Procon
MelcoBEMS MINI (A1M+)

FOR INSTALLERS

INSTALLATION MANUAL
Manual version 1.0.4

Firmware version 4.1.2

For safe and correct use, please read this installation manual thoroughly before installing the PROCON MelcoBEMS MINI (A1M+).

Preface

Safety warnings

⚠ **Caution:**

Do not expose to rain or moisture.

⚠ **Operating Temperature:**

The product has been designed to operate between -20° C and +60° C

⚠ **Shielded Signal Cables:**

Use only shielded cables for connecting peripherals to any Procon MelcoBEMS MINI (A1M+) device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment.

⚠ **CE Notice:**

This product has been determined to be in compliance with 2014/30/EU (EMC Directive), 2014/35/EU (Low Voltage Directive) and 2011/65/EU (RoHS Directive).

UL 61010-1 Electrically Safety Tested.

⚠ **UKCA Notice:**

This product has been determined to be in compliance with SI 2016 No. 1091 (Electromagnetic Compatibility Regulations 2016), SI 2016 No. 1101, (Electrical Equipment (Safety) Regulations 2016) and SI 2012 No. 3032 (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012).

Disclaimer

⚠ **Warranty:**

All products manufactured on behalf of Mitsubishi Electric UK are warranted against defective materials for a period of three years from the date of delivery to the original purchaser.

⚠ **Warning:**

Mitsubishi Electric UK assumes no liability for damages consequent to the user of this product. We reserve the right to change this manual at any time without notice. The information furnished by us is believed to be accurate and reliable. However, no responsibility is assumed by us for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

If the equipment is used in a manor not specified by the manufacturer, the protection provided by the equipment may be impaired.

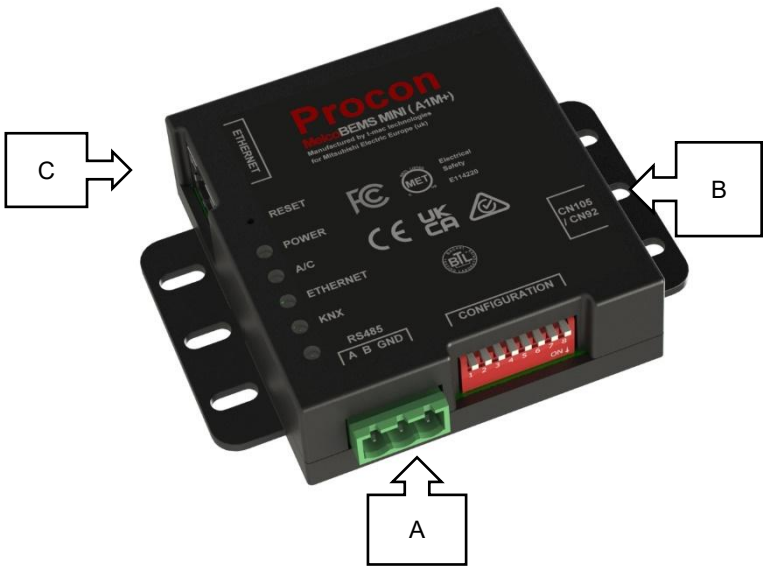
Amendment Register

Document Version	Latest Firmware Version	Date	Author	Notes
1.0.0	V4.0.1	01/11/24	SC/IB	Initial version for firmware V1.0.0
1.0.1	V4.0.2	22/11/24	SC	Added current rating for safety approval
1.0.2	V4.1.0	22/05/25	JNF	Release version of A1M+
1.0.3	V4.1.1	18/09/25	JNF	A1M+ feature update
1.0.4	V4.1.1	12/02/26	JNF/SC	Figures 5 & 6 added Added additional safety page in French-Canadian Migrated Modbus Register Tables to separate Modbus Register Table Document V1.0 Appendix B - changed Ecodan title from FTC6 to FTC6 & FTC7 Appendix D - added new models

Firmware revision history

Firmware Version	Date	Notes
4.0.1	01/04/25	- Initial version of firmware with A1M R5 features
4.0.2	01/04/25	- BACnet IP support
4.0.3	01/04/25	- Modbus TCP support
4.1.0	22/05/25	- Release version of A1M+ with BACnet IP and Modbus TCP support
4.1.1	22/05/25	- BACnet MSTP 76800 baud support - Boot up no network issue fixed - BACnet device name could be set in the setting page
4.1.2	11/02/26	- BACnet Mode and Fan Speed and Air Direction Setup write error resolved - Internal Status page added

[Figure 1]	MelcoBEMS MINI (A1M+)



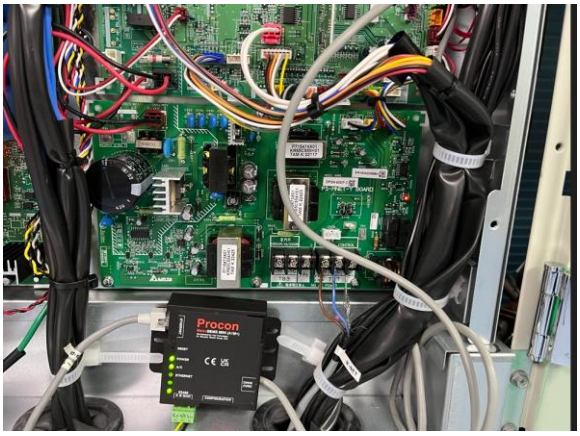
A RS485 connector

B CN105/CN92 connection lead

C Ethernet RJ45 connector

[Figure 2]	

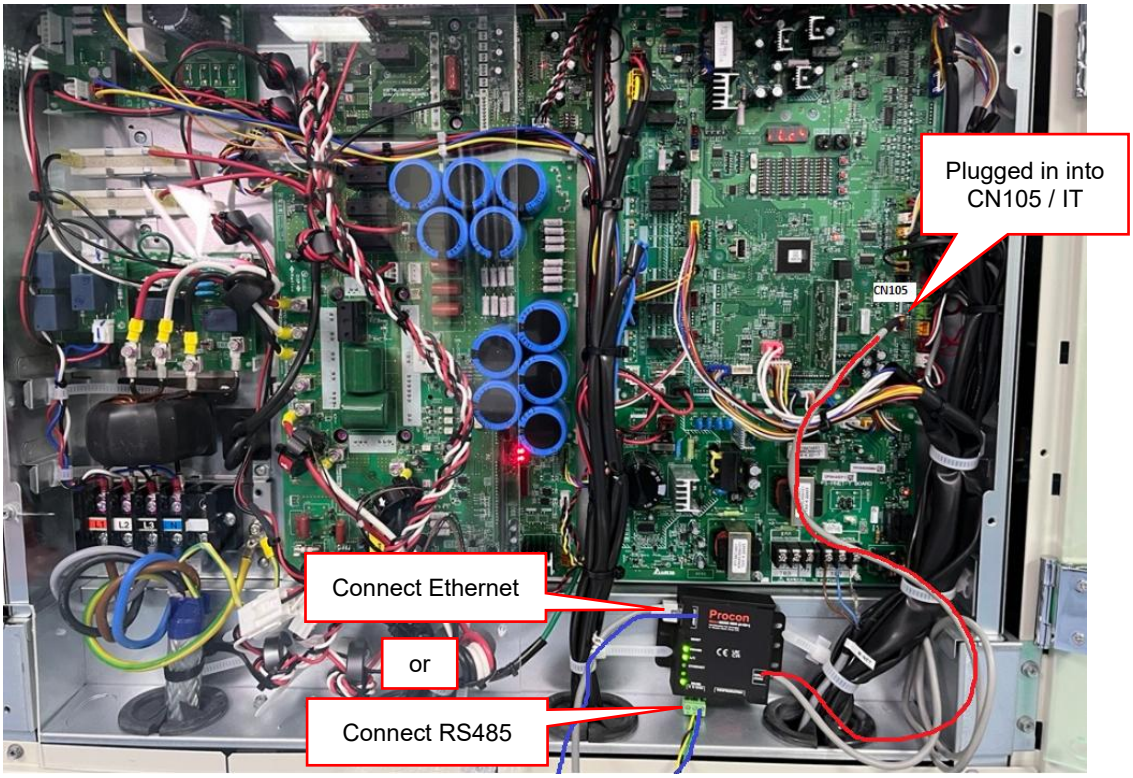
Air to air unit



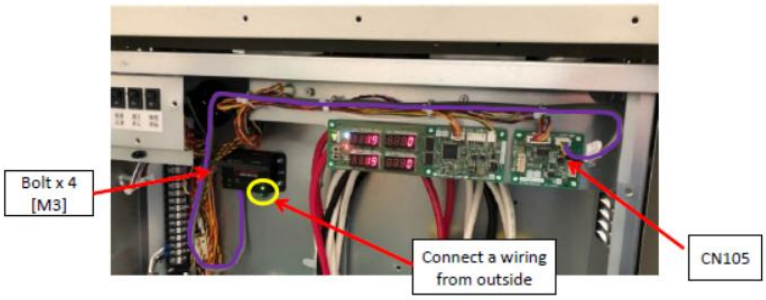
Air to water unit

Lossnay unit

[Figure 3]	Air To Water Unit (CAHV R450YA-HPB)



[Figure 4]	Air-Cooled Chilling Unit (EAHV/EACV-P1500, 1800YB)



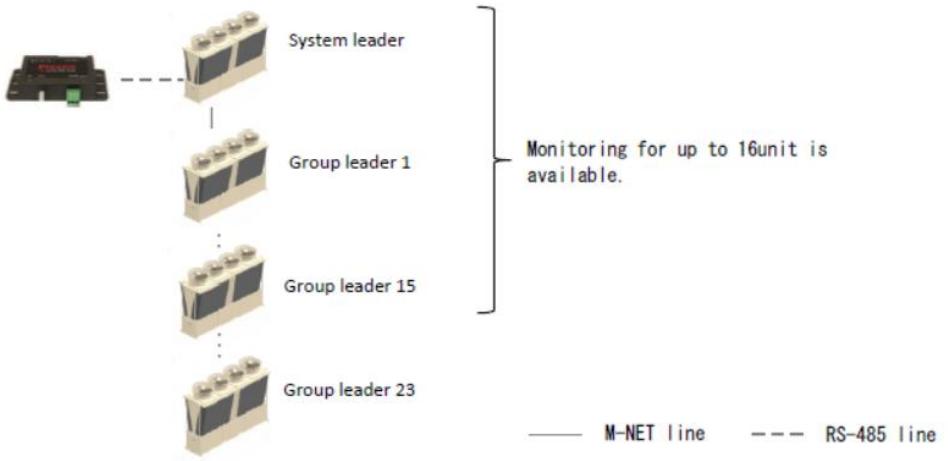
Compressor information acquisition method(EAHV/EACV-P1500,1800YB)

Compressor frequency and compressor ON/OFF information can be monitored for up to 16 units.
Available infromation can be switched by Dip switch 2-10(BMS group setting) according to purpose.

① Information acquisition of representative unit in the system simultaneous operation group

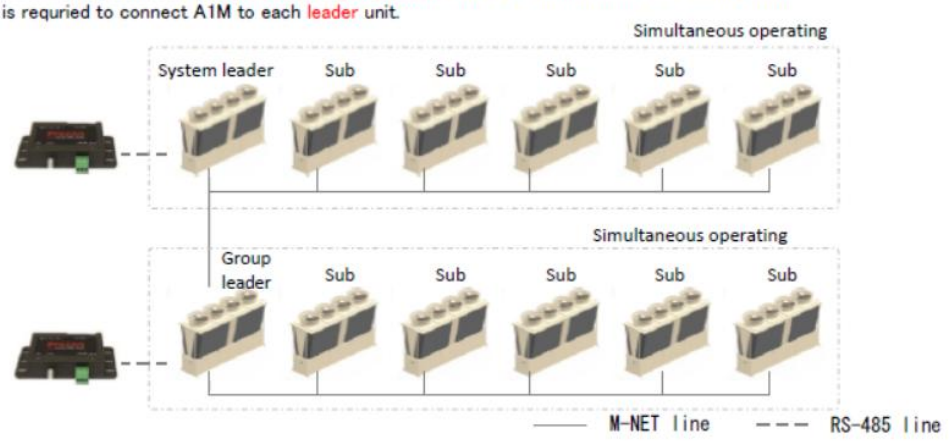
(DIP SW2-10:OFF, only system leader)

The representative unit information in the simultaneous operation group can be acquired by connecting A1M to the representative unit.

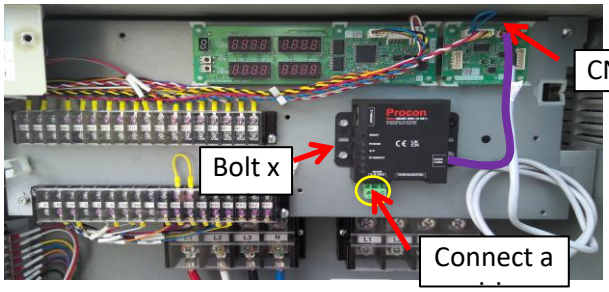


② Information acquisition for slave unit in the simultaneous operation group(DIP SW2-10:ON, only system leader)

The sub unit information of simultaneous operation group can be acquired
by connecting A1M to system leader unit/group leader unit in the simultaneous operation group.
It is requried to connect A1M to each leader unit.

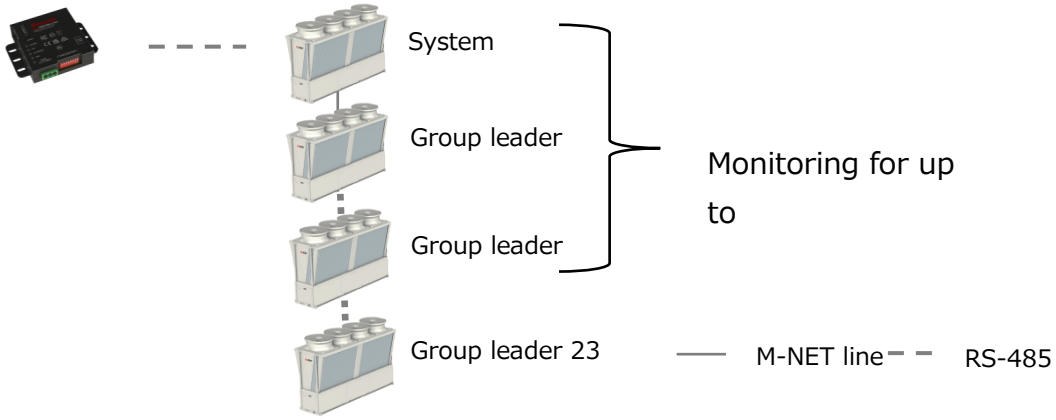


[Figure 5]	Air-Cooled Chilling Unit (EAHV/EACV-M***YCL)

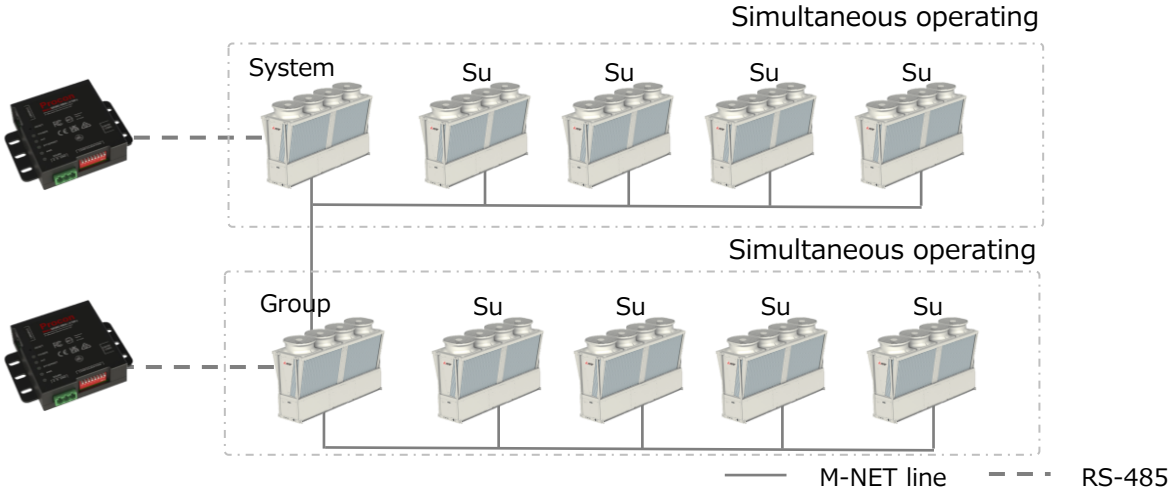


Compressor information acquisition method(EAHV/EACV-M*YCL)**
Compressor frequency and compressor ON/OFF information can be monitored for up to 16 units.
Available information can be switched by Dip switch 5-10(BMS group setting) according to purpose.

① **Information acquisition of representative unit in the system simultaneous operation group (DIP SW5-10：OFF, only system leader)**
The representative unit information in the simultaneous operation group can be acquired by connecting A1M+ to the representative unit.

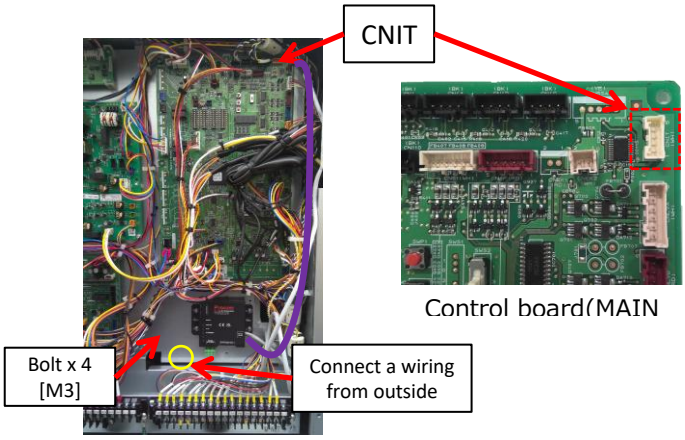


② **Information acquisition for slave unit in the simultaneous operation group (DIP SW5-10:ON, only system leader)**
The sub unit information of simultaneous operation group can be acquired by connecting A1M+ to system leader unit/group leader unit in the simultaneous operating group.
It is required to connect A1M+ to each leader unit.



[Figure 6]	Water-Cooled Chilling Unit (ERCV-M900YA)

Control box



*In case of Double stack stvle(ERCV-M900YA×2), install A1M+ on the MAIN

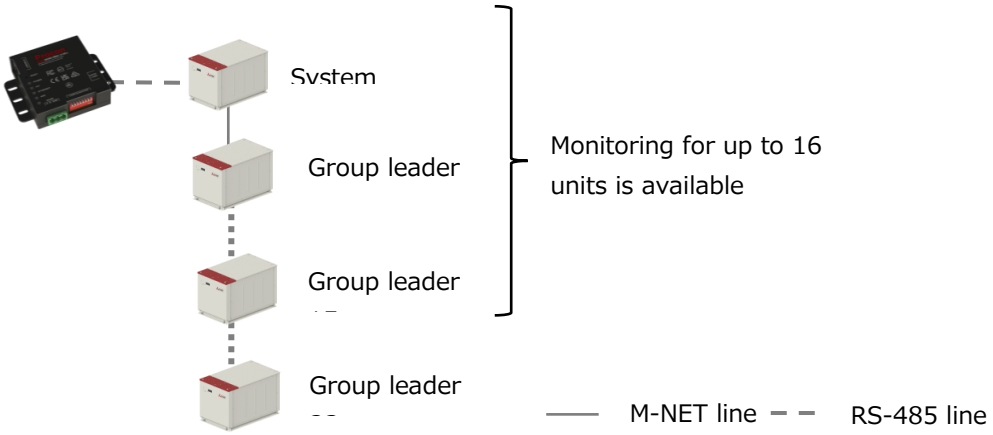
Compressor information acquisition method(ERCV-M900YA)

Compressor frequency and compressor ON/OFF information can be monitored for up to 16 units.

Available information can be switched by Dip switch 5-10(BMS group setting) according to purpose.

① **Information acquisition of representative unit in the system simultaneous operation group (DIP SW5-10：OFF, only system leader)**

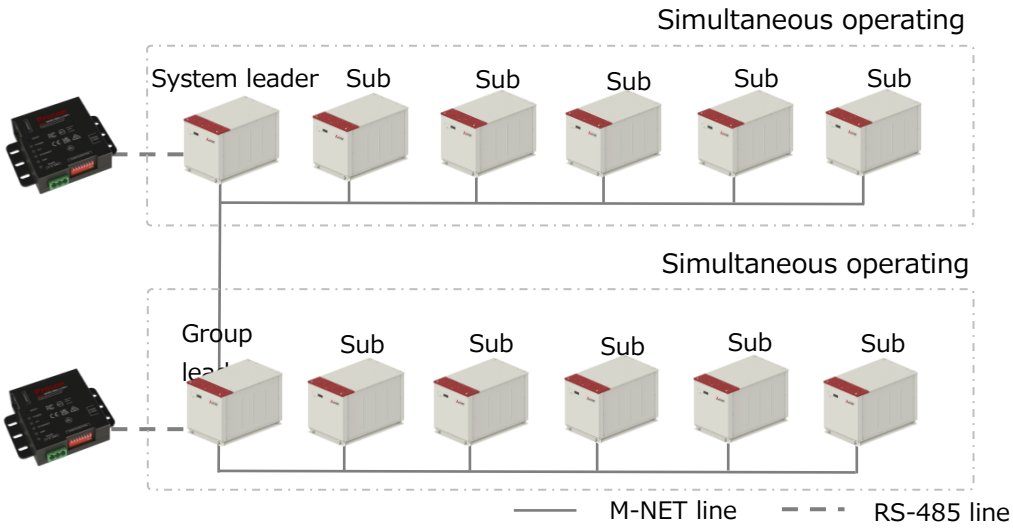
The representative unit information in the simultaneous operation group can be acquired by connecting A1M+ to the representative unit.



② **Information acquisition for slave unit in the simultaneous operation group**

(DIP SW5-10:ON, only system leader)

The sub unit information of simultaneous operation group can be acquired
by connecting A1M+ to system leader unit/group leader unit in the simultaneous operating group.
It is required to connect A1M+ to each leader unit.



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Safety precautions - EN

- **Before installing the unit, make sure you read all the "Safety precautions"**
- **The "Safety precautions" provide very important points regarding safety. Make sure you follow them**

Symbols used in the text

⚠Warning:

Describes precautions that should be observed to prevent danger of injury or death to the user.

⚠Caution:

Describes precautions that should be observed to prevent damage to the unit.

⚠ Warning:

- **Ask the dealer or an authorised technician to install the unit**
  - Improper installation by the user may result in electric shock, or fire
- **Use the specified cables for wiring. Make the connections securely so that any outside forces acting on the cables are not applied to the terminals**
  - Inadequate connection and fastening may generate heat and cause a fire
- **Never repair the unit. If the controller must be repaired, consult the dealer**
  - If the unit is repaired improperly, electric shock, or fire may result
- **Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard", "Interior Wire Regulations" and the instructions given in this manual and always use a special circuit**
  - If the power source capacity is inadequate or electric work is performed improperly, electric shock and fire may result
- **Keep the electric parts away from any water - washing water etc…**
  - Contact may result in electric shock, fire or smoke
- **To dispose of this product, consult your dealer**

⚠Caution:

- **Safely dispose of the packing materials**
  - Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries
  - Tear apart and throw away plastic packaging bags so that children will not play with them - If children play with a plastic bag which has not been torn apart, they face the risk of suffocation

Mesures de sécurité - FR

- **Veillez à lire les mesures de sécurité avant d'installer l'unité.**
- **Les mesures de sécurité fournissent les éléments importants concernant la sécurité. Veillez à les suivre.**

Symboles dans le texte

⚠Prudence :

Indique les mesures à prendre pour prémunir l'utilisateur contre le danger de blessure ou de décès.

⚠Avertissement :

Indique les mesures à prendre pour éviter les dommages à l'unité.

⚠Prudence :

- **Demander au concessionnaire ou à un technicien certifié d'installer l'unité.**
  - Une installation incorrecte par l'utilisateur pourrait causer une électrocution ou un feu.
- **Utiliser les fils indiqués pour le câblage. Effectuer les connexions de manière sûre afin que les jonctions ne soient pas touchées par les éléments extérieurs exerçant une force sur les câbles.**
  - Une connexion et une fixation incorrectes peuvent créer de la chaleur et provoquer un incendie.
- **Ne jamais réparer soi-même l'unité. En cas de réparation nécessaire du contrôleur, s'informer auprès du concessionnaire.**
  - Une réparation incorrecte de l'unité pourrait causer une électrocution ou un feu.
- **Tous les travaux d'électricité doivent être effectués par un électricien certifié, conformément à la « norme d'ingénierie des installations électriques », au « règlement sur le filage intérieur » et aux instructions données dans ce manuel. Toujours utiliser un circuit spécial.**
  - Une capacité insuffisante de la source d'alimentation ou des travaux électriques incorrects entraînent un risque d'électrocution et d'incendie.
- **Tenir les éléments électriques à l'écart de l'eau (eau de lavage, etc.).**
  - Un contact avec l'eau pourrait causer une électrocution, un feu ou de la fumée.
- **S'informer auprès du concessionnaire pour se débarrasser du produit.**

⚠Avertissement :

- **Se débarrasser des matériaux d'emballage de manière sûre.**
  - Les matériaux d'emballage tels que les clous et les autres composants en métal ou en bois peuvent provoquer des lésions ou d'autres blessures.
  - Déchirer et jeter les sacs d'emballage en plastique afin qu'aucun enfant ne puisse jouer avec cet emballage et ne risque de s'étouffer avec un sac.

Overview

The Procon MelcoBEMS MINI (A1M+) Protocol Converter is used for remote monitoring and control of both Air-to-Air products (M-, S- and P-series split air conditioning systems) and Air-to-Water products (CAHV, CRHV, PWFY). It acts as a gateway between the system and external third party equipment.

The MelcoBEMS MINI (A1M+) continuously reads data from the system and changes configuration when necessary. Because the reading is continuous, the MelcoBEMS MINI (A1M+) always stores up-to-date data. This data is then available to external devices through the RS-485 port or Ethernet port using the Modbus or BACnet protocol. Values can be read and changed via this connection. Please refer to the Modbus section for further information.

The MelcoBEMS MINI (A1M+) is powered via the CN105/CN92 connector, hence no external power supply is needed.

Compatible model numbers can be found in the appendices of this document.

⚠ **Caution:**

MAC-397IF and MAC-333IF units cannot be connected when the MelcoBEMS MINI (A1M+) is connected, as the same CN105/CN92 connector is used.

Appendix A lists the compatible Air-To-Air indoor units.
Appendix B lists the compatible Air-To-Water indoor units.
Appendix C lists the compatible Lossnay units.

Figure 1 shows the MelcoBEMS MINI (A1M+) converter.

Figure 2 shows the CN105/CN92 connector on the indoor unit PCB that the MelcoBEMS MINI (A1M+) connects to, for both Air-to-Air and Air-To-Water type units.

Air Con type	Modbus RTU	BACnet MS/TP	Modbus TCP	BACnet IP over UDP
ATA (Air-to-Air)	✓	✓	✓	✓
ATW (Air-To-Water)	✓	✓	✓	✓
Lossnay	✓	✓	✓	✓

1. DIP switch settings

There is a bank of 8 DIP switches on the MelcoBEMS MINI (A1M+) labeled ‘CONFIGURATION’. These switches are used to configure communication settings and to enable some features.

1.1. RS-485 Node address

When BACnet MS/TP protocol has been selected (see section 1.3) the node address is used as the Station ID.
When Modbus RTU protocol has been selected (see section 1.3) The node address is used as the Slave ID.

Any node address in the range 1 – 30 can be chosen using switches 1 – 5. The address is set in binary, where the switch positions have the following values:

Switch number	Value when switch is set to ON
1	1
2	2
3	4
4	8
5	16

To get the node address, add together the value for each switch set ON. For example, to set address 13, set switches 1, 3 and 4 ON (1 + 4 + 8 = address 13).

When all switches 1 – 5 are set to the ON position the node address is set in software by writing to a Modbus register (see Modbus Holding Registers section).

Note: When all switches are set to the OFF position a node address of 1 is assumed.

Note: Each MelcoBEMS MINI (A1M+) connected on the same RS-485 network must be set to a unique node address.

Node Address Range Table

DIP switch[5-1]	Node Address or other meaning
0x00	**Reserved for Bootloader**
0x01	1
0x02	2
…	
0x1D	14
0x1E	15
0x1F	**Using Software Address**

1.2. RS-485 communication settings

The RS-485 settings are set using DIP switch 6.
When the switch is in the OFF position the Baud Rate and Parity settings are set in software by writing to Modbus registers (see Modbus Holding Register section).

Switch 6	RS-485 communication settings
OFF	Baud Rate and Parity set in software
ON	9600 baud, no parity

The number of data bits is fixed at 8 and the number of stop bits is fixed at 1.

1.3. Protocol selection

The RS485 protocol is set using DIP switch 7.
When the switch is in the ON position the Modbus RTU protocol is selected.
When the switch is in the OFF position the BACnet MS/TP protocol is selected.

Switch 7	Protocol selection
OFF	BACnet MS/TP
ON	Modbus RTU

** The BACnet IP and Modbus TCP are always ON

1.4. Deadband mode

The Deadband feature can be enabled using DIP switch 8.

When the switch is in the OFF position the Deadband feature is disabled.
When the switch is in the ON position the Deadband feature is enabled.

Switch 8	Deadband feature
OFF	Disabled
ON	Enabled

2. Deadband Mode

The deadband mode is enabled by setting DIP switch 8 ON. It is only applicable to Air-To-Air type units.

2.1. Settings

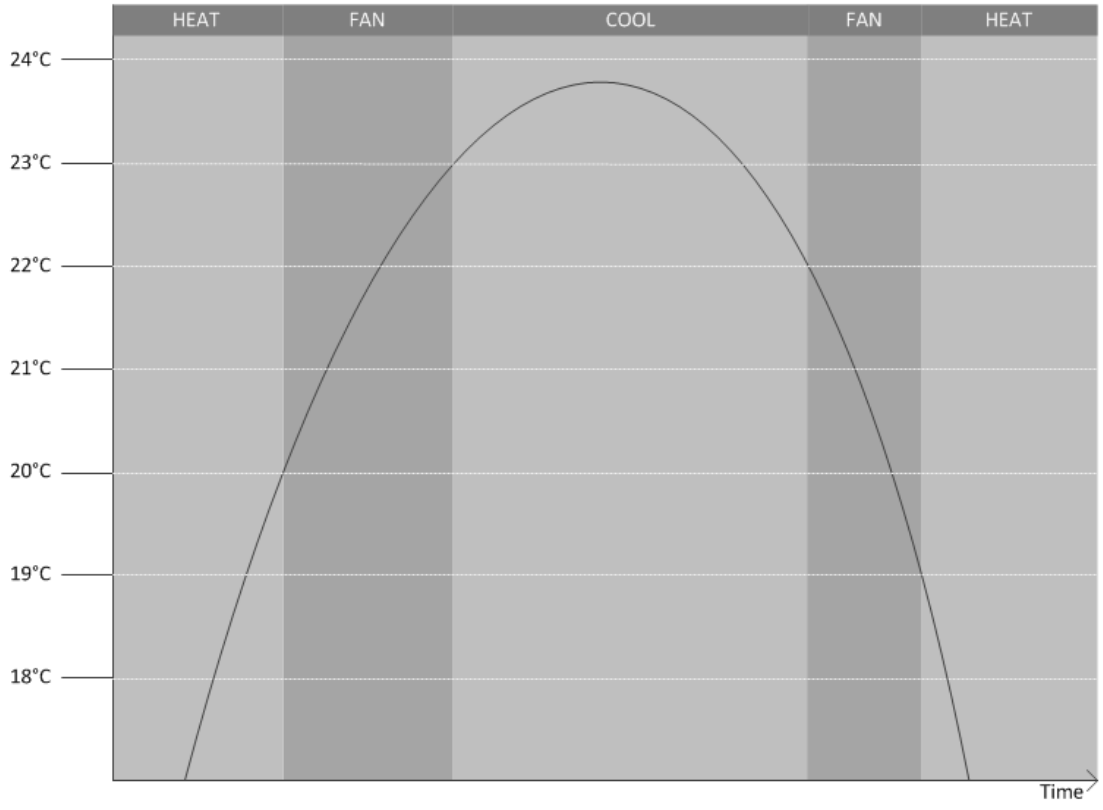
There are two settings, the Heating Setpoint (default 19º) and Cooling Setpoint (default 23ºC). These values can be changed via Modbus, refer to the Air-To-Air Modbus tables for more information.

The Cooling Setpoint must be at least 2ºC greater than the Heating Setpoint, otherwise the default values given above will be assumed.

2.2. Operation

When enabled, the MelcoBEMS MINI (A1M+) controls the Mode and Temperature Setpoint based on the Room (return air) Temperature.

While the room temperature is less than the *Heating Setpoint* the unit will be set to HEAT mode with a setpoint of 28ºC.
Whilst in HEAT mode, if the room temperature rises above the *Heating Setpoint + 1ºC* the unit will be set to FAN mode.
Whilst in FAN mode, if the temperature rises above the *Cooling Setpoint* the unit will be set to COOL mode with a setpoint of 19ºC.
Whilst in COOL mode, if the room temperature falls below the *Cooling Setpoint – 1ºC* the unit will be set to FAN mode.
Whilst in FAN mode, if the room temperature falls below the *Heating Setpoint* the unit will be set to HEAT mode with a setpoint of 28ºC.
The following image shows this graphically (assuming a Heating Setpoint of 19ºC and a Cooling Setpoint of 23ºC):



2.3. Initialisation

When the MelcoBEMS MINI (A1M+) powers up it will set the mode, which will be determined by the room temperature.

If less than the Heating Setpoint the unit will be set to HEAT mode with a setpoint of 28ºC.
If greater than or equal to the Cooling Setpoint the unit will be set to COOL mode with a setpoint of 19ºC.
If between the Heating and Cooling Setpoints the unit will be set to FAN mode.

3. Setpoint Offset

The Setpoint Offset feature is only applicable to, and will only be enabled for, Air-To-Air type units.

3.1. Settings

There are two settings which are applicable to the Setpoint Offset feature, *BMS Room Temperature* and *BMS Virtual Setpoint*.

The BMS Virtual Setpoint can be changed using Modbus and is stored in non-volatile memory so the value is retained if the MelcoBEMS MINI (A1M) loses power.

The BMS Room Temperature can be changed using Modbus but is not stored in non-volatile memory, so the value is lost and reset to zero upon the MelcoBEMS MINI (A1M+) losing power.

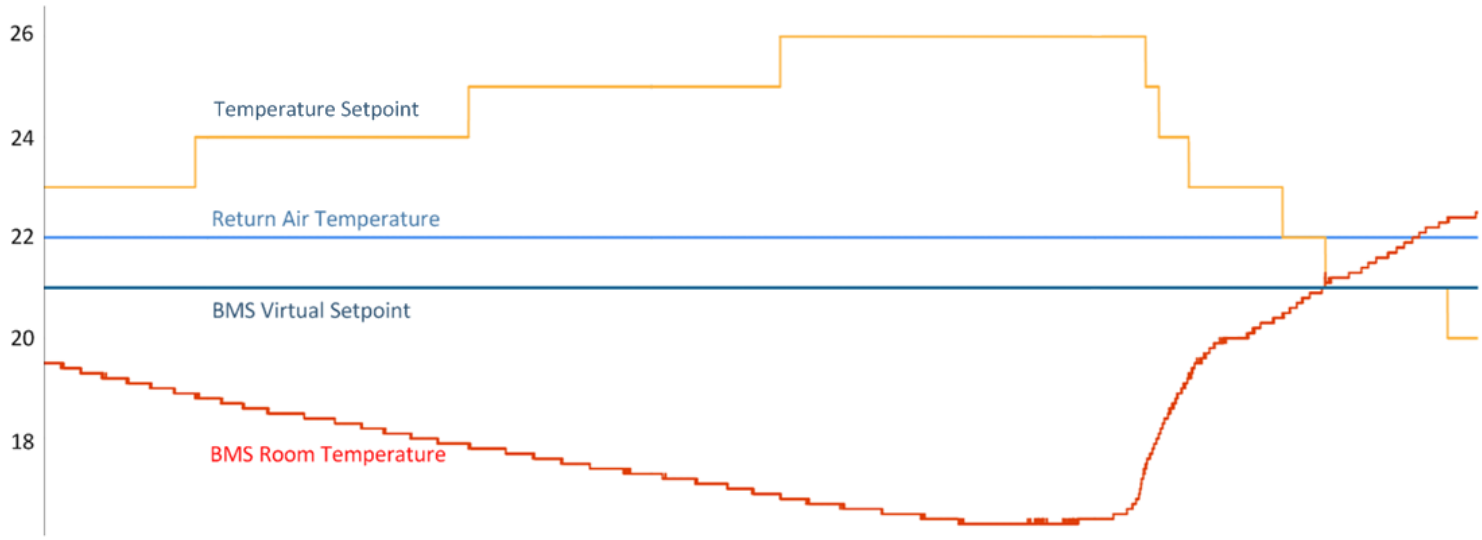
3.2. Operation

In some situations a 3rd party room temperature sensor connected to a BMS or other controller may provide a more accurate temperature reading than the return air temperature of the indoor unit. The A1M+ can calculate the difference between these two temperature readings and compensate by adjusting the indoor unit's temperature setpoint.

The new temperature setpoint is calculated using the following equation:

Temperature Setpoint = Return Air Temperature – (BMS Room Temperature – BMS Virtual Temperature)

As a hypothetical example, consider the BMS Virtual Setpoint being set to 21ºC and the indoor unit return air temperature remaining constant at 22ºC. As the BMS Room Temperature decreases the MelcoBEMS MINI (A1M+) increases the indoor unit's temperature setpoint.
When the BMS Room Temperature reaches 18ºC the Temperature Setpoint = 22 – (18 – 21) = 25ºC.



Hysteresis has been built in to prevent the temperature setpoint from rapidly changing.

The setpoint offset will only operate correctly if the BMS Room Temperature is periodically updated via Modbus, to ensure the MelcoBEMS MINI (A1M+) always has an up to date reading.

If the BMS Room Temperature is set to 0ºC (which it will be on power up) the setpoint offset feature will be disabled. It will only activate when the BMS Room Temperature is not 0ºC.
To disable the feature without removing the MelcoBEMS MINI (A1M+) power, simply set the BMS Room Temperature to 0ºC.

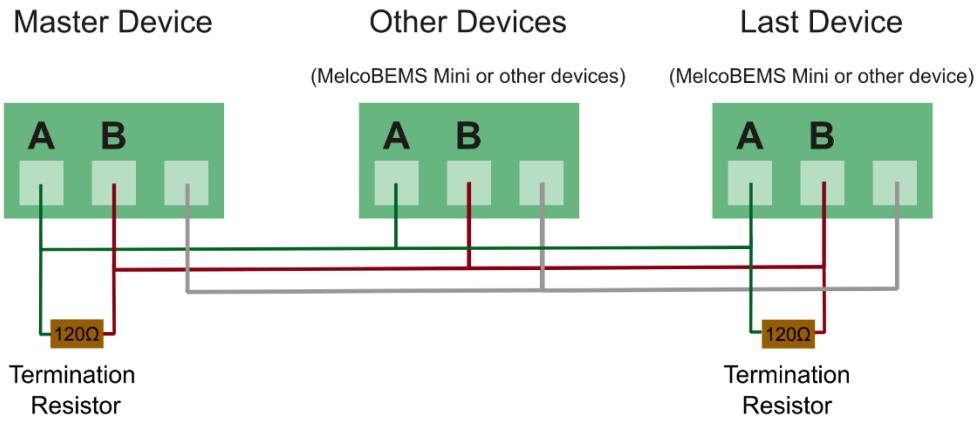
4. RS-485 termination

An RS-485 termination resistor can be enabled on the MelcoBEMS MINI (A1M+) PCB using the single jumper labeled J1.

The jumper setting is summarized below:

Jumper Setting	Description
Not fitted	Termination resistor not enabled
Fitted	Termination resistor enabled

Note: The J1 jumper is only available on Revision 3 & 4 variants. For Revision 5 variant, the 120Ω termination resistors for the RS-485 network must be supplied by the installing contractor and fitted across pins A & B on the first & last device.



5. Installation

5.1. Physical connection

The MelcoBEMS MINI (A1M+) has a flying lead to connect directly into the CN105/CN92 connector on the controller PCB. As an example, Figure 2 shows this connection on a Mr Slim indoor unit and a CRHV unit.

5.2. Power supply

The MelcoBEMS MINI (A1M+) is powered from the CN105/CN92 air conditioner host connector at 12V DC / 83mA / 1W (Max) and therefore does not require an external power supply.

5.3. Modbus connections

The MelcoBEMS MINI (A1M+) has a 3-way screw terminal to provide Modbus RTU communication via RS-485. Figure 1 shows the RS-485 terminal (Box A). The Modbus section contains further detail of the Modbus communications.

5.4. Ethernet connections

The MelcoBEMS MINI (A1M+) has RJ45 socket to provide 10/100Mb Ethernet connection.
Figure 1 shows the RJ45 socket (Box C). The Ethernet section contains further detail of network setting.

For improved Ethernet EMC emissions it is recommended to fit a Wurth ferrite (part number: 742 711 12) to the Ethernet cable as close as possible to the MelcoBEMS MINI (A1M+) enclosure. This will reduce the electrical noise emitted from the Ethernet cable and reduce the possibility of electrical interference with any other device located in close proximity.

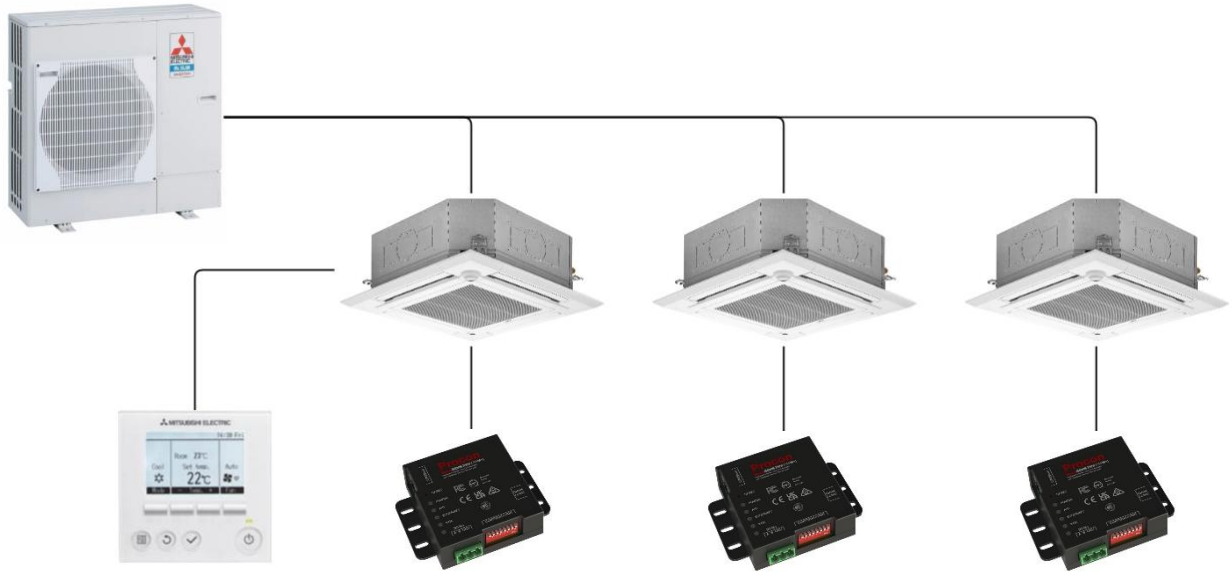
5.5. Unit type selection

The MelcoBEMS MINI (A1M+) software will automatically detect whether an Air-To-Air or Air-To-Water unit is connected. It will then only send commands applicable to that unit type.

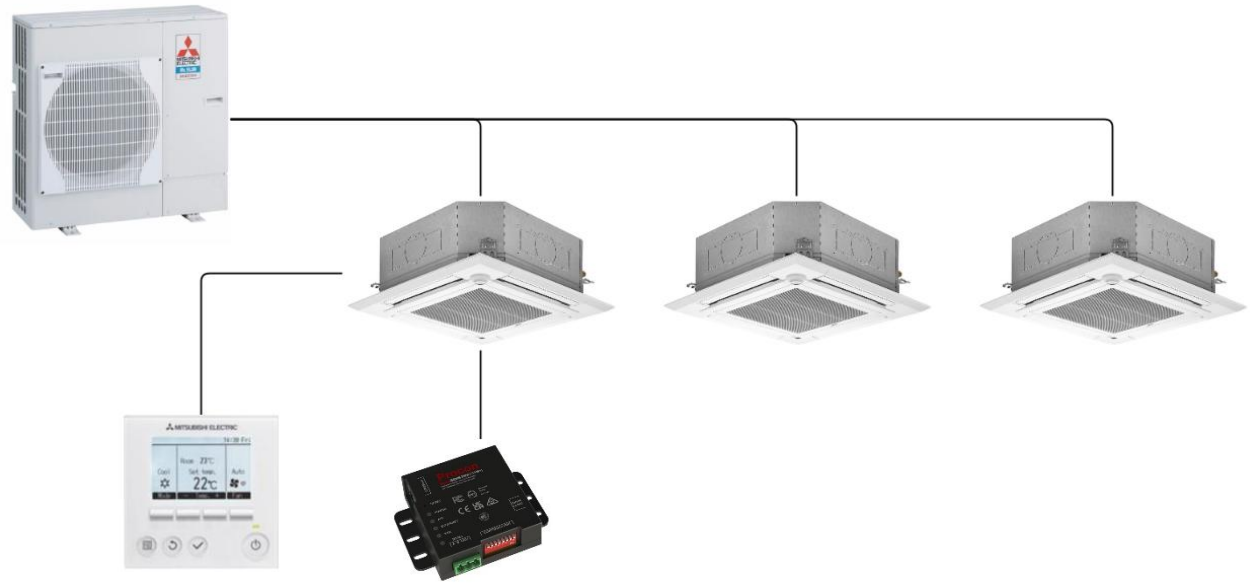
5.6. Using Twin/Triple/Quad systems

It is recommended to use one MelcoBEMS MINI (A1M+) for each indoor unit, however, if the fault Modbus register /BACnet object is not used then one MelcoBEMS MINI (A1M+) can be used per twin / triple / quad system.

5.6.1. When fault Modbus register is being used



5.6.2. When fault Modbus register is not being used



5.7. Using single split units in a group

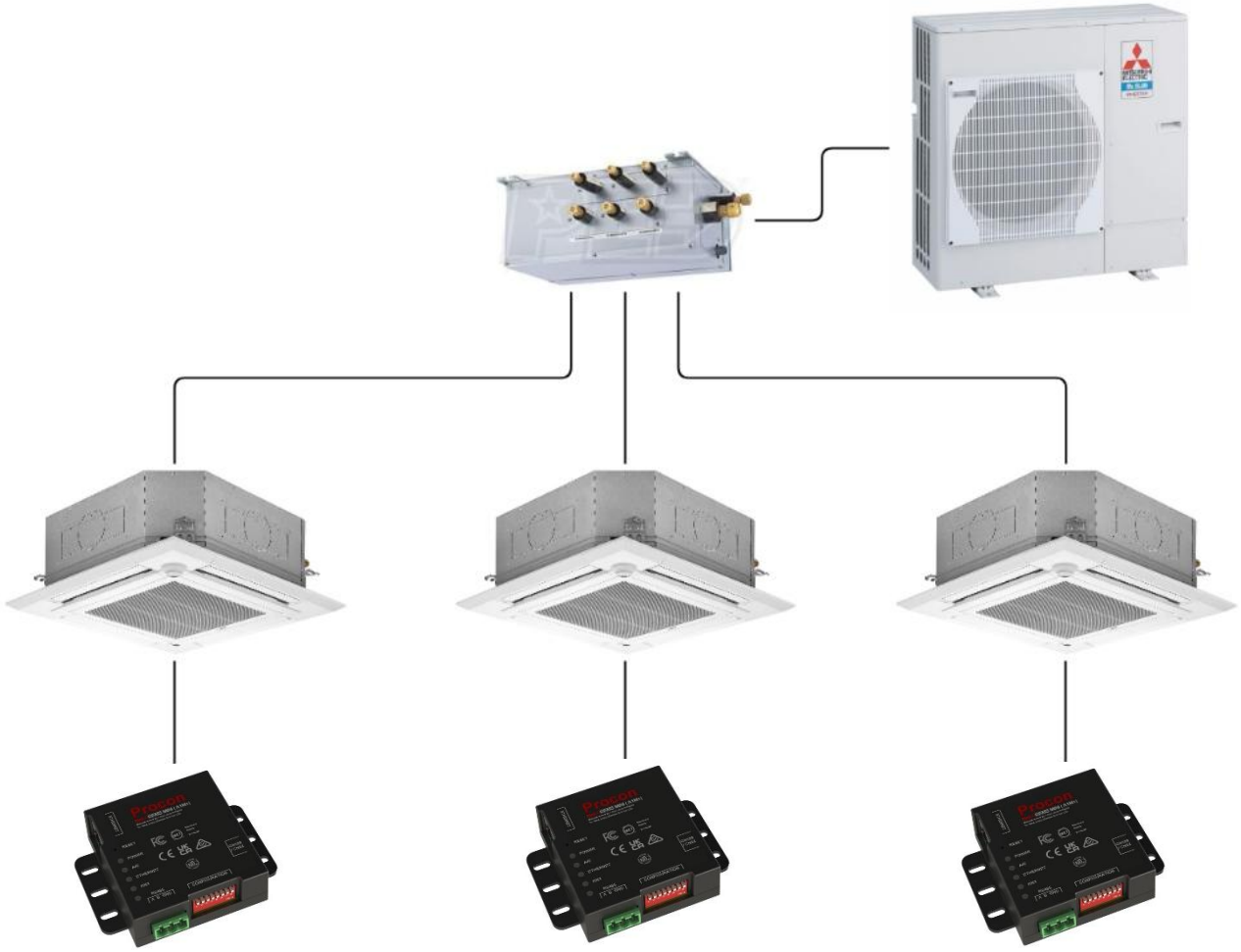
It is recommended to use one MelcoBEMS MINI (A1M+) for each indoor unit, however, if the fault Modbus register is not used then one MelcoBEMS MINI (A1M+) can be used per system.

5.7.1. When fault Modbus register is being used

5.7.2. When fault Modbus register is not being used

5.8. Using MXZ split units

One MelcoBEMS MINI (A1M+) must be installed for each indoor unit when using a MXZ system.



6. Status LEDs

There are two status LEDs on the MelcoBEMS MINI (A1M+). The LED indications are as follows:

LED Name	Colour	Functionality
AC ACK	Green	Lit when A1M+ is powered, flashing indicates valid communication with the indoor unit.
Ethernet ACK	Green	Lit when A1M+ is powered and connecting valid Ethernet connection. Flashing indicates valid Ethernet communication.
RS-485 ACK	Green	Lit when A1M+ is powered, flashing indicates valid Modbus or BACnet communication.

6.1. AC ACK

If this LED is permanently lit and does not flash, check the CN105/CN92 connection is secure and the unit type is supported (see appendix).

6.2. RS-485 ACK

If this LED is permanently lit and does not flash it could be due to a physical RS-485 connection problem, or incorrect Modbus/BACnet/RS-485 configuration.

6.3. Ethernet ACK

If this LED is permanently lit and does not flash it could be due to a physical Ethernet connection problem, or incorrect Network configuration.

7. Ethernet

7.1. Network Setting Modes

A1M+ has two networking modes.

Mode	Dip switches	Description
Bootloader Mode	All set to zero	- For Network setting reset or firmware update purpose only. - Does NOT have Modbus/BACnet features active. - Network setting is **ALWAYS** the **Default Network Settings (see below table)**.
Application Mode	Non zero setting	- Supporting below protocols based on dip switches setting - Modbus TCP - BACnet IP over UDP - Network Settings can be changed by internal webpage

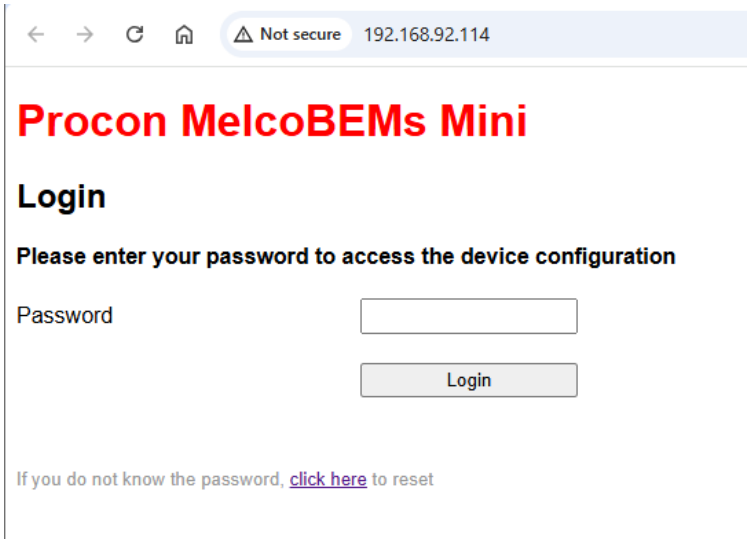
Default Network Setting	
IP	192.168.92.114
Netmask	255.255.255.0
Gateway	192.168.92.1

7.1. Application

7.1.1. Login

To login, type the A1M+ IP address prefixed with http:// into your web browser

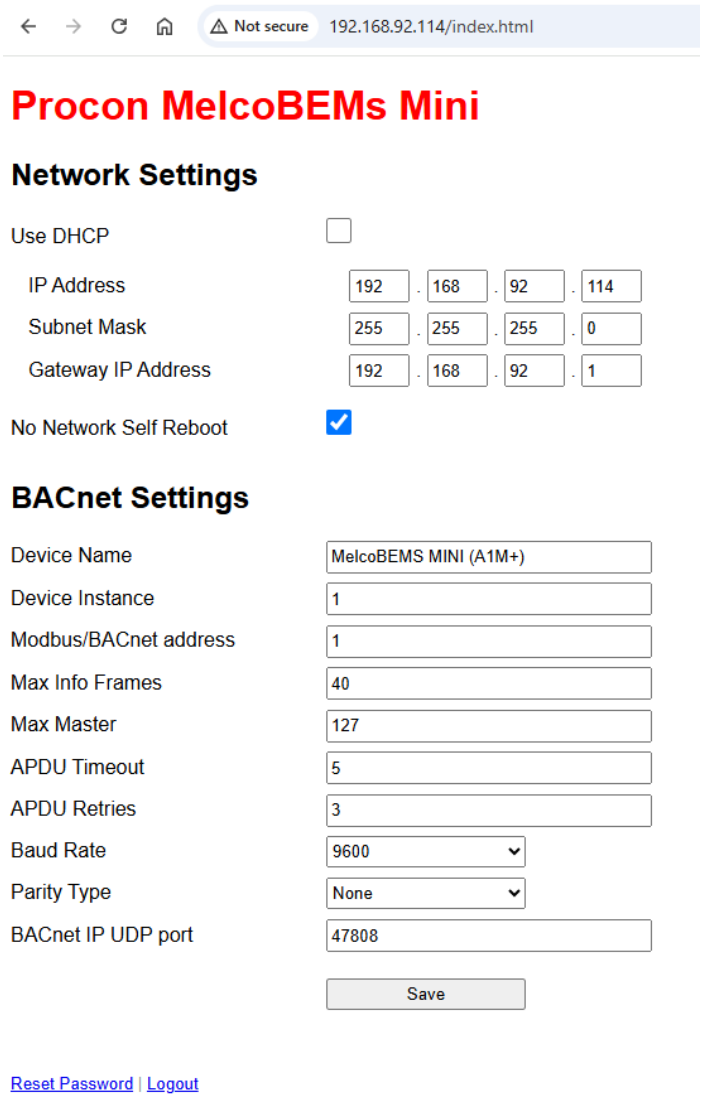
e.g. http://192.168.92.114



Default password is device serial number.
E.g. If the A1M+ labeled as **SM123456**, then the password is **SM123456**

7.1.2. Settings

After login, the settings page will be shown as below:



Click “Save” to save the changes, otherwise the changes will lost.

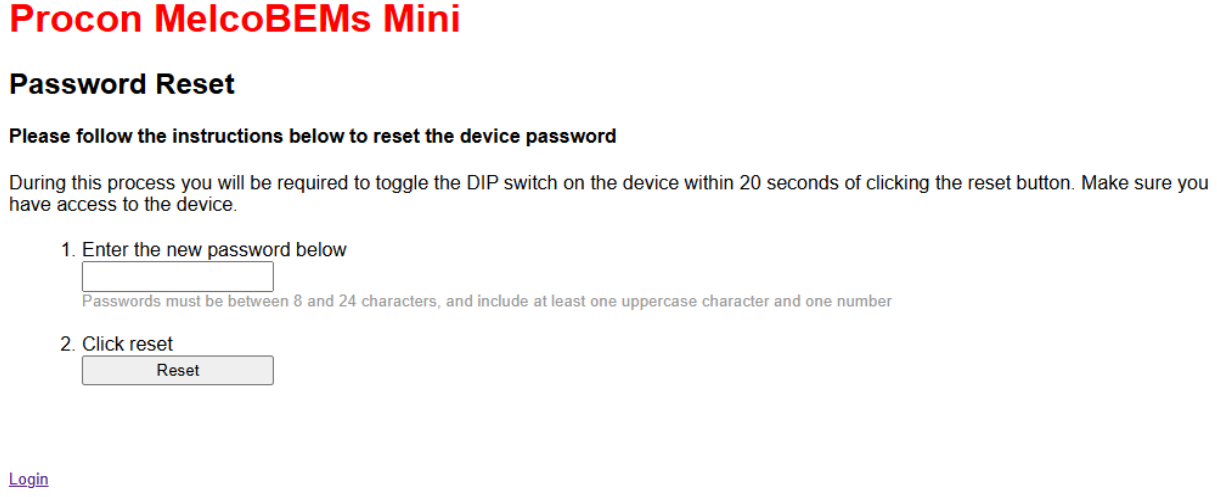
You must reboot the A1M+ before the new settings will take effect.

No Network Self Reboot
- This feature means A1M+ will check network continuously
- If the network link is not available after 20~30 seconds, it will reboot itself.
- For the A1M+ using without Ethernet, please untick the “No Network Self Reboot” Otherwise it will keep rebooting for every 30 seconds.

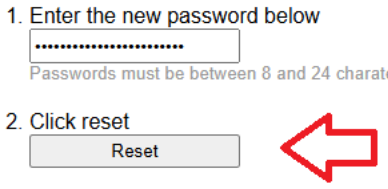
7.1.3. Reset Password

If you need to reset the password, click the “Reset password” on the login page.

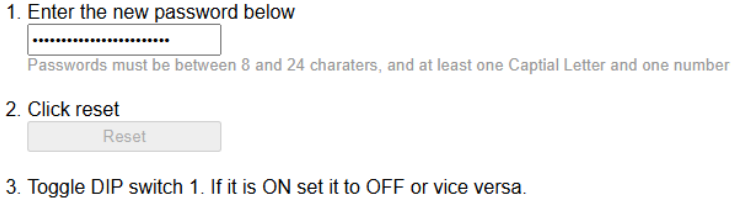
The password reset page will appear as below:



Passwords must be between 8 and 24 characters, and at least one Capital Letter and one numbers

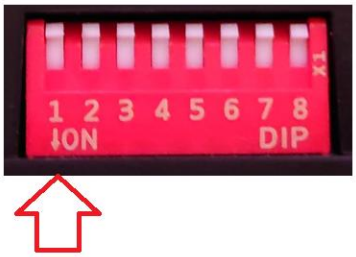


Then it will prompt you toggle the DIP switch.



Toggle the DIP switch 1

- If it is already ON, then Turn it OFF then turn it ON)
- If it is already OFF, then Turn it ON then turn it OFF)



Then it will prompt you toggle back the DIP switch.

1. Enter the new password below
   ••••••••
   Passwords must be between 8 and 24 characters, and include at least one uppercase character and one number
2. Click reset
   Reset
3. Toggle DIP switch 1. If it is ON set it to OFF or vice versa.
4. Toggle DIP switch 1 back to the original position. If it is ON set it to OFF or vice versa.

If successful, the password reset successful message is shown.

1. Enter the new password below
   ••••••••••••••••••••••
   Passwords must be between 8 and 24 charaters, and at least one Captial Letter and one number
2. Click reset
   Reset

Passoword reset successful

If failed (timeout or not toggle the DIP switch), it will show the error message.

1. Enter the new password below
   ••••••••••••••
   Passwords must be between 8 and 24 characters, and include at least one uppercase character and one number
2. Click reset
   Reset

Password reset failed, please try again

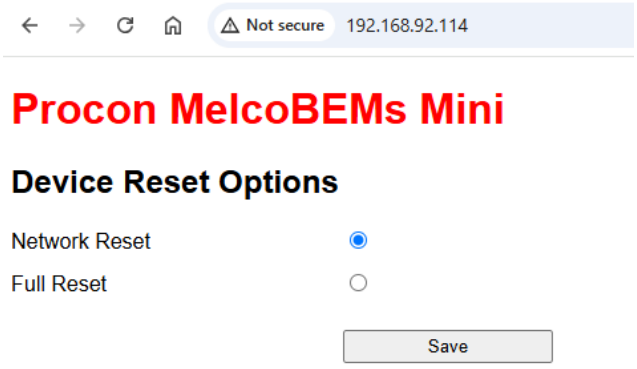
The password changes will take effect immediately

7.2. Bootloader

Option	Description
Reset Setting	Two options available: - Network setting reset only - All setting reset including Login password
Firmware Update	- Update the Firmware by using TFTP tools

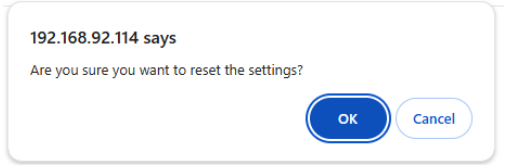
7.2.1. Reset Setting

To login, type http://192.168.92.114 into your web browser



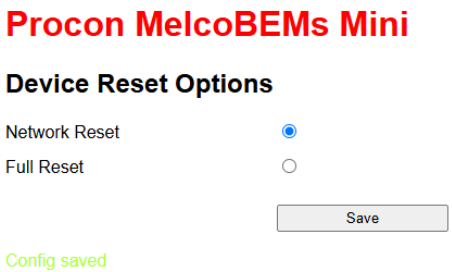
You can choose either Network setting reset or Full reset.

After clicking “Save”, a confirmation dialogue will be shown.

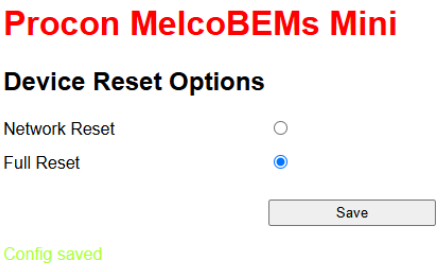


After clicking OK, a config saved message will be shown:

Network Reset

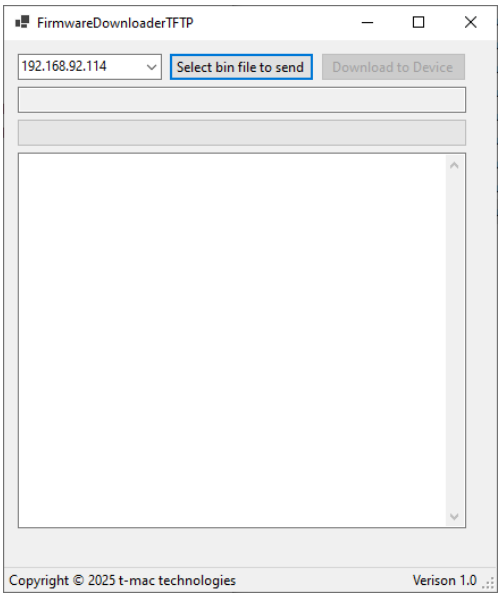


Full Reset



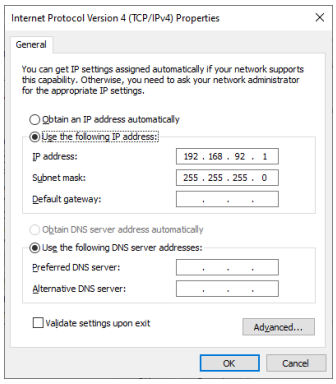
7.2.2. Firmware Update

Before you update the firmware, you will need the following:
1. New firmware .bin file (E.g. A1M_Plus_en.bin)
2. Updating FirmwareDownloaderTFTP application



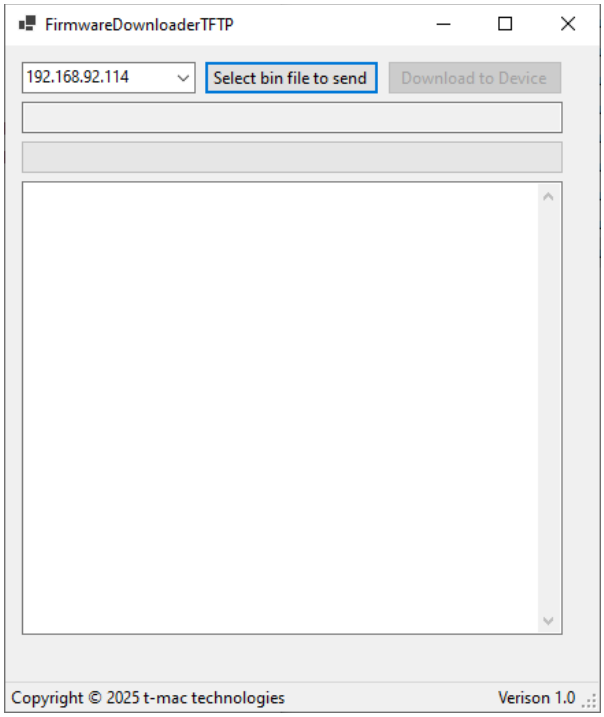
3. Connect the A1M+ to PC Ethernet interface
   - The A1M+bootloader mode IP address is always192.168.92.114.
   - After direct connecting from PC to A1M+, the PC network interface setting needs to have the same subnet.
   - It is recommended to test the connection to the A1M+ by issuing a ping command.

   PC network setting example:

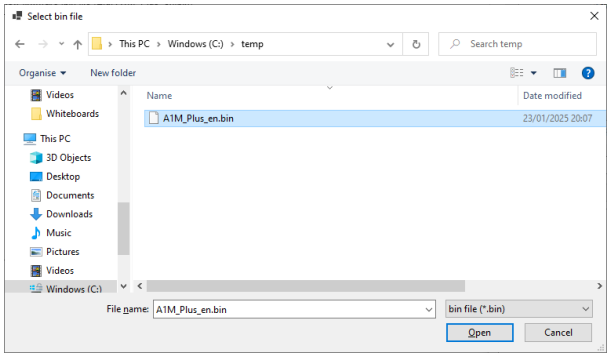


Updating firmware by FirmwareDownloaderTFTP

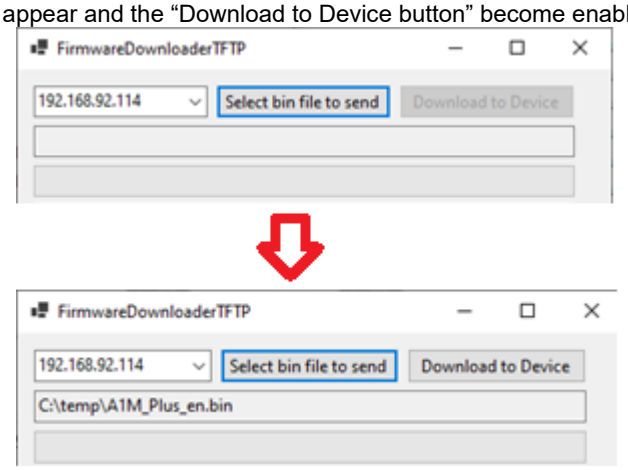
- Open the tools



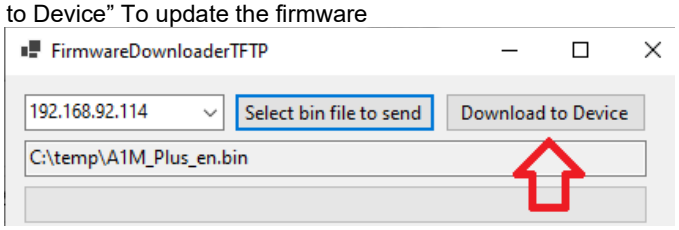
- Click the “Select bin file to send” and select the new firmware file.



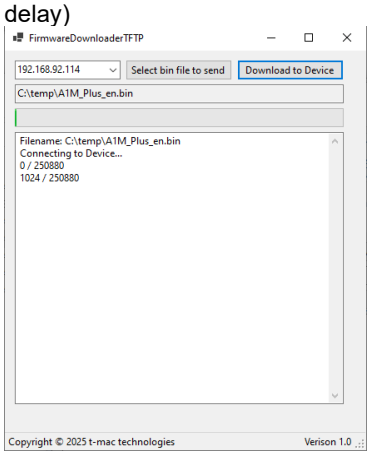
- The file path will appear and the “Download to Device button” become enable



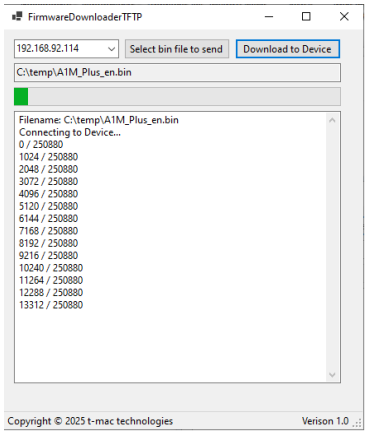
- Press “Download to Device” To update the firmware



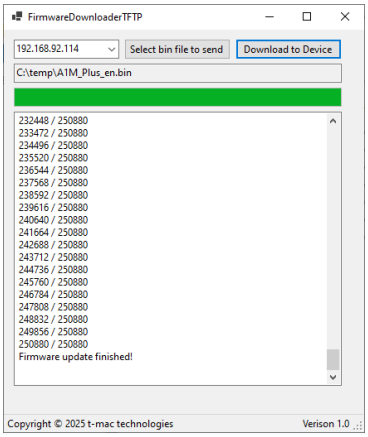
A1M+ will erase the flash after receiving 1st packet. (1-3 second delay)



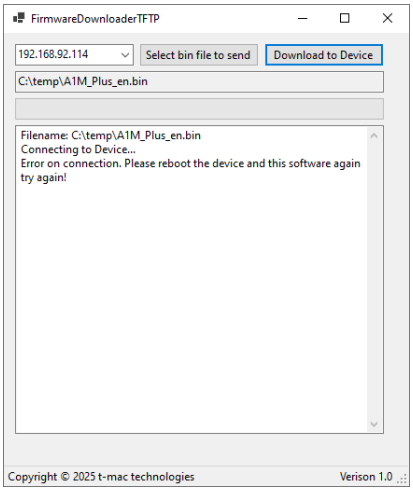
After erasing, it will update the device firmware



After the update is complete, set the DIP switch back before reboot



- If there are any network problem an error message is shown as below:



8. BACnet

8.1. BACnet MS/TP

The MelcoBEMS MINI (A1M+) can be connected to a BACnet MS/TP network using RS-485.
BACnet protocol can be selected using DIP switch 7 (see section 1.3).

8.2. BACnet IP over UDP

The MelcoBEMS MINI (A1M+) can be connected to a BACnet IP over UDP using Ethernet.
BACnet protocol can be selected using DIP switch 7 (see section 1.3).

8.3. Object types supported

Property	Object Type						
	Device	**Analogue Value**	**Binary Input**	**Binary Output**	**Multi State Input**	**Multi State Output**	**Analogue Input**
Object Identifier	R	R	R	R	R	R	R
Object Name	R/W	R	R	R	R	R	R
Object Type	R	R	R	R	R	R	R
Present Value		R/W	R[1]	R/W	R[1]	R/W	R[1]
Status Flags		R	R	R	R	R	R
Event State		R	R	R	R	R	R
Out Of Service		R	R	R	R	R	R
Number Of States					R	R	
State Text					R	R	
Units		R					R
Polarity			R	R			
Priority Array		R		R		R	
Relinquish Default		R		R	R	R	
System Status	R						
Vendor Name	R						
Vendor Identifier	R						
Model Name	R						
Firmware Revision	R						
Application Software Version	R						
Location	R						
Description	R						
Protocol Version	R						
Protocol Revision	R						
Protocol Services Supported	R						
Protocol Object Types Supported	R						
Object List	R						
Max APDU Length Accepted	R						
Segmentation Supported	R						
APDU Timeout	R						
Number Of ADPU Retries	R						
Max Master	R						
Max Info Frames	R						
Device Address Binding	R						
Database Revision	R						

R = Read accessible only.
R[1] = Read accessible only but writable when the Out Of Service property is TRUE.
R/W = Read and write accessible.

8.4. Object list

The MelcoBEMS MINI (A1M+) has objects for certain ATA protocol data points, detailed in the following table.

8.4.1. BACnet Object list – Air-To-Air systems

Object type	Object ID	Object name	Notes
Binary Output	BO0	Drive OFF/ON Setup	0 = Drive OFF 1 = Drive ON
Binary Input	BI1	Drive OFF/ON State	0 = Drive OFF 1 = Drive ON
Analog Value	AV2	Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Multi-state Output	MSO3	Mode Setup	1 = Heating 2 = Humidity reduction 3 = Cooling 4 = Ventilation, clean air operation 5 = Auto Operation
Multi-state Input	MSI4	Mode State	1 = Heating 2 = Humidity reduction 3 = Cooling 4 = Ventilation, clean air operation 5 = Auto Operation
Multi-state Output	MSO5	Fan Speed Setup	1 = Auto 2 = Quiet 3 = Weak 4 = Strong 5 = Very strong (SH i)
Multi-state Input	MSI6	Fan Speed State	1 = Auto 2 = Quiet 3 = Weak 4 = Strong 5 = Very strong (SH i)
Multi-state Output	MSO7	Air Direction Setup	1 = Auto 2 = Position 1 3 = Position 2 4 = Position 3 5 = Position 4 6 = Position 5 7 = Swing
Multi-state Input	MSI8	Air Direction State	1 = Auto 2 = Position 1 3 = Position 2 4 = Position 3 5 = Position 4 6 = Position 5 7 = Swing
Multi-state Output	MSO9	Temperature Units	1 = ºC 2 = ºF
Analog Input	AI10	Inlet Temperature	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI11	Fault Code	4-digit fault code
Binary Output	BO12	External Temperature ON/OFF Setup	0 = Feature OFF 1 = Feature ON This feature is feedback the [AV13] value to AC unit which could replace the internal temperature value
Analog Value	AV13	External Temperature Input	Value in either ºC or ºF, depending on the Temperature Units setting

8.4.2. BACnet Object list – Air-To-Water systems

Object type	Object ID	Object name	Notes
Binary Output	BO0	ATW Drive OFF/ON Setup	0 = System OFF 1 = System ON
Multi-state Output	MSO1	ATW Mode Setup	1 = Stop 2 = Hot Water 3 = Heating 4 = Cooling 5 = No voltage contact input (hot water storage) 6 = Freeze Stat 7 = Legionella 8 = Heating-Eco 9 = Mode 1 10 = Mode 2 11 = Mode 3 12 = No voltage contact input (heating up)
Binary Output	BO2	ATW DHW Mode Setup	0 = Normal 1 = Eco
Multi-state Output	MSO3	ATW Zone 1 Operation Mode AC	1 = Heating Room Temp 2 = Heating Flow Temp 3 = Heating Heat Curve 4 = Cooling Room Temperature (not on 13K model) 5 = Cooling Flow Temp 6 = Floor Dryup
Multi-state Output	MSO4	ATW Zone 2 Operation Mode AC	1 = Heating Room Temp 2 = Heating Flow Temp 3 = Heating Heat Curve 4 = Cooling Room Temperature (not on 13K model) 5 = Cooling Flow Temp 6 = Floor Dryup
Analog Value	AV5	ATW Tank Setpoint Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Value	AV6	ATW Zone1 HC Target Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Value	AV7	ATW Zone2 HC Target Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Value	AV8	ATW MRC OperationProhibit	Bit packed value: Bit 0 - System On/Off (0 = ON, 1 = Prohibit) Bit 1 - Running Mode (0 = ON, 1 = Prohibit) Bit 2 - Setting Temperature (0 = ON, 1 = Prohibit) Bit 3 - Undefined (always 0) Bit 4 - Function Setting (0 = Normal, 1 = Function Setting) Bits 5, 6 and 7 - Undefined (always 0) (†† MRC Prohibit command must NOT be written to Shizuoka designed models)
Binary Output	BO9	ATW Forced DHW Setup	0 = Normal 1 = Force DHW
Binary Output	BO10	ATW Holiday Setup	0 = Normal 1 = Holiday
Binary Output	BO11	ATW DHW ON Prohibit Setup	0 = On 1 = Prohibit
Binary Output	BO12	ATW ZONE1 Heating ON Setup	0 = On 1 = Prohibit
Binary Output	BO13	ATW ZONE1 Cooling ON Setup	0 = On 1 = Prohibit
Binary Output	BO14	ATW ZONE2 Heating ON Setup	0 = On 1 = Prohibit
Binary Output	BO15	ATW ZONE2 Cooling ON Setup	0 = On 1 = Prohibit

Object type	Object ID	Object name	Notes
Binary Output	BO16	ATW Capacity Mode Setup	0 = COP priority 1 = Capacity priority
Analog Value	AV17	ATW Capacity Control Ratio	Value in %. 0 = 0% ... 100 = 100%
Binary Output	BO18	ATW Fan Mode Setup	0 = Ordinary 1 = Coercion
Analog Value	AV19	ATW Current Hour	0 … 23
Analog Value	AV20	ATW Current Minute	0 … 59
Analog Value	AV21	ATW Outdoor Air Temperature Int	Temperature Value in either ºC or ºF, depending on the Temperature Units setting multiplied by 10. 0xFE70 = -40ºC … 0x036B = 87.5ºC
Analog Value	AV22	ATW Setting Water Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Value	AV23	ATW Therm Target Temperature Int - Zone 1	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Value	AV24	ATW Therm Target Temperature Int - Zone 2	Value in either ºC or ºF, depending on the Temperature Units setting
Multi-state Output	MSO25	ATW HC Control Type	1 = Heating 2 = Cooling
Analog Input	AI26	ATW Own Refrigerant Address	0 … 32
Analog Input	AI27	ATW Defrost	0 = Normal 1 = Standby 2 = Defrost 3 = Waiting Restart
Analog Input	AI28	ATW Residual Heat Removal	0 = Normal 1 = Prepared 2 = Residual Heat Removal
Analog Input	AI29	ATW Refrigerant Error Info	0 = Normal 1 = Error (System) 2 = Error (Startup) 3 = Maintenance Error
Analog Input	AI30	ATW 7-Segment Display Error Code Digit 1	0 = A 1 = b 2 = E 3 = F 4 = J 5 = L 6 = P 7 = U
Analog Input	AI31	ATW 7-Segment Display Error Code Digit 2	1 - 15 = 1 - F 16 = O 17 = H 18 = J 19 = L 20 = P 21 = U
Analog Input	AI32	ATW Status Of Heating	FTC4 0 = No type 1 = Heating C1 2 = Heating C2 3 = Heating C3 FTC5/6/7 0 = No type 1 = Heating/Cooling A1, Heating/Cooling B1, Heating/Cooling C1 2 = Heating/Cooling A2, Heating/Cooling B2, Heating/Cooling C2 3 = Heating/Cooling A3, Heating/Cooling B3, Heating/Cooling C3
Analog Input	AI33	ATW HeatPumpFreq Master	Frequency value in Hz 0 = 0Hz … 255 = 255Hz

Object type	Object ID	Object name	Notes
Analog Input	AI34	ATW HeatPumpFreq Slave1	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI35	ATW HeatPumpFreq Slave2	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI36	ATW HeatPumpFreq Slave3	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI37	ATW HeatPumpFreq Slave4	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI38	ATW HeatPumpFreq Slave5	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI39	ATW HeatPumpFreq Slave6	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI40	ATW Heat Source Status	0 = H/P 1 = IH 2 = BH 3 = IH + BH 4 = Boiler
Analog Input	AI41	ATW Zone1 Temperature Setpoint Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI42	ATW Zone2 Temperature Setpoint Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI43	ATW Zone1 Flow Temperature Setpoint Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI44	ATW Zone2 Flow Temperature Setpoint Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI45	ATW Legionella Temperature Setpoint Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI46	ATW Dhw Temperaturedrop Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI47	ATW Zone1roomtemperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI48	ATW Zone2roomtemperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI49	ATW Refrigerant Liquid Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI50	ATW Ambient Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI51	ATW Flow Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI52	ATW Return Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI53	ATW Water Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI54	ATW Flow Temperature Zone1 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI55	ATW Return Temperature Zone1 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI56	ATW Flow Temperature Zone2 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI57	ATW Return Temperature Zone2 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI58	ATW Flow Temperature Boiler Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI59	ATW Return Temperature Boiler Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI60	ATW Roomthermo1 IN1	0 = OFF, 1 = ON
Analog Input	AI61	ATW Roomthermo2 IN6	0 = OFF, 1 = ON
Analog Input	AI62	ATW Flow SW1 IN2	0 = OFF, 1 = ON
Analog Input	AI63	ATW Flow SW2 IN3	0 = OFF, 1 = ON
Analog Input	AI64	ATW Flow SW3 IN7	0 = OFF, 1 = ON
Analog Input	AI65	ATW Demand IN4	0 = OFF, 1 = ON

Object type	Object ID	Object name	Notes
Analog Input	AI66	ATW Outdoorthermo IN5	0 = OFF, 1 = ON
Analog Input	AI67	ATW DipSwitch SW2	Bit 0 = Switch 2-1 (0 = OFF, 1 = ON) … Bit 9 = Switch 2-10 (0 = OFF, 1 = ON)
Analog Input	AI68	ATW Heatpump Master ONOFF	0 = Stop, 1 = Run
Analog Input	AI69	ATW Heatpump Slave ONOFF 0	0 = Stop, 1 = Run
Analog Input	AI70	ATW Heatpump Slave ONOFF 1	0 = Stop, 1 = Run
Analog Input	AI71	ATW Heatpump Slave ONOFF 2	0 = Stop, 1 = Run
Analog Input	AI72	ATW Heatpump Slave ONOFF 3	0 = Stop, 1 = Run
Analog Input	AI73	ATW Heatpump Slave ONOFF 4	0 = Stop, 1 = Run
Analog Input	AI74	ATW Heatpump Slave ONOFF 5	0 = Stop, 1 = Run
Analog Input	AI75	ATW Heatpump Slave ONOFF 6	0 = Stop, 1 = Run
Analog Input	AI76	ATW Heatpump Slave ONOFF 7	0 = Stop, 1 = Run
Analog Input	AI77	ATW Heatpump Runtime Hours	Value in hours 0 = 0 Hours … 99 = 99 Hours
Analog Input	AI78	ATW Heatpump Runtime Hours x100	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours
Analog Input	AI79	ATW Heatpump Refaddr1 Runtime Hours x100	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours
Analog Input	AI80	ATW Heatpump Refaddr2 Runtime Hours x100	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours
Analog Input	AI81	ATW Heatpump Refaddr3 Runtime Hours x100	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours
Analog Input	AI82	ATW Heatpump Refaddr4 Runtime Hours x100	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours
Analog Input	AI83	ATW Heatpump Refaddr5 Runtime Hours x100	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours
Analog Input	AI84	ATW Heatpump Refaddr6 Runtime Hours x100	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours
Analog Input	AI85	ATW Boiler ONOFF	0 = Stop, 1 = Run
Analog Input	AI86	ATW Boosterheater1 ONOFF	0 = Stop, 1 = Run
Analog Input	AI87	ATW Boosterheater2 ONOFF	0 = Stop, 1 = Run
Analog Input	AI88	ATW Boosterheater2plus ONOFF	0 = Stop, 1 = Run
Analog Input	AI89	ATW Immersionheater ONOFF	0 = Stop, 1 = Run
Analog Input	AI90	ATW Waterpump1 ONOFF	0 = Stop, 1 = Run
Analog Input	AI91	ATW Waterpump2 ONOFF	0 = Stop, 1 = Run
Analog Input	AI92	ATW Waterpump3 ONOFF	0 = Stop, 1 = Run

Object type	Object ID	Object name	Notes
Analog Input	AI93	ATW 3wayvalve ONOFF	0 = Stop, 1 = Run
Analog Input	AI94	ATW 2wayvalve2 ONOFF	0 = Stop, 1 = Run
Analog Input	AI95	ATW Mixingvalvestep	0 = Step 0 … 10 = Step 10
Analog Input	AI96	ATW Ref1 Errcode Upper Digit	7-Segment Display Error Code
Analog Input	AI97	ATW Ref1 Errcode Lower Digit	Digit (Upper) Digit (Lower)
Analog Input	AI98	ATW Ref2 Errcode Upper Digit	0 = A 1 - 15 = 1 - F
Analog Input	AI99	ATW Ref2 Errcode Lower Digit	1 = b 16 = O
Analog Input	AI100	ATW Ref3 Errcode Upper Digit	2 = E 17 = H
Analog Input	AI101	ATW Ref3 Errcode Lower Digit	3 = F 18 = J
Analog Input	AI102	ATW Ref4 Errcode Upper Digit	4 = J 19 = L
Analog Input	AI103	ATW Ref4 Errcode Lower Digit	5 = L 20 = P
Analog Input	AI104	ATW Ref5 Errcode Upper Digit	6 = P 21 = U
Analog Input	AI105	ATW Ref5 Errcode Lower Digit	7 = U
Analog Input	AI106	ATW Ref6 Errcode Upper Digit	
Analog Input	AI107	ATW Ref6 Errcode Lower Digit	
Analog Input	AI108	ATW Heatpump Freq 0	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI109	ATW Heatpump Freq 1	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI110	ATW Heatpump Freq 2	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI111	ATW Heatpump Freq 3	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI112	ATW Heatpump Freq 4	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI113	ATW Heatpump Freq 5	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI114	ATW Heatpump Freq 6	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI115	ATW Heatpump Freq 7	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI116	ATW Heatpump Freq 8	Frequency value in Hz 0 = 0Hz … 255 = 255Hz
Analog Input	AI117	ATW Heatpump Operation 0	0 = Stop, 1 = Run
Analog Input	AI118	ATW Heatpump Operation 1	0 = Stop, 1 = Run
Analog Input	AI119	ATW Heatpump Operation 2	0 = Stop, 1 = Run
Analog Input	AI120	ATW Heatpump Operation 3	0 = Stop, 1 = Run
Analog Input	AI121	ATW Heatpump Operation 4	0 = Stop, 1 = Run
Analog Input	AI122	ATW Heatpump Operation 5	0 = Stop, 1 = Run
Analog Input	AI123	ATW Heatpump Operation 6	0 = Stop, 1 = Run
Analog Input	AI124	ATW Heatpump Operation 7	0 = Stop, 1 = Run
Analog Input	AI125	ATW Heatpump Operation 8	0 = Stop, 1 = Run
Analog Input	AI126	ATW Heatpump Operation 9	0 = Stop, 1 = Run
Analog Input	AI127	ATW Heatpump Operation 10	0 = Stop, 1 = Run
Analog Input	AI128	ATW Heatpump Operation 11	0 = Stop, 1 = Run
Analog Input	AI129	ATW Heatpump Operation 12	0 = Stop, 1 = Run
Analog Input	AI130	ATW Heatpump Operation 13	0 = Stop, 1 = Run
Analog Input	AI131	ATW Heatpump Operation 14	0 = Stop, 1 = Run
Analog Input	AI132	ATW Heatpump Operation 15	0 = Stop, 1 = Run
Analog Input	AI133	ATW Heatpump Operation 16	0 = Stop, 1 = Run
Analog Input	AI134	ATW Heatpump Operation 17	0 = Stop, 1 = Run
Analog Input	AI135	ATW Heatpump Operation 18	0 = Stop, 1 = Run

Object type	Object ID	Object name	Notes
Analog Input	AI136	ATW Heatpump Operation 19	0 = Stop, 1 = Run
Analog Input	AI137	ATW Heatpump Operation 20	0 = Stop, 1 = Run
Analog Input	AI138	ATW Heatpump Operation 21	0 = Stop, 1 = Run
Analog Input	AI139	ATW Heatpump Operation 22	0 = Stop, 1 = Run
Analog Input	AI140	ATW Externalheater Operation	0 = Stop, 1 = Run
Analog Input	AI141	ATW Waterpump Operation 0	0 = Stop, 1 = Run
Analog Input	AI142	ATW Waterpump Operation 1	0 = Stop, 1 = Run
Analog Input	AI143	ATW Waterpump Operation 2	0 = Stop, 1 = Run
Analog Input	AI144	ATW Waterpump Operation 3	0 = Stop, 1 = Run
Analog Input	AI145	ATW Waterpump Operation 4	0 = Stop, 1 = Run
Analog Input	AI146	ATW Waterpump Operation 5	0 = Stop, 1 = Run
Analog Input	AI147	ATW Waterpump Operation 6	0 = Stop, 1 = Run
Analog Input	AI148	ATW Waterpump Operation 7	0 = Stop, 1 = Run
Analog Input	AI149	ATW Waterpump Operation 8	0 = Stop, 1 = Run
Analog Input	AI150	ATW Waterpump Operation 9	0 = Stop, 1 = Run
Analog Input	AI151	ATW Waterpump Operation 10	0 = Stop, 1 = Run
Analog Input	AI152	ATW Waterpump Operation 11	0 = Stop, 1 = Run
Analog Input	AI153	ATW Waterpump Operation 12	0 = Stop, 1 = Run
Analog Input	AI154	ATW Drainpan Operation or Antifreeze piping heater operation ON/OFF	0 = Stop, 1 = Run
Analog Input	AI155	ATW Evaporating Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI156	ATW Condensing Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI157	ATW Electric Energy 1	Electric Energy
Analog Input	AI158	ATW Electric Energy 2	0x0000 = 0.00 kWh
Analog Input	AI159	ATW Electric Energy 3	0x0001 = 0.01 kWh
Analog Input	AI160	ATW Electric Energy 4	…
Analog Input	AI161	ATW Electric Energy 5	0xFFFE = 655.34 kWh
Analog Input	AI162	ATW Electric Energy 6	0xFFFF = 655.35 kWh
Analog Input	AI163	ATW Electric Energy 7	
Analog Input	AI164	ATW Electric Energy 8	
Analog Input	AI165	ATW Electric Energy 9	
Analog Input	AI166	ATW Electric Energy 10	
Analog Input	AI167	ATW Electric Energy 11	
Analog Input	AI168	ATW Electric Energy 12	
Analog Input	AI169	ATW Electric Energy 13	
Analog Input	AI170	ATW Electric Energy 14	
Analog Input	AI171	ATW Electric Energy 15	
Analog Input	AI172	ATW Electric Energy 16	
Analog Input	AI173	ATW Brine Inlet Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI174	ATW Brine Outlet Temp1 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI175	ATW Brine Outlet Temp2 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI176	ATW Condensing Temp2 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI177	ATW Water Outlet Temp2 Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI178	ATW Evaporating Temp2 Int	Value in either ºC or ºF, depending on the Temperature Units setting

Object type	Object ID	Object name	Notes
Analog Input	AI179	ATW PWM Duty Of Waterpump1	Duty value in % 0 = 0% … 100 = 100%
Analog Input	AI180	ATW PWM Duty Feedback Waterpump1	Duty value in % 0 = 0% … 100 = 100%
Analog Input	AI181	ATW 3way Valve 1	0 = OFF (stop) 1 = ON (run)
Analog Input	AI182	ATW Protocol Version Upper	Version of Protocol is a value in BCD e.g. V3.01 = 3 (upper) and 1 (lower)
Analog Input	AI183	ATW Protocol Version Lower	Version of Protocol is a value in BCD e.g. V3.01 = 3 (upper) and 1 (lower)
Analog Input	AI184	ATW Model Version Upper	Version of Model is a value in BCD e.g. V2.00 = 2 (upper) and 0 (lower)
Analog Input	AI185	ATW Model Version Lower	Version of Model is a value in BCD e.g. V2.00 = 2 (upper) and 0 (lower)
Analog Input	AI186	ATW Capacity Of Supply Electricity	Value in Watts 0 = 0.0 W … 255 = 25.5 W
Analog Input	AI187	ATW Model Profile 1	0 = FTC2B 1 = FTC4 2 = FTC5 3 = FTC6 128 = CAHV1A 129 = CAHV1B 130 = CRHV1A 131 = CRHV1B 132 = EAHV1A 133 = EAHV1B 134 = QAHV1A 135 = QAHV1B 144 = PWFY1
Analog Input	AI188	ATW Model Profile 2	0 = Address 0 … 255 = Address 255 (addresses 7 - 255 not used for FTC)
Analog Input	AI189	ATW EnergyConsumptionYear	Date of last energy consumption measurement – Year
Analog Input	AI190	ATW EnergyConsumptionMonth	Date of last energy consumption measurement – Month
Analog Input	AI191	ATW EnergyConsumptionDay	Date of last energy consumption measurement – Day
Analog Input	AI192	ATW EnergyConsumptionHeatingKwh	Last measured heating energy consumption - kWh part of the value. 0 = 0kWh … 65535 = 65535kWh
Analog Input	AI193	ATW EnergyConsumptionHeatingWh	Last measured heating energy consumption - Wh part of the value multiplied by 10. 0 = 0Wh … 99 = 990Wh
Analog Input	AI194	ATW EnergyConsumptionCoolingKwh	Last measured cooling energy consumption - kWh part of the value. 0 = 0kWh … 65535 = 65535kWh
Analog Input	AI195	ATW EnergyConsumptionCoolingWh	Last measured cooling energy consumption - Wh part of the value multiplied by 10. 0 = 0Wh … 99 = 990Wh
Analog Input	AI196	ATW EnergyConsumptionDHWKwh	Last measured DHW energy consumption - kWh part of the value. 0 = 0kWh … 65535 = 65535kWh
Analog Input	AI197	ATW EnergyConsumptionDHWWh	Last measured DHW energy consumption - Wh part of the value multiplied by 10. 0 = 0Wh … 99 = 990Wh
Analog Input	AI198	ATW EnergyConsumptionTotalKwh	Last measured DHW energy consumption - Wh part of the value multiplied by 10. 0 = 0Wh … 99 = 990Wh

Object type	Object ID	Object name	Notes
Analog Input	AI199	ATW EnergyProducedYear	Date of last energy produced measurement – Year
Analog Input	AI200	ATW EnergyProducedMonth	Date of last energy produced measurement – Month
Analog Input	AI201	ATW EnergyProducedDay	Date of last energy produced measurement – Day
Analog Input	AI202	ATW EnergyProducedHeatingKwh	Last measured heating energy produced - kWh part of the value. 0 = 0kWh … 65535 = 65535kWh
Analog Input	AI203	ATW EnergyProducedHeatingWh	Last measured heating energy produced - Wh part of the value multiplied by 10. 0 = 0Wh … 99 = 990Wh
Analog Input	AI204	ATW EnergyProducedCoolingKwh	Last measured cooling energy produced - kWh part of the value. 0 = 0kWh … 65535 = 65535kWh
Analog Input	AI205	ATW EnergyProducedCoolingWh	Last measured cooling energy produced - Wh part of the value multiplied by 10. 0 = 0Wh … 99 = 990Wh
Analog Input	AI206	ATW EnergyProducedDHWKwh	Last measured DHW energy produced - kWh part of the value. 0 = 0kWh … 65535 = 65535kWh
Analog Input	AI207	ATW EnergyProducedDHWWh	Last measured DHW energy produced - Wh part of the value multiplied by 10. 0 = 0Wh … 99 = 990Wh
Analog Input	AI208	ATW EnergyProducedTotalKwh	Last measured total energy produced in Kwh. 0 = 0kWh … 65535 = 65535kWh
Analog Input	AI209	ATW FlowRate 1	Litres per minute 0 = 0 l/min … 255 = 255 l/min
Analog Input	AI210	ATW Date Year	Date(year): 0 = 2000 … 99 = 2099
Analog Input	AI211	ATW Date Month	Date(month): 1 = January … 12 = December
Analog Input	AI212	ATW Date Day	Date(day): 1 … 31
Analog Input	AI213	ATW Time Hour	Time(hour): 0 … 255
Analog Input	AI214	ATW Time Min	Time(minute): 0 … 59
Analog Input	AI215	ATW Time Sec	Time(sec): 0 … 59
Analog Input	AI216	ATW Version Main SW	Version of Software: e.g. version 01.23 is entered as 0123
Analog Input	AI217	ATW Version Subcode	Sub-code Version of Software: e.g. "r01" = 0001, "t02" = 0102, "c03" = 0203
Analog Input	AI218	ATW Demand Leg Prevention	Demand of Legionella Prevention; 0 = Normal, 1 = Legionella Prevention
Analog Input	AI219	ATW Type Emergency Op	Type of Emergency Prevention: 0 = Normal, 1 = Standby, 2 = Backup
Analog Input	AI220	ATW Zone1 Sensor Setting	Zone 1 sensor setting: 0 = Main RC, 1-8 = RoomRC1-8, 15 = TH1
Analog Input	AI221	ATW Zone2 Sensor Setting	Zone 2 sensor setting: 0 = Main RC, 1-8 = RoomRC1-8, 15 = TH1
Analog Input	AI222	ATW Freeze Stat Func Outdoor Unit	Freeze stat function for outdoor unit: 0 = Normal, 1 = Freeze stat
Analog Input	AI223	ATW Boiler Protection	Boiler Protection: 0 = Normal, 1 = Prepared, 2 = Protected
Analog Input	AI224	ATW Auto Restart PWR Failure	Auto restart at power failure: 0 = Normal, 1 = Standby, 2 = IT initial setting standby
Analog Input	AI225	ATW Demand of Heater	Demand of heater operation: 0 = No demand, 1 = Run, 2 = Prohibit
Analog Input	AI226	ATW Type Heating Cooling	Type Heating / Cooling: 0 = Type A, 1 = Type B, 2 = Type C

Object type	Object ID	Object name	Notes
Analog Input	AI227	ATW Zone1 HP Thermo Diff Adj Control	Zone1 H/P thermos diff. adjustment control: 0 = Normal, 1 = discriminating, 2 = adjustment α 3 = β, 4 = γ
Analog Input	AI228	ATW Zone2 HP Thermo Diff Adj Control	Zone2 H/P thermos diff. adjustment control: 0 = Normal, 1 = discriminating, 2 = adjustment α 3 = β, 4 = γ
Analog Input	AI229	ATW Slave Unit Connecting	Slave Unit Connection Status: Bit 0 = address 1…….. Bit 5 = address 5 Value: 0 = unconnected, 1 = connected
Analog Input	AI230	ATW Slave Unit Operating Status	Slave Unit Operation Status: Bit 0 = address 1…….. Bit 5 = address 5 Value: 0 = Stop, 1 = Running
Analog Input	AI231	ATW HPFREQ4 Status	Status of H/P frequency 4: 0 = 0 Hz … 255 = 255 Hz
Analog Input	AI232	ATW Heatsource Phase DHW	Heat Source Phase of DHW: 0 = Normal, 1 = H/P Phase, 2 = Heater Phase
Analog Input	AI233	ATW Heatsource Type	Type of Heat Source: 0 = Fixed, 1 = Auto
Analog Input	AI234	ATW Heatsource Judgement condition	1 = Boiler - Emergency operation 2 = Heater - Emergency operation 3 = Boiler - External input (IN5) 4 = Boiler - Heat source setting [Boiler] 5 = Heater - Heat source setting [Heater] 6 = Standard - Heatsource setting [Standard] 7 = Heater - External input (IN5) 8 = Heater - Backup operation 9 = Heater - Demand from outdoor unit 10 = Boiler - External input (IN4) 11 = Boiler - Backup operation 12 = Boiler - Heat source setting [Hyblid] 13 = Heater - Low outdoor temp. operation 14 = Standard - Pumpdown operation 15 = Standard - Floor dry up operation 16 = Boiler - Indoor unit only operation 17 = Heater - Indoor unit only operation
Analog Input	AI235	ATW Boiler Operation Hybrid Settings	Boiler operation hybrid settings - Priority mode 0 = Ambient, 1 = Cost, 2 = CO2
Analog Input	AI236	ATW CP Boiler	CP boiler: 00h 00h 00h = 0.000 */kW 00h 00h 01h = 0.001 */kW … FFh FFh FFh = 16777.215 */kW * unit of user's currency
Analog Input	AI237	ATW CO2 Boiler	CO2 boiler: 00h 00h 00h = 0.000 kg-CO2 00h 00h 01h = 0.001 kg-CO2 … FFh FFh FFh = 16777.215 kg-CO2
Analog Input	AI238	ATW Energyprice Electricity	Energy Price Electricity: 00h 00h 00h = 0.000 */kW 00h 00h 01h = 0.001 */kW … FFh FFh FFh = 16777.215 */kW * unit of user's currency
Analog Input	AI239	ATW OC Connection Error	OC Connection Error:
Analog Input	AI240	ATW RC Connection Error	RC Connection Error:
Analog Input	AI241	ATW Consumed Electric Power	Consumed electric power/energy: 0 = 0 kW or Wh …… 65535 = 65535 kW or Wh

Object type	Object ID	Object name	Notes
Analog Input	AI242	ATW Produced Power	Produced heat power/energy: 0 = 0 kW or Wh ……. 65535 = 65535 kW or Wh
Analog Input	AI243	ATW Calc Func Consumed Electrical Energy	Calculation function of consumed electrical energy: 0 = no function, 1 = with function
Analog Input	AI244	ATW Calcfunc Produced Energy	Calculation function of produced energy: 0 = no function, 1 = with function
Analog Input	AI245	ATW Heatingfunction OnOff	Heating Function: 0 = OFF (inactive), 1 = ON (active)
Analog Input	AI246	ATW Ext Outdoor AmbTemp	Extended Outdoor Ambient Temperature: 0 = OFF, 1 = ON
Analog Input	AI247	ATW Mixtank Water Tempint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI248	ATW Condensing Tempint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI249	ATW Dipswitch SW1	DipSW setting (SW1) lower byte: bit 0 = SW1-1….. bit 7 = SW1-8 upper byte: bit 0 = SW1-9 … bit 1 = SW1-10
Analog Input	AI250	ATW Dipswitch SW3	DipSW setting (SW3) lower byte: bit 0 = SW3-1….. bit 7 = SW3-8 upper byte: bit 0 = SW3-9 … bit 1 = SW3-10
Analog Input	AI251	ATW Dipswitch SW4	DipSW setting (SW4) lower byte: bit 0 = SW4-1….. bit 5 = SW4-6
Analog Input	AI252	ATW Dipswitch SW5	DipSW setting (SW5) lower byte: bit 0 = SW5-1….. bit 7 = SW5-8
Analog Input	AI253	ATW Dipswitch SW6	DipSW setting (SW6) lower byte: bit 0 = SW6-1….. bit 4 = SW6-5
Analog Input	AI254	ATW Flow Rate 2	Flow rate 2: 0 = 0.0 L/min, 1 = 1.0 L/min ….. 255 = 255 L/min
Analog Input	AI255	ATW Waterpump4 OnOff	Water Pump 4 On/Off: 0 = Stop, 1 = Run
Analog Input	AI256	ATW 2WayValve 2a OnOff	2-way Valve 2a On/Off: 0 = Stop, 1 = Run
Analog Input	AI257	ATW 2WayValve 2b OnOff	2-way Valve 2b On/Off: 0 = Stop, 1 = Run
Multi-state Output	MSO258	Temperature Units	1 = ºC 2 = ºF

8.4.3. BACnet Object list – Lossnay systems

Object type	Object ID	Object name	Notes
Binary Output	BO0	Lossnay Drive OFF/ON Setup	0 = Power OFF 1 = Power ON
Multi-state Output	MSO1	Lossnay Mode Setup	1 = Heat 2 = Cool 3 = Fan 4 = Auto
Multi-state Output	MSO2	Lossnay Vent Mode Setup	1 = Lossnay mode 2 = Bypass mode 3 = Auto mode
Multi-state Output	MSO3	Lossnay Fan Speed A Setup	1 = Auto 2 = Speed 1 3 = Speed 2 4 = Speed 3 5 = Speed 4
Analog Value	AV4	Lossnay Temperature Setpoint A	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI5	Lossnay Supply Air Temperature A	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI6	Lossnay Outdoor Temperature Int	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI7	Lossnay Room Temperature A	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI8	Lossnay Room Co2 Level	CO2 level divided by 10. 0 = 0ppm … 240 = 2400 and above. [Value 254 = Under detecting] [Value 255 = No sensor] Note: Only available when ‘CO2 Level Sensor’ value = 1 (Equipped).
Analog Input	AI9	Lossnay Thermo Onoff	0 = Thermo OFF 1 = Thermo ON
Analog Input	AI10	Lossnay Energy Consumption	"Value in kWh multiplied by 10. 0 = 0kWh … 65535 = 6553.5kWh"
Analog Input	AI11	Lossnay Actual Operation Mode	1 = Not auto mode 2 = Determining 3 = Heating 4 = Cooling
Analog Input	AI12	Lossnay Auto Fan Speed Control Availability	0 = Not available 1 = Available
Analog Input	AI13	Lossnay Night Purge	0 = Normal operation 1 = In night purge operation
Analog Input	AI14	Lossnay Maintenance Sign	0 = Inactive 1 = Active
Analog Input	AI15	Lossnay Filter Sign	0 = Inactive 1 = Active
Analog Input	AI16	Lossnay Actual Ventilation Mode	0 = Lossnay ventilation 1 = Bypass ventilation
Analog Input	AI17	Lossnay Actual Supply Fan Speed	1 = Stop 2 = Speed 1 3 = Speed 2 4 = Speed 3 5 = Speed 4
Analog Input	AI18	Lossnay Actual Extract Fan Speed	1 = Stop 2 = Speed 1 3 = Speed 2 4 = Speed 3 5 = Speed 4
Analog Input	AI19	Lossnay Setpoint 0.5ºC Increments Availability	0 = Not available 1 = Available

Object type	Object ID	Object name	Notes
Analog Input	AI20	Lossnay Heat/Cool or Cool-Only	0 = Heat and Cool 1 = Cool only
Analog Input	AI21	Lossnay Auto Operation Mode Availability	0 = Not available 1 = Available
Analog Input	AI22	Lossnay Heat/Cool or Heat-Only	0 = Heat and Cool 1 = Heat only
Analog Input	AI23	Lossnay Minimum Cooling Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI24	Lossnay Maximum Cooling Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI25	Lossnay Minimum Heating Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI26	Lossnay Maximum Heating Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI27	Lossnay Minimum Auto Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI28	Lossnay Maximum Auto Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI29	Lossnay Energy Consumption Data Available	0 = Not available 1 = Available
Analog Input	AI30	Lossnay Number Of Fan Speeds	Values 1 – 4 valid
Analog Input	AI31	Lossnay Bypass Damper Function	0 = Not available 1 = Available
Analog Input	AI32	Lossnay Auto Ventilation Mode Available	0 = Not available 1 = Available
Analog Input	AI33	Lossnay Operation Mode off Temperature Control Unit	0 = Not available (not connected) 1 = Available (connected)
Analog Input	AI34	Lossnay Set Temperature on Temperature Control Unit	0 = No set temperature display 1 = RA (Return Air) temperature 2 = SA (Supply Air) temperature
Analog Input	AI35	Lossnay Outdoor Temperature Sensor	0 = Not equipped 1 = Equipped
Analog Input	AI36	Lossnay Return Air Temperature Sensor	0 = Not equipped 1 = Equipped
Analog Input	AI37	Lossnay Supply Air Temperature Sensor	0 = Not equipped 1 = Equipped
Analog Input	AI38	Lossnay CO2 Sensor	0 = Not equipped 1 = Equipped
Multi-state Output	MSO39	Temperature Units	1 = ºC 2 = ºF

9. Modbus connection

9.1. Modbus background

Modbus is a master-slave protocol, which means there are two types of Modbus device, Modbus *Masters* and Modbus *Slaves*.

Slave devices simply wait until they receive a command from a Master, act upon that command and send a reply to the Master. Slaves do not have the ability to send commands to other devices on the bus. Master devices are responsible for sending commands to slave devices and receiving data. Modbus only permits there to be one Master device on the bus at any one time, but up to 247 slaves can be connected at a time.

Modbus is most commonly used over RS-485, which is a hardware standard allowing multiple devices to be connected on the same bus.

Each Slave device must have a unique ID on the bus, which is referred to as a *Slave ID*. Each Modbus command the Master sends will contain this Slave ID and only the Slave with that Slave ID will reply.

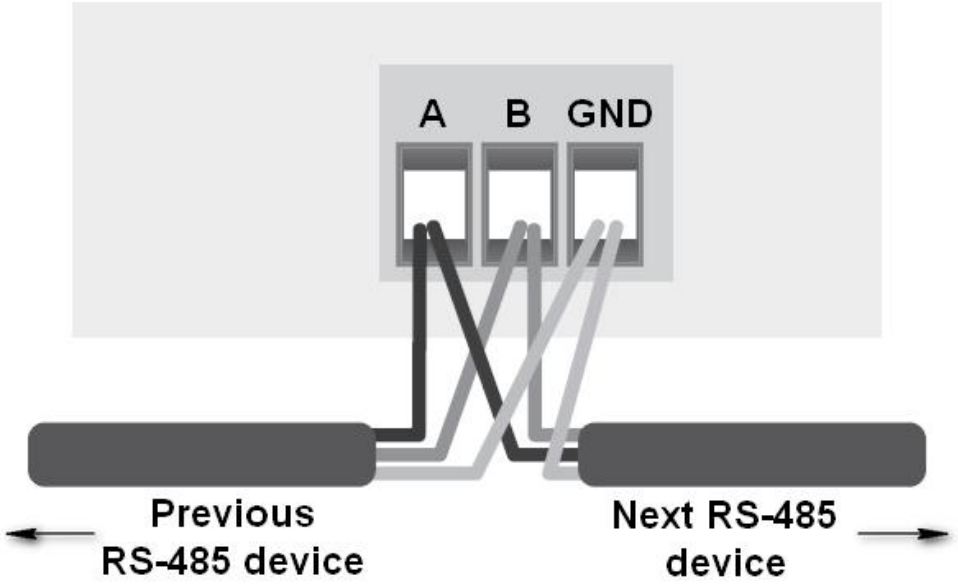
9.2. Modbus registers

Modbus Slave devices store data in registers. There are four register types and each type has its own register bank. The register types are summarised below:

Register Name	Register Type	Description
Discrete Input	Digital Input	Read only register used for holding status information which holds a value of 0 or 1.
Coil	Digital Output	Read and write accessible register which holds a value of 0 or 1.
Input Register	Analogue Input	Read only register used for status information which holds a 16-bit value (0-65535)
Holding Register	Analogue Output	Read and write accessible register used for status information which holds a 16-bit value (0-65535)

9.3. Modbus RS485 connections

For communication over RS-485 all 3 connections are needed. These are labeled A, B and GND. Please refer to the connection diagrams below.



⚠ **Caution:**

The RS-485 cable must be a shielded data cable. Mains flex or other unshielded cable should not be used. The cable shield should be connected to GND at one end only.

⚠ **Caution:**

RS-485 has polarised data connections. It is crucial that all 'A's are connected together, all 'B's are connected together and all 'GND's are connected together.

⚠ **Caution:**

The RS-485 cable must be daisy-chained in a bus network. T-junctions (e.g. star network wiring) are not permitted.

⚠ **Caution:**

RS-485 biasing jumpers must be fitted on the Procon MelcoRETAIL/MelcoREMOTE (if used).

9.4. Modbus TCP connections

For communication over Ethernet, RJ45 port must be connected to the network.

Modbus TCP setting for Modbus TCP client	
IP	The IP address of A1M+. For example, the default IP address is 192.168.92.114
TCP Port	502

10. Modbus tables – Air-To-Air systems

Some BMS controllers can only read Modbus Holding Registers, so the MelcoBEMS MINI (A1M+) also exposes all Discrete, Coil and Input Registers as Holding Registers. The Discrete Input registers and Input registers are not writable so their equivalent Holding Register is read only and marked [**READ ONLY**].

Some BMS controllers may not be able to read signed register values (i.e. values which can be negative in value), so the MelcoBEMS MINI (A1M+) also exposes an unsigned version of those registers (these registers will not return a negative value).

10.1. Holding registers

Holding Registers are read using function code 03 and written to using either function code 06 or 16. Function code 06 is used when writing to a single holding register, function code 16 is used for writing to multiple holding registers in the same command.

Holding Registers (Analogue Outputs)			
Register Name	Address	Modicon Address	Details
Drive Mode	0	40001	1 = Heating 2 = Humidity reduction 3 = Cooling 7 = Ventilation, clean air operation 8 = Auto Operation 9 = i-see heating operation* 10 = i-see humidity reduction* 11 = i-see cooling * * indicates a read only value, writing this value will have no effect
Temperature Setpoint	1	40002	Temperature value in °C multiplied by 10. e.g. value 200 = 20°C
Fan Speed	2	40003	0 = Auto 2 = Quiet 3 = Weak 5 = Strong 6 = Very strong (SH i)
Air Direction	3	40004	0 = Auto 1 = Position 1 2 = Position 2 3 = Position 3 4 = Position 4 5 = Position 5 7 = Swing
Modbus Slave ID	4	40005	Values 1 – 247 valid
BACnet Station ID			Values 1 -127 valid

Holding Registers (Analogue Outputs)			
Register Name	Address	Modicon Address	Details
Modbus RS-485 Baud Rate	5	40006	0 = 9600 1 = 1200 2 = 2400 3 = 4800 4 = 9600 5 = 14400 6 = 19200 7 = 28800 8 = 38400 9 = 56000 10 = 57600 11 = 76800 12 = 115200
BACnet RS-485 Baud Rate			0 = 9600 4 = 9600 6 = 19200 8 = 38400 11 = 76800
RS-485 Parity Type	6	40007	0 = None 1 = Even 2 = Odd
Drive On/Off	7	40008	0 = Drive OFF 1 = Drive ON
Room Temperature [**READ ONLY**]	8	40009	Temperature value in °C multiplied by 10. e.g. value 200 = 20°C
Fault Code (hex) [**READ ONLY**]	9	40010	0x8000 = No error 0x6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
MelcoBEMS MINI (A1M+) Firmware Version [**READ ONLY**]	10	40011	MelcoBEMS MINI (A1M+) firmware version
Modbus Comms Counter [**READ ONLY**]	11	40012	Value of a counter which increments upon every valid Modbus command received. Value is automatically reset to zero when value exceeds 65535.
Fault Code (decimal) [**READ ONLY**]	12	40013	8000 = No error 6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
System Type Detected [**READ ONLY**]	13	40014	0 = ATA 1 = ATW 2 = Lossnay 255 = Undetermined (no unit detected yet)
Deadband Enabled State [**READ ONLY**]	14	40015	0 = Deadband disabled (DIP switch 8 OFF) 1 = Deadband enabled (DIP switch 8 ON)
BMS Room Temperature (signed)	15	40016	Signed temperature value in ºC multiplied by 10. 0xFF9C = -10ºC … 0x01F4 = 50ºC
BMS Room Temperature	16	40017	Temperature value in ºC multiplied by 10. 0 = 0ºC … 500 = 50ºC
BMS Virtual Setpoint	17	40018	Temperature value in ºC multiplied by 10. 100 = 10ºC … 400 = 40ºC
Deadband Heating Setpoint	18	40019	Temperature in ºC (default 19ºC). Value must be at least 2ºC lower than the Deadband Cooling Setpoint.

Holding Registers (Analogue Outputs)			
Register Name	Address	Modicon Address	Details
Deadband Cooling Setpoint	19	40020	Temperature in ºC (default 23ºC). Value must be at least 2ºC higher than the Deadband Heating Setpoint.
BACnet Device Instance (most significant 16 bits)	272	40273	Most significant 16 bits of the 32-bit Device Instance
BACnet Device Instance (least significant 16 bits)	273	40274	Least significant 16 bits of the 32-bit Device Instance
BACnet Max Master	274	40275	Maximum number of masters to search for
BACnet Max Info Frames	275	40276	
BACnet APDU Timeout	276	40277	Timeout value in ms for client requests
BACnet APDU Retries	277	40278	Number of times to retry after timeout

10.2. Input registers

Input Registers are read using function code 04.
Note the values of all Input registers have corresponding Holding registers which can be used instead.

Input Registers (Analogue Inputs)			
Register Name	Address	Modicon Address	Details
Room Temperature	0	30001	Temperature value in °C multiplied by 10. e.g. value 200 = 20°C
Fault Code (hex)	1	30002	0x8000 = No error 0x6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
MelcoBEMS MINI (A1M+) Firmware Version	3	30004	MelcoBEMS MINI (A1M+) firmware version
Modbus Comms Counter	5	30006	Value of a counter which increments upon every valid Modbus command received. Counter is reset to zero when value exceeds 65535.
Fault Code (decimal)	8	30009	8000 = No error 6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
System Type Detected	9	30010	0 = ATA 1 = ATW 2 = Lossnay 255 = Undetermined (no unit detected yet)
Deadband Enabled State	10	30011	0 = Deadband disabled (DIP switch 8 OFF) 1 = Deadband enabled (DIP switch 8 ON)

10.3. Discrete Inputs

There are no Discrete Inputs for Air-To-Air systems.

10.4. Coils

Coils are read using function code 01 and written to using either function code 05 or 15. Function code 05 is used when writing to a single coil register, function code 15 is used for writing to multiple coil registers in the same command.
Note the values of all Coil registers have corresponding Holding registers which can be used instead.

Coils (Digital Outputs)			
Register Name	Address	Modicon Address	Details
Drive On/Off *(Note: Holding register address 7 can also be used to change the Drive)*	0	00001	0 = Drive OFF 1 = Drive ON

11. Modbus tables – Air-To-Water systems

The Modbus register tables for ATW systems has been moved to a separate document.
Please download the latest version of “MelcoBEMS MINI (A1M+ A1M R5) - Modbus Register Tables” from Mitsubishi website.

12. Modbus tables – Lossnay systems

Some BMS controllers can only read Modbus Holding Registers, so the MelcoBEMS MINI (A1M+) also exposes all Discrete, Coil and Input Registers as Holding Registers. The Discrete Input registers and Input registers are not writable so their equivalent Holding Register is read only and marked [**READ ONLY**].

Some BMS controllers may not be able to read signed register values (i.e. values which can be negative in value), so the A1M+ also exposes an unsigned version of those registers (these registers will not return a negative value).

12.1. Holding registers

Holding Registers are read using function code 03 and written to using either function code 06 or 16. Function code 06 is used when writing to a single holding register, function code 16 is used for writing to multiple holding registers in the same command.

Holding Register (Analogue Output)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Modbus Slave ID	4	40005	Values 1 – 247 valid	✓	✓	
Modbus RS-485 Baud Rate	5	40006	0 = 9600 1 = 1200 2 = 2400 3 = 4800 4 = 9600 5 = 14400 6 = 19200 7 = 28800 8 = 38400 9 = 56000 10 = 57600 11 = 115200	✓	✓	
RS-485 Parity Type	6	40007	0 = None 1 = Even 2 = Odd	✓	✓	

Holding Register (Analogue Output)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Fault/Error Code (hex) [**READ ONLY**]	9	40010	0x8000 = No error 0x6999 = Bad communication with unit (Refer to indoor unit documentation for description of other fault code values)	✓	✓	
MelcoBEMS MINI (A1M+) Firmware Version [**READ ONLY**]	10	40011	MelcoBEMS MINI (A1M+) Firmware Version	✓	✓	
Modbus Comms Counter [**READ ONLY**]	11	40012	Value of a counter which increments upon every valid Modbus command received. Counter is reset to zero when value exceeds 65535.	✓	✓	
System Type Detected [**READ ONLY**]	13	40014	0 = ATA unit connected 1 = ATW system connected 2 = Lossnay system connected 255 = Undetermined (no unit detected yet)	✓	✓	
Power On/Off	300	40301	0 = Power OFF 1 = Power ON	✓	✓	
Operating Mode	301	40302	1 = Heat 3 = Cool 7 = Fan 8 = Auto			
Ventilation Mode	302	40303	0 = Lossnay mode 1 = Bypass mode 2 = Auto mode	✓	✓	
Fan Speed A	303	40304	0 = Auto 1 = Speed 1 2 = Speed 2 3 = Speed 3 4 = Speed 4	✓#2	✓#2	
Temperature Setpoint A	304	40305	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Supply Air Temperature [**READ ONLY**]	305	40306	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Supply Air Temperature Sensor' value = 1 (Equipped).			

Holding Register (Analogue Output)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Outdoor Temperature (signed) [**READ ONLY**]	306	40307	Temperature value in ºC multiplied by 10. (see note *) Note: Only available when 'Outdoor Temperature Sensor' value = 1 (Equipped).	✓	✓	
Outdoor Temperature **[READ ONLY]**	307	40308	Temperature value in ºC multiplied by 10. (see note **) Note: Only available when 'Outdoor Temperature Sensor' value = 1 (Equipped).	✓	✓	
Room Temperature A [**READ ONLY**]	308	40309	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Return Air Temperature Sensor' value = 1 (Equipped).	✓	✓	
Room CO2 Level [**READ ONLY**]	309	40310	CO2 level divided by 10. 0 = 0ppm … 240 = 2400 and above. [Value 254 = Under detecting] [Value 255 = No sensor] Note: Only available when 'CO2 Level Sensor' value = 1 (Equipped).			
Fault/Error Code (hex) [**READ ONLY**]	310	40311	0x8000 = No error 0x6999 = Bad communication with unit (Refer to Lossnay unit documentation for description of other fault code values)	✓	✓	
Fault/Error Code (decimal) [**READ ONLY**]	311	40312	8000 = No error 6999 = Bad communication with unit (Refer to Lossnay unit documentation for description of other fault code values)	✓	✓	
Thermo On/Off [**READ ONLY**]	312	40313	0 = Thermo OFF 1 = Thermo ON			
Energy Consumption [**READ ONLY**]	313	40314	Value in kWh multiplied by 10. 0 = 0kWh … 65535 = 6553.5kWh	✓	✓	
Actual Operation Mode [**READ ONLY**]	314	40315	0 = Not auto mode 1 = Determining 2 = Heating 3 = Cooling			

Holding Register (Analogue Output)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Auto Fan Speed Control Availability [**READ ONLY**]	315	40316	0 = Not available 1 = Available			
Night Purge [**READ ONLY**]	316	40317	0 = Normal operation 1 = In night purge operation During night-purge operation: - Pressing ON/OFF button starts normal operation. - When pressing the Ventilation button the Lossnay remains in bypass mode	✓	✓	
Maintenance Sign [**READ ONLY**]	317	40318	0 = Inactive 1 = Active	✓	✓	
Filter Sign [**READ ONLY**]	318	40319	0 = Inactive 1 = Active	✓	✓	
Actual Ventilation Mode [**READ ONLY**]	319	40320	0 = Lossnay ventilation 1 = Bypass ventilation	✓	✓	
Actual Supply Fan Speed [**READ ONLY**]	320	40321	0 = Stop 1 = Speed 1 2 = Speed 2 3 = Speed 3 4 = Speed 4	✓	✓	
Actual Extract Fan Speed [**READ ONLY**]	321	40322	0 = Stop 1 = Speed 1 2 = Speed 2 3 = Speed 3 4 = Speed 4	✓	✓	
Setpoint 0.5ºC Increments Availability [**READ ONLY**]	322	40323	0 = Not available 1 = Available			
Heat/Cool or Cool-Only [**READ ONLY**]	323	40324	0 = Heat and Cool 1 = Cool only			
Auto Operation Mode Availability [**READ ONLY**]	324	40325	0 = Not available 1 = Available			
Heat/Cool or Heat-Only [**READ ONLY**]	325	40324	0 = Heat and Cool 1 = Heat only			

Holding Register (Analogue Output)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Minimum Cooling Setpoint [**READ ONLY**]	326	40327	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Maximum Cooling Setpoint [**READ ONLY**]	327	40328	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Minimum Heating Setpoint [**READ ONLY**]	328	40329	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Maximum Heating Setpoint [**READ ONLY**]	329	40330	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Minimum Auto Setpoint [**READ ONLY**]	330	40331	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Maximum Auto Setpoint [**READ ONLY**]	331	40332	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Energy Consumption Data Available [**READ ONLY**]	332	40333	0 = Not available 1 = Available	✓	✓	
Number of Fan Speeds [**READ ONLY**]	333	40334	Values 1 – 4 valid.	✓	✓	
Bypass Damper Available [**READ ONLY**]	334	40335	0 = Not available 1 = Available	✓	✓	

Holding Register (Analogue Output)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Auto Ventilation Mode Available [**READ ONLY**]	335	40336	0 = Not available 1 = Available	✓	✓	
Operation Mode of Temperature Control Unit [**READ ONLY**]	336	40337	0 = Not available (not connected) 1 = Available (connected)			
Set Temperature on Temperature Control Unit [**READ ONLY**]	337	40338	0 = No set temperature display 1 = RA (Return Air) temperature 2 = SA (Supply Air) temperature			
Outdoor Temperature Sensor [**READ ONLY**]	338	40339	0 = Not equipped 1 = Equipped	✓	✓	
Return Air Temperature Sensor [**READ ONLY**]	339	40340	0 = Not equipped 1 = Equipped	✓	✓	
Supply Air Temperature Sensor [**READ ONLY**]	340	40341	0 = Not equipped 1 = Equipped			
CO2 Level Sensor [**READ ONLY**]	341	40342	0 = Not equipped 1 = Equipped			

* Temperature in ºC multiplied by 10.
0xFDD0 = -56.0ºC
0xFDD5 = -55.5 ºC
…
0xFFFB = -0.5ºC
0x0000 = 0.0ºC
0x0005 = 0.5 ºC
…
0x0271 = 62.5ºC
0x0276 = 63.0ºC

[0x7FFE = Under detecting]
[0x7FFF = No thermistor connected]

** Temperature in ºC multiplied by 10.
0x0000 = 0.0ºC
0x0005 = 5.0ºC
…
0x0271 = 62.5ºC
0x0276 = 63.0ºC

[0x7FFE = Under detecting]
[0x7FFF = No thermistor connected]

[#1] Lossnay ventilation mode supported only, Bypass and Auto modes not supported.
[#2] Auto fan speed (value 0) not supported.

12.2. Input registers

Input Registers are read using function code 04.

Input Register (Analogue Input)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
MelcoBEMS MINI (A1M+) Firmware Version	3	30004	MelcoBEMS MINI (A1M+) Firmware Version	✓	✓	
Modbus Comms Counter	5	30006	Value of a counter which increments upon every valid Modbus command received. Value will automatically reset to zero when value exceeds 65535.	✓	✓	
System Type Detected	9	30010	0 = ATA unit connected 1 = ATW system connected 2 = Lossnay system connected 255 = Undetermined (no unit detected yet)	✓	✓	
Supply Air Temperature	174	30175	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Supply Air Temperature Sensor' value = 1 (Equipped).			
Outdoor Temperature (signed)	175	30176	Temperature value in ºC multiplied by 10. (see note *) Note: Only available when 'Outdoor Temperature Sensor' value = 1 (Equipped).	✓	✓	
Outdoor Temperature	176	30177	Temperature value in ºC multiplied by 10. (see note **) Note: Only available when 'Outdoor Temperature Sensor' value = 1 (Equipped).	✓	✓	
Room Temperature A	177	30178	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Return Air Temperature Sensor' value = 1 (Equipped).	✓	✓	

Input Register (Analogue Input)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Room CO2 Level	178	30179	CO2 level divided by 10. 0 = 0ppm … 240 = 2400 and above. [Value 254 = Under detecting] [Value 255 = No sensor] Note: Only available when 'CO2 Level Sensor' value = 1 (Equipped).			
Fault/Error Code (hex)	179	30180	0x8000 = No error 0x6999 = Bad communication with unit (Refer to Lossnay unit documentation for description of other fault code values)	✓	✓	
Fault/Error Code (decimal)	180	30181	8000 = No error 6999 = Bad communication with unit (Refer to Lossnay unit documentation for description of other fault code values)	✓	✓	
Energy Consumption	181	30182	Value in kWh multiplied by 10. 0 = 0kWh … 65535 = 6553.5kWh	✓	✓	
Actual Operation Mode	182	30183	0 = Not auto mode 1 = Determining 2 = Heating 3 = Cooling			
Actual Supply Fan Speed	183	30184	0 = Stop 1 = Speed 1 2 = Speed 2 3 = Speed 3 4 = Speed 4	✓	✓	
Actual Extract Fan Speed	184	30185	0 = Stop 1 = Speed 1 2 = Speed 2 3 = Speed 3 4 = Speed 4	✓	✓	
Minimum Cooling Setpoint	185	30186	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			

Input Register (Analogue Input)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Maximum Cooling Setpoint	186	30187	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Minimum Heating Setpoint	187	30188	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Maximum Heating Setpoint	188	30189	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Minimum Auto Setpoint	189	30190	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Maximum Auto Setpoint	190	30191	Temperature value in ºC multiplied by 10. 0 = 0ºC … 400 = 40ºC Note: Only available when 'Set Temperature on Temperature Control Unit' value = 1 or 2.			
Number of Fan Speeds	191	30192	Values 1 – 4 valid.	✓	✓	
Set Temperature on Temperature Control Unit	192	30193	0 = No set temperature display 1 = RA (Return Air) temperature 2 = SA (Supply Air) temperature			

12.3. Coils

Coils are read using function code 01 and written to using either function code 05 or 15. Function code 05 is used when writing to a single coil register, function code 15 is used for writing to multiple coil registers in the same command.

Coil (Digital Output)				Applicable Unit Type		
Register Name	Addr	Modicon Address	Details	Lossnay LGH Series	Lossnay VL Series	
Power On/Off	3	00004	0 = Power OFF 1 = Power ON	✓	✓	

12.4. Discrete Inputs

Discrete Inputs are read using function code 02.

Discrete Input (Digital Input)				Applicable Unit Type		
Register Name	Addr	Modicon Address	Details	Lossnay LGH Series	Lossnay VL Series	
Thermo On/Off	80	10081	0 = Thermo OFF 1 = Thermo ON			
Auto Fan Speed Control Availability	81	10082	0 = Not available 1 = Available			
Night Purge	82	10083	0 = Normal operation 1 = In night purge operation During night-purge operation:	✓	✓	

Discrete Input (Digital Input)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
			- Pressing ON/OFF button starts normal operation. - When pressing the Ventilation button the Lossnay remains in bypass mode			
Maintenance Sign	83	10084	0 = Inactive 1 = Active	✓	✓	
Filter Sign	84	10085	0 = Inactive 1 = Active	✓	✓	
Actual Ventilation Mode	85	10086	0 = Lossnay ventilation 1 = Bypass ventilation	✓	✓	
Setpoint 0.5ºC Increments Availability	86	10087	0 = Not available 1 = Available			
Heat/Cool or Cool-Only	87	10088	0 = Heat and Cool 1 = Cool only			
Auto Operation Mode Availability	88	10089	0 = Not available 1 = Available			
Heat/Cool or Heat-Only	89	10090	0 = Heat and Cool 1 = Heat only			
Energy Consumption Data Available	90	10091	0 = Not available 1 = Available	✓	✓	
Bypass Damper Available	91	10092	0 = Not available 1 = Available	✓	✓	
Auto Ventilation Mode Available	92	10093	0 = Not available 1 = Available	✓	✓	
Operation Mode of Temperature Control Unit	93	10094	0 = Not available (not connected) 1 = Available (connected)			
Outdoor Temperature Sensor	94	10095	0 = Not equipped 1 = Equipped	✓	✓	
Return Air Temperature Sensor	95	10096	0 = Not equipped 1 = Equipped	✓	✓	

Discrete Input (Digital Input)				Applicable Unit Type		
Register Name	**Addr**	**Modicon Address**	**Details**	**Lossnay LGH Series**	**Lossnay VL Series**	
Supply Air Temperature Sensor	96	10097	0 = Not equipped 1 = Equipped			
CO2 Level Sensor	97	10098	0 = Not equipped 1 = Equipped			

13. Technical specification

Parameter	Min.	Typ.	Max.	Comments
Environmental				
Operating temperature	-20°C		60°C	
Indoor or outdoor use				Indoor
Altitude		< 2000m		
Relative humidity				90% non-condensing
Pollution degree		2		

Appendix A – Compatible Air-To-Air units

Indoor Unit Models

M Series

MSZ-AP15/20VF	(from Feb 2018)
MSZ-AP25/35/42/50VG(K)	(from Jan 2018)
MSZ-LN18/25/35/50/60VGW/V/R/B	
MSZ-WN25/35VA	
MSZ-DM25/35VA	
MSZ-EF18/22/25/35/42/50VE3W/S/B	
MSZ-EF18/22/25/35/42/50VE2W/S/B	
MSZ-EF18/22VEW/S/B	
MSZ-EF25/35/42/50VEB/W/S-E1	
MSZ-FD25/35/50VA	
MSZ-FH25/35/50VE2	
MSZ-FH25/35/50VE	
MSZ-GA60/71VA	
MSZ-GB50VA	
MSZ-GC22/25/35VA	
MSZ-GE22/25/35/42/50/60/71VA	
MSZ-GF60/71VE2	
MSZ-GF60/71VE	
MSZ-SF15/20VA	
MSZ-SF25/35/42/50VE3	
MSZ-SF25/35/42/50VE2	
MSZ-SF25/35/42/50VE	
MFZ-KJ25/35/50VE2	
MFZ-KJ25/35/50VE	
MFZ-KA25/35/50VA	
MLZ-KP25/35/50VA	(from Feb 2018)
MLZ-KA25/35/50VA	

S Series

SEZ-KA35/50/60/71VA	
SEZ-KD25/35/50/60/71VAL	
SEZ-KD25/35/50/60/71VAQ	
SEZ-M25/35/50/60/71DA	(from Mar 2018)
SEZ-M25/35/50/60/71DAL	(from Mar 2018)
SLZ-KF25/35/50/60VA2	
SLZ-KF25/35/50/60VA	
SLZ-M15/25/35/50/60FA	(from Mar 2018)
SLZ-KA25VAL2	
SLZ-KA25/35/50VAL3	
SLZ-KA25/35/50VAQ	
SLZ-KA25/35/50VAQR1	
SLZ-KA25VAQ2	
SLZ-KA25/35/50VAQ3	
SLZ-KA35/50VAL	
SLZ-KA35/50VALR2	
SLZ-KA35/50VALR3	
SLZ-KA35/50VAQR2	

P Series

PCA-M71HA	
PCA-M50/60/71/100/125/140KA	
PCA-RP35/50/60/71/100/125/140KAQ	
PCA-RP35/50/60/71/100/125/140KAQR2	
PCA-RP50/60/71KAQR1	
PEAD-M35/50/60/71/100/125/140JA	
PEAD-RP50/60/71/125/140EA	
PEAD-RP35/100EA2	
PEAD-RP35/50/60/71/100/125/140JA(L)Q	
PEA-RP200/250GAQR2	
PEA-RP200/250WKA	(from Nov 2017)
PEA-ZM200/250WKA	
PKA-RP35/50HAL	
PKA-RP35/50HALR1	
PKA-RP60/71/100KAL	
PKA-RP60/71/100KALR1	
PLA-SM71/100/125/140EA	(from Dec 2017)
PEAD-SM71/100/125/140JA(L)	(from Dec 2017)
PEAD-SP	(all variants from Dec 2017)
PLA-RP35/50/60/71/EA	
PLA-RP100/125/140EA	(from Oct 2017)
PLA-ZP35/50/60/71/100/125/140EA	
PLA-RP100/125/140AA2	
PLA-RP100/125/140BA	
PLA-RP100/125/140BAR2	
PLA-RP125/140BA2	
PLA-RP100BA3	
PLA-RP140BA2R4	
PLA-RP35/50/60/71AA	
PLA-RP35/50/60/71BA	
PLA-RP35/50/60/71BAR1	
PLA-RP35/50/60/71BAR2	
PLA-RP71BA2	
PLA-ZRP100/125/140BA	
PLA-ZRP100/125/140BAR1	
PLA-ZRP35/50/60/71BA	
PLA-ZRP35/50/60/71BAR1	
PSA-RP71/100/125GA	
PSA-RP71KA	
PSA-RP100/125/140KA	(from Oct 2017)
PLA-SM71/100/125/140EA	
PLA-ZM35/50/60/71/100/125/140EA	
PLA-M35/50/60/71/100/125/140EA	
PKA-M35/50HA	
PKA-M60/71KA	
PKA-M100KA	(from Oct 2017)
PKA-M35/50HAL	
PKA-M60/71KAL	
PKA-M100KAL	(from Oct 2017)
PCA-M35/50/60/71KA	
PCA-M100/125/140KA	(from Oct 2017)
PEAD-M35/50/60/71JA	
PEAD-M100/125/140JA	(from Oct 2017)
PEAD-M35/50/60/71JAL	
PEAD-M100/125/140JAL	(from Oct 2017)

Models Not Supported:

MSZ-HJ25/35VA
MSZ-HC25/35VA/VAB
PCA-RP71/125HA/HAQ
PEA-RP400/500GAQ

City Multi

Name	From Production	Firmware Version	Serial Number
PLFY-P**VLMD-E	Oct-14	Ver. 10.23 →	4XW***** →
PFFY-P**VLEM-E	Jan-15	Ver. 10.23 →	41W***** →
PFFY-P**VLRM-E	Jan-15	Ver. 10.23 →	41W***** →
PFFY-P**VLRM M-E	Nov-14	Ver. 10.23 →	4YW***** →
PEFY-P**VMH-E	Jan-15	Ver. 10.23 →	41W***** →
PEFY-P**VMH-E-F	Jan-15	Ver. 10.23 →	41W***** →
PEFY-P**VMR-E-L	Jan-15	Ver. 10.23 →	41W***** →
PEFY-P**VMR-E-R	Jan-15	Ver. 10.23 →	41W***** →
PEFY-P**VMHS-E	Jan-15	Ver. 11.17 →	31W***** →
PEFY-P**VMA-ER3.UK	Mar-15	Ver. 10.23 →	5C***** →
PEFY-P**VMAL-ER3.UK	Mar-15	Ver. 10.23 →	5C***** →
PEFY-P**VMS1-ER2.TH	Dec-14	Ver. 10.23 →	4ZM***** →
PEFY-P**VMS1L-ER1.TH	Dec-14	Ver. 10.23 →	4ZM***** →
PLFY-P**VBM-ER3.UK	Jan-15	Ver. 10.29 →	5A***** →
PLFY-P**VBM-E.UK	From first product		
PLFY-P**VCM-E2R1.TH	Jan-15	Ver. 10.29 →	51M***** →
PLFY-P**VCM-E3.TH	From first product		
PLFY-P**VFM-E.TH	From first product		
PMFY-P**VBM-ER4	Jan-15	Ver. 10.29 →	41A***** →
PKFY-P**VKM-ER1.TH	Jan-15	Ver. 10.29 →	51M***** →
PKFY-P**VHM-ER2	Jan-15	Ver. 10.29 →	41A***** →
PKFY-P**VBM-ER3	Jan-15	Ver. 10.29 →	41A***** →
PCFY-P**VKM-ER1	Jan-15	Ver. 10.29 →	41A***** →
PFFY-P**VKM-E2	Jan-15	Ver. 10.29 →	41A***** →

Hybrid City Multi

Name
PEFY-WP15-50VMS1-E
PEFY-WP10VMS1-E
PEFY-WP20-50VMA-E
PEFY-WP63-125VMA-E
PFFY-WP20-50VLRMM-E
PLFY-WP32-50VBM-E
PKFY-WP10-25(PKFY chassis basis)
PKFY-WP10-32(MSZ-AP chassis basis)
PLFY-WP10-32VFM

Appendix B – Compatible Air-To-Water units

Ecodan FTC4:

Cylinder	Hydrobox	Controller
EHST20C-VM6HB	EHSC-VM6B	PAC-IF052B-E
EHST20C-YM9HB	EHSC-YM9B	PAC-IF051B-E
EHST20C-VM6B	EHSC-VM6EB	
EHST20C-YM9B	EHSC-YM9EB	
EHST20C-VM6EB	EHPX-VM2B	
EHST20C-YM9EB	EHPX-VM6B	
EHST20C-VM6SB	EHPX-YM9B	
EHPT20X-VM2HB	ERSC-VM2B	
EHPT20X-VM6HB	EHSC-VM2B	
EHPT20X-YM9HB	EHSC-TM9B	
EHPT20X-VM6B		
EHPT20X-YM9B		
EHST-20CVM2B		
EHST20C-TM9HB		
EHPT20X-TM9HB		

Ecodan FTC5:

Cylinder	Hydrobox	Controller
EHST20C-VM2C	EHSC-VM2C	PAC-IF062B-E
EHST20C-VM6C	EHSC-VM2EC	
EHST20C-YM9C	EHSC-VM6C	
EHST20C-TM9C	EHSC-VM6EC	
EHST20C-VM2EC	EHSC-YM9C	
EHST20C-VM6EC	EHSC-YM9EC	
EHST20C-YM9EC	EHSC-TM9C	
EHST20C-MEC	EHSC-MEC	
EHST20C-MHCW	EHSD-VM2C	
EHST20D-VM2C	EHSD-MEC	
EHST20D-MEC	ERSC-VM2C	
EHST20D-MHC	ERSC-MEC	
EHST20D-MHCW	ERSD-VM2C	
EHPT20X-VM2C	EHPX-VM2C	
EHPT20X-VM6C	EHPX-YM9C	
EHPT20X-YM9C		
EHPT20X-TM9C		
EHPT20X-MHCW		
EHPT15X-UKHCW*		
EHPT17X-UKHCW*		
EHPT21X-UKHCW*		
EHPT25X-UKHCW*		
EHPT30X-UKHCW*		
EHPT21X-UKHSCW*		
EHPT25X-UKHSCW*		
EHPT30X-UKHSCW*		
EHPT15X-UKHLCW*		
EHPT17X-UKHLCW*		*UK Models

Ecodan FTC6 & FTC7:

Cylinder	Hydrobox	Controller
EHST17D-VM2D	EHSD-MED	PAC-IF071B-E
EHST17D-YM9D	EHSD-VM2D	PAC-IF072B-E
EHST20D-MED	EHSD-VM6D	PAC-IF073B-E
EHST20D-VM2D	EHSD-YM9D	
EHST20D-VM6D	EHSD-YM9ED	
EHST20D-YM9D	EHSD-TM9D	

EHST20D-YM9ED
EHST20D-TM9D
EHST30D-MED
EHST30D-VM6ED
EHST30D-YM9ED
EHST30D-TM9ED

EHST20C-MED
EHST20C-VM2D
EHST20C-VM6D
EHST20C-YM9D
EHST20C-YM9ED
EHST20C-TM9D

EHST30C-MED
EHST30C-VM6ED
EHST30C-YM9ED
EHST30C-TM9ED

ERST17D-VM2D
ERST17D-VM6D
ERST20D-VM2D
ERST20D-VM6D
ERST20D-YM9D
ERST30D-VM2ED

ERST20C-VM2D
ERST20C-VM6D
ERST20C-YM9D
ERST30C-VM2ED
ERST30D-VM6ED
ERST30D-YM9ED

EHPT17X-VM2D
EHPT17X-VM6D
EHPT17X-YM9D
ERPT17X-VM2D
EHPT20X-MED
EHPT20X-VM6D

EHPT20X-YM9D
EHPT20X-YM9ED
EHPT20X-TM9D
EHPT20X-MHEDW
ERPT20X-MD
ERPT20X-VM2D

ERPT20X-VM6D
EHPT30X-MED
EHPT30X-YM9ED
ERPT30X-VM2ED
ERPT30X-VM6ED

Packaged Cylinder
EHPT20X-MHEDW

Pre-Plumbed Cylinder - Slimline
EHPT15X-UKHLDW*
EHPT17X-UKHLDW*

Pre-Plumbed Cylinder - Standard
EHPT15X-UKHDW*
EHPT17X-UKHDW*
EHPT21X-UKHDW*

EHSC-MED
EHSC-VM2D
EHSC-VM6D
EHSC-YM9D
EHSC-YM9ED
EHSC-TM9D

EHSE-YM9ED
EHSE-MED
ERSD-MED
ERSD-VM2D
ERSC-MED
ERSC-VM2D

ERSD-VM6D
ERSD-YM9D
ERSC-VM6D
ERSC-YM9D
ERSE-YM9ED
ERSE-MED

EHPX-MED
EHPX-VM2D
EHPX-VM6D
EHPX-YM9D
EHPX-YM9ED

ERPX-MD
ERPX-VM2D
ERPX-VM6D
ERPX-YM9D

EHPT25X-UKHDW*
EHPT30X-UKHDW*

Pre-Plumbed Cylinder - Solar
EHPT21X-UKHSDW*
EHPT25X-UKHSDW*
EHPT30X-UKHSDW*

*UK Models

Ecodan Ground Source Heat Pump:
CRHV-P600YA-HPB

Ecodan Air Source Heat Pump:
CAHV-P500YB-HPB
CAHV-R450YA-HPB

Hot Water Heat Pump
QAHV-N560YA-HPB

Appendix C – Compatible Lossnay units

LGH Series	VL Vertical Series
LGH-15-200RVX-E1	VL-250-500CZPVU-R-E
LGH-150-250RVXT-E1	VL-250-500CZPVU-L-E

Appendix D – Compatible E-Series Chiller units

Type	Model	Capacities
Cooling Only	EACV-P900YA(L)(-H)(-N)(-BS)	90kW, 180kW, 270kW, 360kW, 450kW, 540kW
	EACV-P1500YB(L)(-N)(-BS)	150kW, 300kW, 450kW, 600kW 750kW, 900kW
	EACV-M1500YCL(-N)(-BS)	150kW, 300kW, 450kW, 600kW 750kW, 900kW
	EACV-P1800YB(L)(-N)(-BS)	180kW, 360kW, 540kW, 720kW, 900kW, 1080kW
	EACV-M1800YCL(-N)(-BS)	180kW, 360kW, 540kW, 720kW, 900kW, 1080kW
	ERCV-M900YA	90kW
	EACV-M1500YC	150kW
	EACV-M1800YC	180kW
Heating/Cooling	EAHV-P900YA(L)(-H)(-N)(-BS)	90kW, 180kW, 270kW, 360kW, 450kW, 540kW
	EAHV-P1500YB(L)(-H)(-N)(-BS)	150kW, 300kW, 450kW, 600kW 750kW, 900kW
	EAHV-M1500YCL(-N)(-BS)	150kW, 300kW, 450kW, 600kW 750kW, 900kW
	EAHV-P1800YB(L)(-H)(-N)(-BS)	180kW, 360kW, 540kW, 720kW, 900kW, 1080kW
	EAHV-M1800YCL(-N)(-BS)	180kW, 360kW, 540kW, 720kW, 900kW, 1080kW
	EAHV-P1500YB	150kW
	EAHV-M1500YC	150kW
	EAHV-P1800YB	180kW
	EAHV-M1800YC	180kW

Please be sure to put the contact address/telephone number on this manual before handing it to the customer.

MITSUBISHI ELECTRIC UK

MITSUBISHI ELECTRIC UK, TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB