amnimo

Edge Gateway
User's Manual
for amnimo G series

AG10

AG20

Table of Contents

Licenses and Trademarks

Licenses

- This product uses software under an open source license, such as the GNU General Public License (GPL). Please visit our website for details.
  URL: https://amnimo.com/manual/edge_gw/doc/IM_AMD03A01-12EN_amnimo_GW_series_OSS_license.pdf

- Warranty coverage and responsibilities
  In this product, amnimo does not offer any warranties for the operation of the open source software itself under the terms of the GPL, etc.

Trademarks

- Proper nouns including product or company names, etc. mentioned in this manual are the trademarks or registered trademarks of their respective companies.

Introduction

Thank you for choosing our Edge Gateway amnimo G series (hereinafter referred to as "Edge Gateway").

The amnimo G-Series Edge Gateway User's Manual (hereinafter referred to as "this manual") explains basic instructions for working with the Edge Gateway.

This manual is intended for system integrators or administrators who understand telecommunications terminology and concepts.

Read this manual carefully to use all of the functions of Edge Gateway properly and safely, and fully understand the functions and operations before use.

About Edge Gateway

Model and Suffix Codes

This manual is intended for Edge Gateway of the following model number:

Check with the model name and specification code on the nameplate of Edge Gateway.

Model name/specification code and specification content

Item	Suffix Codes									Description
Type name	AG10									Edge Gateway indoor type
	AG20									Edge gateway outdoor type
		-0								0 (Always 0)
Communication type			1							LTE(Cat4), WCDMA for Japan
			2							LTE(Regional BWA) for Japan
			3							LTE(Cat4),WCDMA,GSM for Europe
			4							LTE(Cat4),WCDMA,GSM for US
Expansion board				0						0 (Always 0)
Destination					JP					Japanese model
Housing type						-1				Indoor type
						-2				Outdoor type
Power supply type							0			10.8 VDC-32.0 VDC (Indoor type)
							1			100 VAC -240 VAC (Outdoor type)
Storage capacity (SSD)								000G		No SSD
								064G		SSD 64 GB[*]
								128G		SSD 128 GB[*]
								256G		SSD 256 GB[*]
								512G		SSD 512 GB[*]
								001T		SSD 1 TB[*]
								002T		SSD 2 TB[*]
								004T		SSD 4 TB[*1*2]
Additional specifications									/VW1	VMS Nx Witness

*1 Please contact our Customer Support.

*2 This option is only available for the outdoor type.

RF Supported Band

		AG10-010	AG10-020	AG10-030	AG10-040
Mobile Network	LTE (FDD)	B1/B3/B8/B18 /B19/B21	B1/B18	B1/B3/B7/B8 /B20	B2/B4/B5/B12
	LTE (TDD)	—	B41	—	—
	W-CDMA	B1/B6/B8/B19 (including HSUPA)	—	B1/B8	B2/B5
	GSM (GPRS)	—	—	GSM900 /DCS1800	GSM850 /PCS1900

RF Output Power

The following table shows the RF output power.

RF Support	Transmit Power (Max)
LTE FDD	23±2.7dBm
LTE TDD	23±2.7dBm
WCDMA	24+1/-3dBm
GSM850/GSM900	33±2dBm
DCS1800/PCS1900	30±2dBm

About This Manual

Notes on This Manual

- The contents of this manual are subject to change without notice.

- Reproduction in whole or in part of this manual is prohibited without permission.

- The information in this manual has been prepared with great care. However, if you have any doubt, questions or find any error, please contact our Customer Support.

  Contact: amnimo Customer Support

  E-mail:

  URL: https://support.amnimo.com/

- Note that for changes to specifications, structure, and used parts where it seems that there are no problems in terms of function or performance, they may not be revised on each occasion.

List of Manuals

- amnimo G Series Edge Gateway User's Manual（this manual）
  https://amnimo.com/manual/edge_gw/en/edge_gw_users_manual.pdf
- amnimo Gateway Series GUI User's Manual
  https://amnimo.com/manual/edge_gw/gui/en/gui_users_manual.pdf
- amnimo Gateway Series CLI User's Manual
  https://amnimo.com/manual/edge_gw/cli/en/cli_users_manual.pdf
- Device Management System Manual
  https://amnimo.com/manual/edge_gw/alpine/dms/en/index.htm
- amnimo G Series Edge Gateway Startup Guide
  https://amnimo.com/manual/edge_gw/sg/en/edge_gw_sg.pdf
- amnimo Gateway Series Developer's Manual
  https://amnimo.com/manual/edge_gw/doc/IM_AMD03A01-51EN_Edge_Gateway_Indoor_amnimo_G_series_Developers_manual.pdf
- License terms for open source software
  https://amnimo.com/manual/edge_gw/doc/IM_AMD03A01-12EN_AG10_OSS_license.pdf
- Installation Guide for the Outdoor Type (Edge Gateway / IoT Router)

  https://amnimo.com/manual/edge_gw/set/en/edge_gw_set.pdf

Icons and Symbols Used in This Manual

The icons and symbols in this manual have the following meanings:

❗	Provides information about features and operations that should be paid special attention.
📝	Provides additional information about features and operations.
➔	Provides reference information in this manual or other documents.

How to View Supported Models

This manual covers multiple models. The following shows icons for supported models.

- If the following icons appear at the beginning of a chapter or section, the models described in the chapter or section are supported.
- If the following icons do not appear at the beginning of a section or subsection, the models shown by the icons of a chapter or section it belongs to are supported.

GW	It shows that Edge Gateway for indoor type is supported.
GW	It shows that Edge Gateway for outdoor type is supported.

Safety and Modification Precautions

For the protection and safety of yourself and Edge Gateway or systems that include Edge Gateway, follow the safety instructions in this manual when handling Edge Gateway.
If you do not follow these instructions, amnimo cannot guarantee safety.

Modification to Edge Gateway without permission is strictly prohibited.

Do not attempt to disassemble Edge Gateway or its accessories.

To Use This Product Safely

The purpose of the precautions described herein is to ensure that Edge Gateway is used safely and properly, and to prevent danger and damage to yourself and other people.

These precautions classify content that is predicted to occur as a result of improper handling into two groups: "Warning" and "Caution". All of the content is important with regard to safety, so make sure that you understand the meaning of the indications before using Edge Gateway.

Warning indications

⚠️ Warning	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury[*1].
⚠️ Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury[*2] or physical damage[*3]. It may also be used to alert against unsafe practices.

[*1] Serious injuries include loss of eyesight, injuries, burns (hot and cold), electric shocks, bone fractures, and poisoning with aftereffects which require hospital admission or long-term outpatient treatment.

[*2] Minor or moderate injury includes injuries, burns and electric shocks which do not require hospital admission or long-term outpatient treatment.

[*3] Physical damage refers to incidental damage to buildings, furniture, livestock, and pets, etc.

In addition, the following marks also describe what should be prohibited or made mandatory:

Marks which indicate what should be prohibited/made mandatory

🚫	"Prohibited" things that should not be done.
❗	"Mandatory" things that must be done.

Use of Edge Gateway Main Unit

Warning	🚫	• Do not disassemble or modify. Doing so may cause fire, electric shock, or personal injury. • Do not put any foreign objects, including metal objects, such as pins and wires into the main unit. Doing so may lead to the abnormal operation and cause personal injury, electric shock, or failure. • Do not let a child use the product alone or use it within the reach of a toddler. Doing so may cause electric shock, personal injury, or burns. • Do not soak or put water on the main unit. Doing so may cause short circuit, electric shock, or fire. • Do not use the product in areas where water may get on it, such as outdoors or in a bathroom. Doing so may cause electric shock or short circuit. • Do not use organic solvents or detergents such as benzine or thinner for cleaning. Doing so may cause discoloration, deformation, or damage. • Use the AC adapter and the DC power cable from the available accessories (separately sold products) and do not use anything other than those with the rated voltage. For model AG01-030GA-10, do not use any other AC adapters than model SA50012RF (M7901YA). Doing so may cause failure, fire, electric shock, etc. • Do not stack the main units while the power is on. The bottom (the side with the nameplate) will become hot, and may cause burns or affect other equipment.
	❗	• In case of a malfunction or failure, disconnect the power cable immediately and stop using it. Continuing to use it as is may cause fire, electric shock, or personal injury.

Caution	❗	• Fix in place and use when using Edge Gateway. Fix it in place using the available accessories (separately sold products) such as fixing metal fittings. This is for stable operation and to avoid impacts caused on the human body.

Precautions about Radio Communications

- Edge Gateway may only be used with destination-capable equipment.

- Since Edge Gateway meets the technical requirements of each country, you may be punished by law if you carry out the following actions:

  - Disassembling or modifying Edge Gateway

  - Peeling off the equipment label

  - Using an antenna other than the specified optional items

- The following areas may reflect radio waves and be unable to facilitate communication:

  - Places where a strong magnetic field, static electricity, or radio interference occurs

  - Inside a room with metal walls (including concrete walls embedded with metal reinforcements), cabinets, etc.

- Do not install or use it in areas where the use of radio equipment is prohibited, such as in airplanes or hospitals.

Emergency & Other Situations Requiring Continuous Connectivity for AG10

This device, like any wireless device, operates using radio signals, which cannot guarantee connection in all conditions. Therefore, you must never rely solely on any wireless device for emergency communications or otherwise use the device in situations where the interruption of data connectivity could lead to death, personal injury, property damage, data loss, or other loss.

Installation Environment for Edge Gateway

- Edge Gateway can be installed both vertically and horizontally. Ambient air flow is not required, but the ambient air temperature specification (-20℃ to 60℃) must be observed. In addition, be careful when handling the bottom part, which can become hot under certain use environments and conditions.

Disclaimer for Edge Gateway

- amnimo shall not offer any warranties with regard to Edge Gateway except as provided in a separate warranty statement.

- We shall not be liable to you or any third party for any damage or consequential damage due to a defect in Edge Gateway which we cannot predict.

Conformance with Standards

The various standards that Edge Gateway meets are described as follows.

Mark	Standards/Region	Description of the mark, etc.
	Telecommunications Business Law/Japan	This mark indicates that a device has obtained a technical standards conformity approval, etc. concerning the Telecommunications Business Law of Japan. In addition, the certification number, T, indicates the unique number of the Telecommunication Business Law, and the certification number, R, indicates the unique number of the Radio Law. Edge Gateway has the design certification of the Telecommunications Business Law, and the installed communication modules have the design certification of the Radio Law.
	CE/EU	The CE marking is a mark that indicates that products sold in the European Economic Area (EEA) are evaluated to meet health, safety and environmental requirements.
	FCC Regulations/US	When selling wireless device models in the United States, it is an obligation to evaluate that the limits established by the government's secure exposure requirements are not exceeded. This logo indicates that it meets these requirements.
	WEEE Directive/EU	A mark that indicates application of the Directive (2012/19/EU), which aims to protect the environment and health by preventing or reducing the adverse effects of the generation and management of waste (WEEE) from electrical and electronic equipment, and improving use efficiency. This mark indicates that the product should not be disposed of as domestic waste.

Telecommunications Business Law/Japan

Edge Gateway (Japanese model) has the following certifications:

Eligible countries	Authentication type	Product form name	Certification number
Japan	Certification of the Telecommunications Business Law	AG10-010JP-10	Certification number T: D200011019
		AG10-020JP-10	Certification number T: D200012019
		AG20-010JP-21	Certification number T: D210073020
	Design certification of the Radio Law *	AG10-010JP-10 AG20-010JP-21	Certification number R: 201-180342
		AG10-020JP-10	Certification number R: 022-190195

* Obtained by the cellular module.

CE Marking/EU

The following product is provided with the CE marking and meets the requirements set forth in the RED (2014/53/EU).

● Model number: AG10-030GA-10-XXXX

● Manufacturer: amnimo. Inc, 2-9-32 Nakacho, Musashino-shi, Tokyo, Japan, 180-8750

● Importer: Grazper Technologies ApS, Frederiksgade 7, 1st floor DK-1265
                         Copenhagen K, Denmark

Hereby, amnimo.Inc declares that the radio equipment type, AG10-030GA-10-XXXX, is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following website:

https://amnimo.com/manual/edge_gw/ce/doc

This product has also passed the following certification standards:

Radio Equipment (RE) Directive(2014/53/EU)

Health and Safety（Article 3.1(a)）

● EN 62311: 2008

● EN 62368-1:2014 + A11: 2017   ※IEC62368-1 (CB Certificate）

EMC（Article 3.1(b)）

● EN 301 489-1 V2.2.3, EN 301 489-19 V2.1.1, EN 301 489-52 V1.1.0(Draft)

● EN 55032:2015+AC:2016 Class A, EN55024: 2010+A1:2015

● EN 61000-3-2:2014, EN 61000-3-3:2013

Radio Spectrum（Article 3. 2）

● EN 301 511 V12.5.1, EN 301 908-1 V13.1.1, EN 301 908-2 V13.1.1, EN 301 908-13 V13.1.1

● EN 300 413 V1.1.1

RoHS Directive (2015/863/EU)

- EN 50581: 2015

To comply with the RF exposure requirements, this equipment must be operated with a minimum of 30 cm separation from the user.

This is a regulatory requirement and applies to all 2G/3G/4G capable devices meeting standard regulatory compliance such as the compliance standards listed above. Do not use any antenna other than specified.

WEEE Directive/EU

This device has been marked in accordance with the European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). AT the end of its useful operating life, dispose of the unit as electronic scrap. Please ask Grazper Technologies ApS, or your authorized dealer about collection points in your area. Within the scope of application of this Directive, amnimo. Inc is responsible for the proper disposal of this device. This directive is only valid in the EU.

FCC Statement/United States

The following product is provided with the FCC logo.

*Contains FCC ID: 2APNR-GM500U1A

- Model number: AG10-040GB-10-XXXX

- Responsible party: U.S. Contact Information;
  YOKOGAWA CORPORATION OF AMERICA
  12530 West Airport Blvd, Sugar Land, Texas 77478, USA
  Phone: 1-281-340-3800, E-mail: support@amnimo.com

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.

(2)   This device must accept any interference received, including interference that may cause undesired operation.

FCC Caution

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

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with the minimum distance of 30cm between the radiator and your body.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

External Antenna for AG10-040

Any optional external antenna used for this transmitter must be installed to provide a separation distance of at least 30 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter. Please consult the health and safety guide of the chosen antenna for specific body separation guidelines as a greater distance of separation may be required for high-gain antennas.

Any external antenna gain must meet RF exposure and maximum radiated output power limits of the applicable rule section. The maximum antenna gain for this device as reported to the FCC is:

● Maximum antenna gain: 3.0dBi

Chap 1   Product Outline of the Edge Gateway

This chapter explains the elements that make up the main unit of Edge Gateway.

1.1   Names and Functions of Edge Gateway's Parts

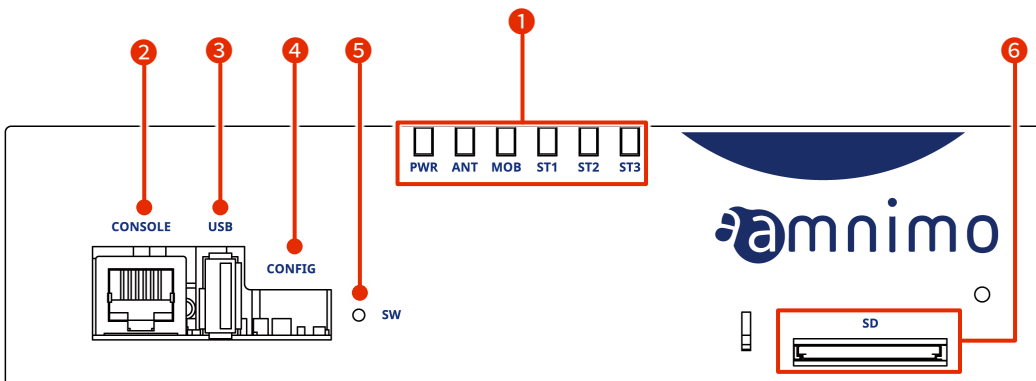This section explains the basic configuration of the front and rear of Edge Gateway.

1.1.1   Indoor-type Edge Gateway

This subsection explains the basic configuration of the main unit of the indoor-type Edge Gateway.

Front

The front configuration (with the SD card lid open) is shown as follows.

No.	Name	Description
❶	LED indicator	PWR: Displays the power status. ANT: Displays the antenna status. MOB: Displays the line connection status of the communication module. ST1, ST2, and ST3: Displays a certain status in combination with other indicators.
❷	Console port	Used to set Edge Gateway.
❸	USB port	Operates as a USB 2.0 host.
❹	DIP switch for setting up	Sets the startup mode for Edge Gateway.
❺	Push switch	Used to shut down Edge Gateway or return to the factory default settings.
❻	SD card slot	Supports SDXC UHS-I cards.

Rear

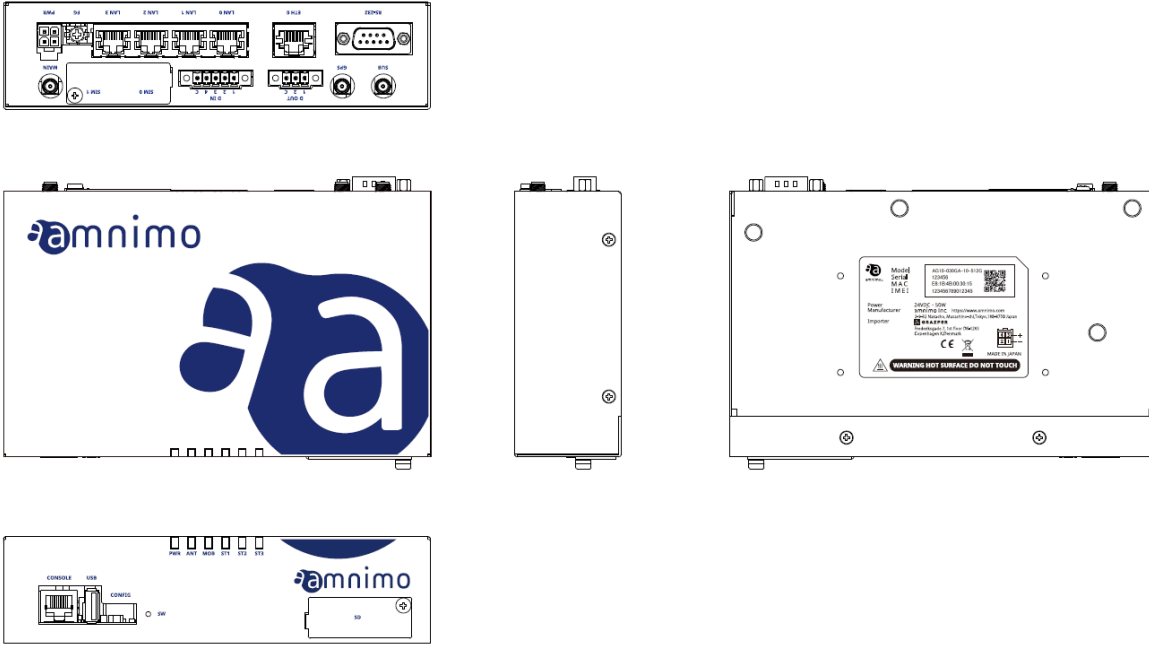The rear configuration of Edge Gateway is shown as follows.
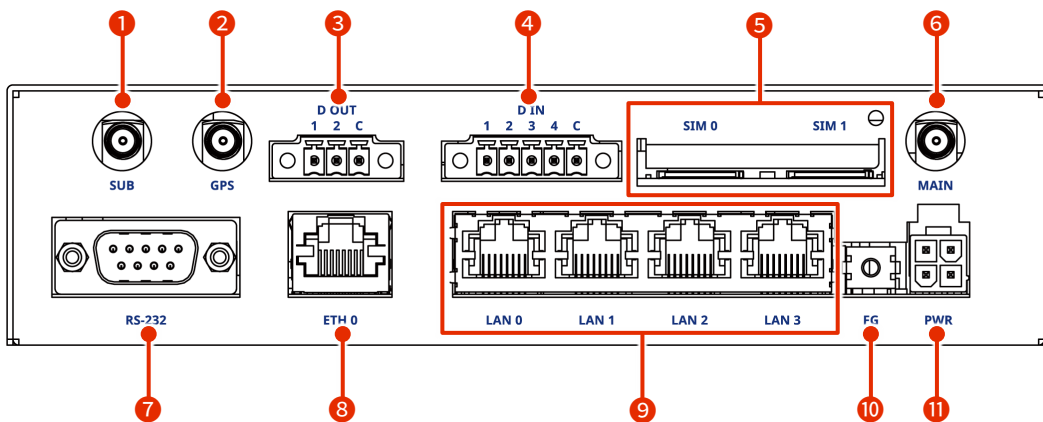
No.	Name	Description
❶	Sub antenna connector	Connect the Cellular(2G/3G/4G) antenna. SMA-J type.
❷	GPS antenna connector	Connect the GNSS antenna. SMA-J type.
❸	D OUT	Isolated digital output terminals for connecting to external devices.
❹	D IN	Isolated digital input terminals for connecting to external devices.
❺	SIM card slot 0, SIM card slot 1	You can insert two SIM cards into the SIM card slots. The priority depends on the setting. SIM 0 is used by default.
❻	Main antenna connector	Connect the Cellular(2G/3G/4G) antenna. SMA-J type.
❼	RS-232 port	Supports a D-Sub 9-pin connector.
❽	ETH0 port	Standard Ethernet port which supports Gigabit Ethernet.
❾	LAN0, LAN1, LAN2, and LAN3 ports (4-port switch)	Standard Ethernet port which supports Gigabit Ethernet. Supports PoE (IEEE802.3at) so that PoE power supply is available.
❿	FG	Connect the frame ground.
⓫	PWR	Connect the dedicated power AC adapter.

Three-view drawing

The three-view drawing is shown as follows.

The nameplate label uses AG10-030GA-10 as an example.
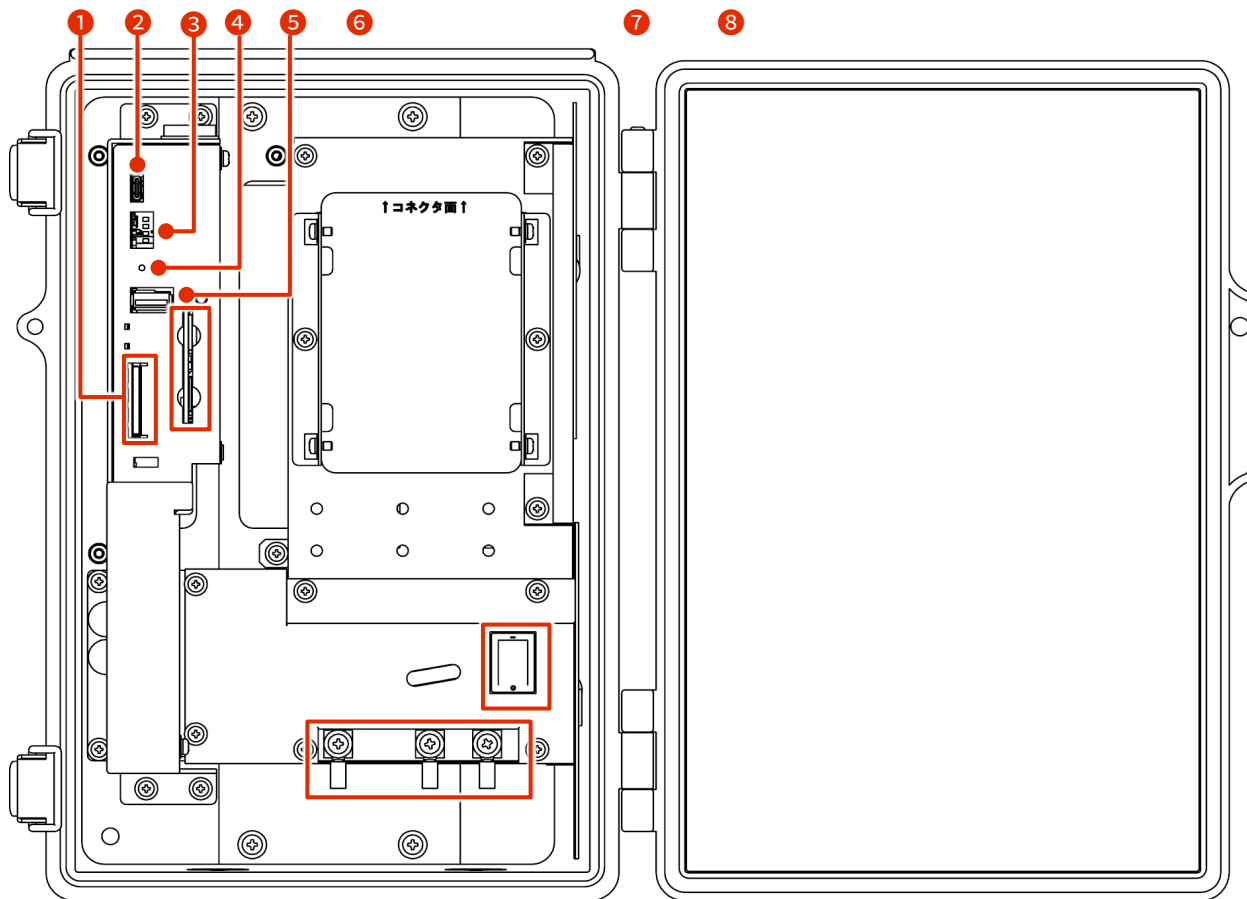
1.1.2   Outdoor-type Edge Gateway

This section explains the basic configuration of the main unit of the outdoor-type Edge Gateway.
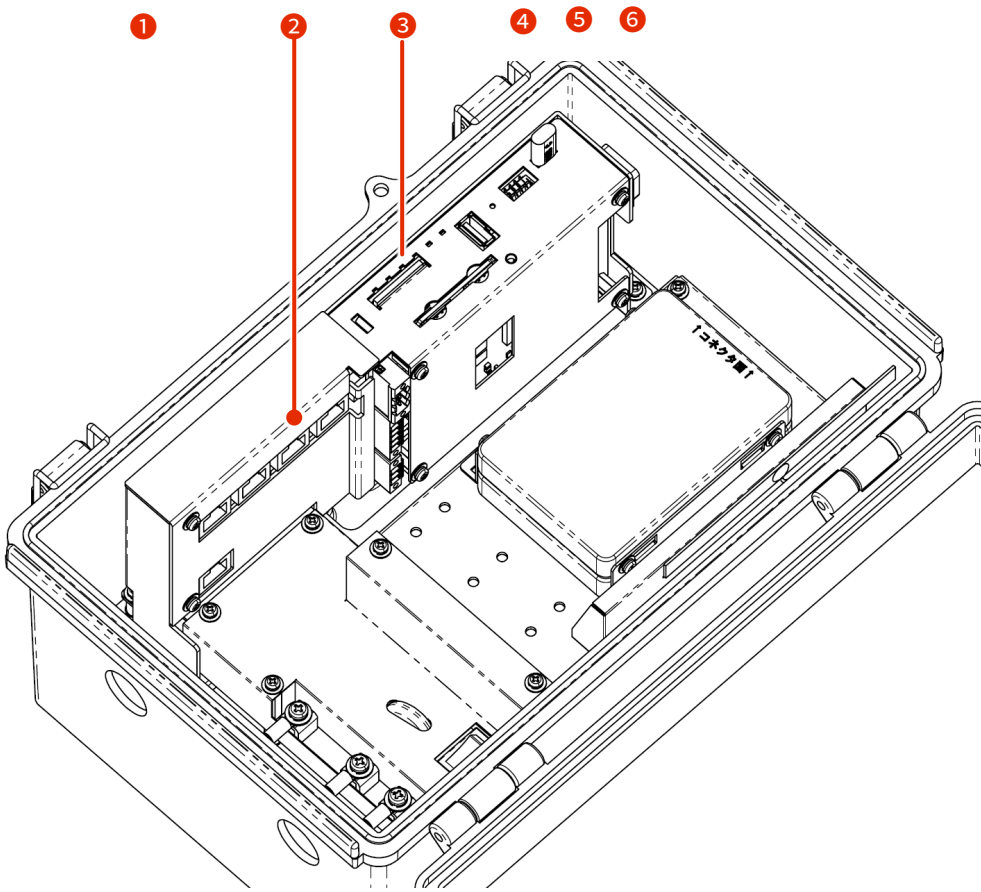
Front (with the lid open)

The front configuration (with the SD card lid open) is shown as follows.

| No.	Name	Description
❶	SD card slot	Supports SDXC UHS-I cards.
❷	Console port	Used to set up Edge Gateway with a serial console. Connect with the USB Type-C connector.
❸	DIP switch for setting up	Sets the startup mode for Edge Gateway.
❹	Push switch	Used to shut down Edge Gateway or return to the factory default settings.
❺	USB port	Operates as a USB 2.0 host.
❻	SIM card slot 0, SIM card slot 1	You can insert two SIM cards into the SIM card slots. The priority depends on the setting. SIM 0 is used by default.
❼	Power switch	Power ON/OFF
❽	AC power input terminal	Starting on the left, FG, L: Live, and N: Neutral. The shape of the screw is M4.

Three-quarter view (with the lid open)

The three-quarter view is shown below.

No.	Name	Description
❶	ETH0 port	Standard Ethernet port which supports Gigabit Ethernet.
❷	LAN0, LAN1, LAN2, and LAN3 ports (4-port switch)	Standard Ethernet port which supports Gigabit Ethernet. Supports PoE (IEEE802.3at) so that PoE power supply is available.
❸	LED indicator	PWR: Displays the power status. ANT: Displays the antenna status. MOB: Displays the line connection status of the communication module. ST1, ST2, and ST3: Displays a certain status in combination with other indicators.
❹	RS485 port	Non-Isolated serial communication terminals for connecting to external devices.
❺	D IN	Isolated digital input terminals for connecting to external devices.
❻	D OUT	Isolated digital output terminals for connecting to external devices.

Three-view drawing

The three-view drawing is shown as follows.
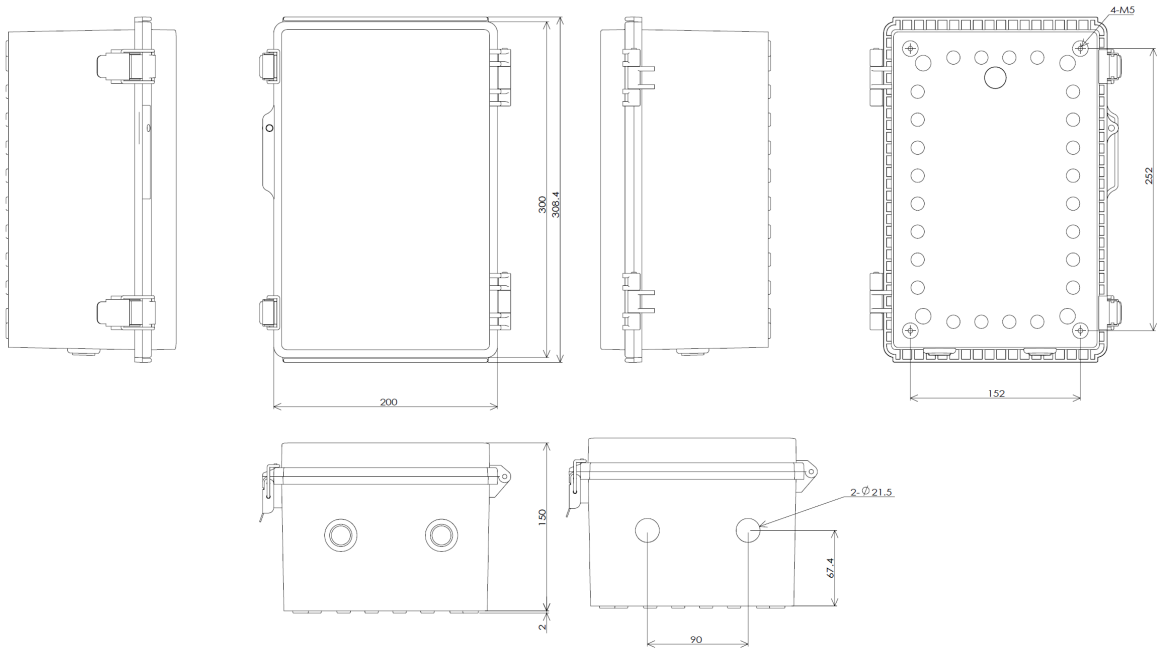
1.2   Interface

This section explains detailed information about each interface installed in Edge Gateway.

1.2.1   LED

This section explains the lighting or flashing patterns of the LED installed on the front of the Edge Gateway.

Description of the LED icons

LED	Description
	Indicates that the red and green LEDs are off.
	Indicates that the red and green LEDs are lit.
	Indicates that the red LED is lit.
	Indicates that the red LED is flashing slowly (500 ms intervals).
	Indicates that the red LED is flashing rapidly (125 ms intervals).
	Indicates that the green LED is lit.
	Indicates that the green LED is flashing slowly (500 ms intervals).
	Indicates that the green LED is flashing rapidly (125 ms intervals).

> The blank columns in the following table indicate that the corresponding LED is not controlled. Any state change between items has no effect.

LED status list

Item	PWR	ANT	MOB	ST1	ST2	ST3	Remarks
Power off	☐						
Power on	🟧	🟧	🟧	🟧	🟧	🟧	
Starting up	🟩	🟩	🟩	🟩	🟩	🟩	Repeated illumination in the order of ANT, MOB, ST1, ST2, ST3 500 ms intervals
Startup problem occurred	🟥						
Power failure occurred	🟥						125 ms intervals
State in which the device can be powered off	🟥						

Item		PWR	ANT	MOB	ST1	ST2	ST3	Remarks
Shutdown is processing		(flashing)						125 ms intervals
Antenna level								
	Normal		(green on)					RSSI (-73 dBm or higher)
	Somewhat normal		(green flashing)					500 ms intervals RSSI (-74 dBm to -83 dBm)
	Medium		(green flashing)					125 ms intervals RSSI (-84 dBm to -93 dBm)
	Somewhat weak		(red flashing)					125 ms intervals RSSI (-94 dBm to -109 dBm)
	Weak		(red flashing)					500 ms intervals RSSI (-110 dBm to -112 dBm)
	Out of range		(red on)					RSSI (-113 dBm or less)
Connection status								
	Not connected			(off)				
	Connection failure			(red on)				
	2G connection			(green flashing)				125 ms intervals
	3G connection			(green flashing)				500 ms intervals
	4G connection			(green on)				
Firmware is being updated		(green on)	(flashing)	(flashing)	(flashing)	(flashing)	(flashing)	ANT, MOB, ST1, ST2 and ST3 flash simultaneously 125 ms intervals
Firmware update complete		(green on)	(green on)	(green on)	(green on)	(green on)	(green on)	
Firmware update failed		(red on)	(red on)	(red on)	(red on)	(red on)	(red on)	

1.2.2   DIP switch

Set the startup mode using the DIP switch for configuration on the front of Edge Gateway.

Description of the DIP switch icons

DIP switch	Description
	ON status
	OFF status

> For the startup mode, the DIP switch No.4 may be either ON or OFF. It is not referred by the boot loader. (used only on the application side.)

● DIP switch settings for Linux startup mode
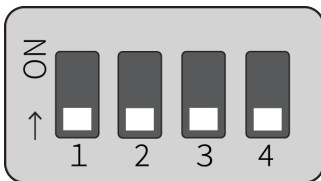
● DIP switch settings for U-Boot command mode
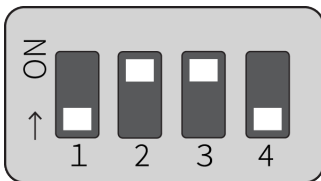
1.2.3　　Push switch

After starting up the OS, press and hold the push switch for three seconds to turn Edge Gateway into the power-off state.

After the power-off state lasts for a specific time, Edge Gateway will be restarted by the Watchdog Timer. By this feature, you can recover Edge Gateway even if you accidentally powered off by a remote command operation (such as poweroff command), instead of going to the site.

> If the DIP switch is set to "U-Boot Command Mode", by pressing and holding the PUSH switch for more than three seconds while starting up Edge Gateway, each setting will be initialized to factory default.
>
> Any configuration files stored on the device will not be initialized. Therefore, if you restart without writing to the configuration file after executing this command, it will start with the configuration set before you initialized the configuration.

1.2.4　　Console port

Indoor-type Edge Gateway

Since the console of the indoor-type Edge Gateway is compatible with a CISCO Console at the RS-232 level, a CISCO console cable can be used.

For pin numbers of the signals assigned to RJ-45 and the available connections to Edge Gateway, refer to the following table.

Pin assignments to RJ-45 and the connections to Edge Gateway

Pin number	Pin assignment	Direction	Connection to Edge Gateway
1	RTS	OUT	×
2	DTR	OUT	×
3	TXD	OUT	○
4	GND	-	○
5	GND	-	○
6	RXD	IN	○
7	DSR	IN	×
8	CTS	IN	×

> **!** If you use a console conversion connector (DB9-RJ45) to connect a LAN cable, use a straight cable of one meter or less in length.

For communication settings of the console port, refer to the table below.

Communication settings of the console port (Indoor-type Edge Gateway)

Item	Details
Speed	115200bps
Data	8bit
Parity	None
Stop bit	1bit
Flow control	None

Outdoor-type Edge Gateway

Since the console of the outdoor-type Edge Gateway is a USB Type-C, a USB Type-C cable can be used.

You may need to install FT230X Basic UART drivers on a PC depending on the PC to which it is connected. Select the driver for your environment at the following site and follow the instructions to install it.
https://ftdichip.com/drivers/d2xx-drivers/

Communication settings of the console port (Outdoor-type Edge Gateway)

Item	Details
Speed	115200bps
Data	8bit
Parity	None
Stop bit	1bit
Flow control	None

1.2.5   RS232 port

For the indoor-type Edge Gateway, RS-232 is supplied with a D-sub 9-pin male and operates as a DTE. It supports hardware flow control and software flow control. The maximum baud rate is up to 230 kbps.

Pin numbers of RS232 port
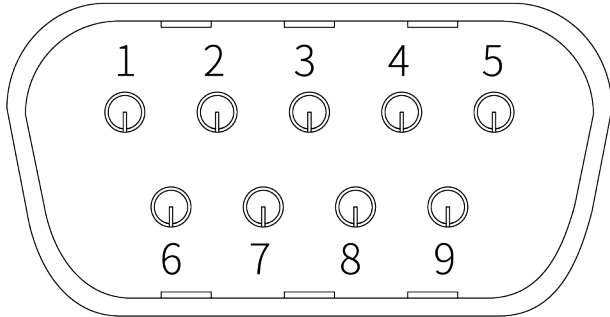
Pin assignments of RS232 port

Pin number	Pin assignment	Direction
1	CD	IN
2	RXD	IN
3	TXD	OUT
4	DTR	OUT
5	GND	-
6	DSR	IN
7	RTS	OUT
8	CTS	IN
9	RI	IN

*Break signal detection is not supported.

Serial communication specification for the RS232 port

Item	Details
Baud rate	1,200 bps, 2,400 bps, 4,800 bps, 9,600 bps, 19,200 bps, 38,400 bps, 57,600 bps, 115,200 bps, 230,400 bps
Data bit	8bit
Parity	Even parity, no parity
Stop bit	1 bit, 2 bit
Flow control	Hardware control, software control, no control

1.2.6   RS485 port

For the outdoor-type Edge Gateway, RS-485 is supplied with a terminal block and the interface is not isolated. Half-duplex communication is possible. Termination resistor (120 Ω) can be enabled or disabled. The maximum baud rate is up to 230 kbps.

Pin numbers of the RS485 port

Pin assignments of the RS485 port

Pin number	Pin assignment
1	TRX+
2	TRX-
3	GND

Serial communication specification for the RS485 port

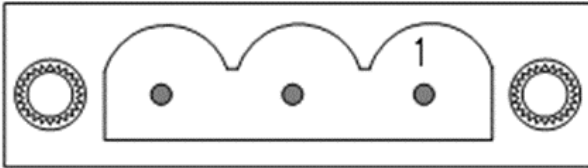| Item	Details
Communication method	Half-duplex communication
Baud rate	1,200 bps, 2,400 bps, 4,800 bps, 9,600 bps, 19,200 bps, 38,400 bps, 57,600 bps, 115,200 bps, 230,400 bps
Data bit	8bit
Parity	Even parity, no parity
Stop bit	1 bit, 2 bit

The connectors are PHOENIX CONTACT connectors for printed circuit boards - 1777086 MSTBV 2,5/ 3-GF-5,08.

1.2.7   D IN/D OUT ports

This subsection explains digital inputs (D IN) and digital outputs (D OUT).

Interface circuits

Edge Gateway has interfaces for digital input (D IN) and digital output (D OUT). Each port can be connected to one connector.

Overview of D IN/D OUT ports

Port	Description
Digital input (D IN)	● When the D IN photo coupler is turned on, more than 1.2 mA at a minimum is required ● As a protective element, a 30 V zener diode is implemented to isolate the internal circuit ● The D IN photo coupler uses bi-directional LEDs
Digital output (D OUT)	● Uses a PhotoMOS relay ● Maximum current drive capability is 100 mA ● Maximum on-resistance value is 2 Ω ● As a protective element, a 30 V zener diode is implemented to isolate the internal circuit **!** For ports that generate surge voltage when turning ON/OFF, surge protection is required.

Circuit schematics of the internal interfaces for digital input and output are shown as follows.

Schematic example of digital input Internal Interface
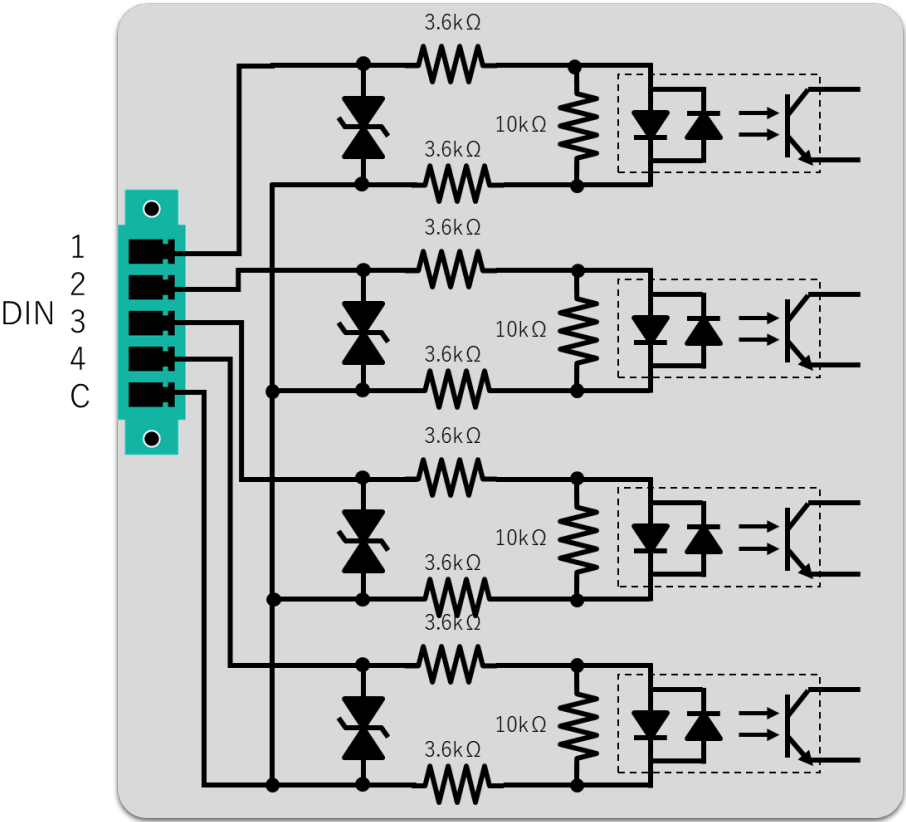
Schematic example of digital output Internal Interface
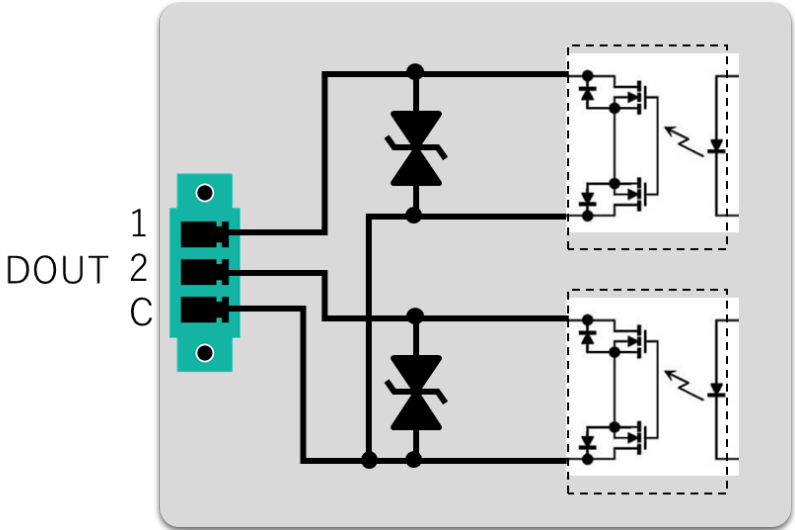
Pin assignment

This subsection explains the pin assignments for the digital inputs (D IN) and digital outputs (D OUT) of Edge Gateway.

Digital input (D IN)

1　2　3　4　C

- Has four isolated digital inputs.
- The input voltage is shared between 12 V and 24 V and accepts both positive and negative voltages.
- The internal impedance is approximately 7.2 kΩ.
- Has a common input.
- The connector has different model numbers for the indoor-type and outdoor-type.

Connector for digital input (D IN)

Installation type	Model number for connector
Indoor type (AG10)	PHOENIX CONTACT / printed circuit board connector : 1827897 MC 1,5 / 5-GF-3,81
Outdoor type (AG20)	PHOENIX CONTACT / printed circuit board connector : 1830622 MCV 1,5 / 5-GF-3,81

Pin assignments for digital inputs (D IN)

Pin number	Pin assignment	Details
1	D IN1	Digital input 1
2	D IN2	Digital input 2
3	D IN3	Digital input 3
4	D IN4	Digital input 4
C	VIN_COM	Digital input Common

Digital output (D OUT)

1   2   C

- Has two isolated digital outputs.
- Up to 100 mA of current can be carried by a PhotoMOS relay. However, Edge Gateway does not provide power.
- The connector has different model numbers for the indoor-type and outdoor-type.

Connector for digital input (D OUT)

Installation type	Model number for connector
Indoor type (AG10)	PHOENIX CONTACT / printed circuit board connector : 1827871 MC 1,5 / 3-GF-3,81
Outdoor type (AG20)	PHOENIX CONTACT / printed circuit board connector : 1830606 MCV 1,5 / 3-GF-3,81

Pin assignments for digital output (D OUT)

Pin number	Pin assignment	Details
1	D OUT1	Digital output 1
2	D OUT2	Digital output 2
C	VIN_COM	Digital output Common

Connection example

Connection examples of digital inputs (D IN) and digital outputs (D OUT) of Edge Gateway are shown as follows.

Connection example of digital inputs

Connection example of digital transistors

12Vor24V
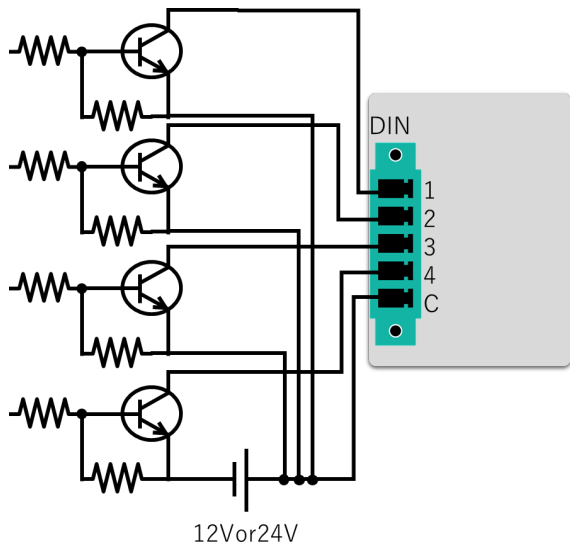
Connection example of volt-free contact switches
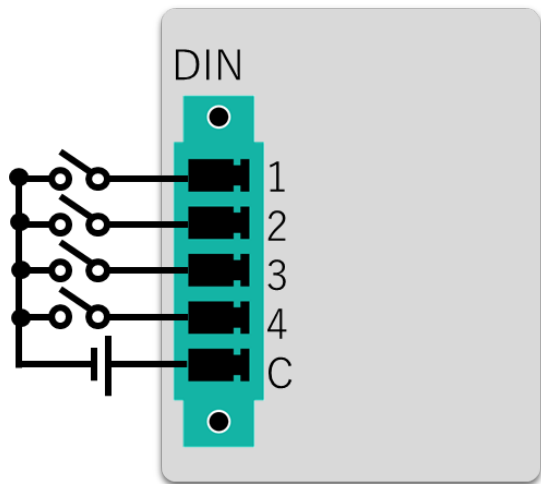
Connection example of the digital outputs

Connection example of LEDs
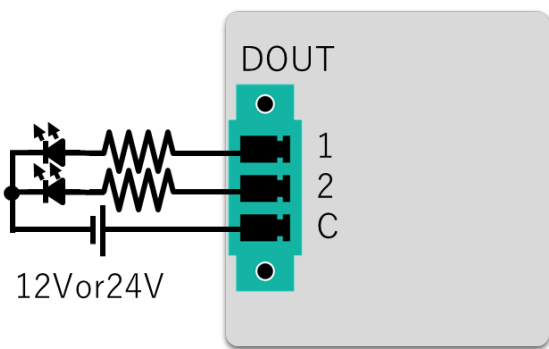
Connection example of relays
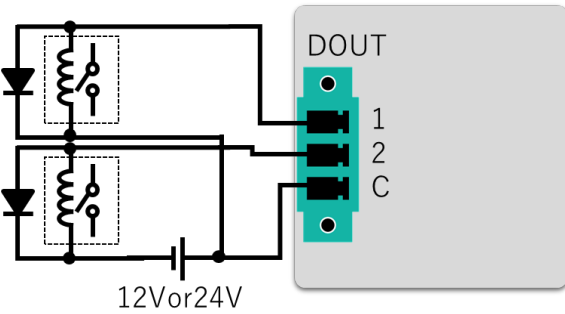
1.2.8   Power connector

This subsection explains power connectors.

Power connector

Pin assignment

Pin number	Pin assignment	Details
1, 2 (top)	+	Positive side of power supply
3, 4 (bottom)	—	Negative side of power supply

* Recommended connector: Molex 5557-04R

1.3   Product Specification of Edge Gateway

This section explains the specifications of Edge Gateway hardware and software.

1.3.1   Hardware specifications

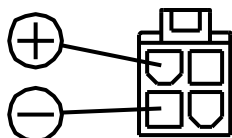| Category	Indoor type (AG10)	Outdoor type (AG20)
CPU	Arm Cortex-A53 1000 MHz (2 cores)	
RAM	2 Gbyte	
NOR-FLASH	4 MByte	
NAND-FLASH	512 MByte	
eMMC	32 Gbyte	
SSD	64 GByte to 2 TByte[*1]	64 GByte to 4 TByte[*1]
Mobile Network [*2]	2G/3G/4G ※2G is not supported in Japan	
Antenna connectors	SMA for 3G/4G x 2, SMA for GPS x 1	(Internal antenna)
GNSS	GPS (QZSS)/GLONASS/Galileo/BeiDou	
PoE power supply	IEEE 802.3at	
Interface		
Ethernet	Gigabit Ethernet 5 ports (of which 4 ports have switch with PoE power supply functions)	
Console	RJ45	USB Type-C
RS-232	DB9	-
RS-485	-	Dedicated terminal block
SD card	1 slot (SDXC)	
SIM slot	Micro SIM (3FF) x 2 slots, eSIM x 2[*3]	
USB	USB2.0 Host 1 port, Type-A	
DI DO	Digital-in Photo coupler 4ch Digital-out PhotoMOS relay 2ch Terminal block (2-piece screw type)	
Switch	● Push switch x 1 (for shutdown and factory default settings) ● DIP switch x 4 (for settings)	● Push switch x 1 (for shutdown and factory default settings) ● DIP switch x 4 (for settings) ● Rocker switch x 1 (for power supply)
LED	Two-color LEDs (PWR, ANT, MOB, ST1, ST2, and ST3)	
Size	177 (W) x 110 (D) x 44 (H) mm (excluding protruding sections)	200 (W) x 151.5 (D) x 300 (H) mm (excluding protruding sections)
Case	-	Openable waterproof and dustproof PC plastic enclosures
Dustproof and waterproof	-	IP65
Weight	Approximately 820 g	Approximately 2.8 kg

Category	Indoor type (AG10)	Outdoor type (AG20)
Power specification	Power-supply voltage: 10.8 VDC (12 VDC-10 %) to 32 VDC (24 VDC+20 %) ※AG10-030GA-10 : 24 VDC^{*4} Power consumption: Up to 50 W (internal PoE: 40 W) Absolute maximum rating 60 W	Rated input voltage: 100 VAC to 240 VAC Frequency: 50/60 Hz Rated input power and capacity: 70 W/ 70 to 75 VA
Operating temperature	-20℃ to 60°℃.	
Storage temperature	-20℃ to 70℃.	
Relative humidity	10% to 90% (non-condensing)	10% to 90%

＊1 Please select a capacity of recording medium　(SSD)　at the time of purchase.

＊2 Bandwidth depends on the communication module installed.

＊3 Please contact us if you are considering using eSIM.

＊4 Main unit: DC 10.8 V to 32 V, AC adaptor: AC 100 V to 240 V (input), DC 24 V (output)

1.3.2　Software specifications

Category	Description
Kernel	Linux (4.19)
OS	Ubuntu 18.04 LTS
Basic protocol	ARP/IPv4/UDP/TCP
Connection protocol	IPCP/PPP/PPPoE
Dynamic IP address	DHCP server/client A DHCP server can be set for each interface.
Domain name resolution	DNS relay/client
Routing	Static routing
Address/port conversion	NAT and NAPT (destination)
VPN	IPsec / remote.it (standard installation)
Clock synchronization	NTP/GPS
Security	Packet filters
Operational management	
Setting method	● amsh Dedicated command line interface (CLI) for IoT router ● amnimo GUI Dedicated Graphical User Interface (GUI) for amnimo IoT router Web browser setting
Firmware update	apt (incremental update) / amfirm (full update)
Log management	syslog
Device management system	amnimo DMS (Device Management System)
Development tool chain	● gcc-7 7.5.0-3ubuntu1 to 18.04 ● binutils 2.30-21ubuntu1 to 18.04.4

1.4   Factory Default Settings

This section explains the factory default settings of Edge Gateway.

1.4.1   Network

```
eth0 : dhcpv4
lan0:
lan1:
lan2:
lan3:
br0: 192.168.0.254/24
 - lan0/lan1/lan2/lan3
```

1.4.2   Default account

● ID: admin

● PW: No settings (set at first login)

1.4.3   Default host name

● amnimo

1.4.4   Server settings

● SSH server: Disabled

● DHCP server: Disabled

● DNS server: **Enabled***

● IPsec: Disabled

● NTP server: Disabled

● Syslog server (Local saving):   **Enabled**

● Syslog server (Transfer):   Disabled

● NxWtiness server: **Enabled**

● Device management system server: **Enabled**

● GUI (HTTP server):   **Enabled***

● remote.it: Disabled

* If your Gateway version is V1.1.2 or earlier, the default settings for the DNS server are disabled and there is no GUI function. When updating from V1.1.2 to V1.2.1 or later, DNS is disabled if it is not set, and the GUI is disabled.

The version can be checked by using the CLI or GUI function. For details, refer to the following.

➜   "2.4.1 Displaying the firmware version" in the "CLI User's Manual"
➜   "1.5 Checking Device Information" in the "GUI User's Manual"

1.4.5   PoE settings

All ports are set as follows:

● Power supply: Enabled
● Startup delay time: 0 seconds
● Current limit: auto

1.4.6   Packet Filtering setting

Index number	Port Number	Protocol	Description	Transmission source/destination	Setting	Policy
100	137,138	udp	NetBIOS Name Service NetBIOS Datagram Service	Transmission destination	Transfer	drop
110	137,138	udp	NetBIOS Name Service NetBIOS Datagram Service	Transmission source	Transfer	drop
120	137	tcp	NetBIOS Name Service	Transmission destination	Transfer	drop
130	137	tcp	NetBIOS Name Service	Transmission source	Transfer	drop
140	139	tcp	NetBIOS Session Service	Transmission destination	Transfer	drop
150	139	tcp	NetBIOS Session Service	Transmission source	Transfer	drop
160	445	tcp	Direct Hosting of SMB	Transmission destination	Transfer	drop
170	445	tcp	Direct Hosting of SMB	Transmission source	Transfer	drop

1.5   Verified Environment Compatible with the GUI Function

OS	Browser	Verified version
Windows10 Pro2004 （64bit） Windows10 Pro20H2 （64bit） Windows10 Pro21H1 （64bit）	Google Chrome	94.0.4606.81 (64bit)
	Microsoft Edge	- *
	Firefox	- *
mac OS big Sur 11.2.3	Safari	15.0(16612.1.29.41.4,16612)
	Google Chrome	- *
	Firefox	- *

* Will be supported in future versions.

1.6　Dustproof and Waterproof Performance

The outdoor-type Edge Gateway has an IP65 dustproof and waterproof rating. To maintain dustproof and waterproof status, install equivalent waterproof cable glands and PF pipe connectors and confirm the performance. Refer to the separate "Installation Guide for the Outdoor Type (Edge Gateway / IoT Router)" for details.

Chap 2　Installation and Operation of Edge Gateway

This chapter explains the basic operations such as startup, shut down, and restart of Edge Gateway. It also explains package and firmware updates that are important for Edge Gateway operation.

2.1　Installing Edge Gateway

Prepare Edge Gateway for installation.
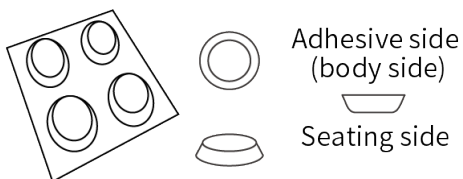
2.1.1　Checking the item contained in the package

Main unit and accessories (Indoor-type Edge Gateway)

The following items are included in the package of the indoor-type Edge Gateway:

● Indoor-type Edge Gateway main unit x 1

● "Before You Use" (IM AMD03A01-11EN) x 1 (A4, folded in half)

● Rubber feet (M7901YH) x 4

Adhesive side (body side)

Seating side
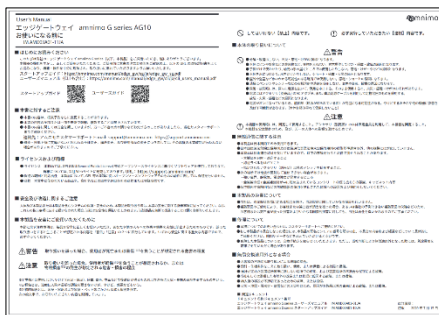
● AC adapter SA50012RF (M7901YA) x 1 (only contained in AG10-030GA-10 package)
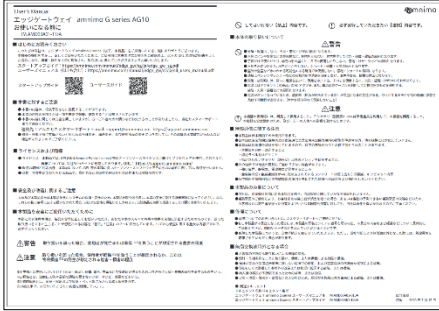
> ⚠ For AG10-030GA-10, DO NOT use any other AC adapters than SA50012RF (M7901YA).

Main unit and accessories (Outdoor-type Edge Gateway)

The following items are included in the package of the outdoor-type Edge Gateway:
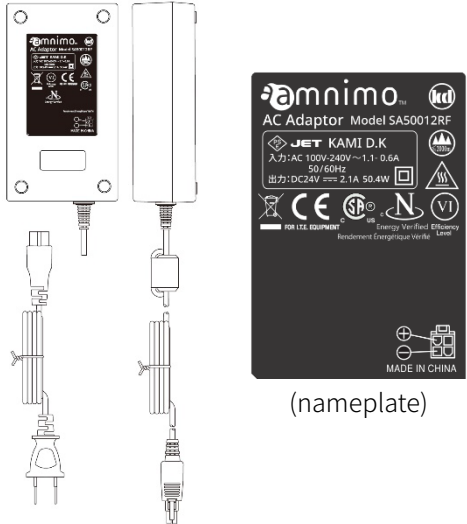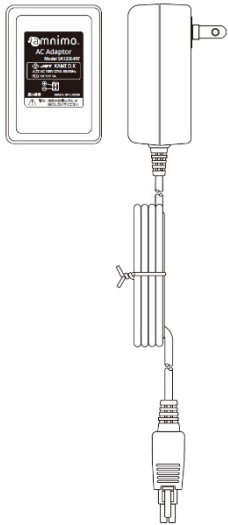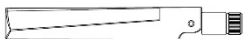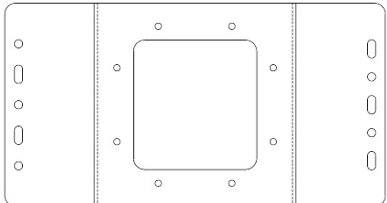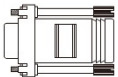
● Outdoor-type Edge Gateway main unit x 1

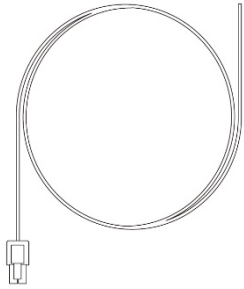● "Before You Use" (IM AMD05A01-11JA) x 1 (A4, folded in half)

● Grommets x 2

● Cable ties x 2

Optional accessories (Indoor-type Edge Gateway)

There are the following optional accessories for the indoor-type Edge Gateway:

Product name	Figure	Part number	Specifications and notes
AC adapter (DC 24 V/2 A)	(nameplate)	M7901YA	DC 24 V/2 A, load: 30 W, environment: 60°C
AC adapter (DC 12 V/1 A)		M7901YC[*1][*2]	DC 12 V/1A, load: 6W, environment: 60°C
Rod antenna		M7901YD	Set of 2 antennas[*3]
External antenna		M7901YE	Cable length: 2.5 m, set of 2 antennas[*3]
GPS antenna		M7901YF	Cable length: 5 m
Main unit fixing metal fittings		M7901YJ	Main unit fixing with screws
Console conversion		M7901YG	RJ-45 - D-Sub 9 pin

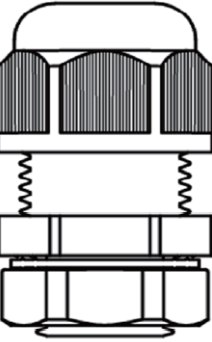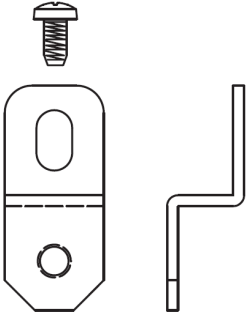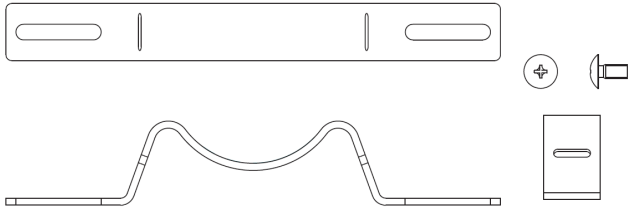| Product name	Figure	Part number	Specifications and notes
Direct current power cable		M7901YK[*1]	Power connector with one end untreated cable
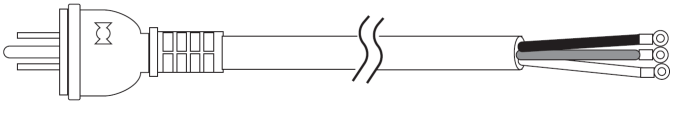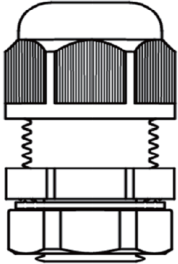
* 1 DO NOT use for AG10-030GA-10.

* 2 MY7901YC is only available in Japan.

* 3 It can be connected to the main connector and sub connector.

> ⚠ **Optional accessories are not covered under Edge Gateway warranty.**

Optional Accessories (Outdoor-type Edge Gateway)

There are the following optional accessories for the outdoor-type Edge Gateway:

Product name	Figure	Part number	Specifications and notes
Rain-proof AC cable		M7901YV	5 m with round crimp terminals. Outer diameter 9.15 mm
cable gland (for Ethernet cables)		M7901YQ	Compatible with wires with a diameter of 6 to 10 mm
cable gland (for power supply only)		M7901YR	Compatible with wires with a diameter of 9 to 14mm
Wall mounting metal fittings		M7901YX	Stainless steel, set of 4
Ball mounting metal fittings		M7901YW	Stainless steel, set of 2
Ball mounting bands		M7901YU	Stainless steel, set of 2

> ⚠ **Optional accessories are not covered under Edge Gateway warranty.**

- BCPK203015S from TAKACHI ELECTRONICS ENCLOSURE CO., LTD is used as an enclosure for the outdoor-type Edge Gateway. You can use genuine options from TAKACHI ELECTRONICS ENCLOSURE CO., LTD compatible with the enclosure.
- For PF pipe connectors, you can use PFS-16BKSR-1 (Waterproof PF pipe connector - IPX5) by Furukawa Electric Co., Ltd., FPK-! 6YPS (Waterproof PF pipe connector - IPX7) by MIRAI INDUSTRY CO.,LTD, and other equivalent products.

2.1.2　Preparing for setup

Prepare the following items as needed:

For indoor-type Edge Gateway

● RJ45 LAN cable (straight cable of one meter or less in length)

● Serial console (PC or equivalent device that has a D-sub 9-pin connector)

> If you use a device that does not have a D-sub 9-pin connector, such as a laptop computer, prepare a USB-serial conversion cable.

● RJ-45/D-sub 9-pin conversion adapter (crossover)

For outdoor-type Edge Gateway

● USB Type-C cable (recommend USB2.0 standard, 2 m or less in length)

● Serial console (PC or equivalent device that has a USB port)

> The shape of the serial console's USB port connector must be compatible with the shape of the Type-C cable's connector to connect to the serial console.

2.2   Connecting Edge Gateway

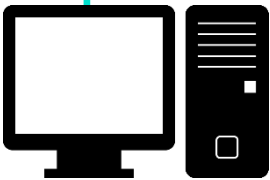The connection diagram for Edge Gateway is shown as follows.
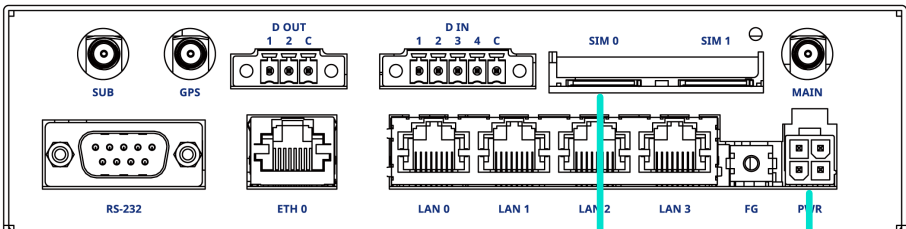
2.2.1   For indoor-type Edge Gateway

Front

Rear
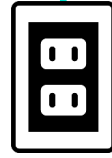
2.2.2   For outdoor-type Edge Gateway

Three-quarter view (with the lid open)

USB cable

Micro SIM card

PC

AC power cable
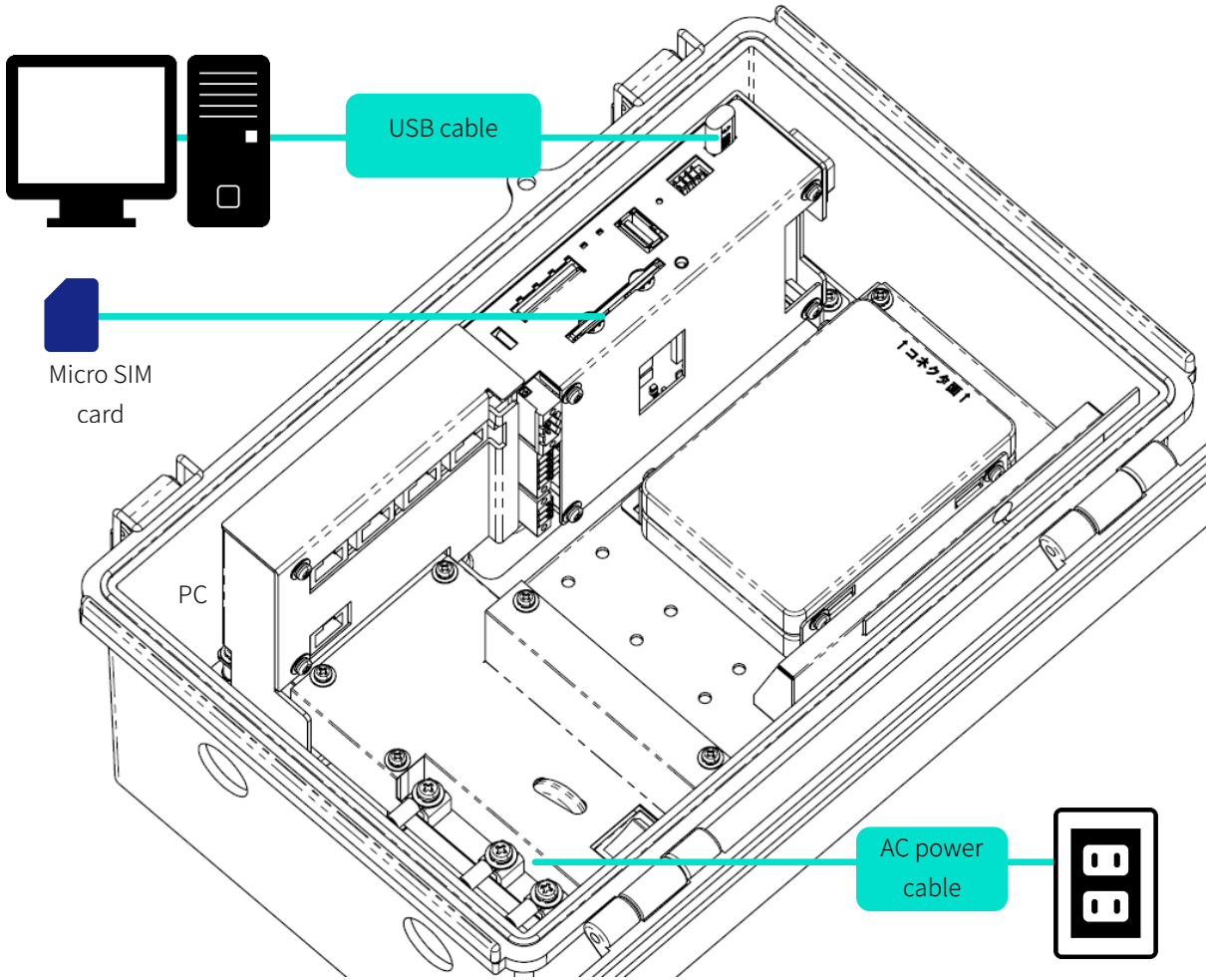
2.3   Starting Up Edge Gateway

The indoor-type Edge Gateway starts automatically when it is connected to power. On the other hand, the outdoor-type Edge Gateway starts when it is connected to power and the power switch is turned on.

Power switch (Outdoor-type Edge Gateway)
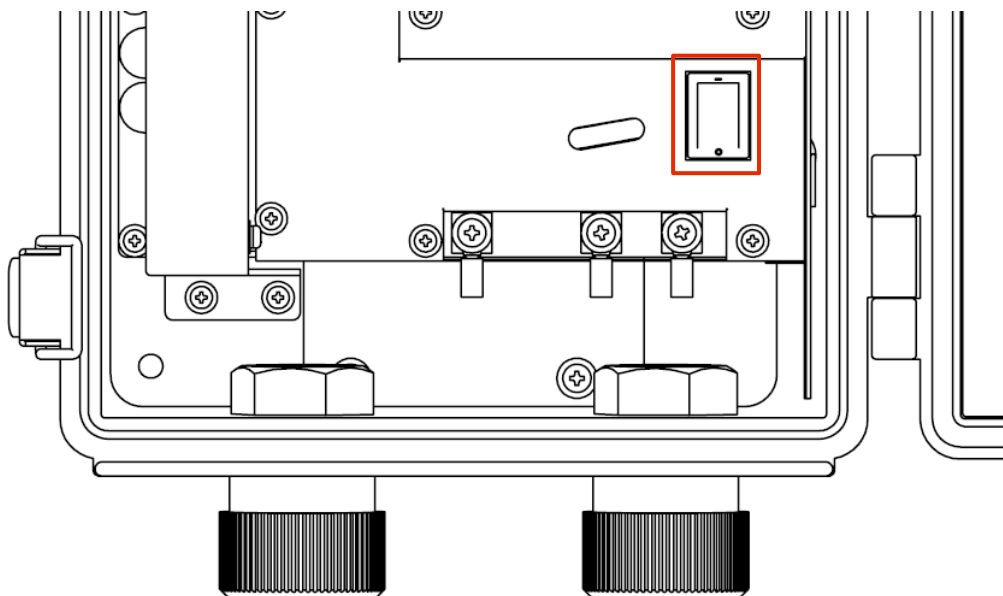
Set the DIP switch to "Linux startup mode" and connect the power as follows:

DIP switch settings (Linux startup mode)
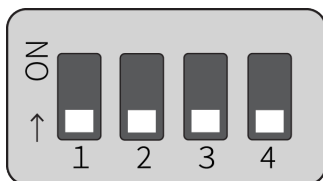
! **Do not perform the following operations during the startup sequence as this may cause a fault:**
- **Power ON/OFF**
- **Inserting or removing a recording medium such as an SD card**
- **Switching DIP switch**

The status of Edge Gateway can be checked through the LEDs on the main unit and the console port.

➔   "1.2.1 LED"

➔   "1.2.4 Console port"

! **About the initial password for the boot loader**
The initial password for starting up Edge Gateway in U-Boot mode is set to "amnimo". Be sure to change this password.

2.4　Shutting Down

There are two ways to shut down: using the push button and using the CLI commands.

> **Precautions regarding the autostart feature**
>
> Since Edge Gateway is intended to operate 24 hours a day, it has the function to automatically recover from a shutdown when a failure occurs, etc.
>
> Therefore, even if you shut down Edge Gateway as explained in this section, it will restart as long as power is supplied from a power connector.
>
> If you want Edge Gateway to be powered down, shut it down and make sure the LED is in a state in which the device can be powered off (the power LED lights up in red), then pull out the power plug.

2.4.1　Shutting down using the push button

Pressing and holding the push button for more than three seconds during startup will put each Edge Gateway service into a shutdown state and the power is turned off.

Push button (Indoor-type Edge Gateway)
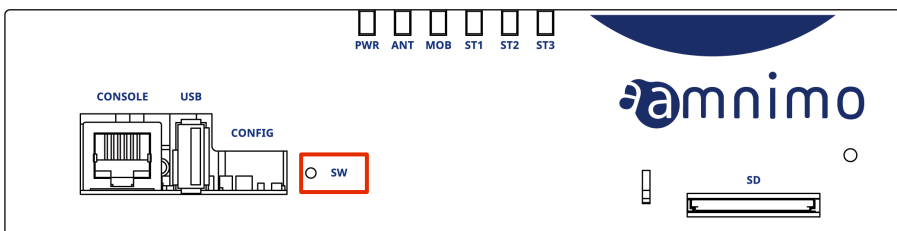
Push button (Indoor-type Edge Gateway)
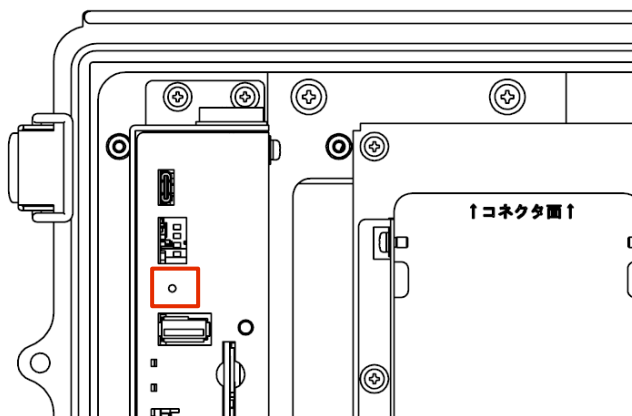
LED display during shutdown process

Item	PWR	ANT	MOB	ST1	ST2	ST3	Remarks
Shutdown Processing	🟢						125 ms intervals
State in which the device can be powered off	🟧						

2.4.2   Shutting down using commands

The power-off command can put Edge Gateway into the shutdown state.

➔   For more information regarding CLI (Command Line Interface) for using commands, refer to "Chapter 1, CLI Basics" in the "CLI User's Manual".

➔   If you want to shut down using the dedicated CLI on Edge Gateway, refer to "2.2 Powering Off This Product" in the "CLI User's Manual".

To execute a shutdown, you must use the sudo command.

Example

An example of a command executing in bash is shown as follows:

```
admin@amnimo:~$ sudo systemctl poweroff ↵
 [sudo] password for admin:        ←Enter the password for the login account and press the [ Enter ] key
        Stopping Session 1 of user admin.
        Stopping Unpack initramfs on shutdown...
[  OK  ] Stopped target Timers.
(Omitted)
[  OK  ] Reached target Shutdown.
[  OK  ] Reached Final Step.
        Starting Power-Off
NOTICE: You can turn off the power.
```

2.5   Rebooting

Edge Gateway can be rebooted by a command operation.

There are two ways to reboot: a "soft reboot" that stops the system and a "hard reboot" that does not stop the system.

➔   For more information regarding CLI (Command Line Interface) for using commands, refer to "Chapter 1, CLI Basics" in the "CLI User's Manual".

➔   If you want to reboot using the dedicated CLI of Edge Gateway, refer to "2.1 Rebooting This Product" in the "CLI User's Manual".

> To reboot Edge Gateway, you must use the sudo command.

2.5.1   Soft rebooting

Stop the system and perform a soft reboot.

Example

An example of a command executing in bash is shown as follows:

```
admin@amnimo:~$ sudo amctrl reboot -t soft ↵
Are you sure you want to restart? (y/n):    ←Press the [ y ] key followed by the [ Enter ] key
```

> To reboot Edge Gateway, you must use the sudo command.

2.5.2   Hard rebooting

Power down and reboot the hardware without stopping the system.

Example

An example of a command executing in bash is shown as follows:

```
admin@amnimo:~$ sudo amctrl reboot -t hard ↵
Are you sure you want to restart? (y/n):    ←Press the [ y ] key followed by the [ Enter ] key
```

> To cancel the execution of the command, press the [n] key followed by the [Enter] key.

> **!**   Performing a hard reboot may corrupt the file system.

2.6　Updating the Package

This section explains how to update applications installed on Edge Gateway.

2.6.1　Updating the package using commands

Since Edge Gateway is based on Ubuntu 18.04 LTS, you can update each application from the apt repository using a package management system.
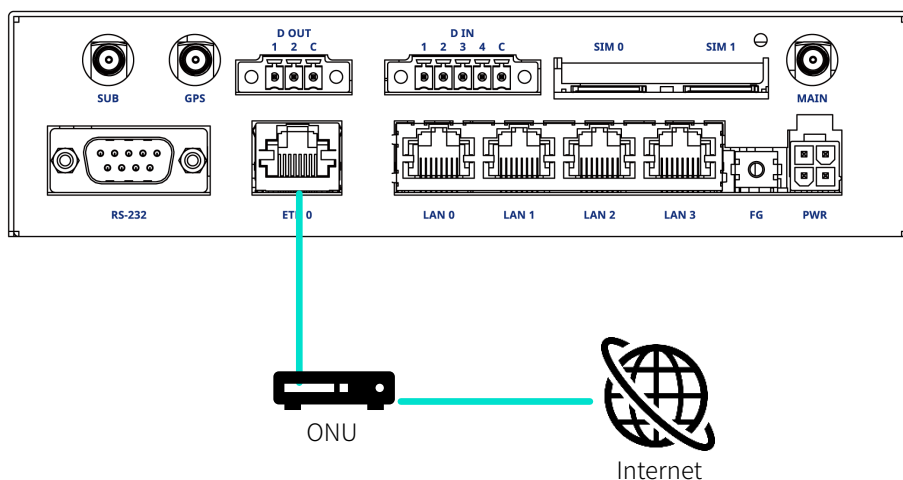
➜　For specific information about using commands, refer to "2.5 Performing the Package Repository Operations" in the "CLI User's Manual".

In addition, if you use a package management system, you must connect your Edge Gateway to the Internet.

It typically uses a communications module to connect to the Internet over a mobile line. However, it can also be connected via Ethernet.

The default IP address on the eth0 side is fixed to the DHCP client. Set it according to the network of a device such as an optical network unit (ONU) on the Internet.

➜　For more information about how to change the network, refer to "6.2 Setting the Interface" in the "CLI User's Manual".

➜　For mobile settings, refer to "5 Mobile Operation" in the "CLI User's Manual".

An example of connecting to the Internet through eth0 is shown as follows:

2.7   Updating the Firmware

There are two ways to update the firmware of Edge Gateway: using an SD card and via a network.

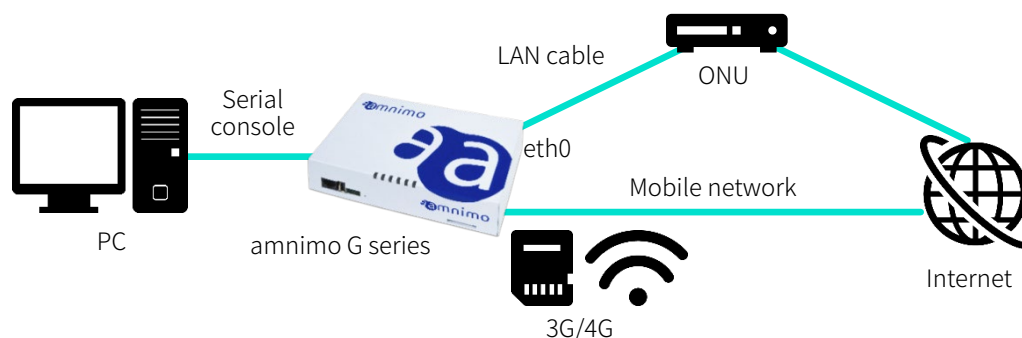The following operations are executed with commands:

➔   For more information about Command Line Interface (CLI) for using commands, refer to "1 CLI Basics" in the "CLI User's Manual".

2.7.1   Updating the firmware over the network

Update the firmware by specifying the firmware on the network.

Operation procedure

1   Set the Edge Gateway network.

The default IP address on the eth0 side is fixed to the DHCP client. Set it according to the network of a device such as an optical network unit (ONU) on the Internet.

➔   For more information about how to change the network, refer to "6.2 Setting the Interface" in the "CLI User's Manual"

➔   For mobile settings, refer to "5 Mobile Operation" in the "CLI User's Manual"

2   Log in as amsh and switch to the administrator mode.

➔   For more information, refer to "1.2 Starting Up the CLI of This Product" in the "CLI User's Manual"

3 Check the firmware file.

To retrieve the firmware, you will need the information of "connection destination and firmware", "account name", and "password".

The URL for the latest firmware used in the example in this procedure is as follows: You must have the firmware that is appropriate for your version.

- Indoor-Type Edge Gatewayftp://(Account Name: (Password)@package.amnimo.com/firmware/ag10.amf
- Outdoor-Type Edge Gatewayftp://(Account Name: (Password)@package.amnimo.com/firmware/ag20.amf

For your account and password, please contact our Customer Support.

```
amnimo# firmware file check ftp://username:password@package.amnimo/com/firmware/ag10.amf
 ↵
Downloading...
############################################################################ 100.0%
version: amnimo G series AG10 version 1.1.2 build 45261
contents: bootloader rootfs userfs sharefs
```

➜ For more information, refer to "2.4.2 Checking the firmware files" in the "CLI User's Manual"

4 Update the firmware file.

Update to the firmware file set in step 3.

```
amnimo# firmware area update ↵
reboot to update? (y/n):          ←Press the [ y ] key followed by the [ Enter ] key
```

➜ For more information, refer to "2.4.4 Updating the firmware" in the "CLI User's Manual"

Edge Gateway reboots.

5 Check the updated version.

```
amnimo# show firmware ↵
amnimo G series AG10 version 1.0.2 build 1
```

➜ For more information, refer to "2.4.1 Displaying the firmware version" in the "CLI User's Manual"

2.8   Using Edge Gateway

Information required to use Edge Gateway is written in the following manuals. Read the content of the manuals according to your purpose.

Document name	Document number
Edge Gateway Startup Guide https://amnimo.com/manual/edge_gw/sg/en/edge_gw_sg.pdf	IM AMD03A01-10JA
amnimo Gateway Series CLI User's Manual https://amnimo.com/manual/edge_gw/cli/en/cli_users_manual.pdf	IM AMF03A01-01JA
amnimo Gateway Series GUI User's Manual https://amnimo.com/manual/edge_gw/gui/en/gui_users_manual.pdf	IM AMF03A02-01JA
Installation Guide for the Outdoor Type (Edge Gateway / IoT Router) https://amnimo.com/manual/edge_gw/set/en/edge_gw_set.pdf	IM AMD05A01-12JA

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