IntesisBox®

PA-AW-MBS-1 v.1.4

Modbus RTU (EIA485) Interface for Panasonic Aquarea series.

User Manual

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Order Code:

PA-AW-MBS-1: Modbus RTU Interface for Panasonic Aquarea series

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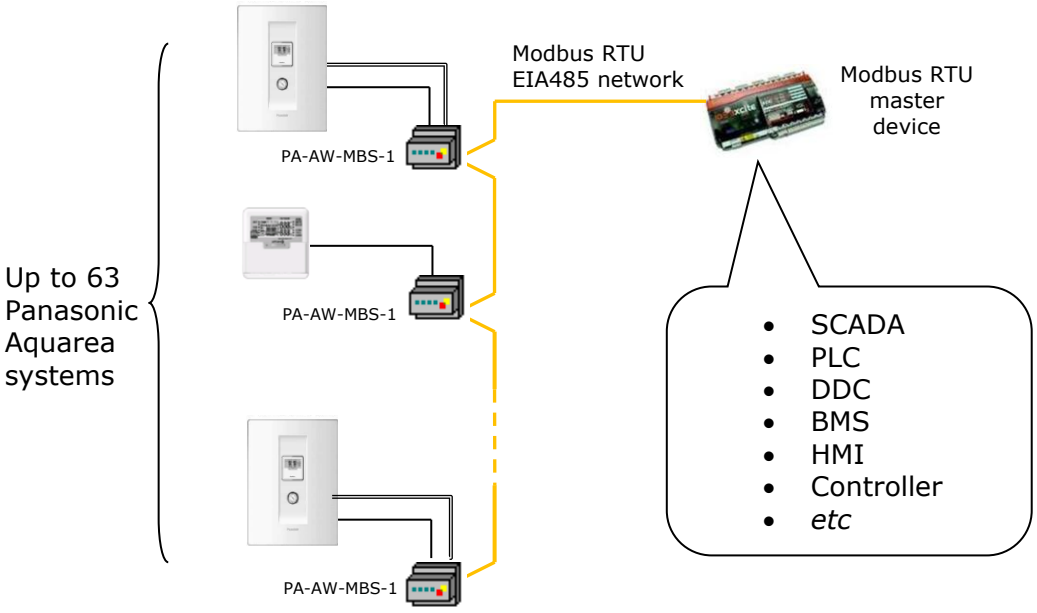
1. Presentation

The PA-AW-MBS-1 interface allows a complete and natural integration of **Panasonic Aquarea Air-to-Water systems** into Modbus RTU (EIA485) networks.

Compatible with Panasonic Aquarea models (see section 5).

- Reduced dimensions. 93 x 53 x 58 mm.
- Quick and easy installation. *Mountable on DIN rail, wall.*
- External power not required.
- Direct connection to Modbus RTU (EIA485) networks. Up to 63 PA-AW-MBS-1 devices can be connected in the same network.
  PA-AW-MBS-1 is a Modbus slave device.
- Direct connection to the AW system.
  The cable for this connection is also supplied.
- Configuration from both on-board DIP-switches and Modbus RTU.
- Total Control and Supervision.
- Real states of the AW unit's internal variables[1].
- Allows using simultaneously the IR remote control and Modbus RTU.



[1] Values shown in the PA-AW-MBS-1 and the Control Panel may differ due to the non-synchronous behavior of the Panasonic Aquarea system.

2. Connection

The interface comes with a cable and the corresponding connectors for direct connection to the Aquarea system and with a plug-in terminal block of 2 poles for connection to a Modbus RTU EIA485 network. If you have installed a ***Monobloc system***, move to section 2.1. On the other hand, if you have installed a ***Bibloc system***, move to section 2.2.

2.1 Monobloc system. Aquarea Control Panel connection.

In the case of Monobloc systems, PA-AW-MBS-1 has to be connected to the Aquarea Control Panel. To do it so, please use the cable supplied and the cable from Panasonic coming from the outdoor unit.

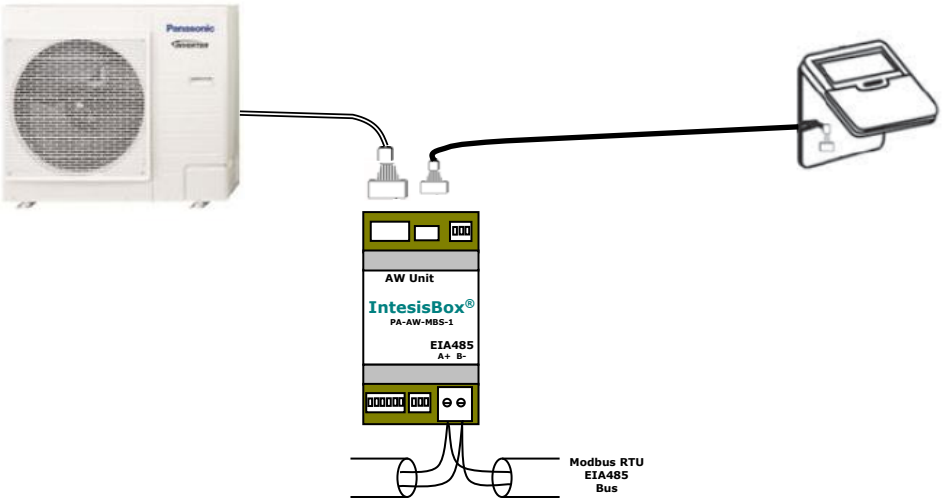


Figure 2.1 PA-AW-MBS-1 and Aquarea Control Panel connection diagram

2.2 Bibloc system. Aquarea indoor unit connection.

In the case of Bibloc systems, the PA-AW-MBS-1 interface has to be connected to the Aquarea indoor unit. Please follow these steps to carry out the connection process.

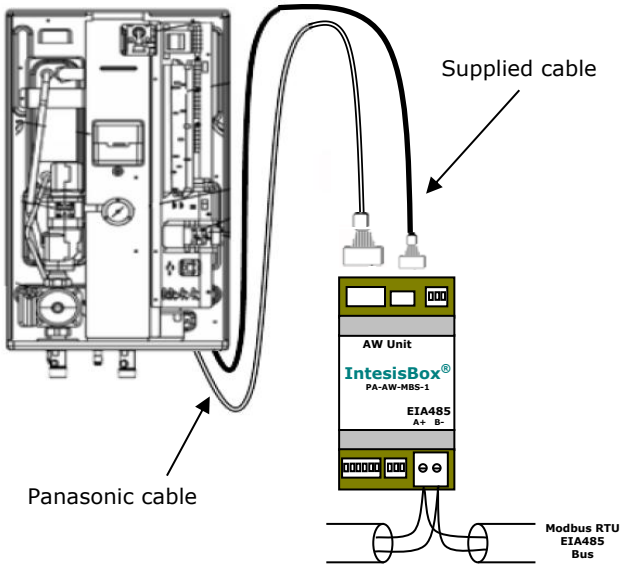


Figure 2.2 PA-AW-MBS-1 and Aquarea Indoor Unit connection diagram

2.3 Connection to the EIA485 bus

Connect the EIA485 bus wires to the plug-in terminal block (the one of two poles) of the PA-AW-MBS-1 with the right polarity on this connection (A+ and B-). Respect the maximum distance of 1.200 meters for the bus, no loop or star topologies are allowed for EIA485 bus, a terminator resistor of 120 must be present at each end of the bus to avoid signal reflections and also a fail-safe biasing mechanism (see section 3.7 for more details).

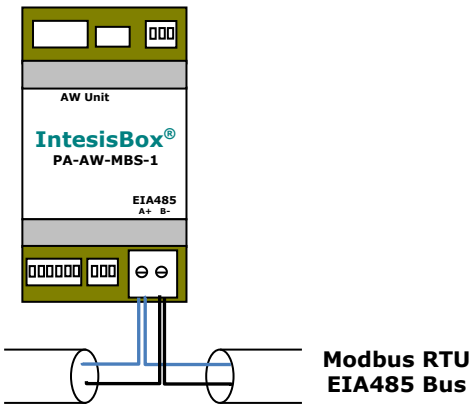


Figure 2.3 PA-AW-MBS-1 to Modbus RTU connection diagram

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3. Modbus Interface Specification

3.1 Modbus physical layer

PA-AW-MBS-1 implements a Modbus RTU (slave) interface, to be connected to an EIA485 line. It performs an 8N1 or 8N2 communication (8 data bits, no parity and 1 or 2 stop bit) with several available baud rates (2400 bps, 4800 bps, 9600 bps -default-, 19200 bps).

3.2 Modbus Registers

All registers are "16-bit unsigned Holding Register" register type, in standard Modbus' big endian notation. Modbus registers are organized according to the Aquarea system functioning mode and structure. Next you can find available registers.

Important: Values shown in the PA-AW-MBS-1 and the Control Panel may differ due to the non-synchronous behavior of the Panasonic Aquarea system.

3.2.1 General System Control

Register Address (protocol address)	Register Address (PLC address)	R/W	Description
0	1	R/W	System On/Off ▪ 0: Off ▪ 1: On
1	2	R	Outdoor Temperature[2] ▪ -127ºC to 127ºC (x1 or x10 values)[3]
2	3	R	Outgoing Water Temperature[2] ▪ 0ºC to 127ºC (x1 or x10 values)[3]
3	4	R	Ingoing Water Temperature[2] ▪ 0ºC to 127ºC (x1 or x10 values)[3]
4	5	R/W	Operating mode ▪ 0: None[4] ▪ 1: Heat ▪ 2: Heat/Tank ▪ 3: Tank ▪ 4: Cool/Tank ▪ 5: Cool

[2] If a non valid value is sent, the value shown in the Modbus register is "-128" and in the remote controller is "---".
[3] Decidegrees or grades units can be selected using the S4 switch. See section1.1 for more details.
[4] This mode will be only active when "***Force Mode***" or "***Pump Down***" registers are active. It can't be set by the user.

3.2.2 Climate Configuration

Register Address (protocol address)	Register Address (PLC address)	R/W	Description
10	11	R	Operating Mode ▪ 0: Off ▪ 1: Heat ▪ 2: Cool
11	12	R/W	Working Mode[5] ▪ 0: Normal ▪ 1: Eco ▪ 2: Powerful
12	13	R/W	Outdoor Temp for Heating at Low Water Temp ▪ -15ºC to 15ºC
13	14	R/W	Outdoor Temp for Heating at High Water Temp ▪ -15ºC to 15ºC
14	15	R/W	Water Setpoint for Heating at Low Outdoor Temp ▪ -25ºC to 15ºC
15	16	R/W	Water Setpoint for Heating at High Outdoor Temp ▪ -25ºC to 15ºC
16	17	R/W	Water Current Thermoshift ▪ -5ºC to 5ºC (x1 or x10 values)[3]
17	18	R/W	Outdoor Temp for Heating off (Max) ▪ 5ºC to 35ºC (x1 or x10 values)[3]
18	19	R/W	Outdoor Temp for Heating off (Min) Selection ▪ 0: Disabled ▪ 1: Enabled
19	20	R/W	Outdoor Temp for Heating off (Min) ▪ -20ºC to -5ºC (x1 or x10 values)[3]
20	21	R/W	Outdoor Temp for Heater On ▪ -15ºC to 20ºC (x1 or x10 values)[3]
21	22	R	Heater Capacity Selection ▪ 0x55: 0 KW ▪ 0x58: 3 KW ▪ 0x5b: 6 KW ▪ 0x5e: 9 KW
22	23	R	Max Heater Capacity ▪ 0 KW ▪ 3 KW ▪ 6 KW ▪ 9 KW
23	24	R/W	Cooling Setpoint Temperature ▪ 5ºC to 20ºC (x1 or x10 values)[3]
24	25	R	Heating Setpoint Temperature ▪ 20ºC to 70ºC (x1 or x10 values)[3]

[5] These working modes are only available through the Modbus registers of the PA-AW-MBS-1.

3.2.3 Tank Configuration

Register Address (protocol address)	Register Address (PLC address)	R/W	Description
30	31	R	On/Off ▪ 0: Off ▪ 1: On
31	32	R/W	Working Mode ▪ 0: Normal ▪ 1: Eco ▪ 2: Powerful
32	33	R	Water Temp[6] ▪ 0ºC to 127º (x1 or x10 values)[3]
33	34	R/W	Setpoint Temperature ▪ 40ºC to 75º (x1 or x10 values)[3]
34	35	R/W	Heat-up Interval ▪ 5 to 95 Min
35	36	R/W	Operation Interval ▪ 1 to 20 (1=30Min, 2=1h, 3:1h 30min… 20=10h)
36	37	R/W	Booster Delay Time ▪ 20 to 95 Min
37	38	W	Sterilization On ▪ 0xAA: On
38	39	R/W	Sterilization Boiling Temp ▪ 40ºC to 75ºC (x1 or x10 values)[3]
39	40	R/W	Sterilization Continuing Time ▪ 5 to 60 Min

3.2.4 Maintenance

Register Address (protocol address)	Register Address (PLC address)	R/W	Description
50	51	W	Test Mode 1 ▪ 1: Go
51	52	W	Test Mode 2 ▪ 1: Go
52	53	R	Error Code from Indoor Unit ▪ See Error List (section 6)
53	54	R	Error History from Indoor Unit ▪ See Error List
54	55	W	Error Reset 1 ▪ 1: Go
55	56	W	Error Reset 2 ▪ 1: Go
56	57	R	Warning Tank Temp. Status ▪ 0: Off ▪ 1: On

[6] If a non valid value is sent, the value shown in the Modbus register is "-128" and in the remote controller is "---". If tank is not connected, a value 0x8000 is sent and overwrites the "-128" value.

57	58	R	Defrost Status ▪ 0: Off ▪ 1: On
58	59	R	Solar Status (For solar panels only) ▪ 0: Off ▪ 1: On
59	60	R	Booster Status ▪ 0: Off ▪ 1: On
60	61	R	Compressor Frequency ▪ 0 to 255 Hz
61	62	R/W	Compressor Operating Hours ▪ 0 to 65535 hours
62	63	R	Pump Down[7] ▪ 0: Off ▪ 1: On
63	64	R/W	Force Mode (Force button < 5seg) ▪ 0: Off ▪ 1: On
64	65	W	Force Deice (Force button > 5seg) ▪ 1: Go
65	66	R/W	Service SW Code ▪ 0x00: NORMAL ▪ 0x01: SERVICE PUMPDOWN ▪ 0x02: SERVICE PUMP ▪ 0x03: SERVICE 3 (NOT USED) …. ▪ 0x63: SERVICE 99 (NOT USED)
66	67	R/W	Quiet Mode ▪ 0: Off ▪ 1: On
67	68	R/W	Heater When Heat ▪ 0: Off ▪ 1: On
68	69	R	Heater Status ▪ 0: Off ▪ 1: On
69	70	R	Heater Mode ▪ 0: Off ▪ 1: On
70	71	R	Alarm Status ▪ 0: No alarm ▪ 1: Alarm

3.2.5 Unit Configuration

Register Address (protocol address)	Register Address (PLC address)	R/W	Description
80	81	R	Room Thermostat ▪ 0x55: Off ▪ 0xAA: On
81	82	R	Tank Connection ▪ 0x55: Off ▪ 0xAA: On

[7] This register can be only activated through the remote controller.

82	83	R	Solar Priority (For solar panels only) ▪ 0x55: Off ▪ 0xAA: On
83	84	R	Heating Priority ▪ 0x55: Off ▪ 0xAA: On
84	85	R	Cooling Priority ▪ 0x55: Off ▪ 0xAA: On
85	86	R	Sterilization ▪ 0x55: Off 0xAA: On
86	87	R	Base Pan Heater ▪ 0x55: Type A ▪ 0xAA: Type B
87	88	R	Anti-Freezing ▪ 0x55: Off ▪ 0xAA: On
88	89	R	Booster Heater ▪ 0x55: Off ▪ 0xAA: On

3.2.6 System Configuration

Register Address (protocol address)	Register Address (PLC address)	R/W	Description
1000	1001	R/W	Decrease Climate Preset HEAT Thermoshift (ECO)[8] ▪ 0ºC to 5ºC (x1 or x10 values)[3]
1001	1002	R/W	Increase Climate Preset HEAT Thermoshift (POWERFUL)[8] ▪ 0ºC to 5ºC (x1 or x10 values)[3]
1002	1003	R/W	Decrease Climate Preset COOL Thermoshift (ECO) [8] ▪ 0ºC to 5ºC (x1 or x10 values)[3]
1003	1004	R/W	Increase Climate Preset COOL Thermoshift (POWERFUL) [8] ▪ 0ºC to 5ºC (x1 or x10 values)[3]
1004	1005	R/W	Decrease Tank Preset Thermoshift (ECO) [8] ▪ 0ºC to 10ºC (x1 or x10 values)[3]
1005	1006	R/W	Increase Tank Preset Thermoshift (POWERFUL)[8] ▪ 0ºC to 10ºC (x1 or x10 values)[3]
1006	1007	R/W	Trigger synchronization[9] ▪ 1: Trigger
1007	1008	R/W	LED flashing enablement ▪ 0: Disabled ▪ 1: Enabled

Thermoshift Presets are special functions designed to set a temperature offset in the HEAT, COOL and TANK modes so user can adjust the temperature to their needs. These functions are only configurable from the PA-AW-MBS-1 Modbus interface. They are ***not*** modifiable from the remote controller of the Aquarea system.

[8] Default value will be the maximum: 5ºC for Climate and 10ºC for Tank.

[9] When this signal is set to 1, the gateway is reset and all values in the remote controller are set in the Modbus registers losing all previous configuration.

3.3 Register dependencies

Due to the system complexity, several functions have been blocked so they are only available when it is reasonable to be active. This will help users not to induce system malfunctioning. Next, there is a list of those signals and the related conditions to make them available.

	Signal			Condition 1			Condition 2		
	Register Address		Name	Register Address		Name	Register Address		Name
	Protocol	PLC		Protocol	PLC		Protocol	PLC	
Climate	18	19	Outdoor Temp for Heating off (Min) Selection	N/A	N/A	Protocol[10]: 2.01	-	-	-
	19	20	Outdoor Temp for Heating off (Min)	N/A	N/A	Protocol[10]: 2.01	-	-	-
	21	22	Heater Capacity Selection	N/A	N/A	Protocol[10]: 2.01	-	-	-
	22	23	Max Heater Capacity	N/A	N/A	Protocol[10]: 2.01	-	-	-
	23	24	Cooling Setpoint Temperature	N/A	N/A	Indoor unit has Cool mode	-	-	-
Tank	30	31	Tank On/Off	81	82	Tank Connection ▪ 0xAA: On	-	-	-
	31	32	Tank Working Mode	81	82	Tank Connection ▪ 0xAA: On	-	-	-
	32	33	Tank Water Temp	81	82	Tank Connection ▪ 0xAA: On	-	-	-
	34	35	Tank Heat-up Interval	81	82	Tank Connection ▪ 0xAA: On	83	84	Heating Priority ▪ 0x55: Off
	35	36	Operation Interval	81	82	Tank Connection ▪ 0xAA: On	83	84	Heating Priority ▪ 0x55: Off
	36	37	Booster Delay Time	81	82	Tank Connection ▪ 0xAA: On	88	89	Booster Heater ▪ On: 0xAA (Protocol: 2.01)
	37	38	Sterilization On	81	82	Tank Connection ▪ 0xAA: On	85	86	Sterilization ▪ 0xAA: On
	38	39	Sterilization Boiling Temp	81	82	Tank Connection ▪ 0xAA: On	85	86	Sterilization ▪ 0xAA: On
	39	40	Sterilization Continuing Time	81	82	Tank Connection ▪ 0xAA: On	85	86	Sterilization ▪ 0xAA: On

Maintenance	56	57	Warning Tank Temp. Status	N/A	N/A	Protocol[10]: 2.01	-	-	-
	57	58	Defrost Status	N/A	N/A	Protocol[10]: 2.01	-	-	-
	62	63	Pump Down	N/A	N/A	Protocol[10]: 1.01	-	-	-
	64	65	Force Deice	N/A	N/A	Protocol[10]: 2.01	-	-	-
	65	66	Service SW Code	N/A	N/A	Protocol[10]: 2.01	-	-	-
Unit config	82	83	Solar Priority	81	82	Tank Connection ▪ 0xAA: On	-	-	-
	83	84	Heating Priority	81	82	Tank Connection ▪ 0xAA: On	-	-	-
	84	85	Cooling Priority	N/A	N/A	Protocol[10]: 2.01	N/A	N/A	Indoor Unit has Cool mode
	85	86	Sterilization	81	82	Tank Connection ▪ 0xAA: On	-	-	-
	86	87	Base Pan Heater	N/A	N/A	Protocol[10]: 2.01	-	-	-
	87	88	Anti-Freezing	N/A	N/A	Protocol[10]: 2.01	-	-	-
	88	89	Booster Heater	N/A	N/A	Protocol[10]: 2.01	81	82	Tank Connection ▪ 0xAA: On

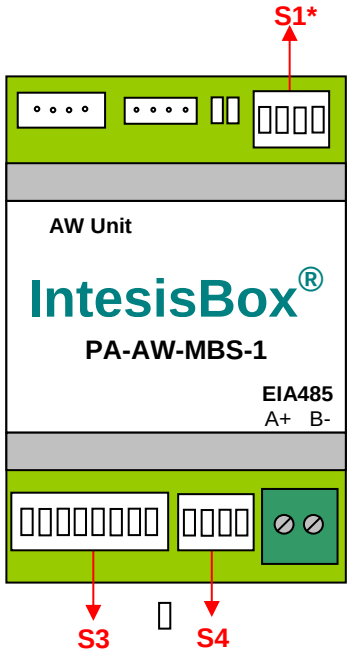
If conditions specified in this table are not matched for each signal, the register shows a not valid value (0x8000) and the register's entry is blocked.

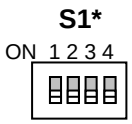
[10] Modbus protocol communication version used by the Aquarea system.

3.4 DIP-switch Configuration Interface

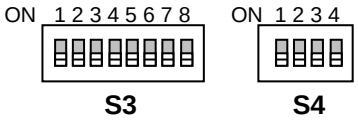
All configuration values on PA-AW-MBS-1 can be written and read from Modbus interface. Though, some of them can also be setup from its on-board DIP-switch interface.

They are DIP-switches S1*, S3 and S4 on the device, in the following location:





* DIP-Switch S1 is not used by current version of PA-AW-MBS-1



The following tables apply for configuration of the interface through these DIP-switches:

Table 3.1 S3 Switch – Modbus protocol: Slave address and baudrate

Add	Switches 1 2 3 4 5 6 7 8	Add	Switches 1 2 3 4 5 6 7 8	Add	Switches 1 2 3 4 5 6 7 8	Add	Switches 1 2 3 4 5 6 7 8
0	↓ ↓ ↓ ↓ ↓ ↓ x x	16	↓ ↓ ↓ ↓ ↑ ↓ x x	32	↓ ↓ ↓ ↓ ↓ ↑ x x	48	↓ ↓ ↓ ↓ ↑ ↑ x x
1[11]	↑ ↓ ↓ ↓ ↓ ↓ x x	17	↑ ↓ ↓ ↓ ↑ ↓ x x	33	↑ ↓ ↓ ↓ ↓ ↑ x x	49	↑ ↓ ↓ ↓ ↑ ↑ x x
2	↓ ↑ ↓ ↓ ↓ ↓ x x	18	↓ ↑ ↓ ↓ ↑ ↓ x x	34	↓ ↑ ↓ ↓ ↓ ↑ x x	50	↓ ↑ ↓ ↓ ↑ ↑ x x
3	↑ ↑ ↓ ↓ ↓ ↓ x x	19	↑ ↑ ↓ ↓ ↑ ↓ x x	35	↑ ↑ ↓ ↓ ↓ ↑ x x	51	↑ ↑ ↓ ↓ ↑ ↑ x x
4	↓ ↓ ↑ ↓ ↓ ↓ x x	20	↓ ↓ ↑ ↓ ↑ ↓ x x	36	↓ ↓ ↑ ↓ ↓ ↑ x x	52	↓ ↓ ↑ ↓ ↑ ↑ x x
5	↑ ↓ ↑ ↓ ↓ ↓ x x	21	↑ ↓ ↑ ↓ ↑ ↓ x x	37	↑ ↓ ↑ ↓ ↓ ↑ x x	53	↑ ↓ ↑ ↓ ↑ ↑ x x
6	↓ ↑ ↑ ↓ ↓ ↓ x x	22	↓ ↑ ↑ ↓ ↑ ↓ x x	38	↓ ↑ ↑ ↓ ↓ ↑ x x	54	↓ ↑ ↑ ↓ ↑ ↑ x x
7	↑ ↑ ↑ ↓ ↓ ↓ x x	23	↑ ↑ ↑ ↓ ↑ ↓ x x	39	↑ ↑ ↑ ↓ ↓ ↑ x x	55	↑ ↑ ↑ ↓ ↑ ↑ x x
8	↓ ↓ ↓ ↑ ↓ ↓ x x	24	↓ ↓ ↓ ↑ ↑ ↓ x x	40	↓ ↓ ↓ ↑ ↓ ↑ x x	56	↓ ↓ ↓ ↑ ↑ ↑ x x
9	↑ ↓ ↓ ↑ ↓ ↓ x x	25	↑ ↓ ↓ ↑ ↑ ↓ x x	41	↑ ↓ ↓ ↑ ↓ ↑ x x	57	↑ ↓ ↓ ↑ ↑ ↑ x x
10	↓ ↑ ↓ ↑ ↓ ↓ x x	26	↓ ↑ ↓ ↑ ↑ ↓ x x	42	↓ ↑ ↓ ↑ ↓ ↑ x x	58	↓ ↑ ↓ ↑ ↑ ↑ x x
11	↑ ↑ ↓ ↑ ↓ ↓ x x	27	↑ ↑ ↓ ↑ ↑ ↓ x x	43	↑ ↑ ↓ ↑ ↓ ↑ x x	59	↑ ↑ ↓ ↑ ↑ ↑ x x
12	↓ ↓ ↑ ↑ ↓ ↓ x x	28	↓ ↓ ↑ ↑ ↑ ↓ x x	44	↓ ↓ ↑ ↑ ↓ ↑ x x	60	↓ ↓ ↑ ↑ ↑ ↑ x x
13	↑ ↓ ↑ ↑ ↓ ↓ x x	29	↑ ↓ ↑ ↑ ↑ ↓ x x	45	↑ ↓ ↑ ↑ ↓ ↑ x x	61	↑ ↓ ↑ ↑ ↑ ↑ x x
14	↓ ↑ ↑ ↑ ↓ ↓ x x	30	↓ ↑ ↑ ↑ ↑ ↓ x x	46	↓ ↑ ↑ ↑ ↓ ↑ x x	62	↓ ↑ ↑ ↑ ↑ ↑ x x
15	↑ ↑ ↑ ↑ ↓ ↓ x x	31	↑ ↑ ↑ ↑ ↑ ↓ x x	47	↑ ↑ ↑ ↑ ↓ ↑ x x	63	↑ ↑ ↑ ↑ ↑ ↑ x x

[11] Default value

Table 3.2 S3 Switch - Modbus baud rate selection

Binary value $b_0...b_8$	Decimal value	Switches 1 2 3 4 5 6 7 8	Description
xxxxxx00	0	x x x x x x ↓ ↓	2400bps
xxxxxx10	1	x x x x x x ↑ ↓	4800bps
xxxxxx01	2	x x x x x x ↓ ↑	9600bps (- default value)
xxxxxx11	3	x x x x x x ↑ ↑	19200bps

Table 3.3 S4 Switch - Other: Degrees/Decidegress (x10) and EIA485 termination resistor

Binary value $b_0...b_4$	Decimal value	Switches 1 2 3 4	Description
0xxx	0	↓ x x x	Temperature values in Modbus register are represented in degrees (x1) (default value)
1xxx	1	↑ x x x	Temperature values in Modbus register are represented in decidegrees (x10)
x0xx	0	x ↓ x x	Disabled
x1xx	1	x ↑ x x	Disabled
xxx0	0	x x x ↓	EIA485 bus without termination resistor (default value)
xxx1	1	x x x ↑	Internal termination resistor of 120Ω connected to EIA485 bus [12]

3.5 Implemented Functions

PA-AW-MBS-1 implements the following standard MODBUS functions:

- 3: Read Holding Registers
- 4: Read Input Registers
- 6: Write Single Register
- 16: Write Multiple Registers (Although this function is allowed, the interface does not allow write operations on more than 1 register with the same request, this means that length field should always be 1 when using this function for writes).

[12] Only in the interfaces connected at both ends of the bus must be activated the termination resistor. More information can be found in section 3.7.

3.6 Device LED indicator

The device includes a LED indicator to signal its different possible operational states. In the following table are presented the different indications it can perform and their meaning.

L1 (yellow)			
Operation	**ON**	**OFF**	**Meaning**
Blinking	500 ms	500 ms	Communication error
Flashing	100 ms	1900 ms	Normal operation (configured and working)

L1 (yellow) & L2 (red)			
Operation	**ON**	**OFF**	**Meaning**
Pulse	5 sec	--	Device start-up
Alternate blinking	500 ms	500 ms	Flash checksum not OK

3.7 EIA485 bus. Termination resistors and Fail Safe Biasing mechanism

EIA485 bus requires a 120Ω terminator resistor at each end of the bus to avoid signal reflections.

In order to prevent fail status detections by the receivers *"listening"* the bus when all the transmitters outputs are in three-state (high impedance), it is also required a fail-safe biasing mechanism. This mechanism provides a safe status (a correct voltage level) in the bus when all the transmitters' outputs are in three-state.

The PA-AW-MBS-1 device includes an on-board terminator resistor of 120Ω that can be connected to the EIA485 bus by using DIP-switch P5 (see below).

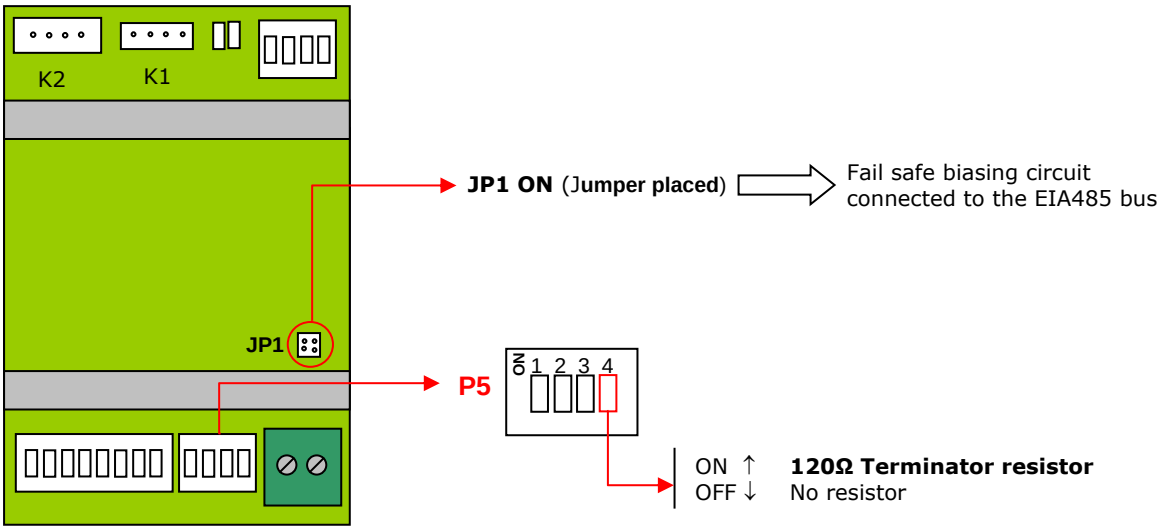
A fail safe biasing circuit has also been included in the board of PA-AW-MBS-1, it can be connected to the EIA485 bus by placing the internal jumper JP1 (see details below).

This fail safe biasing of the EIA485 bus must only be supplied by one of the devices connected to the bus. As this fail safe biasing circuit also provides a termination resistance, only one of both must be selected in the PA-AW-MBS-1 device, fail safe biasing (*jumper JP1 placed*) or terminator resistor (*DIP-switch P5 position 4 to ON*).

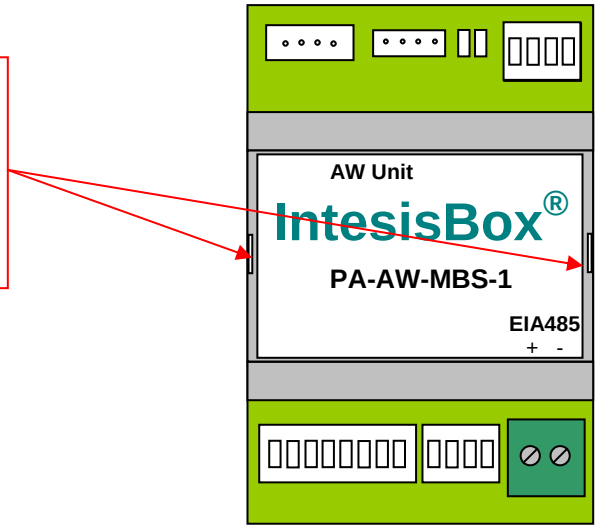
The device providing fail safe biasing or terminator resistor should be the one connected at one end of the bus. At the other end of the bus, if there is also a PA-AW-MBS-1 device, select the 120Ω terminator resistor through DIP-switch P5, or if there is a master device not providing internal 120Ω terminator resistor, connect an external 120Ω resistor in the bus terminal block connection of such master device.

Some Modbus RTU EIA485 master devices can provide also internal 120Ω terminator resistor and/or fail safe biasing (consult the technical documentation of the master device connected to the EIA485 network in every case).

Location of jumpers and DIP-switches for EIA485 bus Termination resistor or Fail Safe Biasing selection:

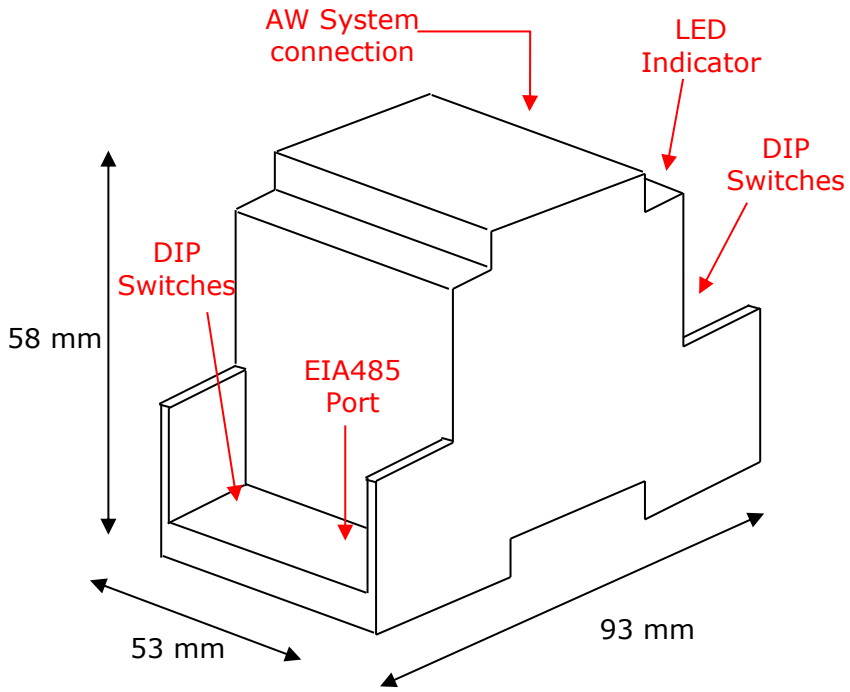


To access the internal jumper JP1, extract the top cover of the interface inserting a small screw-driver or clip in the holes located at both sides of the cover.



4. Technical Specifications

Enclosure	ABS (UL 94 HB). 2,5mm thickness. Size: 93 x 53 x 58 mm. Weight: 85g
Color	Light Grey
Power supply	Supplied through Modbus bus.
LED indicators	1 x Device status 1 x Error indicator
Terminal wiring (for low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.75 … 1.25mm^2 2 cores: 0.75 … 1.25mm^2 3 cores: not permitted
AW system connection	K1 (Aquarea unit) (4 x 0.22 - Shielded) K2 (Remote controller) (4 x 0.22 - Shielded)
Modbus RTU port (EIA485 Port)	1 x Serial EIA485 (Plug-in screw terminal block 2 poles). SELV
Operating Temperature	From 0ºC to 40ºC
Operating Humidity	<95% RH, non-condensing
Isolation Voltage	1000 VDC
Isolation Resistance	1000 MΩ
RoHS conformity	Compliant with RoHS directive (2002/95/CE).
Certifications	CE conformity to EMC directive (2004/108/EC) and Low-voltage directive (2006/95/EC) EN 61000-6-2; EN 61000-6-3; EN 60950-1; EN 50491-3; EN 50090-2-2;



5. List of supported Panasonic Aquarea Unit Types

A list of Panasonic Aquarea references compatible with PA-AW-MBS-1 can be found in:

http://www.intesis.com/pdf/IntesisBox_PA-AW-xxx-1_AW_Compatibility.pdf

6. Error Codes

Error Code (Modbus)	Error in Remote Controller	Error Description
000	H00	No abnormality detected
042	H12	Indoor / outdoor capacity unmatched
224	H15	Outdoor compressor temperature sensor abnormality
225	H23	Indoor refrigerant liquid temperature sensor abnormality
226	H24	*Unknown*
227	H38	Indoor / outdoor mismatch
232	H42	Compressor low pressure abnormality
228	H61	*Unknown*
229	H62	Water flow switch abnormality
230	H63	Refrigerant low pressure abnormality
231	H64	Refrigerant high pressure abnormality
236	H70	Indoor backup heater OLP abnormality
038	H72	Tank temperature sensor abnormality
156	H76	Indoor - control panel communication abnormality
020	H90	Indoor / outdoor abnormal communication
002	H91	Tank booster heater OLP abnormality
222	H95	Indoor / outdoor wrong connection
233	H98	Outdoor high pressure overload protection
036	H99	Indoor heat exchanger freeze prevention
193	F12	Pressure switch activate
195	F14	Outdoor compressor abnormal rotation
196	F15	Outdoor fan motor lock abnormality
197	F16	Total running current protection
200	F20	Outdoor compressor overheating protection
202	F22	IPM overheating protection
203	F23	Outdoor DC peak detection
204	F24	Refrigerant cycle abnormality
234	F25	Cooling / heating cycle changeover abnormality
205	F27	Pressure switch abnormality
208	F36	Outdoor air temperature sensor abnormality
209	F37	Indoor water inlet temperature sensor abnormality
013	F38	*Unknown*
212	F40	Outdoor discharge pipe temperature sensor abnormality
214	F41	PFC control
215	F42	Outdoor heat exchanger temperature sensor abnormality
216	F43	Outdoor defrost temperature sensor abnormality
210	F45	Indoor water outlet temperature sensor abnormality
207	F46	Outdoor current transformer open circuit
237	F48	Outdoor EVA outlet temperature sensor abnormality
238	F49	Outdoor bypass outlet temperature sensor abnormality
235	F95	Cooling high pressure overload protection
65535	N/A	Communication error between PA-AW-MBS-1 and the AW unit

In case you detect an error code not listed, contact your nearest Panasonic technical support service.