AE-M EN 1.00

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Safety instructions

Observe the following instructions to use the product safely and prevent any risk of injury or property damage.

⚠Warning

Noncompliance of instructions could lead to serious injury or death.

Installation

Do not install the product in a place with direct sunlight, moisture, dust, or soot.

- A fire or electric shock may occur.

Do not install the product in a place with heat from an electric heater.

- A fire or electric shock may occur due to overheating.

Install the product in a dry place.

- Otherwise, a product damage or electric shock may occur due to moisture.

Install the product in a place with no electromagnetic interference.

- Otherwise, a product damage or electric shock may occur.

The user should not install or repair the product independently.

- A fire, electric shock, or personal injury may occur.
- If the product has been damaged due to independent installation or repair of the product by the user, free A/S service will not be provided.

Operation

Do not allow liquids such as water, beverages, or chemicals get into the product.

- A fire, electric shock, or product damage may occur.

⚠Caution

Noncompliance of instructions could lead to minor injury or product damage.

Installation

Do not install the power supply cable in a place where people pass by.

- Product damage or physical injury may occur.

Do not install the product near a highly magnetic object such as a magnet, TV, (especially CRT) monitor, or speaker.

- A product failure may occur.

If installing the product outside where the product is completely exposed, it is recommended to install the product together with the enclosure.

Keep the minimum separation distances between the devices when install multiple devices.

- Otherwise, RF performance is affect to the other device, the devices may not operate normally.

Operation

Do not drop the product or apply an impact to the product.

- A product failure may occur.

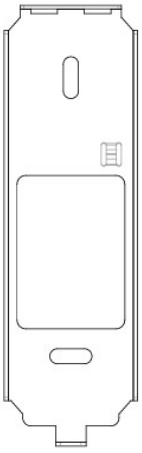
When cleaning the product, wipe the product with a soft and dry cloth and no water, benzene or alcohol.

- Otherwise, a product failure may occur.

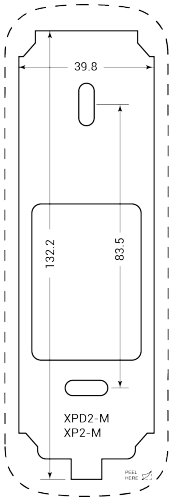
Introduction

Components

AE-M



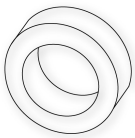
Wall Bracket



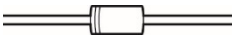
Drilling Template

Wall Fixing Screw x 2

Bracket Fixing Screw (Star Shaped)

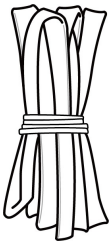


Ferrite Core

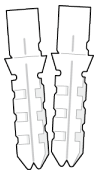


Diode

120 Ω resistor



Shrink Tube



PVC Anchor x 2

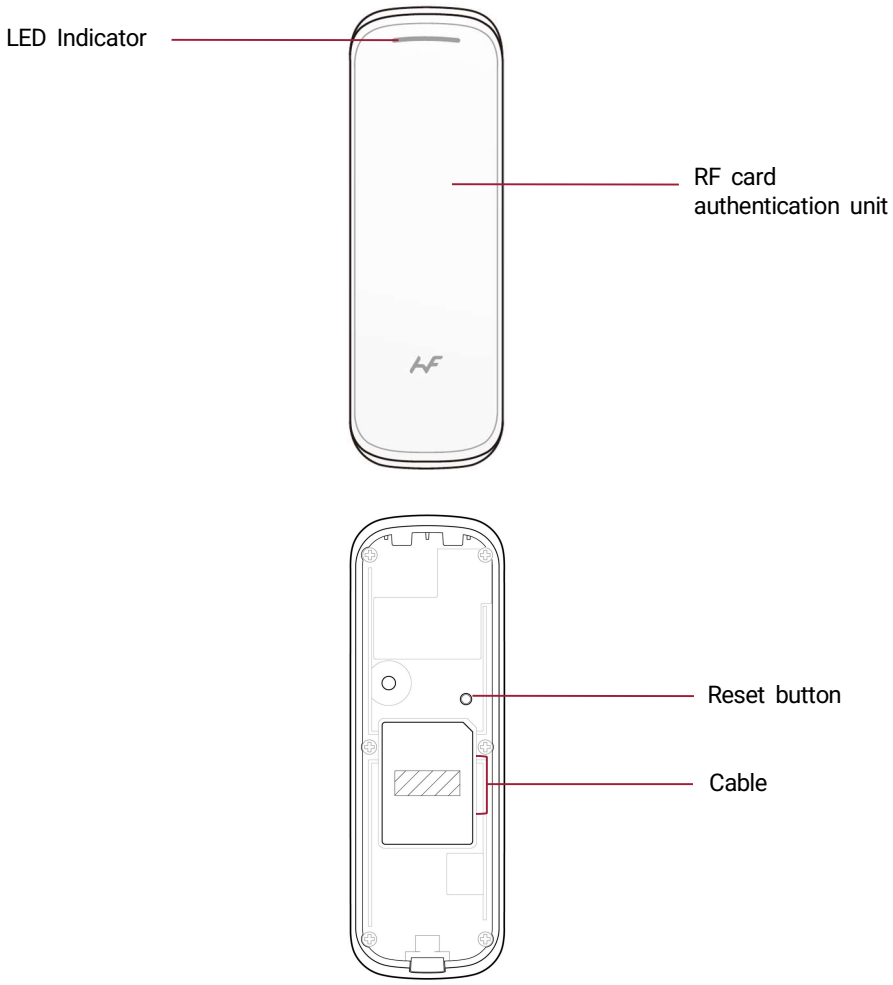
Quick Guide

Open Source Software Guide

NOTE

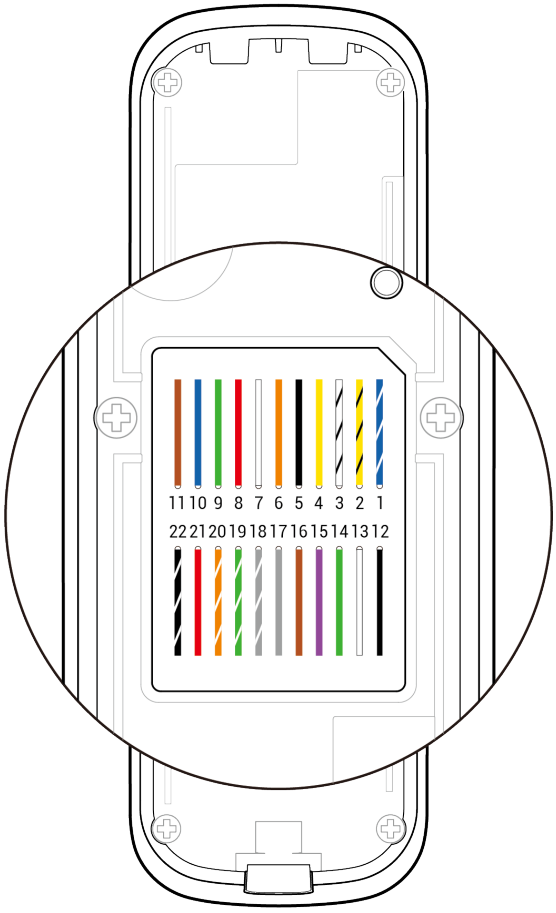
- Components may vary according to the installation environment.

Name and function of each part



Name	Description
LED Indicator	Indicates the operational status of the device with the color of the LED. • Green solid: Authentication success • Red solid: Authentication failure • Blue/Sky blue blinking: Normal operation • Blue/Green blinking: The IP address has not been received properly when using DHCP • Blue/Green blinking: When initializing network settings • Green blinking: Waiting for an input • Green/White blinking: Connecting with the Mobile Credential (BLE) application • White blinking: Connecting with the Device Manager application
RF card authentication unit	Reads RF cards for entering and exiting.
Reset button	Initialize the device.
Cable	• Power cable • RS485 cable • Ethernet cable • Wiegand input/output cable • TTL input cable • Relay cable

Cables and connectors

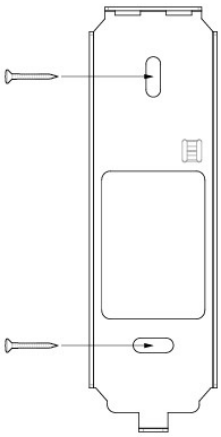


Pin	Name	Color
1	485 TRXP	Blue (White stripe)
2	485 TRXN	Yellow (Black stripe)
3	485 GND	White (Black stripe)
4	ENET RXN	Yellow
5	ENET RXP	Black
6	ENET TXN	Orange
7	ENET TXP	White
8	ENET VB1	Red
9	ENET VB1	Green
10	ENET VB2	Blue
11	ENET VB2	Brown
12	WG GND	Black
13	WG D1	White
14	WG D0	Green
15	TTL IN0	Purple
16	TTL IN1	Brown
17	TTL GND	Gray
18	RLY NO	Gray (White stripe)
19	RLY COM	Green (White stripe)
20	RLY NC	Orange (White stripe)
21	PWR +VDC	Red
22	PWR GND	Black (White stripe)

Installation

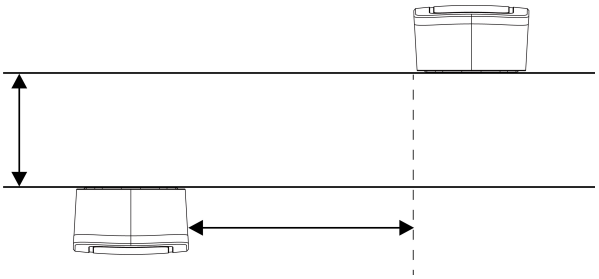
Fixing the bracket and the product

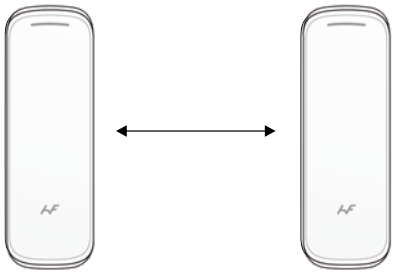
1 Determine the correct position to install the bracket using the provided drilling template. Fix the bracket firmly using fixing screws through the bracket to the position where AE-M will be installed.



NOTE

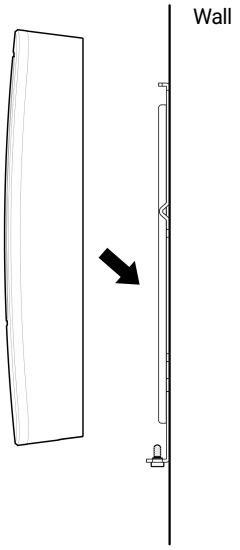
- If installing AE-M on a concrete wall, drill holes, insert PVC anchors, and fix them with fixing screws.
- To avoid RF interference, a minimum separation distance must be maintained.



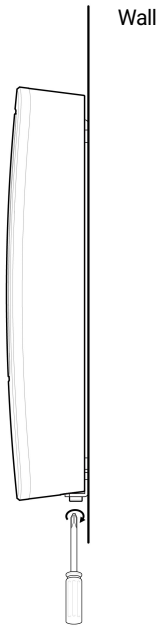


Wall thickness	Distance
100 mm	360 mm
120 mm	360 mm
150 mm	300 mm

2 Install AE-M onto the fixed bracket.



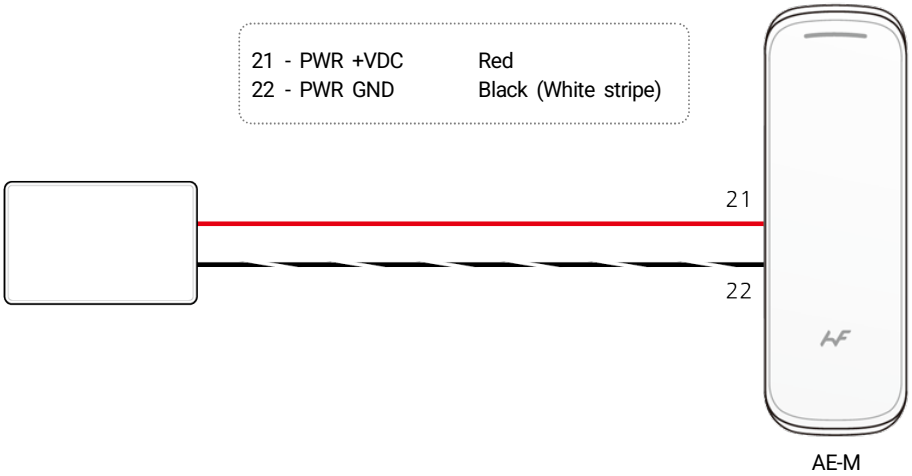
3 Assemble AE-M with the bracket by rotating the product fixing screw.



NOTE

- When assembling the product with the bracket, you can use the included bracket fixing screw(Star Shaped) instead of the product fixing screw for enhanced security.

Power supply connection



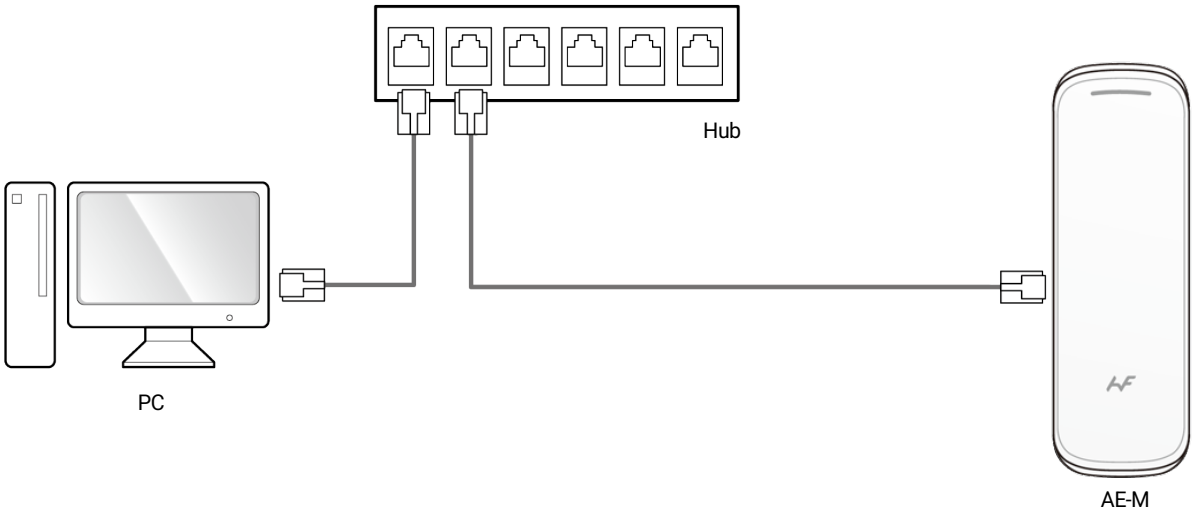
NOTE

- Use a power supply adaptor of DC 12 V (± 10%) with a minimum of 1,000 mA which has obtained the approval of IEC/EN 60950-1. If you wish to connect and use another device to the power supply adaptor, you should use an adaptor with a current capacity which is the same or larger than the total power consumption required for the terminal and another device.
- Use a separate power supply for Secure I/O 2, the electric lock, and the product respectively. If connecting and using the power supply to these devices together, the devices may malfunction.

Network connection

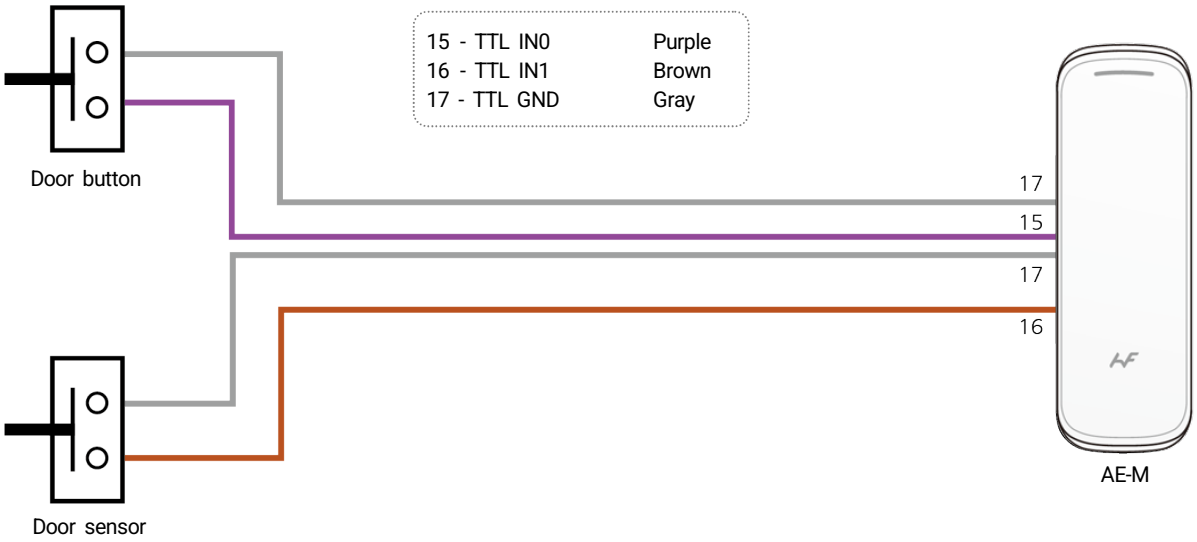
TCP/IP

LAN connection (connecting to a hub)
You can connect the product to a hub using a general type CAT-5e cable.



LAN connection (connecting to a PC directly)
AE-M has an automatic MDI/MDIX function so that it can be connected to a PC directly using a normal straight type CAT-5e cable, not a cross cable.

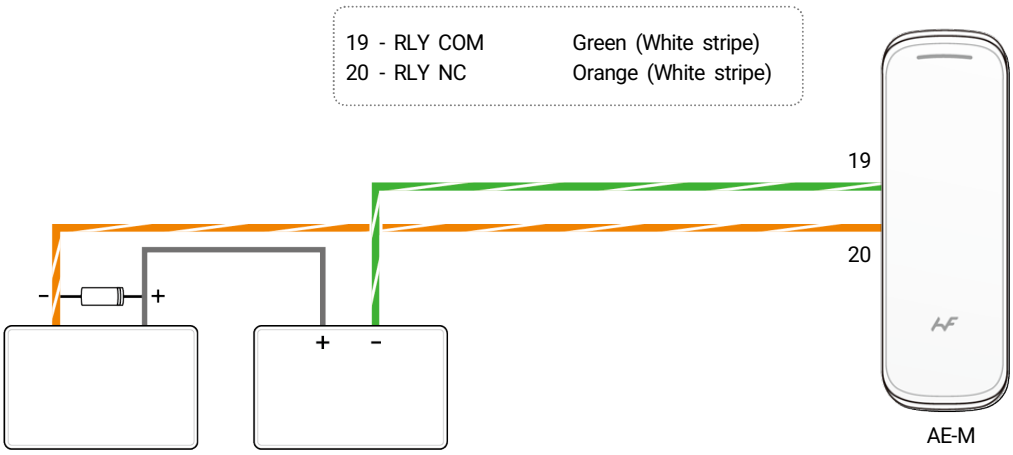
TTL input connection



Relay connection

Fail Safe Lock

In order to use the Fail Safe Lock, connect N/C relay as shown in the figure below. There is normally a current flowing through the relay for the Fail Safe Lock. When the relay is activated, blocking the current flow, the door will open. If the power supply to the product is cut off due to a power failure or an external factor, the door will open.

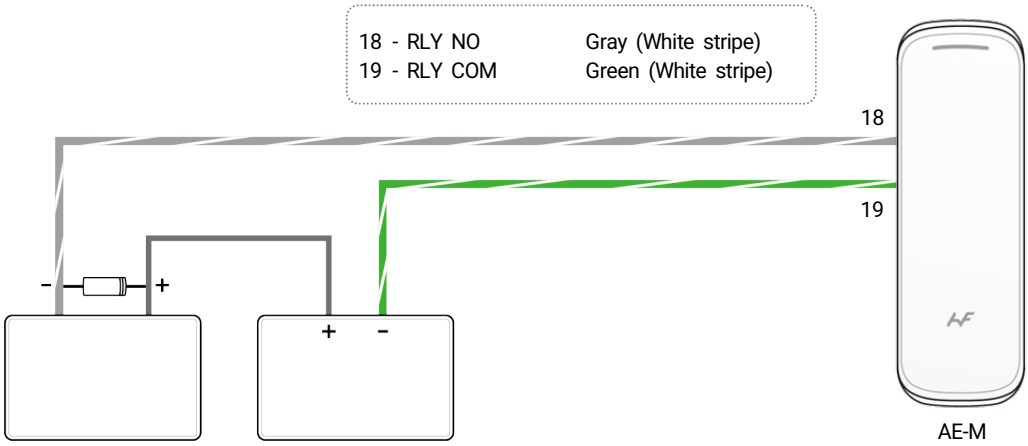


NOTE

- Install a diode at both sides of the door lock wire as shown in the figure to protect the relay from the reverse current, which occurs when the door lock operates.
- Take caution of the installation direction of the diode. Install the diode close to the door lock.
- Use a separate power supply for AE-M and the door lock.

Fail Secure Lock

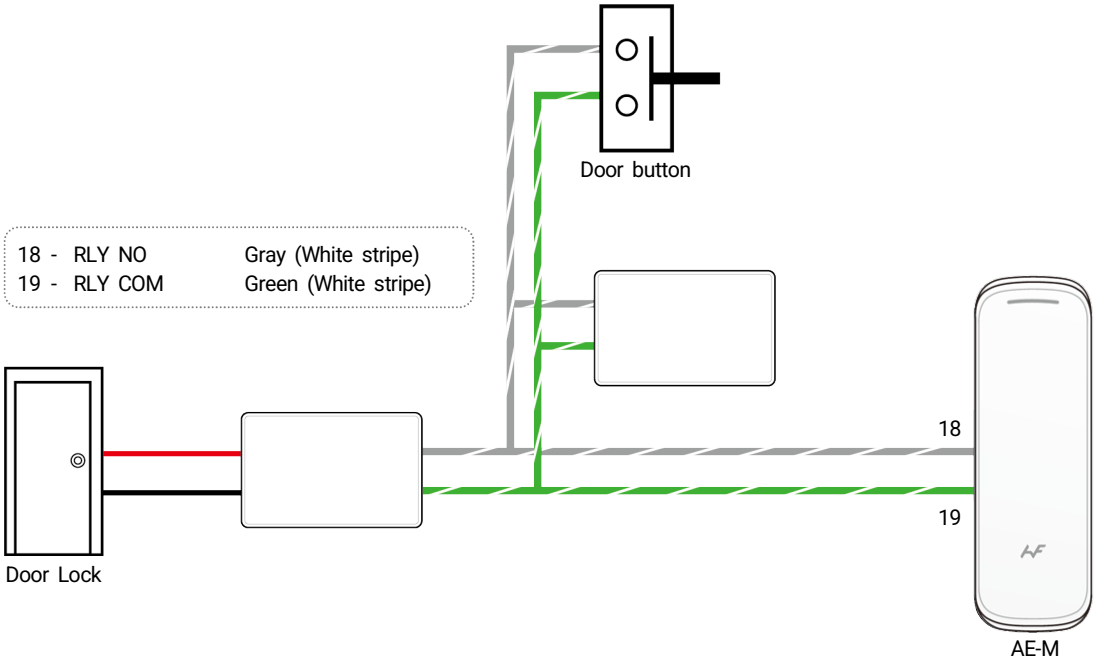
In order to use the Fail Secure Lock, connect N/O relay as shown in the figure below There is normally no current flowing through the relay for the Fail Secure Lock. When the current flow is activated by the relay, the door will open. If the power supply to the product is cut off due to a power failure or an external factor, the door will lock.



NOTE

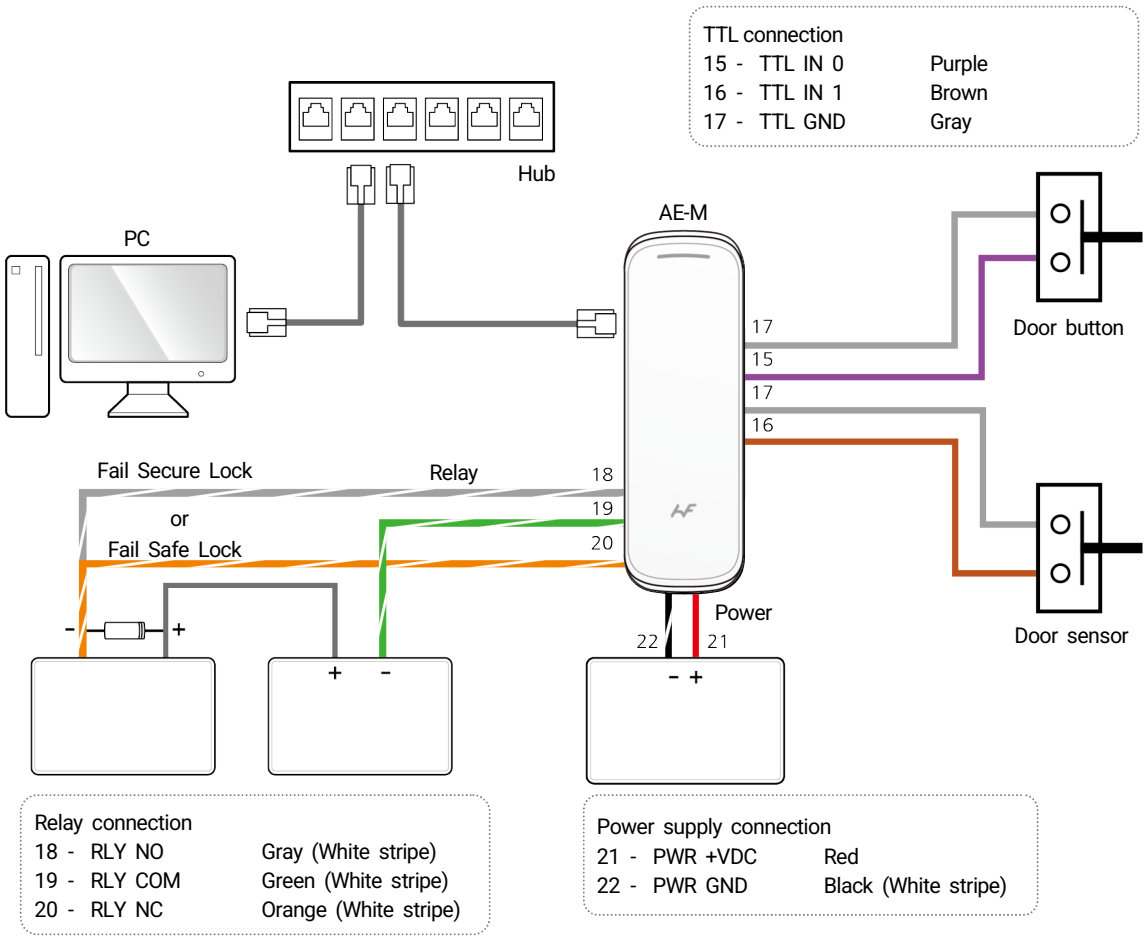
- Install a diode at both sides of the door lock wire as shown in the figure to protect the relay from the reverse current, which occurs when the door lock operates.
- Take caution of the installation direction of the diode. Install the diode close to the door lock.
- Use a separate power supply for AE-M and the door lock.

Automatic door connection



Connecting as a standalone

AE-M can be connected to the door lock, door button, and door sensor directly without connecting a separate I/O device.



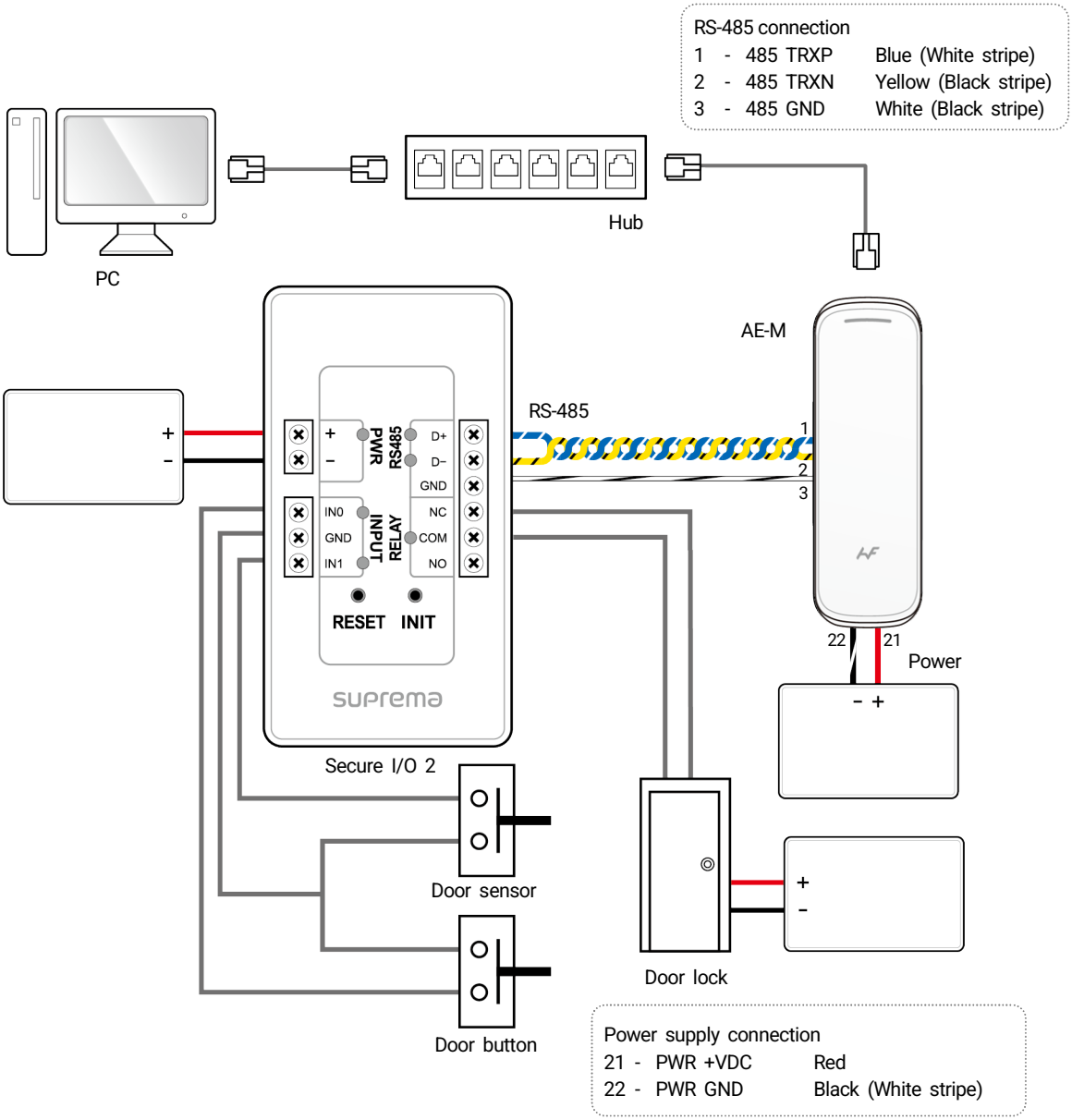
NOTE

- AE-M can be used as a multi-door controller with the slave devices with the RS485 cable. The slave devices are used as dummy readers and authentication is performed in the master device.
- If AE-M is connected as the master device, only card authentication is available on the slave device.
- Up to 31 slave devices can be connected.
- For more information, contact the MOCA System technical support team (mocainc.zendesk.com).

Connecting to Secure I/O 2

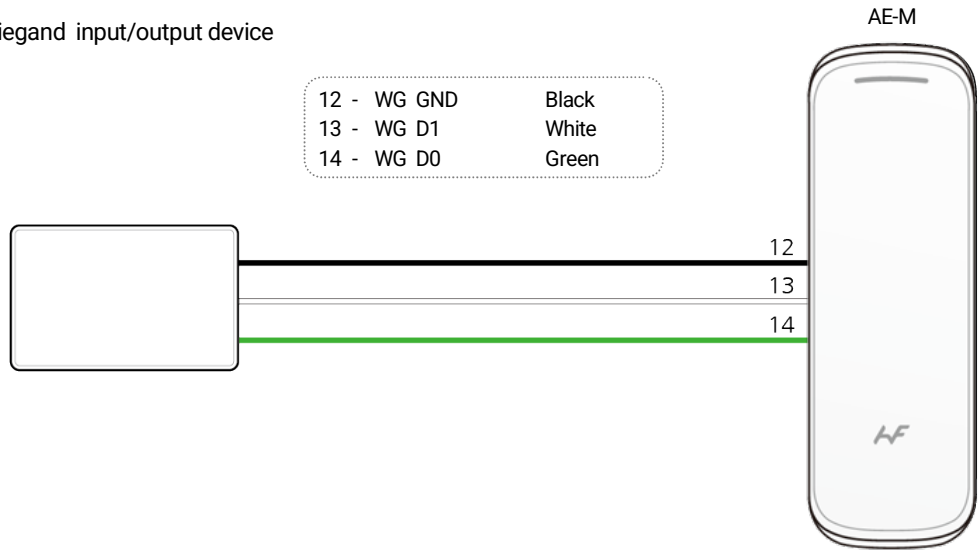
Secure I/O 2 is an I/O device, can be connected to AE-M with the RS-485 cable. Security can be maintained even if the connection between AE-M and Secure I/O 2 has been lost or the power supply to AE-M has been shut off due to external factors.

- Use the RS-485 cable with AWG24, twisted pair, and less than 1.2 km in length.
- If connecting with a RS-485 daisy chain, connect the termination resistor (120 Ω) to both ends of the daisy chain connection. If connected to the middle line, the signal level becomes smaller and the communication performance will deteriorate. Make sure to connect it to both ends of the daisy chain connection.



Wiegand connection

Use as a Wiegand input/output device



Resetting Network Settings

1 Turn the power on.

2 Press and hold the reset button on the rear of device until the device restart automatically.

3 Connect the device with default values.
- TCP/IP address: DHCP address assignment (If DHCP address assignment is failed, 169.254.x.x will be set.)
- Server mode: Disabled
- RS-485: Default, 115200 bps

4 Change the TCP/IP address or RS-485 information.

5 Turn the power off later on and then check the network setting is properly.

Restoring the Factory Defaults

This will delete all data and root certificate on the device and reset the settings.

1 Turn the power on.

2 Press the reset button three times quickly.

3 When the green LED is blinking, press the reset button again.

NOTE
- If there is no root certificate on the device, you cannot restore the factory defaults.

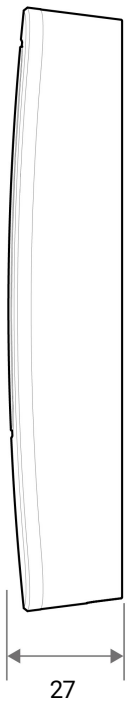
Product specifications

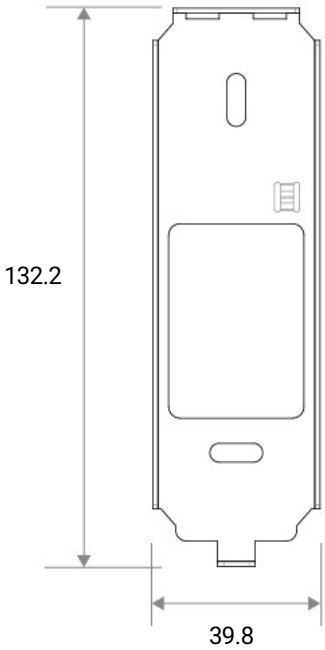
Category	Feature	Specification
		AE-M
Credential	LF card option	EM
	HF card option	MIFARE, MIFARE Plus, DESFire EV1/EV2*, FeliCa
	NFC card	Supported
	BLE card	Supported
	RF read range *	MIFARE/DESFire/EM : 50 mm, FeliCa: 30 mm
General	CPU	1 GHz
	Memory	4 GB Flash + 64 MB RAM
	LED	Multi-color
	Sound	Multi-tone Buzzer
	Operating temperature	-20 °C - 50 °C
	Storage temperature	-40 °C - 70 °C
	Operating humidity	0% - 95 %, non-condensing
	Storage humidity	0% - 95 %, non-condensing
	Dimension (W x H x D)	48 mm x 145 mm x 27 mm
	Weight	Device: 141 g Bracket: 30 g (Including washer and bolt)
	IP rating	IP65, IP67
	IK rating	IK08
	Certificates	CE, FCC, KC, RoHS, REACH, WEEE, SIG, TELEC
Capacity	Max. User	200,000
	Max. Card	200,000
	Max. Text Log	1,000,000
Interface	Wi-Fi	Not supported
	Ethernet	Supported (10/100 Mbps, auto MDI/MDI-X)
	RS-485	1ch Master or Slave (Selectable)
	Wiegand	1ch Input or Output (Selectable)
	TTL input	2ch Input
	Relay	1 Relay
	PoE	Supported (IEEE 802.3af compliant)
	Tamper	Supported
Electrical	Power	Voltage: DC 12 V, Current: Max. 500 mA * Use 12 VDC, 1 A power supply
	Switch input V_{IH}	Min. 3 V Max. 5 V
	Switch input V_{IL}	Max. 1 V
	Switch Pull-up resistance	4.7kΩ (The input ports are pulled up with 4.7kΩ.)
	Wiegand output V_{OH}	Min. 4.8 V
	Wiegand output V_{OL}	Max. 0.2 V
	Wiegand output Pull-up resistance	Internally pulled up with 1 kΩ
	Relay	Voltage: Max. 30 VDC Current: Max. 2 A

* RF read range will vary depending on the installation environment.
* DESFire EV2 cards are supported by having backward compatibility of DESFire EV1 cards. CSN and smart card functions are compatible with AE-M.

Dimensions

(Unit: mm)
* The tolerance is ±0.3mm.





EU Declaration of Conformity (CE)

This product is CE marked according to the provisions of the Radio Equipment Directive (RED) 2014/53/EU. Hereby, MOCA System Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2014/53/EU.

- Bluetooth Transmit Power: 2.1dBm
- Bluetooth Frequency: 2402~2480 MHz
- NFC Frequency: 13.56 MHz
- RFID Frequency: 134.2 kHz

For more information, contact us at the following contact information.
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Tel: +82-31-710-4958 / Email: support@mocainc.com

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- This product uses the "OpenSSL", which is licensed under the OpenSSL and Original SSLeay licenses. As for the OpenSSL and Original SSLeay licenses, please refer to OpenSSL License and Original SSLeay License in this manual.
- To request the modified source code based on Linux Kernel 3.x and the source code of glibc and QT libraries, which are included in this product, please visit at https://mocainc.zendesk.com and contact to MOCA System Tech Team.

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EU Declaration of Conformity (CE)

This product is CE marked according to the provisions of the Radio Equipment Directive (RED) 2014/53/EU. Hereby, Suprema Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2014/53/EU.

The RF distance between body and product is 20cm

This device meet the EU requirements on the limitation of exposure of the general public to electromagnetic fields by way of health protection.

AT	BE	BG	HR	CY	CZ	DK
EE	FI	FR	DE	EL	HU	IE
IT	LV	LT	LU	MT	NL	PL
PT	RO	SK	SI	ES	SE	

Device Information

		Frequency range in MHz		Rated RF power output	Rated RF power output	Modulation technique	Number of channels	Antenna type	Antenna gain
		Low Freq	High Freq	Conducted(W)	Radiated(dBuV/m)				
CE (EIRP)	BLE	2 402	2 480	0.0014	-	GFSK	40	PCB pattern antenna	1.72 dBi
	NFC	134.2	-	-	50.5	ASK	1	Loop antenna	-
	RFID	13.56	-	-	46	ASK	1	Loop antenna	-

		Frequency range in MHz		Rated RF power output	Rated RF power output	Rated RF power output	Modulation technique	Number of channels	Antenna type	Antenna gain
		Low Freq	High Freq	Conducted(W)	Radiated(dBuV/30m)	Radiated(dBuV/300m)				
FCC (Conducted)	BLE	2 402	2 480	0.0009	-	-	GFSK	40	PCB pattern antenna	1.72 dBi
	NFC	134.2	-	-	-	-5.44	ASK	1	Loop antenna	-
	RFID	13.56	-	-	32.38	-	ASK	1	Loop antenna	-

	Channel	Power(dBm)	Max Power(W)	Tolerance(dB)
CE (EIRP)	00	1.47	0.0014	±1
	19	1.12	0.0013	±1
	39	0.72	0.0012	±1
	Channel	Power(dBm)	Max Power(W)	Tolerance(dB)
FCC (Conducted)	00	-0.66	0.0009	±1
	19	-0.86	0.0008	±1
	39	-1.16	0.0008	±1

For more information, contact us at the following contact information.

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FCC Instructions

FCC Compliance Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from which the receiver is connected. • Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

IC Instructions

Industry Canada Statement

This device complies with RSS-247 of the Industry Canada Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Ce dispositif est conforme à la norme CNR-247 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Industry Canada Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non con trôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Warning & Safety Information

Safety Symbols

Warning

- When encountering this symbol in the manual, you must follow these recommendations to avoid irreparable damage to your car, system or connected devices or to avoid accidents with injuries or death.