		Cover screen on or off	On
	Screen timeout		Cover screen retention time settings	7 min
App lock			App lock on or off	Off
Storage	Storage information		Update apps	
Security status of your devices				
Language			Language selection	Set country's language
Date and time	Automatic date and time		Auto date/time on or off	On
	Select time zone		Time zone selection	
	Use 24-hour format		AM/PM format on or off	On
Accessibility	Visibility enhancements	High contrast	High contrast on or off	Off
		Color inversion	Color inversion on or off	Off
		Greyscale	Greyscale on of off	Off
		Magnification	Magnification on of off	Off
		Font size	Font size adjustment	

Setting Options

Step1	Step2	Step3	Description	Default
Software update	Download and install		Check for software updates	
Support	Watch tutorial again		Watch tutorial again	
	User manual		User Manual QR code display	
	Remote support		Remote support	
Reset	Reset network settings		Reset connected network settings	
	Reset all settings		Reset all settings	
	Restart		Restart	
About device	Status information		Wi-Fi MAC address	
			Bluetooth address	
			Serial number	
	Legal information	AI Home Privacy Notice	Privacy Notice	
		Terms of Service for AI Home	Service notice	
		Open source licenses	Open source notice	
	Software information			

NOTE

- When Cover Screen is off, screen inactivity of 10 minutes turns the LCD screen off. Touch the screen to return to the Home screen.
When Cover Screen is on, Cover Screen is displayed for the duration set in Settings. The LCD screen turns off after a further 10 minutes. Touch the screen to return to the Home screen.



Heat pump settings


Step 1	Step 2	Step 3	Description	Default
Quiet	Quiet mode		Quiet mode on or off	Off
	Schedule Quiet mode		Schedule Quiet mode on or off	Off
Temperature control unit			Set temperature control unit	1°C
Temperature limits	Cooling water outlet		Set cooling temperature limit	16-25°C
	Heating water outlet		Set heating temperature limit	25°C-55/65/70/75°C ^(*)
	Hot water		Set hot water temperature limit	40°C-53/55/63/70°C ^(*)
PV energy saving			PV energy saving on or off	Off
Emergency mode	Auto emergency mode		Auto emergency mode on or off	Off
	Start manually	Set Emergency heating Emergency hot water supply on or off		Off
Heat pump software update		Heat pump software update check	Update	
Smart reset			Reset on or off	Off
Error history			View error history	
Service information			View service info	

- ^(*) The value is determined according to the type of outdoor unit.



Installation/Service mode

Accessing Service mode

On the Home screen, select  > **Heat pump** > **Service information**. When "Customer service contact" is displayed, touch the display 10 to 15 times in quick succession to access Service mode.

Heat pump FSV options can be set in Service mode.

NOTE

- Certain setting changes require a reboot, in which case the product will reboot after displaying a reboot notification.





Installation/Service mode

NOTE

- Unavailable functions are marked inactive and they cannot be set.
- If communication initialization is needed after the setting, the system will reset automatically and communication will be initialized.

Step1	Step2	Step3	Description	Default
Service information	Service company		Enter service provider's name	
	Call number		Entering a phone number	
	E-mail		Entering an email address	
	Last service date		Enter service date	
	Installation date		Enter installation date	
Heat pump options	Zone 2 (4061)		Used / Not used	Not used
	Water pump settings	Inverter pump control (4051)	Not used / Max 100% / Max 85% / Max 70% (only for Heat pumps)	100%
		Inverter pump minimum control (4054)	25% / 35% / 45% / 55% (only for Heat pumps)	25%
		Zone 1 pump control(Thermo off) (4062)	Off/On / Off and On	Off and On
		Zone 2 pump control(Thermo off) (4063)	Off/On / Off and On	Off and On
	Mixing valve (4041)		Used / Not used	Not used





Installation/Service mode

Step1	Step2	Step3	Description	Default
Heat pump options	Activating hot water function (3011) ^{Note1)}		Used / Not used When Used is selected, select from Control hot water thermo type 1 and Control hot water thermo type 2	Not used
	Energy metering (3083, 3084, 3085, 3086) ^{Note2)}	Booster heater capacity (3083)	0kW to 30kW	0kW
		Backup heater capacity (3084)	0kW to 30kW	0kW
		Heating/Cooling pump power (3085)	0W to 1000W	0W
		DHW pump power (3086)	0W to 1000W	0W
	Solar panel (3061)		Used / Not used	Not used
	Disinfection (3041, 3042, 3043)		On/Off	On
		Interval (3042)	Sun / Mon / Tue / Wed / Thu / Fri / Sat	Fri
		Start time (3043)	Set time	02:00PM / 11:00PM ^(*)
	Water Law settings	WL type (2041)	Water Law1 / Water Law 2	Water Law1
		Max outdoor temperature (2011)	-20 to 5°C	-10 °C
		Min outdoor temperature (2012)	10 to 20°C	15 °C
		Max water out temp for Water Law1 (2021)	17 to 65/70/75°C ^(*)	40°C
		Min water out temp for Water Law1 (2022)	17 to 65/70/75°C ^(*)	25°C
		Max water out temp for Water Law 2 (2031)	17 to 65/70/75°C ^(*)	50°C
		Min water out temp for Water Law 2 (2032)	17 to 65/70/75°C ^(*)	35°C
	Away mode settings	Water out temperature (5013)	15 to 55°C	15°C
		Water Law 1 temperature (5017)	15 to 55°C	15°C
		Water Law 2 temperature (5018)	15 to 55°C	15°C
		Water out temperature (5011)	5 to 25°C	25°C

Installation/Service mode





Step1	Step2	Step3	Description	Default
Heat pump options	Away mode settings	DHW tank temperature (5019)	30 to 70°C	30°C
	DHW heat pump settings	Max temp for heat pump (3021)	45 to 55/63/70°C ^(*)	55/63/70°C ^(*)
		Heat pump thermo off hysteresis (3022)	0 to 10°C	0°C
		Heat pump thermo on hysteresis (3023)	5 to 30°C	5°C
		Max hot water operating time (3025)	5 min to 95 min.	30 min.
		Max heating operating time (3026)	30 min to 600 min.	180 min.
	PV control / Peak power control (5041, 5081)		On/Off	Off
			When On is selected, select from PV control and Peak power control	PV control ^(Note 3)
	Frequency ratio control (5051)		On/Off	Off
	Smart grid control (5091)		On/Off	Off
	Booster heater (3031)		On/Off	On
	Backup heater (4021)		On/Off	Off
			When On is selected, select from Buffer tank and Pipe	Buffer tank
Backup boiler (4031)		On/Off	Off	
Heat pump status		Heat pump status display		

Installation/Service mode



Installation/Service mode

Step1	Step2	Step3	Description	Default
Self-test mode	Self-test mode display <small>Note 4)</small>		On/Off	Off
			Self-test mode display	
			Water pump (Heating/ Cooling)	Off
			Water pump (DHW)	Off
			Booster heater On/Off	Off
			DHW valve (3way valve) On/Off	Off
			Zone1 pump	Off
			Backup heater <small>Note 5)</small>	Off
			Backup boiler	Off
			Zone2 pump	Off
		Mixing valve	Off	
Set number for connected heat pump <small>Note 6)</small>			0 to 8	0
Cascade options	3-way valve type		Individual / Shared	Individual
	Water distributor type		Buffer tank / Separator	Buffer tank
	Operation pattern constants	Initial operation number weight	0.05 to 1.00	0.2
		Time control delay	5min to 30min	10min
		Time control on temperature	1°C to 30°C	15°C
		Time control off temperature	1°C to 30°C	7°C
	Operation pattern		Single unit operation, Temperature difference operation, Simultaneous operation	Temperature difference operation
	Outdoor unit mode		[Cooling, heating, hot water], [Cooling, heating], [Hot water]	
	Outdoor unit on/off control		Time control / Capacity control	Time control
High efficiency mode for outdoor unit		Used / Not used	Not used	

Installation/Service mode



Step1	Step2	Step3	Description	Default
Field setting value	Simple setting		Enter FSV ID and value	
Concrete curing			Concrete curing start	
ODU K3 reset			K3 reset	
Reset all service mode data			Reset service settings	
Service mode history			View history of service settings	

- ^{Note1} After making a change to Activating hot water function (3011) settings, the product must be rebooted and re-registered in SmartThings.
- ^{Note2} If Booster heater, Backup heater, or common pumps for heating/cooling or DHW is not installed, set this value to 0.
- ^{Note3} PV control must be set to Used to access the PV energy saving menu.
- ^{Note4} In Self-test mode of heat pumps, only Water pump and DHW valve can be controlled.
- ^{Note5} Backup heater of Cascade controller in Self-test mode can be activated only when the direction of all 3-way valves of Cascade and Control Kit are Room (OFF) and all Water Pumps of Cascade (Heating/Cooling) and all Control Kit (except for Hot water only unit) are turned on.
- ^{Note6} If this value and the number of connected heat pumps are different, an error(E638) will occur.
- ^(*) The value is determined according to the type of outdoor unit.



Installation/Service mode

NOTE

- Address is displayed in hexadecimal. Please refer to the following table.

Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal
00	0	10	16	20	32
01	1	11	17	21	33
02	2	12	18	22	34
03	3	13	19	23	35
04	4	14	20	24	36
05	5	15	21	25	37
06	6	16	22	26	38
07	7	17	23	27	39
08	8	18	24	28	40
09	9	19	25	29	41
0A	10	1A	26	2A	42
0B	11	1B	27	2B	43
0C	12	1C	28	2C	44
0D	13	1D	29	2D	45
0E	14	1E	30	2E	46
0F	15	1F	31	2F	47

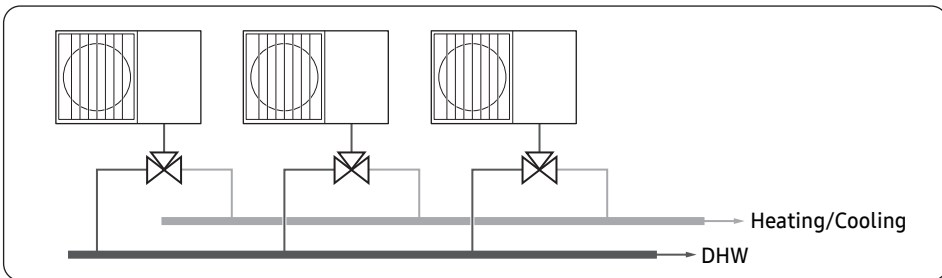
Hexadecimal	Decimal	Hexadecimal	Decimal
30	48	40	64
31	49	41	65
32	50	42	66
33	51	43	67
34	52	44	68
35	53	45	69
36	54	46	70
37	55	47	71
38	56	48	72
39	57	49	73
3A	58	4A	74
3B	59	4B	75
3C	60	4C	76
3D	61	4D	77
3E	62	4E	78
3F	63	4F	79



Cascade option - 3-way valve type

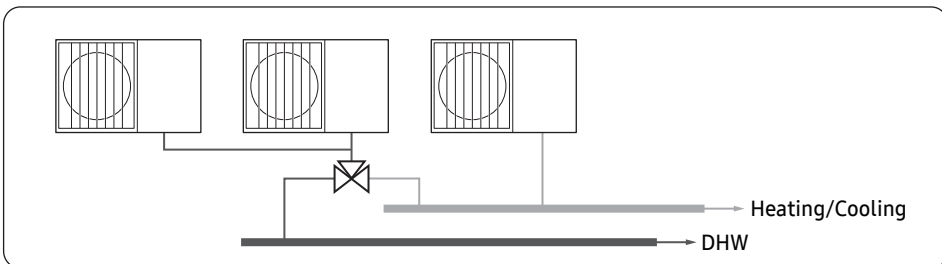
Individual 3-way valve

- If individual 3-way valve is installed to each outdoor unit, select 3-way valve type to "Individual".
- The outdoor unit mode of the units with the individual 3-way valve must be set to "Cooling, heating, hot water" in Service mode, to operate the units in both Heating/Cooling and Hot water modes.
- When Heating/Cooling and Hot water are requested simultaneously, the outdoor units with the 3-way valve will change the direction of their 3-way valve so that half of the outdoor units operate in Heating/Cooling mode and the rest operate in Hot water mode.



Shared 3-way valve

- If two or more outdoor units are connected in a 3-way valve, select 3-way valve type to "Shared".
- The outdoor unit mode of the units connected to the common 3-way valve must be set to "Cooling, heating, hot water" in Service mode, to operate the units in both Heating/Cooling and Hot water modes.
- When Heating/Cooling and Hot water are requested simultaneously, the Cascade controller will change the direction of the common 3-way valve to enable Heating/Cooling and Hot water modes to operate simultaneously. (Example : In the figure below, the direction of the common 3-way valve is DHW mode)



NOTE

- Refer to the installation manual for more detailed installation examples.





Installation/Service mode

Cascade option - Water distributor type

Buffer tank

- If a Buffer tank is installed for Heating/Cooling operation, select the Water distributor type to "Buffer tank"
- In this case, Heating/Cooling operation will be controlled by the Buffer tank temperature.

Separator

- If a Separator (Low loss header) is installed for Heating/Cooling operation, select the Water distributor type to "Separator"
- In this case, Heating/Cooling operation will be controlled by the outlet temperature after the Separator (please use the Zone 2 sensor)

NOTE

- Refer to the installation manual for more detailed installation examples.
- In the Buffer tank case, if 2 zone control is used (FSV 4061=1), the Heating/Cooling operation will be controlled by zone outlet temperatures (Tw2_Z1, Tw2_Z2), not by the Buffer tank temperature.

Cascade option - Operation pattern constants

- Initial operation number weight : refer to the Temperaturer Difference Operation in Operation pattern
- Time control delay, Time control on/off temperature : refer to the Time control in Outdoor unit on/off control

Cascade option - Operation pattern

- When Heating/Cooling operation starts, the number of units that start Heating/Cooling operation is 1 unit (Single unit operation), N units as calculated below (Temperature difference operation), or all units (Simultaneous operation)
- [Temperature difference operation] : $N \text{ (number of starting units)} = \lfloor \text{Set temperature} - \text{current temperature} \rfloor \times \text{(number of units capable of Heating/Cooling operation)} \times \text{(Initial operation number weight)}$





Cascade option - Outdoor unit mode

Cooling, heating, hot water

- if the Outdoor unit mode of an unit is selected as Cooling, heating, hot water, the Cascade controller can operate the unit in Cooling, heating or Hot water mode as needed.
- The Cooling, heating, hot water outdoor unit must have an individual or shared 3-way valve to be operated in Cooling, heating and Hot water modes.

Cooling, heating

- if the Outdoor unit mode of an unit is selected as Cooling, heating, the Cascade controller can operate the unit ONLY in Cooling, heating mode.

Hot water

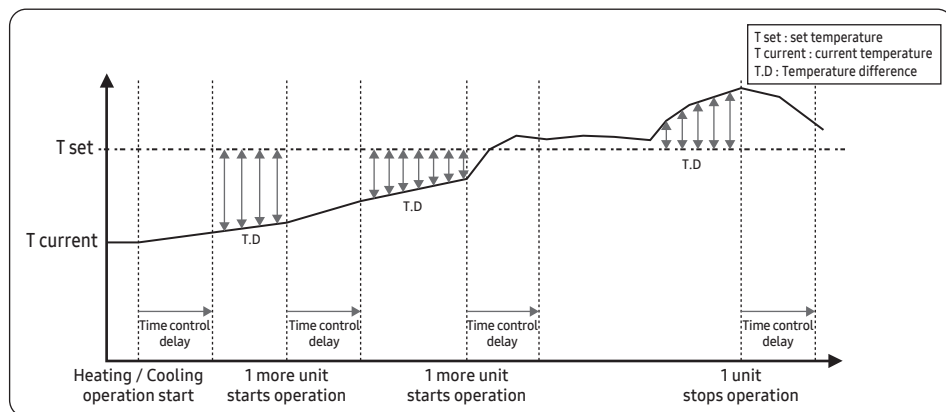
- if the Outdoor unit mode of an unit is selected as Hot water, the Cascade controller can operate the unit ONLY in Hot water mode.

Cascade option - Outdoor unit on/off control

Time control

- After "Time control delay" has elapsed after some units start or stop heating/cooling operation, the absolute temperature difference between the set and current temperatures is added every minute.
- If the sum of the temperature difference is larger than "Time control on temperature" and the current temperature does not reach the set temperature, one unit starts heating/cooling operation.
- If the sum of the temperature difference is larger than "Time control off temperature" and the current temperature has met the set temperature, one unit stops heating/cooling operation.
- While the temperature difference is small, the temperature difference is not added and the sum is reset to 0 °C.

[Example of heating operation]





Installation/Service mode

Capacity control

- if all units in heating/cooling mode are operating at their full capacity and the current temperature does not reach the set temperature, one more unit will start operating in heating/cooling mode.
- If all units in heating/cooling mode are operating at their minimum capacity and the current temperature has met the set temperature, one of the units in heating/cooling mode will stop operating.

Cascade option - High efficiency mode for outdoor unit

- If this mode is activated, the compressor frequencies of all units are limited to the efficient operating range.
- When the set temperature cannot be reached even when all units are operating, the high efficiency mode will be deactivated to increase the compressor capacity of the units. The high efficiency mode will be automatically activated when the operation is thermo off.



Field setting mode

Air to Water Heat Pump: Only MCM-D3E0N Model

⚠ CAUTION

- The hereafter mentioned field setting values only apply to the MCM-D3E0N.

📖 NOTE

- Be sure to reset the power when changing the FSV (#3041 to 3046) of disinfection operation and the FSV (#5011 to 5019) of setting the Away mode.

Field Setting Value (FSV) 10**

Code 10** : Upper and lower temperature limits of each operation mode of AI Home Heating, Cooling, DHW (Tank)

- The values in the following table are just examples for your understanding.

Main Code	Menu	Function				Sub Code	Remark	F.S. Value	Setting Standard		
		Item	Step	Unit	Default				Min. value	Max. value	
Wired Controller Code 10**	Cooling	Water Out Temperature for Cooling	Max	1	°C	1011			25	18	25
			Min	1	°C	1012			16	5	18
	Heating	Water Out Temperature for Heating	Max	1	°C	1031			65/70/75 ^(*)	37	65/70/75 ^(*)
			Min	1	°C	1032			25	15	37
	DHW	DHW tank Temperature	Max	1	°C	1051			55/63/70 ^(*)	50	70
			Min	1	°C	1052			40	30	40
	Hysteresis for Thermo ON	Water Out Hysteresis for Heat		0.5	°C	1061			0	0	7
			Water Out Hysteresis for Cool		0.5	°C	1062			1	1

📖 NOTE

- The FSV #3011 in the AI Home should be set to 1 or 2 to use the DHW mode.
- ^(*) The value is determined according to the type of outdoor unit.



Field setting mode

AI Home Setting Range: Code 10**

Space Cooling (FSV#1011/1012)

- Target water outlet temperature ^(*): Upper limit(#1011, Default 25°C, Range : 18 ~ 25°C), Lower limit(#1012, Default 16°C, Range : 5 ~ 18°C)
 - With this default FSV settings, user can change the target water outlet temperature within the range of 16 ~ 25°C for cooling.
 - Do not set it below 16 degrees to prevent floor condensation when using underfloor cooling.

Space Heating (FSV#1031/1032)

- Target water outlet temperature ^(*): Upper limit(#1031, Default 65/70/75°C, Range : 37 ~ 65/70/75°C), Lower limit(#1032, Default 25°C, Range : 15 ~ 37°C)
 - With this default FSV settings, user can change the target water outlet temperature within the range of 25 ~ 65/70/75°C for heating.

DHW Heating (FSV#1051/1052)

- Target DHW tank temperature : Upper limit(#1051, Default 55/63/70°C, Range : 50 ~ 70°C), Lower limit(#1052, Default 40°C, Range : 30 ~ 40°C)
 - With this default FSV settings, user can change the target tank temperature within the range of 40 ~ 55/63/70°C for DHW heating.

Hysteresis (FSV#1061/1062)

If the value of the FSV is high, it takes longer to thermo on

- Heating control by hysteresis
 - Ex) When target water outlet temperature(*1) is 55°C, thermo off temperature is 56°C(one unit operating) or 57°C(two or more units operating), and thermo on temperature is 55°C-FSV#1061(Default 0°C, Range 0~7°C)
- Cooling control by hysteresis
 - Ex) When target water outlet temperature(*1) is 7°C, thermo off temperature is 6°C(one unit operating) or 5°C(two or more units operating), and thermo on temperature is 7°C+FSV#1062(Default 1°C, Range 1~7°C)

NOTE

- ^(*) Water outlet temperature : refer to the case below
 - Case1) water distributor type = [Buffer tank] & FSV#4061=0 : Buffer tank temperature
 - Case2) water distributor type = [Separator] & FSV#4061=0 : Separator zone outlet temperature (use Zone 2 outlet sensor)
 - Case3) FSV#4061=1 : Zone 1 and 2 outlet temperatures





Field Setting Value (FSV) 20**

Code 20** : Water law control in Heating

- The values in the following table are just examples for your understanding.

Main Code	Menu	Function				Sub Code	Remark	F.S. Value	Setting Standard		
		Item	Step	Unit	Default				Min. value	Max. value	
Water Law Code 20**	Heating	Outdoor Temperature for Heating Water Law	Max	1	°C	2011			-10	-20	5
			Min	1	°C	2012			15	10	20
		Water out Temperature for WL1 Heating (UFHs)	Max	1	°C	2021			40	17	65/70/75 ^(*)
			Min	1	°C	2022			25	17	65/70/75 ^(*)
		Water out Temperature for WL2 Heating (FCUs)	Max	1	°C	2031			50	17	65/70/75 ^(*)
			Min	1	°C	2032			35	17	65/70/75 ^(*)
		Heating Water Law Selection	WL Type	-	-	2041			1 (WL1)	1	2

NOTE

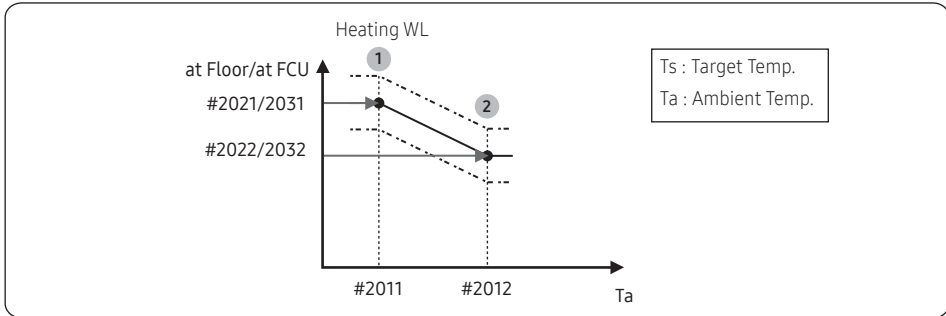
- ^(*) The value is determined according to the type of outdoor unit.





Field setting mode

Water Law : Code 20**



Water Law for Heating (FSV#2011~2041)

- Outdoor air temperature range : Lower limit ① (#2011, Default -10°C, Range : -20 ~ 5°C),
Upper limit ② (#2012, Default 15°C, Range : 10 ~ 20°C)
 - With this default settings, the water outlet temperature by heating water law can be changed within the outdoor temperature range of -10 ~ 15°C.
- Water out temperature range for floor/FCU applications respectively :
Upper limit ① (#2021/2031, Default 40/50°C, Range : 17 ~ 65/70/75°C
Lower limit ② (#2022/2032, Default 25/35°C, Range : 17 ~ 65/70/75°C)
 - With this default settings, the water outlet temperature by heating water law can be changed within the range of 25/35 ~ 40/50°C.
- In case that 2 zone control is not used (FSV# 4061 = 0), type of water law is determined by FSV#2041 (1(Default, WL1 for floor), 2(WL2 for FCU or radiator))





Field Setting Value (FSV) 30**

Code 30** : User's options for Domestic Hot Water(DHW) tank heating

- The values in the following table are just examples for your understanding.

Main Code	Menu	Function				Sub Code	Setting Standard		
		Item	Step	Unit	Default		Min. value	Max. value	
Domestic Hot Water Tank Code 30**	DHW	DHW mode activate	DHW mode	-	-	3011	1	0	2
		Heat Pump	Max. Temp.	1	°C	3021	55/63/70 ^(*)	45	55/63/70 ^(*)
			Stop	1	°C	3022	0	0	10
			Start	1	°C	3023	5	5	30
			Max. Operating Time	5	min	3025	30	5	95
			Operation Interval	30	min	3026	180	30	600
		Booster Heater	On/Off	-	-	3031	1 (On)	0 (Off)	1
			Delay Time	5	min	3032	20	20	95
			Overshoot	1	°C	3033	0	0	4
		Disinfection	On/Off	-	-	3041	1 (On)	0 (Off)	1
			Interval	1	day	3042	Fri (5)	Sun (0)	All (7)
			Start Time	1	o'clock	3043	14/23 ^(*)	0	23
			Target Temp.	5	°C	3044	70	40	70
			Duration	5	min	3045	10	5	60
			Max time	1	min	3046	480	60	1440
		Power DHW by User Input	Timer OFF Function	-	-	3051	0 (No)	0	1 (Yes)
			Time Duration	1	(x10) min	3052	6	3	30
		Solar Panel	H/P Combination	1	-	3061	0 (No)	0	1
			3-way Valve	Default Direction	-	-	3071	0 (Room)	0
	Additional Function	Energy metering	Booster Heater capacity	1	kW	3083	0	0	30
Backup Heater capacity			1	kW	3084	0	0	30	
Heating/Cooling Pump power			50	W	3085	0	0	1000	
Domestic hot water Pump power			50	W	3086	0	0	1000	

Field Setting Mode





Field setting mode

NOTE

- (*) The value is determined according to the type of outdoor unit.

DHW Heating : Code 30**

DHW Application (FSV#3011)

The FSV #3011 in the AI Home should be set to 1 or 2 to use DHW function.

If the Outdoor unit mode of all units is [Cooling, heating, hot water] and 3-way valve type is [Shared], DHW operation is controlled as follows :

- If FSV #3011 is set to 1, the DHW operation starts based on the thermo on temperature. (In case of Heating/Cooling - DHW Combined Operation Mode)
- If FSV #3011 is set to 2, the DHW operation starts based on the thermo off temperature. (In case of Heating/Cooling - DHW Combined Operation Mode)
- (For example, when the current temperature becomes 45°C under the conditions that the thermo on temperature is 43°C and the thermo off temperature is 48°C, the DHW turns off if FSV #3011 is set to 1 and DHW turns on if FSV #3011 is set to 2.)

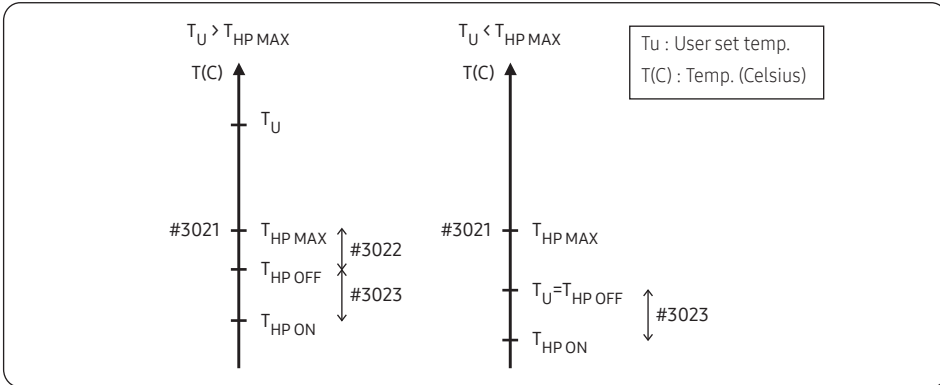
Heat Pump Variables for Controlling DHW Tank (FSV#3021~3026)

- Maximum DHW tank temperature with the heat pump operation :
FSV (#3021, Default 55/63/70°C, Range : 45 ~ 55/63/70°C.)
- Temperature difference determining the heat pump OFF temperature :
FSV #3022, Range : 0 ~ 10°C.
- Temperature difference determining the heat pump ON temperature :
FSV #3023, Default 5°C, Range : 5 ~ 30°C.



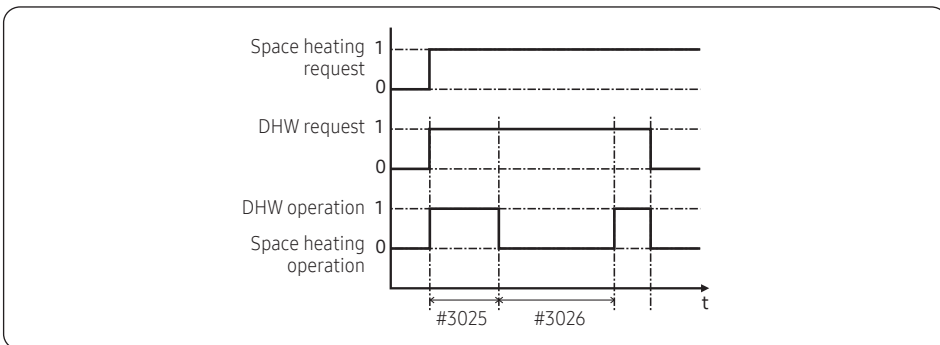


[DHW Tank water temperature thermo on/off control]



- In case of Heating/Cooling - DHW Combined Operation Mode, if the Outdoor unit mode of all units is [Cooling, heating, hot water] and 3-way valve type is [Shared], heating/cooling and DHW operate alternately according to the set time (FSV #3024, 3025, 3026), details as follows:
- DHW heating mode timer : Mode timer manage the operation terms when there are simultaneous requests of space heating/cooling and DHW.
 - #3025 (maximum DHW time, Default 30 min., Range 5 ~ 95 min.), #3026(maximum space heating operation time, Default 3 hour, Range 0.5 ~ 10 hour)
 - Maximum operation time is applied only when both DHW and Space heating request operation. DHW or Space heating operates continuously until reaching at target temperature without time limitation in the single operation.

[Time variation control of DHW and space heating mode]



Field Setting Mode



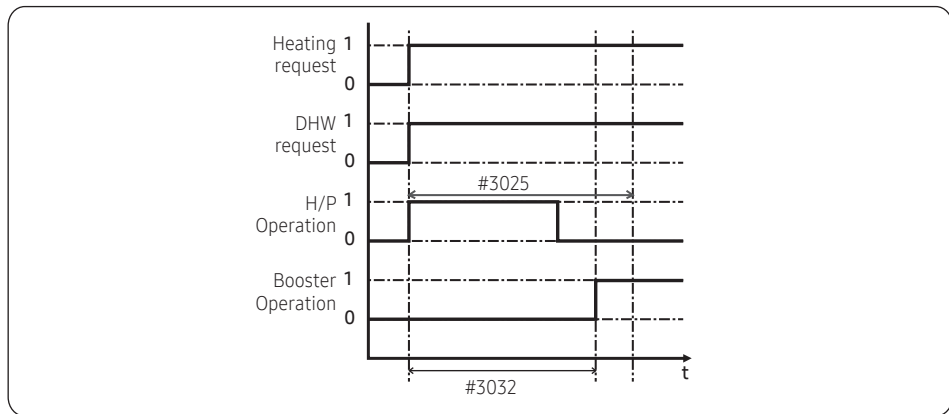


Field setting mode

Booster Heater Variables for Controlling DHW Tank (FSV#3031~3033)

- The FSV #3031 should be set to "1(On)" (Default) to use booster heater as an additional heat source for DHW tank.
- Booster heater startup delay timer : In case of DHW request, this timer will delay the operation of booster heater compared to heat pump.
 - FSV #3032 (Default 20 min., Range 20 ~ 95 min.), In "Power/Forced" DHW mode, the delay timer will be neglected, and the booster starts immediately.
 - In "Economic" DHW mode, the DHW heating will be conducted only with heat pump.
 - #3032 should be smaller than the maximum H/P time (#3025). If the delay time is set too high, it might take very long time for DHW heating.
- Temperature difference determining the booster heater OFF temperature ($T_{BH\ OFF} = T_u + \#3033$) : FSV #3033, Default 0°C, Range : 0 ~ 4°C.
- Temperature difference determining the booster heater ON temperature ($T_{BH\ ON} = T_{BH\ OFF} - 2$)

[Time variation control of Heat pump and booster heater of DHW]



NOTE

- The FSV #4022 for booster heater priority should be set to "0 (both)" or "2" (booster) to use booster heater.
- If not(backup heater priority), the booster heater can be operated in case of no backup heater demand.





<Example of using BSH in hot water supply>

Case 1) When set temperature is 70°C

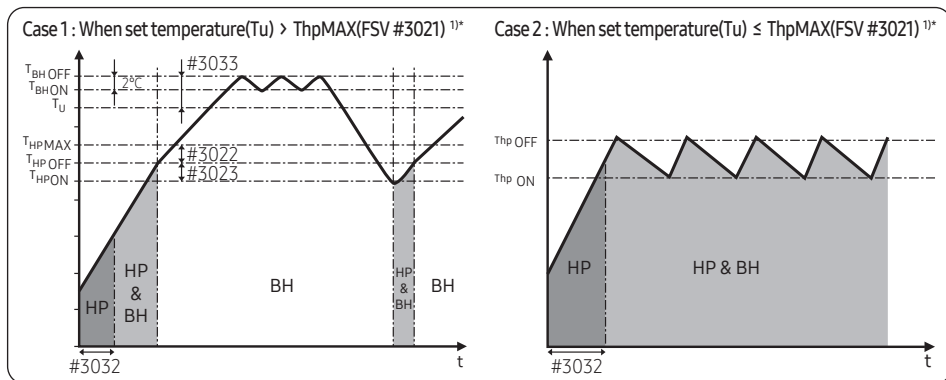
BSH is ON at less than 68 degrees, OFF at more than 70°C.

Case 2) When setting temperature is 50°C (FSV 3022 = 0°C, FSV 3023 = 5°C condition)

Heat pump and BSH are ON at less than 45 degrees, OFF at more than 50°C

(Thermo off / on operation temperature is used together)

[Thermo on/off control of Heat pump and Booster Heater]



NOTE

- ¹⁾ The value is determined according to the type of outdoor unit.
- "Power/Forced/Standard" DHW mode operation without booster heater installed, DHW mode operates as a heat pump only.





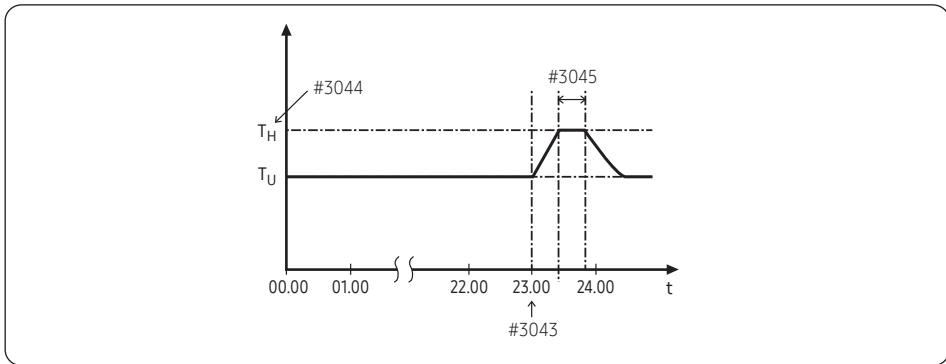
Field setting mode

Disinfection Function

1) "Booster heater" Disinfection

- The FSV #3041 should be set to "1 (On)" (Default) to use disinfection function.
 - Scheduling : Day (#3042, Default "Friday"), starting time (#3043, Default "23:00"), target tank temp. (#3044, Default "70°C"), duration (#3045, Default 10 min.)

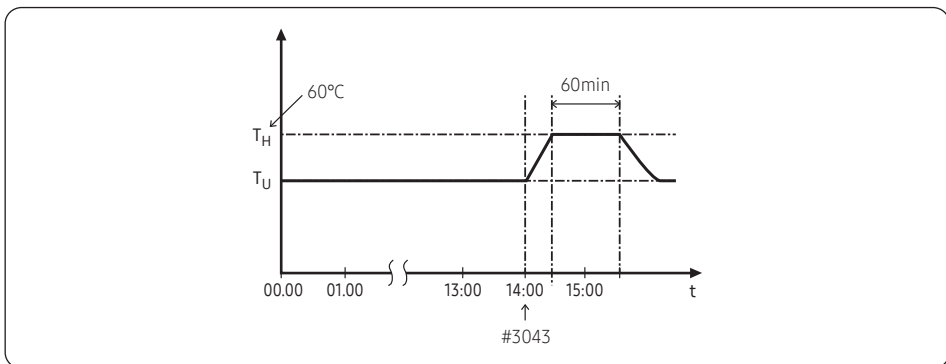
["Booster heater" disinfection function]



2) "R290 Heat Pump" Disinfection

- The FSV #3041 should be set to "1 (On)" (Default) to use disinfection function.
- When FSV#3031 is set to "0(Off)", the disinfection function is only performed by the heat pump to reach a target tank temp.
 - Scheduling : Day (#3042, Default "Friday"), starting time (#3043, Default "14:00"), target tank temp. 60°C, duration 60 min.

["R290 Heat Pump" disinfection function]



Field Setting Mode





NOTE

- Disinfection function is available only when a booster heater is connected. (However, AE***CXY*** is also capable of Heat Pump Disinfection.)
- R290 Mono Outdoor unit (AE***CXY**G) can be operated in disinfection mode without a booster heater.
- During disinfection operation of heat pumps, regardless of settings, PV/smart grid/solar interlocking/boiler interlocking control do not work.
- Ensure that the tank and booster heater capacities are sufficient to avoid exceeding the maximum operation time.
- If both the R290 MONO outdoor unit and booster heater (FSV#3031=1) are installed in the system, the outdoor unit and booster heater will operate together with the disinfection function. The R290 MONO outdoor unit operates until the DHW tank temperature reaches 61°C. The booster heater starts operation at DHW tank temperature of 60°C and stops operation at #3044 +3°C. The termination condition for the disinfection function is the same as for "booster heater" disinfection.

Forced DHW by User's Input (FSV#3052)

- Forced mode can be activated by changing the FSV #3011 (default=0=NOT USE) to 1 / 2 (USE)
- Adjust the timer settings (FSV#3051 and FSV#3052) for custom operation durations.

Additional Solar panel Installation for DHW with Heat Pump (Field Option) (FSV#3061)

- Solar panel and heat pump are able to operate simultaneously by setting value. (FSV #3061, "1")

3-way Valve (FSV#3071)

- The 3-way valve determines the direction of DHW (domestic hot water) and space heating/cooling, and cannot open in both directions simultaneously.
- There is one minute delay of 3-Way valve closing whereas no delay of valve opening.
- FSV 3071 determines a 3-way direction. [Default #3071=0; When the power to the 3-way valve is OFF, it goes towards the room]

Energy metering (FSV#3083~3086)

- To accurately indicate energy consumption, the capacity of the backup heater and booster heater and the power consumption of the common heating/cooling and DHW pumps must be set using FSV#3083~3086.

NOTE

- Energy metering measurements are made by the product and can differ from actual energy consumption.



Field setting mode

Field Setting Value (FSV) 40**

Code 40** : User's options for heating devices including backup heater and external boiler

- The values in the following table are just examples for your understanding.

Main Code	Menu	Function			Sub Code	Setting Standard			
		Item	Step	Unit		Default	Min. value	Max. value	
Heating Code 40**	Heating	Heat Pump	Heating / DHW priority	-	-	4011	0 (DHW)	0	1 (Heating)
			Low Outdoor Temp. for Heating Priority	1	°C	4012	0	-15	20
			Heating Off Temp.	1	°C	4013	35/45 ^(*)	10	35/45 ^(*)
		Backup Heater	On/Off	-	-	4021	0 (No)	0	2
			BUH/BSH Priority	1	-	4022	0(Both)	0(Both)	2(BSH)
			Back-up Heater On/Off	-	-	4023	1 (Yes)	0 (No)	1
			Threshold Temp.	1	°C	4024	0	-25	35
		Backup Boiler	Defrost Backup Temp.	5	°C	4025	15	10	55
			Back-up Boiler On/Off	-	-	4031	0 (No)	0	1 (Yes)
			Boiler Priority	-	-	4032	0 (No)	0	1 (Yes)
		Mixing valve	Threshold Condition	1	°C	4033	-15	-20	5
			Application	1	-	4041	0(No)	0	1(Yes)
			Control factor	1	-	4044	2	1	5
			Control interval	1	min	4045	1	1	30
Running Time	1		(x10) sec	4046	12	6	24		
Heating Code 40**	Addition Function	Zone control	Application	1	-	4061	0(No)	0	1(Yes)
			T-Off Zone1 pump Control	1	-	4062	2	0	2
			T-Off Zone2 pump Control	1	-	4063	2	0	2

NOTE

- ^(*) The value is determined according to the type of outdoor unit.



Additional heating option : 40**

Heat Pump Variables for Space Heating (FSV#4011~4013)

- If the outdoor unit mode of all units is [Cooling, heating, hot water] and 3-way valve type is [Shared], FSV #4011,4012 are applied as follows. (In other cases, FSV #4011,4012 are not used)
 - FSV #4011 for DHW priority is set to "0(DHW)" as a default. Space heating gets a priority by setting FSV #4011 to "1", but this is only valid when the outdoor temperature is lower than the specified temperature defined by FSV #4012.
 - In case of Heating/Cooling - DHW Combined Operation Mode, when priority is given to DHW, DHW will operate first during FSV #3025 and space heating will operate during FSV #3026. When priority is given to space heating, space heating will operate first, followed by DHW.
- Space heating off temperature(FSV #4013, Default "35/45°C", Range 10 ~ 35/45°C): At high outdoor temperature above this value, the space heating will be turned off.

Backup Heater Variables for Space Heating (FSV#4021~4025)

- The FSV #4021 should be set to 1 or 2 to use the electric backup heater as an additional heat source.
- If an immersion backup heater is installed in the buffer tank, set FSV #4021 to "1". If the backup heater is installed on the main heating pipe (before the buffer tank or separator), set FSV #4021 to "2".
- To configure the backup heater's operating conditions by setting FSV #4023 and FSV #4024.
 - When FSV #4023 is set to 0, the backup heater operates regardless of the outdoor temperature.
 - When FSV #4023 is set to 1(Default), the backup heater operates when the outdoor temperature is below FSV #4024(Default "0") to save energy; its operation is restricted at FSV #4024 or higher.
- If the set temperature is not reached even though all units capable of heating operation are in operation, the heater will operate.
- FSV #4022 can be set to priorities such as 0 (both), 1 (backup heater), and 2 (booster heater).
- The FSV #4022 for backup heater priority should be set to "0 (both)" (Default) or "1" (backup) to use backup heater. If FSV #4022 is not set to 2 (booster heater priority), the backup heater can be operated in case of no booster heater demand.
- The threshold temperature for backup heater operation during defrost mode to prevent cold draft because of chilled water can be controlled by adjusting FSV #4025. Under FSV #4025 of water outlet temperature, backup heater Will be turned on.

NOTE

- To use both backup heater and booster heater together at the same time as set FSV#4022="0", please check the capacity of the power circuit breaker of your house before use.





Field setting mode

External Backup Boiler for Space Heating (Field Option) (FSV#4031~4033)

- The FSV #4031 should be set to "1 (Yes)" to use a backup boiler as an additional heat source. (default: "0 (No installation)")
- Priority of backup boiler and heat pump is defined by FSV #4032 (default: "0 (OFF)")
- To compensate the lowered heat pump heating performance under very cold weather conditions, the backup boiler operates instead of heat pump under the threshold temperature (FSV #4033, Default "-15°C", Range -20 ~ 5°C).

NOTE

- If an external backup boiler is connected to backup heater terminal or booster heater terminal in the Cascade controller to use backup boiler as a backup heater or booster heater, set FSV#3031 or FSV#4021 to "1" and FSV#4031 to "0".

Mixing valve Installation (Field Option) (FSV#4041,4044~4046)

- The FSV #4041 should be set to "1" to use mixing valve.
- FSV #4044 determines the amount of the opening/closing degree of the valve per operation, and the larger the set number, the greater the opening/closing degree per operation. It operates every FSV#4045 set interval.
- When using mixing valve, FSV #4046 should be matched with mixing valve running time characteristic. (set according to the mixing valve specifications.)

Zone Control (Field Option) (FSV#4061~4063)

- Zone control Using AI Home (install option) FSV # 4061 should be set to "1 (Yes)" to zone control.
 - This field option controls each zone (Zone 1, Zone 2) with AI Home setting.
 - According to FSV #4062/4063 setting, Zone pump is operated when Zone1/ Zone2 Thermo Off (Setting "0": Thermo off_ Water pump off, "1": Thermo off _ Water pump on, "2": Thermo off _Water pump 7min off → 3min on →.....).





Field Setting Value (FSV) 50**/60**

Code 50**/60** : User's options for extra functions

- The values in the following table are just examples for your understanding.

Main Code	Menu	Function			Sub Code	Setting Standard				
		Item	Step	Unit		Default	Min. value	Max. value		
Others Code 50**	Away Mode	Water Out Temperature for Cooling		1	°C	5011	25	5	25	
		Water Out Temperature for Heating		1	°C	5013	15	15	55	
		Heating WL1 Temp.		1	°C	5017	15	15	55	
		Heating WL2 Temp.		1	°C	5018	15	15	55	
		DHW tank Temp.		1	°C	5019	30	30	70	
	DHW Saving	DHW Saving Temp		1	°C	5021	5	0	40	
		Application		-	-	5041	0 (No)	0	1 (Yes)	
	Power Peak Control	Select forced off parts		1	-	5042	0 (All)	0	3	
		Using input voltage		-	-	5043	1 (High)	0 (Low)	1	
		Frequency Ratio Control		-	-	5051	0 (No)	0	1 (Yes)	
	Additional Function	PV control	Application		1	-	5081	0 (No)	0	1 (Yes)
			Setting Temp Shift Value(Cooling)		1	°C	5082	2	1	20
			Setting Temp Shift Value(Heating)		1	°C	5083	2	1	50
		Smart Grid Control	Application		1	-	5091	0 (No)	0	1 (Yes)
Setting Temp Shift Value(Heating)			1	°C	5092	2	1	50		
Setting Temp Shift Value(DHW)			1	°C	5093	5	1	40		
DHW Mode (Target Tank Temp.)		1	-	5094	0	0	1			
Others Code 60**	Outdoor Unit	Heating Outdoor Unit Control	Mini Thermo ON operating time limit		1	min	6022	5	5	30





Field setting mode

Others : Code 50**/60**

Away mode (FSV#5011~5019)

- All the target temperatures – space heating and cooling, water law, DHW – are set to the values defined in the above table under the Away mode.



NOTE

- With the lowered target temperatures (FSV #5011 ~ #5019), the system operates normally.

Economic DHW Heating (FSV#5021)

- DHW heating only by the heat pump to save energy (Operated in Eco mode of AI Home)
Target DHW temperature is lower than the temperature set by user.
The temperature difference is defined by FSV #5021. (default: 5°C) If user sets the temperature 45°C, the system sets the target temperature 40°C with the default setting.





Peak Power Control (FSV#5041~5043)

- If users make contracts with local electric power company for limiting the amount of power consumption when a surge in power usage, users can set FSV of "Forced off".
- The setting of FSV#5041 (default "0", No use) determines whether to use Peak power control.
- Depending on the setting of FSV#5042, the system will operate as follows when the external contact is "ON": If FSV#5042 is "0 (default)", Back up heater (BUH) is unavailable.
If FSV#5042 is "1", Only Compressor(Heat Pump) is available.
If FSV#5042 is "2", Only Booster Heater (BSH) is available.
If FSV#5042 is "3", nothing is available.

FSV#5042	Outdoor unit	Back up heater	Booster heater
0 (Default)	Permitted	Forced off	Permitted
1	Permitted	Forced off	Forced off
2	Forced off	Forced off	Permitted
3	Forced off	Forced off	Forced off

- Peak power control operates when the input contact is High (if FSV#5043 is 1) or Low (if FSV#5043 is 0)
- When Peak power control is applied, the system is subject to "Forced OFF" according to the set value. Therefore, appropriate measures such as antifreeze are necessary to prevent freezing at low temperatures.

FR Control(Frequency ratio control) - Display "DR" on AI Home (FSV#5051)

- This is to limit the maximum frequency of the outdoor unit compressor. (if #5051 = 1 "use")
 - External DC signal Control uses a DC voltage of 0 ~ 10V (0v = 50%, ~ 10v = 150%)

PV Control (Photovoltaics control) (FSV#5081~5083)

This is for energy saving by using the solar energy.

The FSV #5081 should be set to "1(Yes)" for PV control. (However, Peak power control can not be used at the same time.)

FSV	0	1
#5081	Disable (Default)	Activation

NOTE

- This function is activated only when using a Buffer tank, Away mode, or DHW mode.



Field setting mode

- **Cooling mode (FSV #5082 = 2°C, Default)**
 - Water outlet setting: Current setting value - FSV #5082 (Min = FSV #1012)
- **Heating mode (FSV #5083 = 2°C, Default)**
 - Water outlet setting: Current setting value + FSV #5083 (Max = FSV #1031)
 - Water law setting: Current setting value + FSV #5083 (Max = FSV #2021, #2022, #2031, #2032)
- **DHW mode**
 - Thermo on operation regardless of Away mode: Setting temperature = Max temperature of DHW mode (FSV #1051)

Smart Grid Control (FSV#5091~5094)

The FSV #5091 should be set to "1(Yes)" for Smart grid control.

FSV	0	1
#5091	Disable (Default)	Activation

[Operation mode for Smart grid]

Operation Mode	Terminal 1	Terminal 2
Mode 1	Short	Open
Mode 2	Open	Open
Mode 3	Open	Short
Mode 4	Short	Short

- Mode 1 : Forced thermo off operation of all system
- Mode 2 : Normal operation
It is equally applied both heating and DHW mode.
- Mode 3 : Normal operation (FSV #5092 = 2°C, FSV #5093 = 5°C, Default)
The heating and DHW setting temperature are set by the FSV setting value.
 - Heating mode (Water outlet setting) : Current setting value + FSV #5092
 - Heating mode (Water law setting) : Current setting value + FSV #5092
 - DHW mode : Current setting value + FSV #5093
- Mode 4 : When operating on, the setting temperature is reflected as follows.



DHW mode

- The booster heater operates with the heat pump immediately without delay.
 - #5094=0 : Target setting temperature is 55/63/70°C ^(*). FSV#3021 (Maximum DHW tank temperature with the heat pump operation)
 - #5094=1 : Target setting temperature is 70°C.
[If FSV #3031 is 0 (no use booster heater) or DHW mode is economic mode, it does not activate booster heater.]

Heating mode

- Heating mode (Water outlet setting) : Current setting value + FSV #5092+5°C (Max=FSV #1031)
- Heating mode (Water law setting) : Current setting value + FSV #5092+5°C
(Max=FSV #2021, #2022, #2031, #2032)

Outdoor Unit Control (FSV#6022)

- Minimum Thermo ON operating time limit (FSV#6022): Minimum operating time after outdoor unit starts.





Maintaining the Unit

Maintenance activities

- In order to ensure optimal availability of the unit, a number of checks and inspections on the unit and the field wiring have to be carried out at regular intervals, preferably yearly.
This maintenance should be carried out by SAMSUNG local technician. Besides keeping the AI Home and remote controller clean by means of a soft damp cloth, no maintenance is required by the operator.

WARNING

- During longer periods of standstill, e.g. during summer with a heating only application, it is very important NOT TO SWITCH OFF THE POWER SUPPLY towards the unit.
- Switching off the power supply stops the automatic repetitive movement of the motor in order to prevent it from getting jammed.

Emergency heating / Emergency hot water supply

<Emergency heating_ (when backup heater on (FSV#4021=1 or 2)>

- Heating function is performed only by the backup heater if the outdoor unit malfunctions (available only when a backup heater is connected).

Method 1 (AI Home setting)

- Enabling the function: Select Emergency heating (⚙️ > Heat pump > Emergency mode) Turn on in AI Home
- Disabling the function: Select Emergency heating (⚙️ > Heat pump > Emergency mode) Turn off in AI Home

Method 2 (Dip Switch setting)

- Enabling the function: Turn off Cascade controller Dip Software 1, then turn the power off and on.
- Disabling the function: Turn on Cascade controller Dip Software 1, then turn the power off and on.
- Default operation: Automatic heating is performed at a set temperature of 45°C.





<Emergency hot water supply_(when DHW on (FSV#3011) and Booster Heater on (FSV#3031))

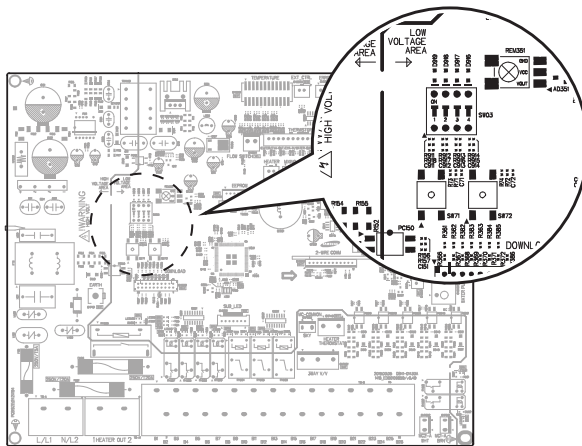
- Hot water is supplied only by the booster heater if the outdoor unit malfunctions.

Method 1 (AI Home setting)

- Enabling the function: Select Emergency hot water supply (⚙️ > Heat pump > Emergency hot water supply) Turn on in AI Home
- Enabling the function: Select Emergency hot water supply (⚙️ > Heat pump > Emergency hot water supply) Turn off in AI Home

Method 2 (Dip Switch setting)

- Enabling the function: Turn off Cascade controller Dip Software 2, then turn the power off and on.
- Disabling the function: Turn on Cascade controller Dip Software 2, then turn the power off and on.
- Default operation: Automatic hot water supply is performed at a set temperature of 50°C.



NOTE

- Emergency heating and Emergency hot water supply do not function concurrently.
- AI Home supports Auto emergency mode. When Auto emergency mode is activated, if any heat pump in the Cascade system is unable to operate in heating or DHW mode because of errors, the Cascade controller automatically activates Emergency mode.





Troubleshooting tips

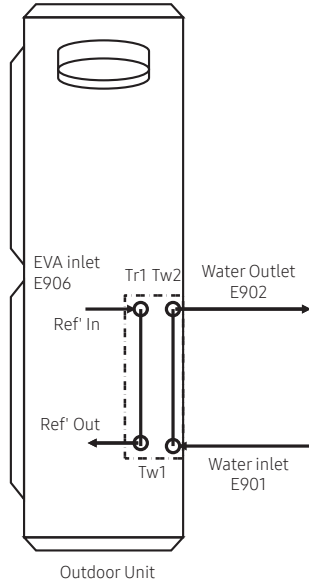
If the unit has some problem to work properly, some error codes will be displayed on the controller. The following table described the explanation of error codes on the LCD display.

Thermistor

- Check its resistance. 10kohm@25 °C (Control kit), 200kohm@25 °C (DHW Tank, Solar)
- Check its location as shown at the diagram.
- Check its contact status with pipe.
- Final solution is to change parts

Display	Explanation
120	Short- or open-circuit error of the room temperature sensor of the Zone 2 indoor unit (detected only when the room thermostat is used)
121	Short- or open-circuit error of the room temperature sensor of the Zone 1 indoor unit (detected only when the room thermostat is used)
899	Zone1 Water Outlet Themistor SHORT or OPEN
900	Zone2 Water Outlet Themistor SHORT or OPEN
901	Water Inlet thermistor SHORT or OPEN
902	Water Outlet thermistor SHORT or OPEN
903	Water outlet (Back up Heater) temp sensor SHORT or OPEN (The Backup heater for using)
904	Water TANK (DHW) thermistor SHORT or OPEN
906	Outdoor Eva Inlet Temp Sensor SHORT or OPEN
916	Mixing Valve thermistor SHORT or OPEN
980	Buffer tank thermistor SHORT or OPEN





Communication

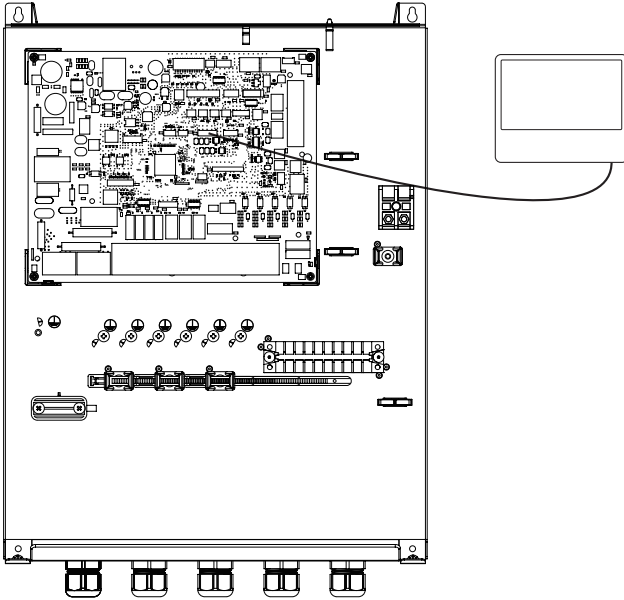
Display	Explanation
105	Wi-Fi communication error
601	Communication error between remote controller and the Cascade controller
604	Tracking error between remote controller and the Cascade controller
639	Communication error between Control kit and Cascade controller (3 min)
654	Memory(EEPROM) Read/Write Error(Wired remote Controller data error)
670	Controller combination error





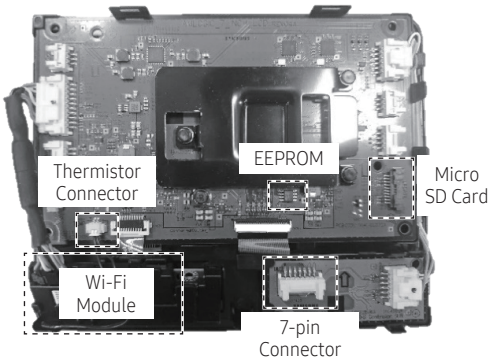
Troubleshooting tips

E601, E604



E654

- MEMORY(EEPROM) Read/Write Error (AI Home data error)



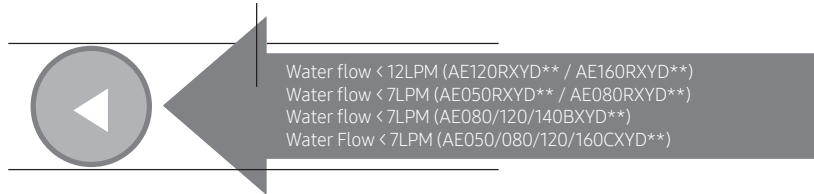


Water pump & Flow Sensor

Display	Explanation
911	Low flow rate error <ul style="list-style-type: none"> in case of low flow rate in 60 sec during water pump signals is ON(Starting) in case of low flow rate in 30 sec during water pump signals is ON(After starting)

E911

- Water pump ON (Low flow rate) : NOT enough water flow



Water flow range

	Water flow rates (LPM)	
	Min	Max
AE050RXYD** / AE080RXYD**	7	48
AE120RXYD** / AE160RXYD**	12	58
AE080BXYD** / AE050CXYD** / AE080CXYD**	7	48
AE120BXYD** / AE140BXYD** / AE120CXYD** / AE160CXYD**	7	58



Error codes

NOTE

- If you turn OFF and then ON the Heating/cooling or DHW operation of the Cascade controller, all errors except serious errors of the Outdoor units and Control kits will be cleared.

Display	Explanation	Error Source
101	CONTROL KIT / OUTDOOR UNIT wire connection error	CONTROL KIT, OUTDOOR UNIT
105	Wi-Fi communication error	CASCADE CONTROLLER
108	Duplication of setting address of indoor units and outdoor units	OUTDOOR UNIT, CASCADE CONTROLLER
109	Address incomplete communication error	CASCADE CONTROLLER, CONTROL KIT
120	Short- or open-circuit error of the room temperature sensor of the Zone 2 indoor unit (detected only when the room thermostat is used)	CASCADE CONTROLLER
121	Short- or open-circuit error of the room temperature sensor of the Zone 1 indoor unit (detected only when the room thermostat is used)	CASCADE CONTROLLER
162	EEPROM Error	CONTROL KIT, CASCADE CONTROLLER
163	EEPROM OPTION SETTING Error	OUTDOOR UNIT, CASCADE CONTROLLER
177	In hydro box, take place emergency signal Error	CONTROL KIT
198	Error of Terminal Block's Thermal Fuse(Open)	CONTROL KIT, CASCADE CONTROLLER
201	CONTROL KIT/OUTDOOR UNIT communication error (Matching error)	CONTROL KIT, OUTDOOR UNIT
202	CONTROL KIT/OUTDOOR UNIT communication error (3 min)	CONTROL KIT, OUTDOOR UNIT
203	Communication error between INVERTER and MAIN MICOM (6 min)	OUTDOOR UNIT
205	Communication Error Between Outdoor Unit Inv Micom - Fan Motor Micom	OUTDOOR UNIT
221	OUTDOOR UNIT temperature sensor error	OUTDOOR UNIT
231	Condenser temperature sensor error	OUTDOOR UNIT
241	COND OUT Sensor of Outdoor Unit breakaway Error	OUTDOOR UNIT



Display	Explanation	Error Source
251	Discharge temperature sensor error	OUTDOOR UNIT
262	Discharge Sensor breakaway Error	OUTDOOR UNIT
266	Comp Top Sensor breakaway Error	OUTDOOR UNIT
269	SUCTION Sensor breakaway Error	OUTDOOR UNIT
276	Compressor Top Temperature Sensor Error (open/short)	OUTDOOR UNIT
291	High Pressure Sensor Error (open/short)	OUTDOOR UNIT
296	Low Pressure Sensor Error (open/short)	OUTDOOR UNIT
308	Suction Sensor Error (open/short)	OUTDOOR UNIT
320	OLP sensor error	OUTDOOR UNIT
321	EVI Inlet Sensor Error (open/short)	OUTDOOR UNIT
322	EVI Outlet Sensor Error (open/short)	OUTDOOR UNIT
381	Inverter1 PCB overheat error	OUTDOOR UNIT
403	Plate heat exchanger freeze detection (During cooling operation)	OUTDOOR UNIT
404	Protection of OUTDOOR UNIT when it is overload (during Safety Start, Normal operation state)	OUTDOOR UNIT
407	Comp down due to high pressure sensor	OUTDOOR UNIT
410	COMP down due to Low PressureSensor Protection Control	OUTDOOR UNIT
416	Discharge of a compressor is overheated	OUTDOOR UNIT
425	Power source line missing error (only for 3-phase model)	OUTDOOR UNIT
428	COMP down by Compression Ratio control Error	OUTDOOR UNIT
436	Plate heat exchanger freeze detection (During heating operation)	OUTDOOR UNIT
438	EVI EEV Opening Error	OUTDOOR UNIT
439	Refrigerant Leakage Error (Detect when the system is not operated)	OUTDOOR UNIT
440	Heating operation blocked (outdoor temperature over 35°C)	OUTDOOR UNIT
441	Cooling operation blocked (outdoor temperature under 9°C)	OUTDOOR UNIT
443	No startup due to Low pressure	OUTDOOR UNIT
450	Error due to high cond temperature	OUTDOOR UNIT
458	OUTDOOR UNIT fan1 error	OUTDOOR UNIT
461	[Inverter] Compressor startup error	OUTDOOR UNIT
462	[Inverter] Total current error/PFC over current error	OUTDOOR UNIT
463	OLP is overheated	OUTDOOR UNIT
464	[Inverter] IPM over current error	OUTDOOR UNIT
465	Compressor V limit error	OUTDOOR UNIT
466	DC LINK over/low voltage error	OUTDOOR UNIT
467	[Inverter] Compressor rotation error	OUTDOOR UNIT



Error codes

Display	Explanation	Error Source
468	[Inverter] Current sensor error	OUTDOOR UNIT
469	[Inverter] DC LINK voltage sensor error	OUTDOOR UNIT
470	Outdoor unit EEPROM Read/Write Error	OUTDOOR UNIT
471	Outdoor unit EEPROM Read/Write Error(OTP error)	OUTDOOR UNIT
474	IPM(IGBT Module) or PFCM temperature sensor Error	OUTDOOR UNIT
475	OUTDOOR UNIT fan2 error	OUTDOOR UNIT
483	H/W DC_link over voltage Error	OUTDOOR UNIT
484	PFC Overload Error	OUTDOOR UNIT
485	Input current sensor error	OUTDOOR UNIT
488	AC Input Voltage Sensor Error	OUTDOOR UNIT
500	IPM is overheated	OUTDOOR UNIT
507	Comp down due to high pressure switch	OUTDOOR UNIT
536	PHE refrigerant leak error	OUTDOOR UNIT
554	Gas leak error	OUTDOOR UNIT
563	INDOOR UNIT Mixed Install Error	OUTDOOR UNIT
590	[Inverter] Data flash Error	OUTDOOR UNIT
601	Communication error between the CASCADE CONTROLLER and wired remote controller	Wired Remote Controller
602	Wired remote controller Main/Sub setting error	Wired Remote Controller
604	Communication tracking error between the CASCADE CONTROLLER and wired remote controller	CASCADE CONTROLLER, Wired Remote Controller
607	Communication error between the Main and Sub wired remote controllers	Wired Remote Controller
638	EHS unit quantity setting error (different set and connected number, or the address of EHS unit is outside the range 1 to 8.)	CASCADE CONTROLLER
639	Communication error between Control kit and Cascade controller (3 min)	CONTROL KIT
653	AI Home temp sensor SHORT or OPEN	CASCADE CONTROLLER
654	Memory(EEPROM) Read/Write Error(Wired remote Controller data error)	CASCADE CONTROLLER
670	Controller combination error	CASCADE CONTROLLER
899	Short- or open-circuit error of the Zone 1 water-out temperature sensor	CASCADE CONTROLLER



Display	Explanation	Error Source
900	Short- or open-circuit error of the Zone 2 water-out temperature sensor	CASCADE CONTROLLER
901	Water inlet (PHE) temperature sensor error(open/short)	OUTDOOR UNIT, CASCADE CONTROLLER
902	Water outlet (PHE) temperature sensor error(open/short)	OUTDOOR UNIT, CASCADE CONTROLLER
903	Water outlet (backup heater) temperature sensor error.	CASCADE CONTROLLER
904	DHW tank temperature sensor error	CONTROL KIT, CASCADE CONTROLLER
906	Outdoor evaporator inlet temperature sensor (open/short)	OUTDOOR UNIT
907	Error due to pipe rupture protection	CONTROL KIT
908	Error due to freeze prevention(Re-Operation is possible)	CONTROL KIT
909	Error due to freeze prevention(Re-Operation is impossible)	CONTROL KIT
910	Water Temperature Sensor on water Outlet pipe is detached	CONTROL KIT
911	Low flow rate error <ul style="list-style-type: none"> in case of low flow rate in 60 sec during water pump signals is ON(Starting) in case of low flow rate in 30 sec during water pump signals is ON(After starting) 	CONTROL KIT
913	Six times detection for FLOW Switch Error(Re-Operation is not possible)	CONTROL KIT
914	Error due to Incorrect Thermostat Connection	CONTROL KIT
915	Error on DC fan(Non-operating)	CONTROL KIT
916	Mixing valve temperature sensor (open/short)	CASCADE CONTROLLER
919	Error that the set temperature for disinfection operation is not reached, or, after reaching, the temperature fails to continue for the requested time	CASCADE CONTROLLER
920	FSV SD Card Read Error	CONTROL KIT
973	Water pressure error (Short/Open)	OUTDOOR UNIT
980	Buffer tank thermistor SHORT or OPEN	CASCADE CONTROLLER



Specifications

Wi-Fi	
Frequency Range	Transmitter Power(Max)
2412 - 2472 MHz	20 dBm

Bluetooth	
Frequency Range	Transmitter Power(Max)
2402 - 2480 MHz	20 dBm

Open Source Announcement

The software included in this product contains open source software.

The following URL http://opensource.samsung.com/opensource/SMART_TP1_0/seq/0 leads to open source license information as related to this product.



Security updates information

Security updates are provided to strengthen the security of your device and protect your personal information. For more information on security updates, visit <https://security.samsungda.com>.

* The website supports only some languages.



Memo



QUESTIONS OR COMMENTS?

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Samsung, PO Box 12987, Blackrock, Co. Dublin. IE
or Euro QA Lab. Saxony Way, Yateley, Hampshire GU46 6GG, UK

