ENGLISH

INMBSPAN001A100 User Manual

Panasonic Aquarea H/J/K/L/M Air-to-Water Units to Modbus RTU

USER MANUAL
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1. Description and Order Codes

Modbus RTU gateway for Panasonic Aquarea air-to-water units.

Compatible with Aquarea H/J/K/L/M series commercialized by Panasonic.

Use the compatibility tool to get a complete list of compatible units: https://compatibility.intesis.com/

ORDER CODE	LEGACY ORDER CODE
INMBSPAN001A100	INMBSPAN001A000

2. General Information

2.1. Intended Use of the User Manual

This manual contains the main features of this Intesis gateway and the instructions for its appropriate installation, configuration, and operation.

Any person who installs, configures, or operates this gateway or any associated equipment should be aware of this manual's contents.

Keep this manual for future reference during the installation, configuration, and operation.

2.2. General Safety Information

IMPORTANT
Follow these instructions carefully. Improper work may seriously harm your health and damage the gateway and/or any other equipment connected to it.

Only technical personnel, following these instructions and the country legislation for installing electrical equipment, can install and manipulate this gateway.

Install this gateway indoors, in a restricted access location, avoiding exposure to direct solar radiation, water, high relative humidity, or dust.

Preferably, mount this gateway on a DIN rail inside a grounded metallic cabinet, following the instructions in this manual.

If mounting on a wall, firmly fix this gateway on a non-vibrating surface, following the instructions in this manual.

Connect this gateway only to networks without routing to the outside plant.

All communication ports are considered for indoor use and must only be connected to SELV circuits.

Disconnect all systems from power before manipulating and connecting them to the gateway.

Respect the expected polarity of power and communication cables when connecting them to the gateway.

Take the necessary antistatic precautions before manipulating the gateway to avoid electrostatic discharges.

Safety instructions in other languages can be found here.

2.3. Admonition Messages and Symbols

CAUTION
Instruction that must be followed to avoid a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.

IMPORTANT
Instruction that must be followed to avoid a risk of reduced functionality and/or damage to the equipment or to avoid a network security risk.

NOTE
Additional information which may facilitate installation and/or operation.

TIP
Helpful advice and suggestions.

NOTICE
Remarkable Information.

3. Quickstart Guide for the INMBSPAN001A100 Gateway

IMPORTANT
Disconnect all systems from power before connecting them to the gateway.

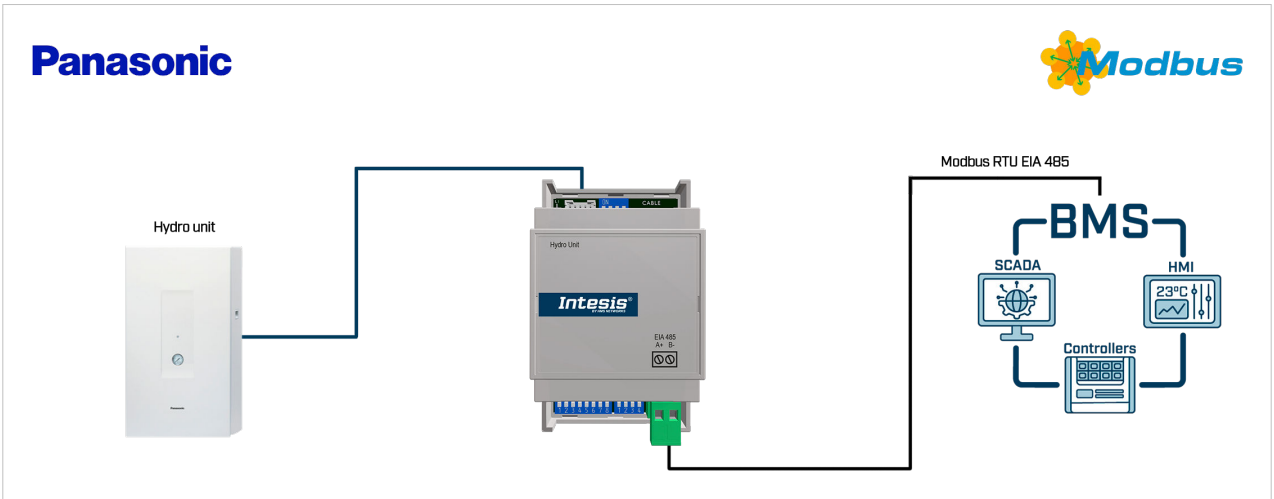
1. Configure the gateway using the built-in DIP switches. See details in DIP Switches (page 7).
2. Mount the gateway in the desired installation site. This gateway can be mounted over a DIN rail or a wall. See details in Mounting (page 8).

   NOTE
   DIN rail mounting inside a grounded cabinet or metal enclosure is recommended.

3. Connect the gateway to the Modbus RTU network via its EIA-485 port.
4. Connect the gateway to the Panasonic Aquarea unit using the cable supplied with the product. See details in Connection Procedure (page 10).
5. Check the communication performance between the Modbus bus, the gateway, and the Panasonic Aquarea unit through the gateway's LED indicators. See details in LED Indicator (page 11).
6. The Intesis gateway is ready to be used in your system.

4. Overview

Figure 1. Integration of Panasonic Aquarea air-to-water units into a Modbus control system using the INMBSPAN001A100 gateway.



NOTE
This document assumes the user is familiar with Modbus and Panasonic Aquarea technologies, including their associated technical terminology.

4.1. Inside the Package

Items included:

- Intesis INMBSPAN001A100 gateway
- Installation Guide
- Aquarea unit connection cable

4.2. Main Features

- Compatible with Panasonic Aquarea H/J/K/L/M series.
- Specific signals for cascade control.
- Specific signals for energy consumption.
- Configuration with onboard DIP switches.
- Quick and easy installation: Set the DIP switches, plug, and play.
- Built-in 120 Ω termination resistor configurable via DIP switches.
- External power supply not required.
- Reduced dimensions (HxWxD): 93 x 53 x 58 mm / 3.7 x 2.1 x 2.3”.
- Mountable on DIN rail or wall.

- Compatibility with the principal Aquarea system features, including simultaneous control of domestic hot water (DHW) and two climate zones.
- More than 170 communication signals implemented by default that ensure monitoring and control over the main functions of the Aquarea unit.
- Significant reduction of the HVAC system energy consumption.
- Three-year warranty.

4.3. Gateway Capacity

This Intesis gateway can integrate one single Panasonic Aquarea air-to-water unit.

4.4. General Functionality

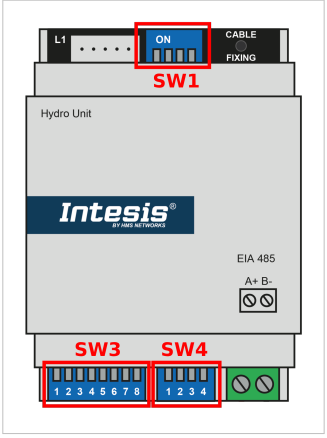
With this Intesis INMBSPAN001A100 gateway, you can easily integrate Panasonic Aquarea air-to-water units into a system based on Modbus RTU. To do so, the gateway acts as a server device of the installation itself, accessing the Aquarea unit signals. The gateway is continuously polling the Aquarea unit, storing in its memory the current status of signals and serving this data to the control system when requested. The gateway also sends the requested commands from the control system to the unit.

A wide range of signals can be controlled and monitored, including those for system configuration, domestic hot water (DHW), zones, maintenance, consumption, and more. Besides, the gateway implements more than 120 specific signals for cascade control.

The configuration of the gateway is carried out in a fast and straightforward manner via DIP switches.

5. Hardware

5.1. DIP Switches



IMPORTANT
Ensure the gateway is powered off[1] before adjusting the DIP switches to avoid configuration errors or hardware damage.

[1] Remember that the gateway is powered exclusively by the Aquarea hydro unit.

The gateway features three DIP switches: SW1 (4 switches) at the top and SW3 (8 switches) and SW4 (4 switches) at the bottom.

NOTICE
SW1 has no usage.

SW3 (P7, P8) and SW4 (P3): Baud rate

SW3		SW4	Description
P7	P8	P3	
OFF	OFF	OFF	2400 bps
ON	OFF	OFF	4800 bps
OFF	ON	OFF	9600 bps (Default setting)
ON	ON	OFF	19200 bps
OFF	OFF	ON	38400 bps
ON	OFF	ON	57600 bps
OFF	ON	ON	76800 bps
ON	ON	ON	115200 bps

SW3 (P1 to P6): Modbus server address

SW3						Modbus address[2]
P1	P2	P3	P4	P5	P6	
OFF	OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	2
...						...
ON	OFF	ON	ON	ON	ON	61
OFF	ON	ON	ON	ON	ON	62
ON	ON	ON	ON	ON	ON	63

TIP

[2] To determine the position of each switch, convert the decimal value of a Modbus address to binary. A value of 0 indicates the switch is set to OFF, while a value of 1 indicates it is set to ON. Keep in mind that P1 represents the least significant bit (LSB) and P6 represents the most significant bit (MSB).

Example to set the Modbus address 34:

1. Convert the value to binary: 100010.
2. Read the binary value from right (MSB) to left (LSB).
3. Set each switch accordingly: P1 = OFF, P2 = ON, P3 = OFF, P4 = OFF, P5 = OFF, P6 = ON

SW4 (P1, P2, P4): Temperature settings and termination resistor activation

SW4			Description
P1	**P2**	**P4**	
ON	-	-	Temperature in degrees x10 (Only for Celsius). Example: 19.2°C=192.
OFF	-	-	Temperature in degrees x1 (Default setting).
-	ON	-	Temperature in Fahrenheit.
-	OFF	-	Temperature in Celsius (Default setting).
-	-	ON	120 Ω termination resistor enabled[3].
-	-	OFF	120 Ω termination resistor disabled (Default setting)[3].

IMPORTANT

[3] Enable the gateway's 120 Ω termination resistor only when it is mounted at one end of the EIA-485 bus and no other termination resistor is present at that end.

5.2. Mounting

Mount the gateway over a DIN rail or over a wall.

IMPORTANT

Before mounting, please ensure that the chosen installation place preserves the gateway from direct solar radiation, water, high relative humidity, or dust.

IMPORTANT

Leave enough clear space to wire the gateway easily and for the subsequent manipulation of elements such as connectors, DIP switches, etc.

IMPORTANT

Do not mount the gateway in air-handling units or conducts.

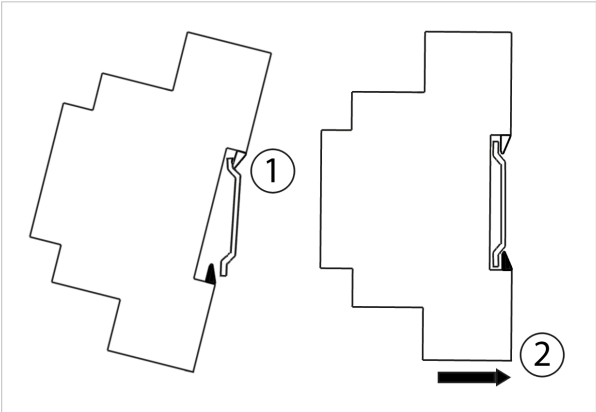
NOTE

DIN rail mounting inside a grounded metallic cabinet is recommended.

DIN rail mounting

1. Fit the gateway's top-side clip in the upper edge of the DIN rail.
2. Press the low side of the gateway gently to lock it in the DIN rail.
3. Make sure the gateway is firmly fixed.

NOTE
For some DIN rails, to complete step 2, you may need a small screwdriver or similar to pull the bottom clip down.



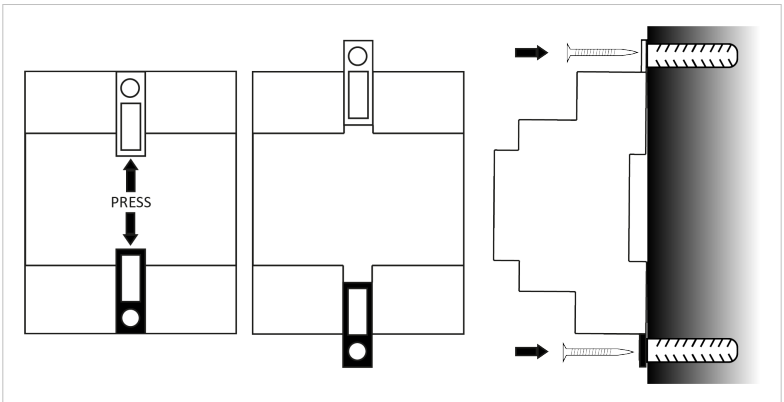
Wall mounting

IMPORTANT
For reasons of security, the maximum height for wall mounting is two meters (6.5 feet).

1. Press the rear panel clips outwards until you hear a *click*.
2. Use the clip holes to screw the gateway to the wall.

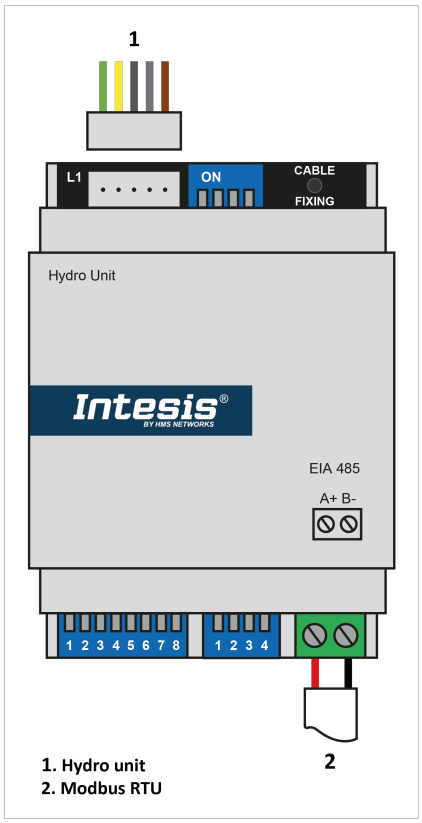
   NOTE
   Use M3 screws, 25 mm (1") length.

3. Make sure the gateway is firmly fixed.



5.3. Connection Procedure

Figure 2. Wiring diagram



CAUTION
Disconnect all systems from power before connecting them to the gateway.

IMPORTANT
Keep communication cables as far away as possible from power and ground cables. Never bundle them together.

NOTE
Mount the gateway in the desired place before wiring it.

Connecting the gateway to the Aquarea unit

1. Use the supplied cable to connect the Aquarea unit and the gateway,

IMPORTANT
This cable is 1.50 m (4.9 feet) long. Its modification in length may affect the correct operation of the gateway.

a. **Aquarea unit connection:** Plug the end connector, the one on the longest unsheathed part of the cable, into the socket of the Aquarea unit control board.

b. **Gateway connection:** Plug the other end connector, the one on the shortest unsheathed part of the cable, into the gateway's socket labeled as **Hydro Unit**.

TIP
Screw the supplied cable staple into the gateway's **CABLE FIXING** hole to secure the connection.

Connecting the gateway to the Modbus RTU bus

2. Connect the Modbus RTU bus to the EIA-485 port of the gateway.

IMPORTANT
Observe polarity.

IMPORTANT

- EIA-485 bus doesn't allow loop or star topologies.
- Maximum length for the EIA-485 bus is 1200 meters (4000 feet).

EIA-485 BUS TERMINATION AND FAIL-SAFE BIASING

The EIA-485 bus requires a 120Ω termination resistor at each end to avoid signal reflections.

When all transmitters are in high impedance (three-state), a fail-safe biasing mechanism is needed to maintain a valid voltage level and avoid false fail status detections.

The gateway includes a built-in 120Ω terminator, which can be activated via DIP switch SW4.

- **SW4, Position 4:**
  ON: 120 Ω termination active.
  OFF: 120 Ω termination inactive (default position).

Some Modbus RTU EIA-485 Master devices may also include internal termination and/or fail-safe biasing. Always check the Master device's documentation.

If the gateway is installed at one end of the bus and termination is enabled, do not add another resistor at that end.

To know more, refer to the document Polarity Issues in RS485 Networks.

3. Reconnect all systems to power.

5.4. LED Indicator

The gateway features one green LED to indicate the following operational states:

Status	Description
On	Gateway startup
Flashing (100ms ON/ 1900ms OFF)	Normal operation
Blinking (500ms ON/ 500ms OFF)	Communication error
SOS (3 short blinks, 3 long blinks, 3 short blinks, pause)	Bootloader mode

5.5. Technical Specifications

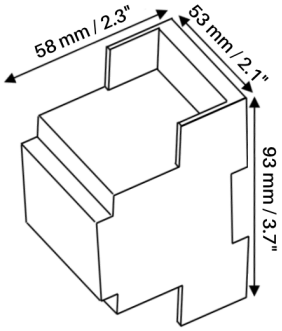
Housing	Plastic, PC type (UL 94 V-0) Net dimensions (DxWxH): 93 x 53 x 58 mm / 3.7 x 2.1 x 2.3" Color: Light grey. RAL 7035 Protection: IP20
Weight	85 g (3 oz)
Mounting	Wall or DIN rail (EN60715 TH35)
Wires	Per terminal: solid wires or stranded wires (twisted or with ferrule) Wire cross-section/gauge: One core: 0.2 to 2.5 mm^2 (24 to 11 AWG) Two cores: 0.2 to 1.5 mm^2 (24 to 15 AWG) Three cores: Not permitted
EIA-485 port for Modbus RTU	1 x Green pluggable terminal block (2 poles: A+, B-)
Hydro unit port	1 x Specific socket
LEDs	1 x Green LED (operational status)
DIP switches	3 x DIP switches: • SW1: Not used • SW3: Baud rate and Modbus address • SW4: Baud rate, temperature units, and termination resistor activation
Consumption	12 VDC, 60 mA
Operational temperature	0 .. 60°C / 32 .. 140°F
Stock temperature	-20 .. 85°C / -4 .. 185 °F
Operational and stock humidity	5 to 95%. No condensation
Isolation voltage between comm. ports	1000 VDC

5.6. Dimensions

Net dimensions (HxWxD):

Millimeters: 93 x 53 x 58 mm

Inches: 3.66 x 2.08 x 2.28"



IMPORTANT
Leave enough clear space to wire the gateway easily and for the subsequent manipulation of elements such as connectors, DIP switches, etc.

6. Modbus Interface Specification

6.1. Modbus Physical Layer

The INMBSPAN001A100 gateway implements a Modbus RTU (server) interface to be connected to an EIA-485 bus. It features 8-N-2 communication (eight data bits, no parity, and two stop bits) with several baud rates available (2400 bps, 4800 bps, **9600 bps -default-**, 19200 bps, 38400 bps, 57600 bps, 76800 bps, and 115200 bps). It also supports 8-N-1 communication (eight data bits, no parity, and one stop bit). The default Modbus server address is 1.

NOTE
AUTO-DETECT FUNCTION. The gateway will automatically detect the communication type (8-N-1 or 8-N-2) and set itself accordingly. No user action or manual settings are required.

6.2. Implemented Functions

The INMBSPAN001A100 gateway implements the following standard Modbus functions:

- 3: Read Holding Registers
- 4: Read Input Registers
- 6: Write Single Register
- 16: Write Multiple Registers

IMPORTANT
Although this last function is allowed, the gateway does not allow write operations on more than one register with the same request. This means that the length field should always be 1 when this function is being used for writing.

6.3. Modbus Registers

NOTE

- Values for temperature registers can be reported in °C, °Cx10, or °F, depending on the DIP switch SW4 setting. For more information, see DIP Switches (page 7).
- For registers that apply only to specific Aquarea series, a note below the register's name indicates the applicable series. For example: *Only for series H and J*.
- For invalid values, registers report:
  - 0xFFFF for unsigned data types.
  - 0x8000 for signed data types.
- For registers that require calculation, values written to the register are subject to range validation. If a value exceeds the defined limits, the gateway will automatically approximate it to the nearest valid boundary. For example, if a register accepts values from 0 to 5, and a value of 6 is written, the gateway will apply 5 instead. Similarly, writing -1 will result in 0 being applied.

6.3.1. Gateway Registers

<table>
<tr><th>Register name</th><th>Possible values</th><th>Modbus Address (protocol address)</th><th>Register Address (PLC address)</th><th>R/W</th></tr>
<tr><td>Type of Modbus Gateway</td><td>1: Standard Gateway
2: Checker Gateway</td><td>49</td><td>50</td><td>R</td></tr>
<tr><td>Gateway Firmware Version</td><td>Value in hexadecimal format
Example for version 1.4: 0x14</td><td>50</td><td>51</td><td>R</td></tr>
<tr><td>Gateway ID</td><td>3328 (0x0D00)</td><td>460</td><td>461</td><td>R</td></tr>
<tr><td>Gateway Reset[1]</td><td>1</td><td>463</td><td>464</td><td>RW</td></tr>
<tr><td colspan="5">[1] Write a 1 in this register to reset the gateway.</td></tr>
<tr><td>Baudrate</td><td><table><tr><td>0: 2400 bps</td><td>4: 38500 bps</td></tr><tr><td>1: 4800 bps</td><td>5: 57600 bps</td></tr><tr><td>2: 9600 bps</td><td>6: 76800 bps</td></tr><tr><td>3: 19200 bps</td><td>7: 115200 bps</td></tr></table></td><td>464</td><td>465</td><td>R</td></tr>
<tr><td>Gateway's Modbus Server Address</td><td>1 .. 63</td><td>465</td><td>466</td><td>R</td></tr>
<tr><td>DIP Switches Value[2]</td><td>Current DIP switches value</td><td>466</td><td>467</td><td>R</td></tr>
<tr><td colspan="5">[2] This register reports a decimal value that, when converted to binary, indicates the gateway's DIP switches position: ON (1) or OFF (0) .</td></tr>
</table>

6.3.2. General System Control

Register name	Possible values	Modbus Address (base 0)	PLC Address (base 1)	R/W
System On/Off	0: Off 1: On (Default)	0	1	R/W
Outdoor Temperature	-127 .. 127ºC -196.6 .. 260.6ºF	1	2	R
Outlet Water Temperature	-127 .. 127ºC -196.6 .. 260.6ºF	2	3	R
Inlet Water Temperature	-127 .. 127ºC -196.6 .. 260.6ºF	3	4	R
Operating Mode[3]	1: Heat 2: Heat Tank 3: Tank 4: Cool Tank 5: Cool 6: Auto (default) 7: Auto Tank	4	5	R/W
	8: Auto Heat 9: Auto Heat Tank 10: Auto Cool 11: Auto Cool Tank			R
[3] To know more about how this setting affects other registers, see Considerations on Temperature Registers (page 29).				
Heat Mode Water Temp. Setting Method	1: Compensation curve 2: Direct (default)	5	6	R/W
Cool Mode Water Temp. Setting Method	1: Compensation curve 2: Direct (default)	6	7	R/W

6.3.3. Zones

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Zone 1/Zone 2 On/Off[4]	1: Zone 1 On / Zone 2 Off 2: Zone 1 Off / Zone 2 On 3: Zone 1 On / Zone 2 On	9	10	R/W
[4] This register applies only when the Aquarea system is set to control two zones, i.e., when the register **Number of zones** (Modbus address 82) is set to **2: 2 zones**.				
Zone 1 Sensors	1: Water temperature 2: External room sensor 3: Internal room sensor 4: Room thermistor 5: Pool Sensor	10	11	R
Zone 2 Sensors	1: Water temperature 2: External room sensor 3: Internal room sensor 4: Room thermistor 5: Pool Sensor	11	12	R
Zone 1: (Water Shift/ Water/Room/Pool) Setpoint Temperature[5]	COOL • Water shift: -5 .. 5ºC / 23 .. 41ºF • Water: 5 .. 20ºC / 41 .. 68ºF • Room: 18 .. 35ºC / 64.4 .. 95ºF HEAT • Water shift: -5 .. 5ºC / 23 .. 41ºF • Water: 20 .. 55/75ºC / 68 .. 131/167ºF • Room: 10 .. 30ºC / 50 .. 86ºF • Pool: 15 .. 35ºC / 59 .. 95ºF	12	13	R/W
Zone 2: (Water Shift/ Water/Room/Pool) Setpoint Temperature[5]	COOL • Water shift: -5 .. 5ºC / 23 .. 41ºF • Water: 5 .. 20ºC / 41 .. 68ºF • Room: 18 .. 35ºC / 64.4 .. 95ºF HEAT • Water shift: -5 .. 5ºC / 23 .. 41ºF • Water: 20 .. 55/75ºC / 68 .. 131/167ºF • Room: 10 .. 30ºC / 50 .. 86ºF • Pool: 15 .. 35ºC / 59 .. 95ºF	13	14	R/W

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
[5] To know more about how this register applies the needed range, see Considerations on Temperature Registers (page 29).				
Zone 1: Actual (Water Shift/ Water/Room/Pool) Temperature[6]	-127 .. 127ºC -196.6 .. 260.6ºF	14	15	R
Zone 2: Actual (Water Shift/ Water/Room/Pool) Temperature[6]	-127 .. 127ºC -196.6 .. 260.6ºF	15	16	R
Zone 1: Temperature Setting Mode[6]	1: Room temperature 2: Compensation curve (Water Temp) 3: Direct (Water Temp) 4: Pool Temp	16	17	R
Zone 2: Temperature Setting Mode[6]	1: Room temperature 2: Compensation curve (Water Temp) 3: Direct (Water Temp) 4: Pool Temp	17	18	R
[6] To know more, see Considerations on Temperature Registers (page 29).				
Zone 1 Min. Setpoint Temperature	COOL • Water shift: -5C / 23ºF • Water: 5ºC / 41ºF • Room: 18ºC / 64.4ºF HEAT • Water shift: -5ºC / 23ºF • Water: 20ºC / 68ºF • Room: 10ºC / 50ºF • Pool: 15ºC / 59ºF	18	19	R

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Zone 1 Max. Setpoint Temperature	COOL • Water shift: 5ºC / 41ºF • Water: 20ºC / 68ºF • Room: 35ºC / 95ºF HEAT • Water shift: 5ºC / 41ºF • Water: 55/75ºC / 131/167ºF • Room: 30ºC / 86ºF • Pool: 35ºC / 95ºF	19	20	R
Zone 2 Min. Setpoint Temperature	COOL • Water shift: -5C / 23ºF • Water: 5ºC / 41ºF • Room: 18ºC / 64.4ºF HEAT • Water shift: -5ºC / 23ºF • Water: 20ºC / 68ºF • Room: 10ºC / 50ºF • Pool: 15ºC / 59ºF	20	21	R
Zone 2 Max. Setpoint Temperature	COOL • Water shift: 5ºC / 41ºF • Water: 20ºC / 68ºF • Room: 35ºC / 95ºF HEAT • Water shift: 5ºC / 41ºF • Water: 55/75ºC / 131/167ºF • Room: 30ºC / 86ºF • Pool: 35ºC / 95ºF	21	22	R

6.3.4. Tank Configuration

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Tank On/Off	0: Off 1: On	30	31	R/W
Tank Current Water Temperature	-127 .. 127ºC -196.6 .. 260.6ºF	32	33	R
Tank Water Setpoint Temperature	40 .. 55/75ºC 104 .. 131/167ºF	33	34	R/W
Tank Heater	1: Internal 2: External	34	35	R
Tank Min. Water Setpoint Temperature	40ºC 104ºF	35	36	R
Tank Max. Water Setpoint Temperature	55/75ºC 131/167ºF	36	37	R

6.3.5. Consumption

Register name	Possible values	Modbus Address (protocol address)	Register Address (PLC address)	R/W
Tank Mode Energy Consumption	0 .. 65534 W	45	46	R
Heat Mode Energy Consumption	0 .. 65534 W	46	47	R
(Cool Mode / Heat Recovery Mode) Energy Consumption	0 .. 65534 W	47	48	R

6.3.6. Maintenance

Register name	Possible values	Modbus Address (base 0)	PLC address (base 1)	R/W
Error Code To know more, see Error Codes (page 31).	0: No Error 1xxx: U + error 2xxx: H + error 3xxx: F + error	52	53	R
De-ice Status	0: Off 1: On	64	65	R
Current Error Status[7]	0: No error 1: Error	70	71	R

[7] Before the gateway establishes communication with the Aquarea unit, this register will report the value **1: Error**.

6.3.7. Unit Configuration

Register name	Possible values	Modbus Address (base 0)	PLC address (base 1)	R/W
Tank Connection	0: No 1: Yes	81	82	RW
Number of Zones	1: 1 zone 2: 2 zones	82	83	RW
Zone 1 Setup[8]	1: Room 2: Pool	83	84	RW
Zone 2 Setup[8]	1: Room 2: Pool	84	85	RW
[8] To know more about how this setting affects other registers, see Considerations on Temperature Registers (page 29).				
Direction	1: Room 2: Tank	85	86	R
Outdoor Type	1: STD 2: TCAP 3: HWT	86	87	R

6.3.8. Cascade Control

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Heat-Cool Meter *Only for K series onwards*	0: No 1: Yes	105	106	R
Tank Meter *Only for K series onwards*	0: No 1: Yes	106	107	R
Electricity Meter HP *Only for K series onwards*	0: No 1: Yes	107	108	R
SG Ready: Control Pattern *Only for K series onwards*	1: Normal 2: HP stop 3: Capacity 1 4: Capacity 2	111	112	R
Water Pressure *Only for K series onwards*	0 .. 5080 mbar	112	113	R
Water Inlet 2 Temperature *Only for L series onwards*	-127°C .. 127°C -196.6 .. 260.6ºF	113	114	R
RC-1: Room Thermostat Internal Sensor Temperature (Integer Part)	-127°C .. 127°C -196.6 .. 260.6ºF	116	117	R
Model Series Selection	1: H-Series 2: J-Series 3: K-Series 4: L-Series 5: M-Series	117	118	R
RC-2: Room Thermostat Internal Sensor Temperature (Integer Part)	-127°C .. 127°C -196.6 .. 260.6ºF	118	119	R
Heat Mode Energy Consumption Total[9]	0 .. 4294967294 kWh	120 121	121 122	R
Heat Mode Energy Generation Total[9]	0 .. 4294967294 kWh	122 123	123 124	R
(Cool Mode / Heat Recovery Mode) Energy Consumption Total[9]	0 .. 4294967294 kWh	124 125	125 126	R
(Cool Mode / Heat Recovery Mode) Energy Generation Total[9]	0 .. 4294967294 kWh	126 127	127 128	R
Tank Mode Energy Consumption[9]	0 .. 4294967294 kWh	128 129	129 130	R

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Tank Mode Energy Generation[9]	0 .. 4294967294 kWh	130	131	R
		131	132	
[9] These registers can be reset to 0 through the **Consumption Reset** register (Modbus address 378).				
External SW	0: No 1: Yes	150	151	RW
Heat-Cool SW	0: Disable 1: Enable	151	152	RW
External Compressor SW	For H, J, K, and L series: 0: No; 1: Yes For M series: 0: No; 1: Yes Heat Source; 2: Yes Heater	152	153	RW
Solar Connection	0: No 1: Yes & Buffer Tank 2: Yes & DHW Tank	153	154	R
SG Ready	For H, J, K, and L series: 0: No; 1: Yes For M series: 0: No; 1: Yes Capacity; 2: Yes Power Consumption	154	155	RW
AT Buffer Tank	0 .. 10°C 32 .. 50°F	155	156	R
SG Ready DHW Capacity Up (1-0)	50 .. 150% Resolution: ± 5%	156	157	RW
SG Ready Heat Capacity Up (1-0)	50 .. 150% Resolution: ± 5%	157	158	RW
Compensation Curve - Heat - Zone 1 - Max. Temperature	20 .. 55/75°C 68 .. 131/167°F	158	159	RW
Compensation Curve - Heat - Zone 1 - Min. Temperature	20 .. 55/75°C 68 .. 131/167°F	159	160	RW
Compensation Curve - Heat - Zone 1 - Outdoor Air Min. Temperature	-20 .. 15°C -4 .. 59°F	160	161	RW
Compensation Curve - Heat - Zone 1 - Outdoor Air Max. Temperature	-20 .. 15°C -4 .. 59°F	161	162	RW
Compensation Curve - Heat - Zone 2 - Max. Temperature	20 .. 55/75°C 68 .. 131/167°F	162	163	RW

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Compensation Curve - Heat -Zone 2 - Min. Temperature	20 .. 55/75°C 68 .. 131/167°F	163	164	RW
Compensation Curve - Heat - Zone 2 - Outdoor Air Min. Temperature	-20 .. 15°C -4 .. 59°F	164	165	RW
Compensation Curve - Heat - Zone 2 - Outdoor Air Max. Temperature	-20 .. 15°C -4 .. 59°F	165	166	RW
Compensation Curve - Cool - Zone 1 - Max. Temperature	5 .. 20°C 41 .. 68°F	166	167	RW
Compensation Curve - Cool - Zone 1 - Min. Temperature	5 .. 20°C 41 .. 68°F	167	168	RW
Compensation Curve - Cool - Zone 1 - Outdoor Air Min. Temperature	15 .. 30°C 59 .. 86°F	168	169	RW
Compensation Curve - Cool - Zone 1 - Outdoor Air Max. Temperature	15 .. 30°C 59 .. 86°F	169	170	RW
Compensation Curve - Cool - Zone 2 - Max. Temperature	5 .. 20°C 41 .. 68°F	170	171	RW
Compensation Curve - Cool - Zone 2 - Min. Temperature	5 .. 20°C 41 .. 68°F	171	172	RW
Compensation Curve - Cool - Zone 2 - Outdoor Air Min. Temperature	15 .. 30°C 59 .. 86°F	172	173	RW
Compensation Curve - Cool - Zone 2 - Outdoor Air Max. Temperature	15 .. 30°C 59 .. 86°F	173	174	RW
Solar (Actual)	0: Off 1: On	174	175	R
2 Way Valve Direction (Actual)	0: Off 1: On	175	176	R
Zone1: Water Temperature	-127 .. 127°C -196.6 .. 260.6ºF	176	177	R
Zone2: Water Temperature	-127 .. 127°C -196.6 .. 260.6ºF	177	178	R
Zone 1 Temperature (Target)	-127 .. 127°C -196.6 .. 260.6ºF	178	179	R
Zone 2 Temperature (Target)	-127 .. 127°C -196.6 .. 260.6ºF	179	180	R

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Buffer Tank: Water Temperature	-127 .. 127°C -196.6 .. 260.6ºF	180	181	R
Solar: Water Temperature	-127 .. 127°C -196.6 .. 260.6ºF	181	182	R
Pool: Water Temperature	-127 .. 127°C -196.6 .. 260.6ºF	182	183	R
Water Outlet Temperature (Target)	-127 .. 127°C -196.6 .. 260.6ºF	183	184	R
Compressor Total On Time MSB	0 .. 16777214 hours	184	185	R
Compressor Total On Time LSB		185	186	R
Tank Mode Energy Generation	0 .. 65534 W	187	188	R
Heat Mode Energy Generation	0 .. 65534 W	188	189	R
(Cool Mode / Heat Recovery Mode) Energy Generation	0 .. 65534 W	189	190	R
Powerful (Request)	1: OFF 2: ON 30 mins 3: ON 60 mins 4: ON 90 mins	197	198	RW
Quiet (Request)	1: OFF 2: Level 1 3: Level 2 4: Level 3	198	199	RW
Quiet Timer	1: Cancel 2: Set	199	200	RW
System Reset (Request)	0: No Request 1: Request	200	201	W
Sterilization (Request)	0: No Request 1: Request	202	203	W
Optional PCB Connection	0: No 1: Yes	208	209	RW
Buffer Tank Connection	0: No 1: Yes	212	213	RW

<table>
<tr><th>Register name</th><th>Possible values</th><th>Modbus address (base 0)</th><th>PLC address (base 1)</th><th>R/W</th></tr>
<tr><td>Heater Capacity</td><td><table><tr><th>If NOT Big-A2W</th><th>If Big-A2W and Big-A2W Heater Capacity ≤ 18kW</th><th>If Big-A2W and Big-A2W Heater Capacity > 18 kW</th></tr><tr><td>3 kW</td><td>6 Kw</td><td>1 htr</td></tr><tr><td>6 Kw</td><td>12 Kw</td><td>2 htr</td></tr><tr><td>9 Kw</td><td>18 Kw</td><td>3 htr</td></tr></table></td><td>213</td><td>214</td><td>RW</td></tr>
<tr><td>Bivalent control pattern</td><td>1: Alternative
2: Parallel
3: Advance parallel</td><td>216</td><td>217</td><td>RW</td></tr>
<tr><td>Bivalent Heat Mode</td><td>0: No
1: Yes</td><td>217</td><td>218</td><td>RW</td></tr>
<tr><td>Bivalent DHW Mode</td><td>0: No
1: Yes</td><td>218</td><td>219</td><td>RW</td></tr>
<tr><td>Demand Control</td><td>0: No
1: Yes</td><td>219</td><td>220</td><td>RW</td></tr>
<tr><td>Defrost Signal
Only for J series onwards</td><td>0: No
1: Yes</td><td>222</td><td>223</td><td>RW</td></tr>
<tr><td>Zone 1: (Water Shift/Water/ Room/Pool) Set Temperature for Heat Mode</td><td>Range water shift: -5°C .. 5°C / 23 .. 41ºF
Range water: 20°C .. 55/75°C / 68 .. 131/167ºF
Range room: 10°C .. 30°C / 50 .. 86ºF
Range pool: 15°C .. 35°C / 59 .. 95ºF</td><td>226</td><td>227</td><td>RW</td></tr>
<tr><td>Zone 1: (Water Shift/Water/ Room) Set Temperature for Cool Mode</td><td>Range water shift: -5°C .. 5°C / 23 .. 41ºF
Range water: 5°C .. 20°C / 41 .. 68ºF
Range room: 18°C .. 35°C / 64.4 .. 95ºF</td><td>227</td><td>228</td><td>RW</td></tr>
<tr><td>Zone 2:(Water Shift/Water/ Room/Pool) Set Temperature for Heat Mode</td><td>Range water shift: -5°C .. 5°C / 23 .. 41ºF
Range water: 20°C .. 55/75°C / 68 .. 131/167ºF
Range room: 10°C .. 30°C / 50 .. 86ºF
Range pool: 15°C .. 35°C / 59 .. 95ºF</td><td>228</td><td>229</td><td>RW</td></tr>
<tr><td>Zone 2: (Water Shift/Water/ Room) Set Temperature for Cool Mode</td><td>Range water shift: -5°C .. 5°C / 23 .. 41ºF
Range water: 5°C .. 20°C / 41 .. 68ºF
Range room: 18°C .. 35°C / 64.4 .. 95ºF</td><td>229</td><td>230</td><td>RW</td></tr>
<tr><td>Current Lv</td><td>0 .. 20 Lv</td><td>235</td><td>236</td><td>RW</td></tr>
<tr><td>SG Ready: DHW Capacity Up (2-0)</td><td>50 .. 150%
Resolution: ± 5%</td><td>248</td><td>249</td><td>RW</td></tr>
</table>

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
SG Ready: Heat Capacity Up (2-1)	50 .. 150% Resolution: ± 5%	249	250	RW
Tank: Floor Operation Time (Maximum)	0 .. 600 min Resolution: ± 30 min	256	257	RW
Tank: Heat Up Time (Maximum)	5 .. 240 min Resolution: ± 5 min	257	258	R
Tank: Re-heat Temperature	-12 .. -2°C 10.4 .. 28.4°F	258	259	RW
Tank: Sterilization Boiling Temperature	55 .. 75°C 131 .. 167ºF	259	260	RW
Tank: Sterilization Operation Time (Maximum)	5 .. 60 min Resolution: ± 5 min	260	261	RW
SG Ready: Cool Capacity Up (1: 2) *Only for J series onwards*	-15 .. 0°C 5 .. 32°F	261	262	RW
SG Ready: Cool Capacity Up (2-2) *Only for J series onwards*	-15 .. 0°C 5 .. 32°F	262	263	RW
External SW	1: Close 2: Open	267	268	R
Heat-Cool SW	1: Heat 2: Cool	268	269	R
Powerful (Actual)	0: Off 1: On	269	270	R
Quiet (Actual)	0: Off 1: On	270	271	R
Heat Mode Water Set Temperature Range	1: Range 1 2: Range 2 3: Range 3	271	272	R
Room Heater (Actual)	0: Off 1: On	273	274	R
Tank Heater (Actual)	0: Off 1: On	274	275	R
Bivalent (Actual)	0: Off 1: On	275	276	R
Last Error Number (x1)	10: No error 0 .. 9	276	277	R

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Last Error Number (x2)	10: No error 0 .. 9	277	278	R
Last Error Number (x3)	10: No error 0 .. 9	278	279	R
Last Error Character	0: No error 1: U 2: H 3: F	280	281	R
Sterilization Status (Actual)	0: Off 1: On	289	290	R
Indoor Unit Model Reference	To be read as a 0x value Example: EEPROM number and version: A53D8170C Hex: 0x8170	305	306	R
Outdoor Unit Model Reference	To be read as a 0x value Example: EEPROM number and version: A53D8191C Hex: 0x8191	314	315	R
Capacity Rank	0 .. 30 kW	351	352	R
Electricity Meter HP (Error Status)	1: No error 2: Error	352	353	R
Heat-Cool Meter (Error Status)	1: No error 2: Error	353	354	R
Tank Meter (Error Status)	1: No error 2: Error	354	355	R
Modbus Meter Gateway (Error Status)	1: No error 2: Error 3: Communication not established yet	358	359	R
Heat Mode Energy Consumption *Only for K series onwards*	0 .. 65534 W	360	361	R
(Cool Mode / Heat Recovery Mode) Energy Consumption *Only for K series onwards*	0 .. 65534 W	361	362	R
Tank Mode Energy Consumption *Only for K series onwards*	0 .. 65534 W	362	363	R

Register name	Possible values	Modbus address (base 0)	PLC address (base 1)	R/W
Heat Mode Energy Generation *Only for K series onwards*	0 .. 65534 W	363	364	R
(Cool Mode / Heat Recovery Mode) Energy Generation *Only for K series onwards*	0 .. 65534 W	364	365	R
Tank Mode Energy Generation *Only for K series onwards*	0 .. 65534 W	365	366	R
Total Energy Consumption *Only for K series onwards*	0 .. 4294967294 Wh	366 367	367 368	R
Total Heat Mode Energy Generation *Only for K series onwards*	0 .. 4294967294 Wh	368 369	369 370	R
(Total Cool Mode / Heat Recovery Mode) Energy Generation *Only for K series onwards*	0 .. 4294967294 Wh	370 371	371 372	R
Total Tank Mode Energy Generation *Only for K series onwards*	0 .. 4294967294 Wh	372 373	373 374	R
Consumption Reset[10]	0: No Request 1337: Request to Clear	378	379	W
[10] This register sets registers 120 to 131 to 0.				
SG Ready: Power Consumption [1-0]: DHW *Only for M series*	500 .. 10000 W Resolution: ±100 W	417	418	RW
SG Ready: Power Consumption [1-1]: Heat *Only for M series*	500 .. 10000 W Resolution: ±100 W	418	419	RW
SG Ready: Power Consumption [1-2]: Cool *Only for M series*	500 .. 10000 W Resolution: ±100 W	419	420	RW
SG Ready: Power Consumption [2-0]: DHW *Only for M series*	500 .. 10000 W Resolution: ±100 W	420	421	RW
SG Ready: Power Consumption [2-1]: Heat *Only for M series*	500 .. 10000 W Resolution: ±100 W	421	422	RW

<table>
<tr><th>Register name</th><th>Possible values</th><th>Modbus address (base 0)</th><th>PLC address (base 1)</th><th>R/W</th></tr>
<tr><td>SG Ready: Power Consumption [2-2]: Cool
Only for M series</td><td>500 .. 10000 W
Resolution: ±100 W</td><td>422</td><td>423</td><td>RW</td></tr>
<tr><td>SG Ready: HPU Stop Consumption
Only for M series</td><td>500 .. 10000 W
Resolution: ±100 W</td><td>423</td><td>424</td><td>RW</td></tr>
<tr><td>Anti-stick Mode
Only for M series</td><td>0: Disable
1: Enable</td><td>426</td><td>427</td><td>R</td></tr>
<tr><td>DHW Circulation
Only for M series</td><td>0: Off
1: On</td><td>427</td><td>428</td><td>R</td></tr>
<tr><td>Power Consumption: Minimum Range
Only for M series</td><td><table><tr><td>1: 0.5 Kw</td><td>6: 3.0 Kw</td><td>11: 7.0 Kw</td></tr><tr><td>2: 1.0 Kw</td><td>7: 3.5 Kw</td><td>12: 8.0 Kw</td></tr><tr><td>3: 1.5 Kw</td><td>8: 4.0 Kw</td><td>13: 9.0 Kw</td></tr><tr><td>4: 2.0 Kw</td><td>9: 5.0 Kw</td><td>14:10.0 Kw</td></tr><tr><td>5: 2.5 Kw</td><td>10: 6.0 Kw</td><td>15: No data received from the outdoor unit yet.</td></tr></table></td><td>428</td><td>429</td><td>R</td></tr>
<tr><td>Power Consumption: Maximum Range
Only for M series</td><td><table><tr><td>1: 0.5 Kw</td><td>6: 3.0 Kw</td><td>11: 7.0 Kw</td></tr><tr><td>2: 1.0 Kw</td><td>7: 3.5 Kw</td><td>12: 8.0 Kw</td></tr><tr><td>3: 1.5 Kw</td><td>8: 4.0 Kw</td><td>13: 9.0 Kw</td></tr><tr><td>4: 2.0 Kw</td><td>9: 5.0 Kw</td><td>14:10.0 Kw</td></tr><tr><td>5: 2.5 Kw</td><td>10: 6.0 Kw</td><td>15: No data received from the outdoor unit yet.</td></tr></table></td><td>429</td><td>430</td><td>R</td></tr>
<tr><td>Electrical Anode (Actual)
Only for M series</td><td>0: Off
1: On</td><td>432</td><td>433</td><td>R</td></tr>
<tr><td>Big-A2W Heater Capacity (If Big-A2W)</td><td>0: ≤18 kW
1: >18 kW</td><td>437</td><td>438</td><td>RW</td></tr>
<tr><td>Big-A2W
Only for M series</td><td>0: No
1: Yes</td><td>438</td><td>439</td><td>R</td></tr>
</table>

6.3.9. Considerations on Temperature Registers

The Panasonic Aquarea system features four parameters for the setpoint temperature control:

- Water shift
- Water
- Room

- Pool

Find in the table below the correspondence between these parameters and the gateway's Modbus registers related to zone setup, operating mode, and setpoint temperature.

NOTE
The numbers in parentheses indicate the Modbus addresses of the registers.

Zone 1 Setup (83) **Zone 2 Setup (84)**	**Zone 1 Temperature Setting Mode (16)** **Zone 2 Temperature Setting Mode (17)**	**Operating Mode (4)**	**Zone 1 Setpoint Temperature (12)** **Zone 2 Setpoint Temperature (13)**	**Zone 1 Actual (Water Shift/ Water/Room/Pool) Temperature (14)** **Zone 1 Actual (Water Shift/ Water/Room/Pool) Temperature (15)**
1: Room	1: Room temperature	1: Heat 2: Heat Tank 3: Tank 4: Cool Tank 5: Cool 6: Auto 7: Auto Tank	Room	Room
	2: Compensation Curve		Water Shift	Water
	3: Direct		Water	
2: Pool	4: Pool Temp	1: Heat 2: Heat Tank	Pool	Pool

7. Error Codes

Modbus Error Code	Error in Remote Controller	Error Description
0	H00	No abnormality detected
112	H12	Indoor/Outdoor capacity unmatched
115	H15	Outdoor compressor temperature sensor abnormality
120	H20	Water pump abnormality
123	H23	Indoor refrigerant liquid temperature sensor abnormality
127	H27	Service valve error
128	H28	Abnormal solar sensor
131	H31	Abnormal swimming pool sensor
136	H36	Abnormal buffer tank sensor
138	H38	Brand code not match
142	H42	Compressor low pressure abnormality
143	H43	Abnormal Zone 1 sensor
144	H44	Abnormal Zone 2 sensor
162	H62	Water flow switch abnormality
163	H63	Refrigerant low pressure abnormality
164	H64	Refrigerant high pressure abnormality
165	H65	Deice circulation error
167	H67	Abnormal External Thermistor 1
168	H68	Abnormal External Thermistor 2
170	H70	Back-up heater OLP abnormality
172	H72	Tank sensor abnormal
174	H74	PCB communication error
175	H75	Low water temperature control
176	H76	Indoor - control panel communication abnormality
190	H90	Indoor/outdoor abnormal communication
191	H91	Tank heater OLP abnormality
195	H95	Indoor/Outdoor wrong connection
198	H98	Outdoor high pressure overload protection
199	H99	Indoor heat exchanger freeze prevention
212	F12	Pressure switch activate
214	F14	Outdoor compressor abnormal revolution
215	F15	Outdoor fan motor lock abnormality
216	F16	Total running current protection
220	F20	Outdoor compressor overheating protection
222	F22	IPM (power transistor) overheating protection
223	F23	Outdoor Direct Current (DC) peak detection
224	F24	Refrigeration cycle abnormality

225	F25	Cooling/Heating cycle changeover abnormality
227	F27	Pressure switch abnormality
229	F29	Low Discharge Superheat
230	F30	Water outlet sensor 2 abnormality
232	F32	Abnormal Internal Thermostat
236	F36	Outdoor air temperature sensor abnormality
237	F37	Indoor water inlet temperature sensor abnormality
240	F40	Outdoor discharge pipe temperature sensor abnormality
241	F41	PFC control
242	F42	Outdoor heat exchanger temperature sensor abnormality
243	F43	Outdoor defrost sensor abnormality
245	F45	Indoor water outlet temperature sensor abnormality
246	F46	Outdoor Current Transformer open circuit
248	F48	Outdoor EVA outlet temperature sensor abnormality
249	F49	Outdoor bypass outlet temperature sensor abnormality
295	F95	Cooling high pressure overload protection

NOTE
If you detect an error code that is not listed, contact your nearest Panasonic technical support service.