Hitachi Kokusai Electric

150Mbps High-speed Radio Link

SINELINK®24G

Operation manual

PLEASE READ THIS MANUAL
BEFORE USING THE REPEATER

Caution:

Changes or modifications not expressly approved by Hitachi Kokusai Electric Inc. could void the user's authority to operate the equipment.

Note:

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.

Using this product close to radio or television receivers may cause receive failures. Use the receiver correctly in accordance with the user's manual.

- Use the receiver correctly in accordance with the user's manual.
- The specifications for this product are for use in America. The product cannot be used in other countries.
- Please be advised that Hitachi Kokusai Electric is in no way responsible for losses caused by lost opportunities such as lost communication, or pure economic losses such as the loss of data registered in the product, as a result of external causes such as product breakage, malfunction, problems, or power outages. Please keep a separate record of the data registered in this product.
- Never disassemble or modify this product.
- Use this product as a general wireless communication device. Please be advised that Hitachi Kokusai Electric is in no way responsible for damage that occurs as a result of using this product for applications other than a general wireless communication device.
  - ・Do not use this product for applications that require a high level of safety, such as medical equipment or systems that directly or indirectly affect human life.
  - ・If you do use this product in applications such as devices and computer systems that require a higher degree of reliability than a general wireless communication device, ensure that you have thoroughly implemented adequate measures regarding failures and safety design for the system that you are using.
- References made in this manual to the products of other companies are intended to be references only. They are not intended to enforce use of the mentioned products.
- The contents of this manual were created with the utmost of care. However, if you are unsure about the content, or if you find errors or omissions, please contact Hitachi Kokusai Electric or the representative that sold you the product.
- The product manual, hardware, software, and external appearance are subject to change without notice for the purpose of improvements. As a result, they may differ slightly from the product that you have purchased.
- Liability for damages, based on a default on a debt or illegal activity attributed to this product, shall be limited to the purchase price of this product or equivalent, unless Hitachi Kokusai Electric is found to have acted in bad faith or to have been grossly negligent.

For safe and correct operation

Before using the repeater, read this manual thoroughly to ensure proper operation. After reading the manual, store it carefully in an easily accessible location so that it can be referenced at any time.

About the Symbols

This manual uses a range of symbols intended to ensure the safe and correct use of this product, and to prevent financial losses and injury to you and others. The symbols and their meanings are explained below.
It is important to understand these symbols before reading the rest of this manual.

⚠ Warning	This symbol highlights instructions that, if ignored or handled incorrectly, may result in death or serious injury.
⚠ Caution	This symbol highlights instructions that, if ignored or handled incorrectly, may result in injury or physical damage.

Examples of Symbols

	△ symbol indicates information that is a warning (including dangers and warnings). Specific warning information is provided within the symbol. The symbol on the left is an electric shock warning.
	⃠ symbol indicates prohibited actions. Specific warning information is provided within the symbol or near the symbol. The symbol on the left indicates that disassembly is prohibited.
	● symbol indicates instructions that require an action. Specific instruction information is provided within the symbol. The symbol on the left indicates that you must connect a grounding wire.

Warning

Strict compliance

Please comply with the following requirements regarding PoE power supply equipment.

- Always use IEEE802.3af-compliant PoE (Power over Ethernet) power supply equipment (sold separately). Using other power supply equipment may cause fire, electric shock, or equipment failure.
- Connect PoE power supply equipment to the power source specified in the user's manual for that equipment. Connecting to other power sources may cause fire, electric shock, or equipment failure.
- Do not exceed wiring device standards. Excess current will generate heat and may cause fire or equipment failure.

Strict compliance

Please comply with the following requirements regarding LAN cables.

- Always use the specified LAN cables. Power is supplied to this product through LAN cables. Using other cables may cause fire, electric shock, or equipment failure.
- Do not scratch or damage, or forcefully bend, twist, or bundle the LAN cables, or perform any process with the cables other than connecting the connectors. Placing heavy objects on the cables, applying heat, or pulling the cables may damage the LAN cables and cause fire or electric shock.
- When installing, do not squeeze the cables between the product and the wall or racks. Doing so may damage the LAN cables or cause fire or electric shock.
- Do not install LAN cables close to a heater. Doing so may melt the cable coating or cause fire or electric shock.
- Using a damaged LAN cable (such as a cable with exposed core or broken wires) may cause fire or electric shock. Immediately replace a damaged cable with another LAN cable.
- When connecting or disconnecting a LAN cable, always use a connector. Pulling a LAN cable may cause damage to the connector and cable, or cause fire or electric shock. It may also cause the repeater or other devices connected to the LAN cable to fall or topple, resulting in injury.
- When connecting or disconnecting a LAN cable, first disconnect the PoE power supply equipment or turn off the power supply. Failure to do so might cause electric shock.
- When inserting the LAN cable connector, ensure that it is inserted properly. Failure to do so might allow moisture in and cause a short or improper insulation, or fire, electric shock, or equipment failure.

Strict compliance

Please comply with the following requirements when installing this repeater outdoors.

- Do not perform installation work during bad weather (such as strong winds). Wind may blow over components and result in injury or damage. Slippery conditions from rain and snow may cause you to fall over and sustain injuries.
- Do not install the repeater in an area in which lightning may strike. Doing so might cause fire, electric shock, or equipment failure.
- When routing LAN cables indoors, incorporate the appropriate use of STP cables and surge protectors (sold separately). Failure to connect such equipment might cause fire, electric shock, or equipment failure.
- Ensure that the installation location and support poles are sufficiently strong.
- If you are installing the repeater on a balcony, consult a builder to ensure that the veranda is strong enough. If it is not strong enough, the balcony may break, or the repeater may fall, resulting in injury.

Prohibited

Do not touch the repeater or LAN cables while it thunders.

- Doing so might cause electric shock.

Prohibited

Do not perform installation work while it thunders.

- There is a risk of electric shock.

Prohibited

Do not touch the repeater, LAN cables, or connectors with wet hands while current is flowing through them.

- Doing so might cause electric shock.

Disassembly prohibited

Do not disassemble, modify, or repair yourself.

- It is a violation of law for you to disassemble this equipment yourself.
- Disassembly or modification may cause fire, electric shock, or product failure.
- If the repeater fails, ask your representative to repair it. If you disassemble or modify the repeater yourself, you will be required to pay for repairs even if the repeater is still under warranty.

Strict compliance

Install the repeater out of reach of children.

- Failure to do so might cause electric shock or injury.

Disconnecting a LAN cable

If you notice smoke, noise, or an odor coming from the repeater, or if it is abnormally hot, terminate the power supply immediately.

- Failure to do so may result in fire, electric shock, or product failure.

Disconnecting a LAN cable

If water or foreign objects get inside the repeater, or if the repeater breaks, disconnect the LAN cable immediately and terminate the power supply.

- Failure to do so may result in fire, electric shock, or product failure.

Prohibited

Do not install or use the repeater in a location that might result in fire or explosion.

- Using the repeater in a location that is exposed to dust or flammable gases, such as propane gas or gasoline, may result in an explosion or fire. Do not install or use the repeater in a location that might result in fire or explosion.

Strict compliance

Install the repeater in a secure and stable location.

- Installing the repeater in an unstable rack or on an incline may cause the repeater to fall or topple, resulting in injury.
- Ensure that the surface on which the repeater is placed, the mounting location, and the support poles are sufficiently strong.
- When mounting the repeater on support poles, such as a BS antenna stand, take precautions to avoid the wires becoming a tripping hazard.
- Do not locate the repeater in a location that is subject to vibration and shock. If the repeater falls or topples, injury may result.

Strict compliance

Please comply with the following requirements regarding drip-proof caps and received power monitor terminals.

- Do not insert, wedge, or drop water or foreign objects into the repeater. Doing so may result in fire, electric shock, or product failure.
- Turn the drip-proof cap until it meets firmly with the base. Failure to do so might allow moisture in and cause a short or improper insulation, or fire, electric shock, or equipment failure.
- When opening the lid of the received power monitor terminal, first make sure that water or foreign objects are not going to get inside the repeater. Once you have finished directional adjustments, firmly close the lid and tighten the bolts. If the lid is not closed properly, moisture may be allowed in, causing a short or improper insulation, or fire, electric shock, or equipment failure.

Strict compliance

Periodically check that the bolts are still tight.

- If the metal mounting bracket bolts or earth terminal bolts become loose, the repeater and grounding wire may drop or fall, causing injury.

Earth connection

Always install an earth connection.

- Securely attach the grounding wire to the earth terminal and be sure to connect the ground before use. Failure to connect such equipment might cause electric shock or equipment failure.

Earth connection

Ground both ends of STP cables.

- When using STP (shielded twisted pair) cables for the LAN cable, install a shielded RJ-45 connector at both ends of the STP cable and ground them appropriately through the repeater or PoE power supply equipment. If you cannot ground the cables through the PoE power supply equipment, peel back the STP cable coating and properly ground the cable by connecting a grounding wire to the drain wire or aluminum foil shield. Failure to connect such equipment might cause fire, electric shock, or equipment failure.

Strict compliance

If you do not have advanced knowledge of installations, or if you must install the repeater in a high or dangerous place, ask a tradesman to perform the work.

- Installing on a roof, wall, or the outside of a high veranda puts you at risk of slipping and falling.
- Installations near electrical wires are also dangerous due to the risk of electric shock.

Strict compliance

When using this product, follow the correct procedures in accordance with the user's manuals for the PoE power supply equipment, PCs, and LAN devices that you are using.

- Comply with the warnings and cautions listed in the user's manuals from each equipment provider and use the correct procedures. Incorrect use of equipment can result in personal injury and damage to property.

Caution

Strict compliance

Please comply with the following requirements regarding installation.

- Do not install in a location with poor ventilation. Do not cover the equipment with cloth, or place it on thick carpet or bedding, or in close contact with a wall or furniture, in such a way that obstructs natural ventilation. Excess heat might cause fire or electric shock.
- Do not install in an environment that has corrosive gases. Doing so might cause device failure.
- Do not block the air pressure adjustment hole. Doing so might cause device failure.
- Route LAN cables appropriately. Tripping over LAN cables can cause equipment to fall or topple and may result in injury. It may also cause failure or the loss of important data in connected equipment. Take the appropriate care when connecting and installing equipment.
- Do not leave or place heavy objects on top of the repeater. If objects fall or topple, injury may result. If the repeater becomes deformed under heavy weight and internal components are damaged, this may cause fire, electric shock, or equipment failure.
- Do not apply unnecessary stress to the repeater. Do not let it hang and do not hang items from it. If it topples, injury may result.
- When installing equipment, use the provided metal mounting brackets and bolts. Using other brackets and bolts may cause fire, electric shock, or equipment failure.
- When moving the equipment, first remove the LAN cables and check that the grounding wire has been removed. If cables are damaged, they may cause fire or electric shock.
- When cutting and swaging LAN cables and working with them, protect your body using protective glasses and gloves. Cable core, drain wires, and aluminum foil shield can cause injuries.

Strict compliance

Always use the repeater with the power supply on.

- If this repeater is installed outdoors, always use it with the power supply on to avoid internal condensation. Only turn the power supply off if it is not going to be used for an extended period.

Caution

Be very careful not to drop the repeater or any components.

- Dropping the repeater or components may cause death or injury to those below, or damage any objects below the installation area.
- When installing the equipment, mount and install it securely so that it does not fall under its own weight. Failure to do so might cause injury.
- Use additional installation materials, such as mounting poles and brackets, if required to strengthen the installation.

Prohibited

Turn off the power supply when performing maintenance.

- When performing maintenance, always disconnect the power supply from the PoE power supply equipment for your safety.

Care Instructions

Please pay attention to the following when using the equipment.

- Do not drop or throw the equipment or expose it to shock.
- Do not keep the equipment in a damp, dusty, or hot place.
- Do not wipe the equipment with solvents such as benzine or thinners.
  Doing so may remove or deteriorate the coating. If the equipment is very dirty, firmly wring out a soft cloth dampened with water, or detergent diluted in water, and remove the dirt. Then wipe it with a dry cloth. When using a chemically-treated dust cloth, use it according to the directions.
- Remove any snow or icicles that attach to the repeater antenna as a result of snowfall. Failure to do so may cause deterioration in the communication properties.

Please be advised of the following points regarding wireless.

- The communication speed for wireless connections may be slower than when a LAN cable is connected.
- The wireless link speed and wireless line speed indicate the maximum speed in the wireless link. The actual speed may vary depending on the usage environment and connected devices.

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Contents

Contents

1. Read First

This manual is the user's manual that explains how to use SINELINK 24G.
To ensure proper use, please read this manual before using this product.

1-1 Target audience

The installation, maintenance, or removal of data communication systems requires qualified, experienced engineers. This manual is designed for such engineers with a working knowledge of LAN, TCP/IP, SNMP, and web browsers.

1-2 Overview of this product

SINELINK 24G is a 24GHz data communication system capable of a maximum throughput of 95Mbps on one side. It uses wireless data communication lines that make it easy to build a high-speed communication system between sites in areas where it is difficult to lay wired lines.

1-3 Features

(1) Wireless Link Speed Up to 150Mbps
① A wireless link speed of up to 150Mbps
② Throughput of up to 95Mbps, suitable for high capacity data distribution such as high-definition and MPEGs. Also allows for two-way 59Mbps <-> 59Mbps communication, sufficient for multimedia image transmissions

(2) 24GHz band communication with minimal interference
① A carrier sense function that achieves stable line quality by not using channels with interference

(3) High security
① In addition to unique private wireless protocol, all data is scrambled
② A pencil beam antenna that does not spread electro-magnetic waves (half value angle 3˚)

(4) Simple installation *1
① Compact/light weight (approx. 29 x 29 x 7 cm, approx. 3.5 kg), built-in antenna
② Directional adjustments can be made by sight using a simple scope
In addition, directional adjustments can be made while checking the receive level with a commercially-available digital multimeter.
③ Device settings and open checks can be performed easily from a web browser on a PC.
④ The rainproof construction allows for outdoor installation

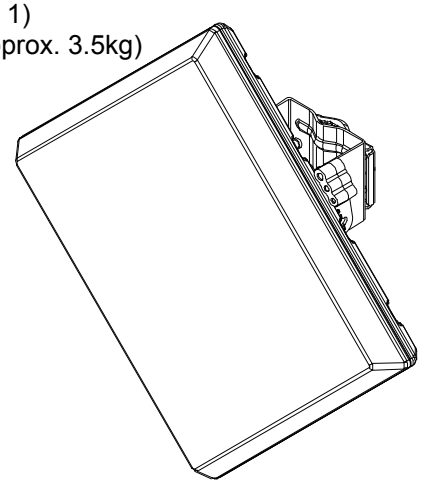
*1: The repeater cannot perform communication if the opposed device cannot penetrate through the installation environment. You are responsible for carrying out installation work.

1-4 Included items

Before commencing the installation, check that you have all of the included items. If anything is missing, contact the store or representative that you purchased the equipment from.

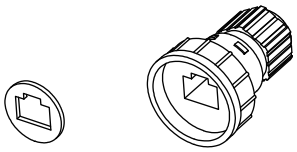
Included items

☐ SINELINK 24G (main unit x 1)
(Approx. 29 x 29 x 7 cm, approx. 3.5kg)

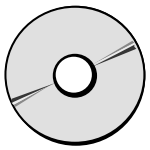


The metal mounting bracket and antenna adjustment scope have already been attached to the main unit.

☐ Drip-proof cap (1 set)

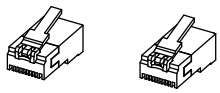


☐ User's manual CD-ROM (1)



Content
- Electronic manual (this manual)
- MIB definition file

☐ RJ45 Connectors (1)



(Shielded RJ-45 connectors)

Tyco Electronics AMP 5-569530-3

☐ Certificate of Warranty (1)

Certificate of warranty

* Use the included shielded RJ-45 connector with the drip-proof cap.
* PoE power supply, LAN cables, and grounding wires are not included.

1-5 Other items that you will need

Please purchase the following items as required.

☐ **LAN cable**

(1) Category 5 or higher A maximum length of 100m from the switching hub to this product.
(2) A maximum diameter of φ5.0 to 6.5mm.
(3) A cable with a single-wire core.
If you are using a twisted-wire LAN cable, use the RJ-45 connector for twisted wire (sold separately).
(4) Eight core wires (four sets).
When supplying power through a signal core from a switching hub with a built-in PoE power supply function, you can have four core wires (two pairs).
(5) When installing the equipment outdoors, use an outdoor STP cable (shielded twisted-pair cable) that is water-proof and resistant to ultraviolet rays.
[Proven equipment]
・Nippon Seisen Cable Ltd. 0.5-4P NSEDT-SO
Wire diameter: Approx. 0.5mm (24 AWG or equivalent) Number of pairs: 4P Outer coating material: polyvinyl chloride (PVC) Standard outer diameter: Approx. 6.5mm
Min. bend radius: 50mm Temperature range during construction: -10 to +50˚C Temperature range during operation: -20 to +60˚C

☐ **PoE power supply equipment**

IEEE802.3af-compliant PoE (Power over Ethernet) power supply equipment. There are two types of PoE devices. These are the PoE power supply adapter and the switching hub with a built-in PoE power supply function.

If you are using a STP cable, ground it through a PoE power supply device. If you cannot ground the cables through the PoE power supply equipment, peel back the STP cable coating and properly ground the cable by connecting a grounding wire to the drain wire or aluminum foil shield.

☐ **Noise filters and uninterruptible power supply equipment**

If there is a lot of noise in the power line that is connected to the PoE power supply, we recommend that you install a noise filter or uninterruptible power supply.

☐ **Switching hub**

100BASE-TX (100Mbps full duplex) supported.

☐ **Grounding wire**

Use a grounding wire.

☐ **Surge protector**

Use surge protectors as needed when connecting between outdoors and indoors.

☐ **PC for configuration**

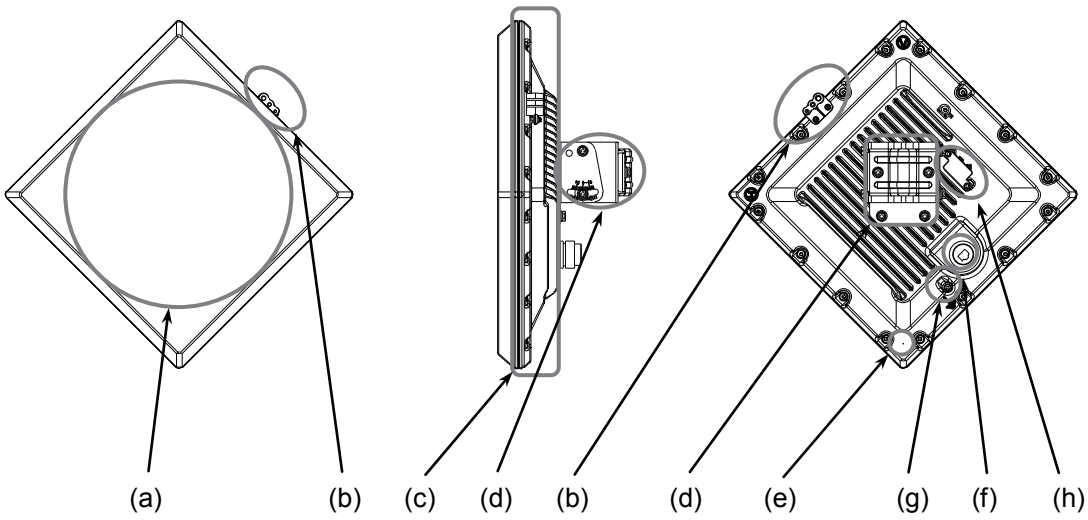
Use a configuration PC to set up this product and check operations. Use the specified operating system and web browser to ensure proper use. If you use an OS or web browser other than those specified, the system may not operate properly during display, login, and setup.
(1) OS: Microsoft Windows 7 SP1
(2) Web browser: Microsoft Internet Explorer 8.0 or higher
(3) Set the web browser to "Do not dial" and set Java
Script (Allow paste operations via Java applet script, Active script, script) to "Enabled."
(4) Turn off the firewall for the OS and your security software.

1-6 Required tools

You will need the following tools to install this product. If you do not already have these tools, please purchase them separately.

☐ **RJ45 crimping tool**	・ Recommended product (1) Tyco Electronics AMP 2-231652-1 (2) IDEAL 30-521
☐ **Phillips head screwdriver No. 2 (or M5)**	・ Use during installation.
☐ **Torque wrench (for the M6 metal mounting bracket bolts)**	・ Use during installation. We recommend that you use a tool with torque control.
☐ **LAN cable qualification tester**	・ Use to check the quality of LAN cables swaged to wires and the RJ-45 connectors. Poor swages cannot be detected through a conduction check. Use a LAN cable qualification tester that is capable of verifying the quality of a 100BASE-TX cable. Recommended product (1) Fluke CIQ-100
☐ **Vinyl tape, self-adhesive tape**	・ If installing outdoors, wrap the tape around the drip-proof cap.
☐ **Binoculars**	・ Use if the opposed device is a long way away and the installation location is not visible.
☐ **Monitor cable (Optional items available from Hitachi Kokusai Electric)** Product name: SL-monitor cable Model: HP5-010601	・ Use to adjust the antenna direction when monitoring the receive level. Use this cable to connect the received power monitor terminal and the digital multimeter.
☐ **Torque wrench (Size 3mm for M4 hexagon socket bolts)**	・ Use to open and close the lid of the received power monitor terminal. We recommend that you use a tool with torque control.
☐ **Digital multimeter**	・ Use to adjust the antenna direction when monitoring the receive level. DC: 0 to 3.3V Accuracy: Use a meter that can measure at 1.5%.

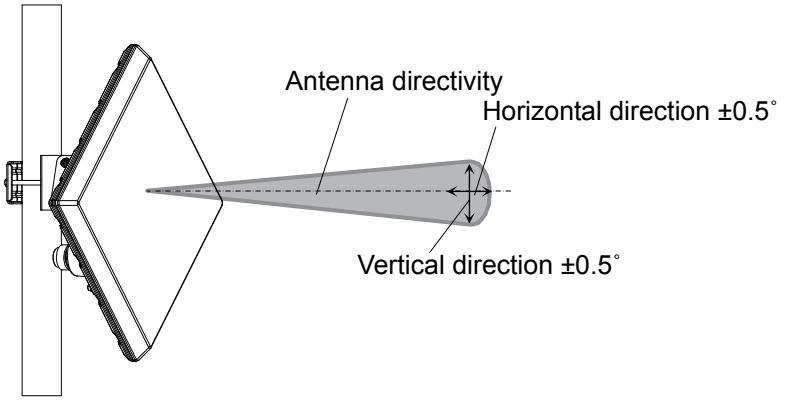
1-7 Part names and descriptions for the main unit



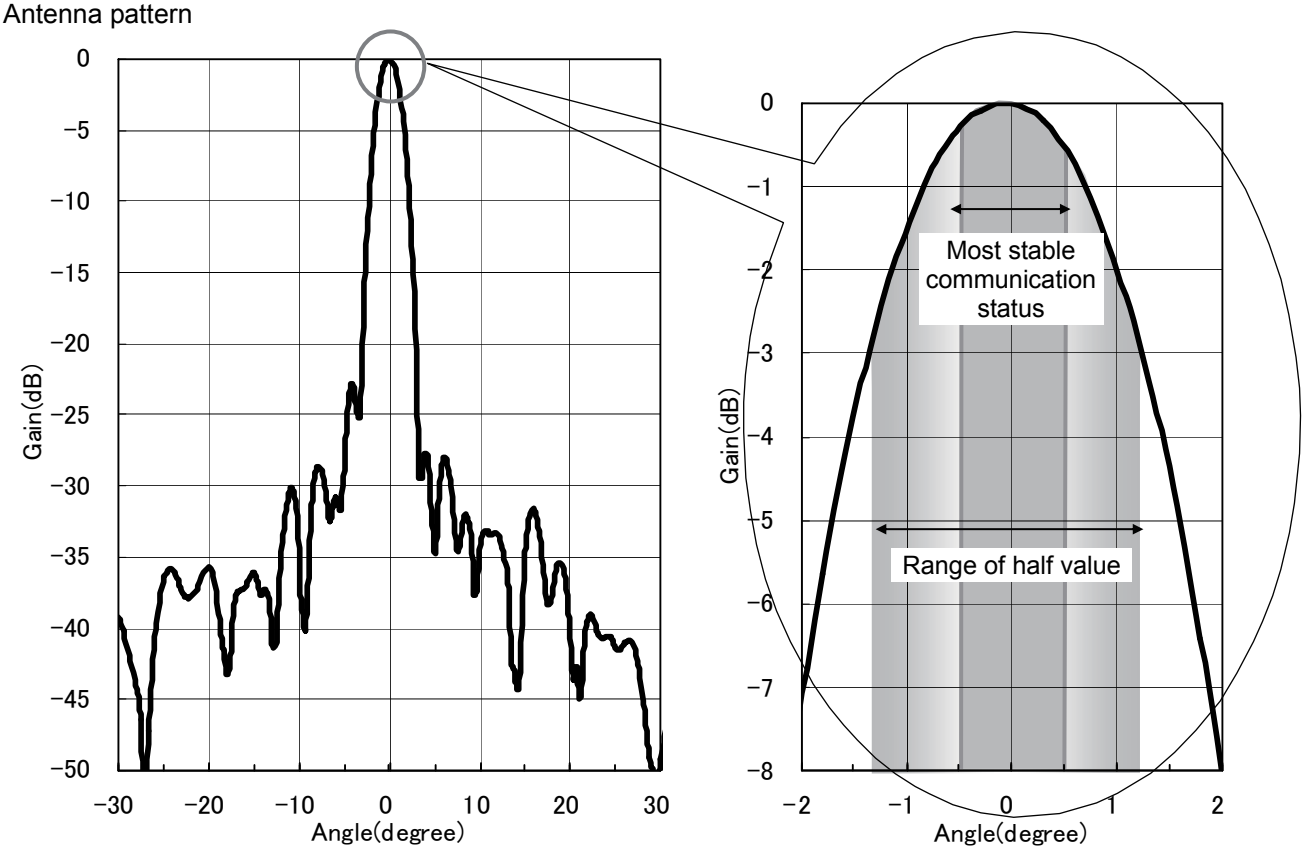
Name	Description
(a) Antenna	Electromagnetic waves are emitted from the antenna surface. Install the antenna facing the opposed device. The antenna face is AES resin (water-repellent)
(b) Antenna adjustment scope	Look through the scope hole to adjust the direction of this product. ABS resin (no coating)
(c) Radiation fin integrated reverse-side lid	The internal temperature escapes into the atmosphere. Aluminum die cast (coated)
(d) Metal mounting bracket	Attach this product to the mounting pole. You can use a mounting pole with an outer diameter of 25 to 2.01in. Stainless (not coated)
(e) Air pressure adjustment hole	Maintain a rainproof construction and adjust the atmospheric pressure inside this product.
(f) LAN cable connector	Connect the LAN cable. When installing the equipment outdoors, connect the outdoors LAN cable with the drip-proof cap attached.
(g) Earth terminal (FG)	Connect the grounding wire.
(h) Received power monitor terminal	Connect the monitor cable. The lid is aluminum die cast (coated)

1-8 Antenna directivity

To make communication as stable as possible when there is a opposed device, the antenna is directed within a 0.5˚ cone to the left, right, up, and down from a line perpendicular to the surface of the antenna.
When the distance to the opposed device is 1km, 0.5˚ creates a circle with an 8.7m radius.



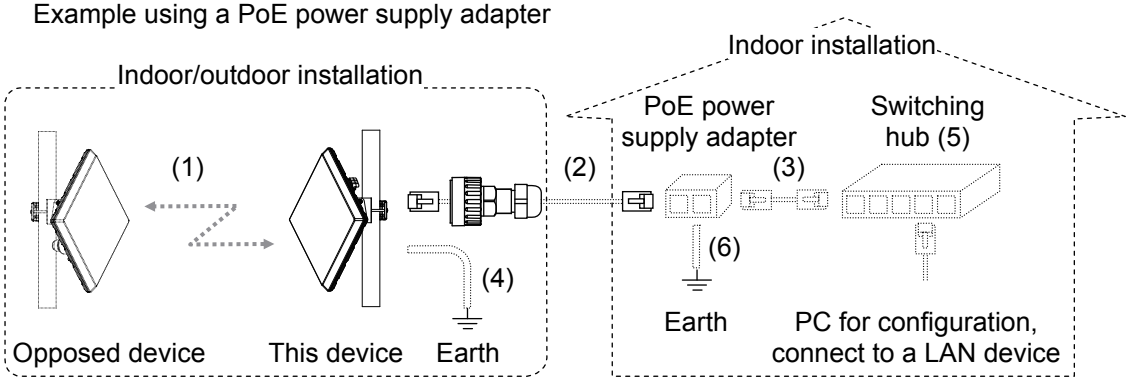
Antenna pattern



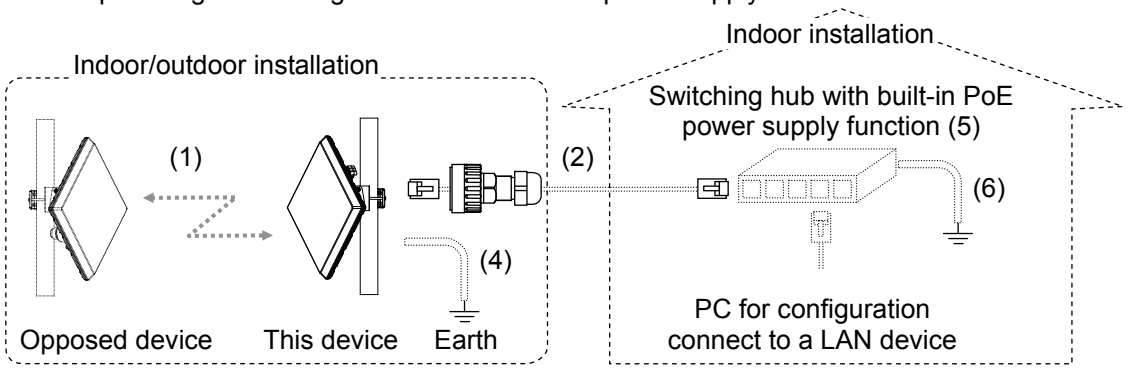
1-9 Connection configuration

The connection configuration for this product is as follows.

■ Connection configuration example 1
Example using a PoE power supply adapter



■ Connection configuration example 2
Example using a switching hub with built-in PoE power supply function



(1) The minimum communication distance between the device and the opposed device is 5m.
(2) Connect the PoE power supply to this product. The total cable length for (2) and (3) is up to 100m. If you are installing this device outdoors, use an STP cable and a surge protector (sold separately) in (2) or (3). The length of the cable for installing outside of a building must be no more than 42m.
(3) Connect a PoE power supply adapter and a switching hub.
(4) Configure grounding for this product (earth terminal) using a grounding wire. Install the earth wire in accordance with NFPA70 regulations.
(5) Use a switching hub that supports 100Mbps full duplex communication.
(6) Ground the STP cable in (2) through a PoE power supply device. If you cannot ground the cables through the PoE power supply equipment, peel back the STP cable coating and properly ground the cable by connecting a grounding wire to the drain wire or aluminum foil shield.
In addition, implement potential equalization for the grounding in (4), (6), and the surge protector.

* The connection configuration may vary depending on the conditions such as the devices that you are using and the installation location.
* If there is a lot of noise in the power line that is connected to the PoE power supply, we recommend that you install a noise filter or uninterruptible power supply.

2. Turning Power On/Off

⚠ Caution

Be careful of the followings when connecting or disconnecting a LAN cable.

- When connecting or disconnecting a LAN cable, first disconnect the PoE power supply equipment or turn off the power supply. Failure to do so might cause electric shock.

2-1 Turning power on

To turn the power on, connect an IEEE802.3af-compliant PoE power supply using a LAN cable.
Check the lamp on the PoE power supply to confirm that power is being supplied to this product.
Follow the correct procedure to turn on the power for the PoE power supply, in accordance with the user's manual that comes with each device.

2-2 Turning power off

To turn the power off, disconnect the LAN cable from the IEEE802.3af-compliant PoE power supply.
Follow the correct procedure to turn off the power for the PoE power supply, in accordance with the user's manual that comes with each device.
To turn the power on/off, wait several seconds.

3. Installation/Connection/Setup

3-1 Steps for installing/connecting

This section explains the steps from installing this product to connecting with LAN devices.

Check the interval of the wireless section

Check whether the interval of the wireless section is adequate based on the annual rate of operation that is expected for the wireless circuit.

⇩

Setup from a PC

Configure this product's settings using a web browser on a PC.

(1) Prepare the settings environment
(2) Change the IP address of the configuration PC
(3) Configure this product's settings from the configuration PC

⇩

Prepare for installation

In an indoor work area, prepare for the installation of this product.

(1) Check the orientation of the metal mounting bracket
(2) Install the drip-proof cap on the LAN cable

⇩

Install

Mount this product on a pole or others.

(1) Install the mounting pole
(2) Wire the cables
(3) Mount this product
(4) Adjust the direction with a scope
(5) If necessary, use the monitor cable to make fine adjustments
(6) Attach the metal mounting bracket

⇩

Connect to a LAN device

Connect this product to a LAN device.

⇩

Check the wireless status

Use a web browser on a PC to check the wireless status for this product

3-2 Checking the interval of the wireless section

When performing wireless communication outdoors, there is a possibility that the wireless circuit will get disconnected as a result of attenuation from rain. The longer the interval of the wireless section, the greater the impact from rain. Thus, the interval that you can install is limited by the annual rate of operation that you want from the wireless circuit.

3-3 Setting up from a PC

Prepare the configuration environment and configure the settings for this product from a web browser on the configuration PC.

(1) Prepare the settings environment

Connect the PoE power supply device, switching hub, configuration PC, and this product with LAN cables. For information on the connection configuration and how to turn on the power, refer to "1-5 Other items that you will need," "1-9 Connection configuration," and "2-1 Turning power on."
Check the following information to see if your PC has the appropriate environment for setting up this product.

● PoE power supply equipment
  ☐ Supplying power to this product.

● LAN cables
  ☐ The total cable length from this product to the switching hub is not more than 100m.
  ☐ The LAN cables from this product to the switching hubs are all straight cables.
  (If the switching hub supports Auto MDI/MDI-X, you can also connect using a cross cable.)

● Switching hub
  ☐ 100BASE-TX (100Mbps full duplex) or equivalent.
  ☐ The setting for the connection port for connecting to this product is auto negotiation or 100Mbps full duplex fixed.
  This product supports auto negotiation. If connected devices do not support auto negotiation, link up using 100Mbps full duplex.
  ☐ The connection port for connecting with this product is linked up at 100Mbps full duplex.
  ☐ The connection port for connecting with the configuration PC is linked up.

● PC for configuration
  ☐ The connection port for connecting with the switching hub is linked up.

(2) Change the IP address of the configuration PC
When this product is shipped, the IP address is set to 192.168.0.202 and the subnet mask is set to 255.255.255.0.

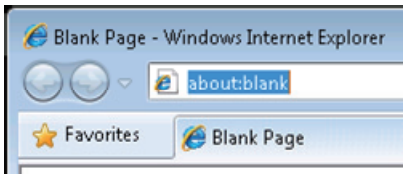
Change the IP address and subnet mask for the configuration PC to the following values.

IP address	192.168.0.1 to 192.168.0.254 (excluding 192.168.0.202)
Subnet mask	255.255.255.0

To take multiple SINELINK units with factory default settings and set them up in a series, first connect the configuration PC to the PoE power supply device, and then connect this product unit and PoE power supply device that you want to configure. If you connect this product to the configuration PC after you have current flowing to the unit, the ARP tables will not be updated and you may not be able to perform maintenance work on this product.

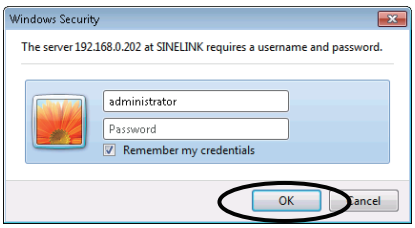
(3) Configure this product's settings from the configuration PC
Configure the settings so that the opposed device can be communicated with wirelessly through a web browser. Configure the settings for the main device and the opposed device.

1 Open the web browser and enter the IP address for this product in the address bar to connect.
The default IP address is 192.168.0.202.



2 Enter a user name and leave the password blank to connect.

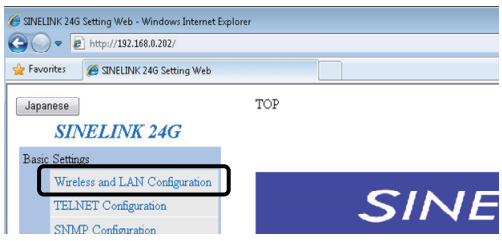
- The default user name is "**administrator**".
- A default password is not set. Make sure that you set up a password later.



3 The main page is displayed.

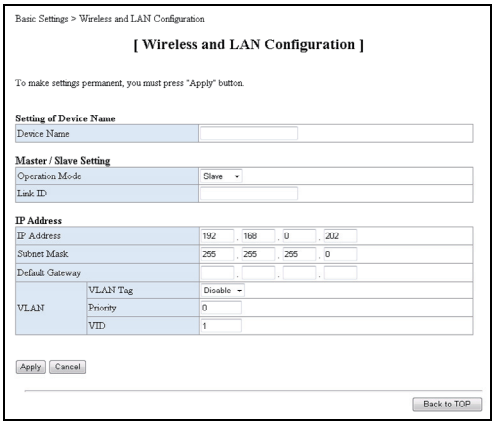
In the web maintenance window, a menu is displayed on the left side and information is displayed on the right side.

4 On the menu, click "Wireless and LAN Configuration".



5

Enter the following settings.



For details, refer to "4-2 Configuring basic wireless and LAN settings."

Device Name

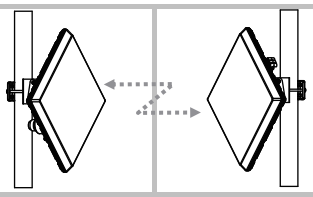
Enter the name of the main unit.

Operation Mode

Enter Master (primary station) or Slave (tributary station).

Link ID

Enter the same strings as these on the opposed device.

Opposed wireless commu-nication		
Operation Mode	Master	Slave
Link ID (Example)	ABCDEF	ABCDEF

[For preventing interference]
Set a different Link ID for each Master and Slave pair.
To ensure security, change the default ID.

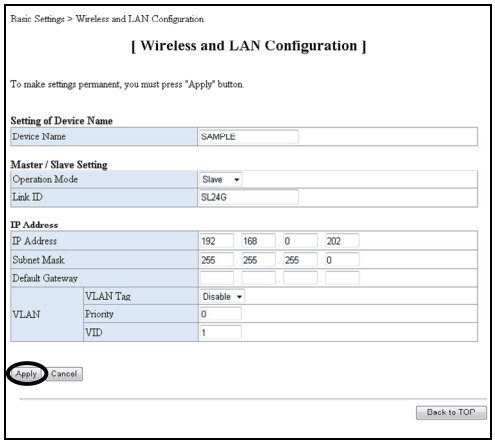
If you set the same Link ID for multiple pairs, normal communication may not be possible (unable to communicate, pair combinations not acknowledged correctly, or unstable communication).

IP address **Subnet mask**
Default gateway
VLAN tag **Priority** **VID**

Make suitable entries for your LAN environment into "IP Address".
If you make invalid entries, you cannot perform maintenance communication with this product.

6

Enter every setting, and then click the "Apply" button.

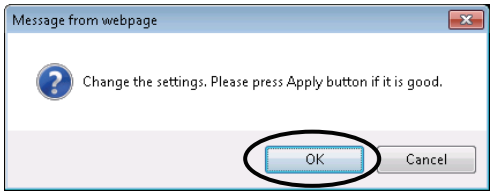


* The entered values are samples.

Click the "Apply" button in each setup page. If you open another page without clicking the "Apply" button, the entered information is not saved and will be lost.

7

Click "OK" to set up this product.

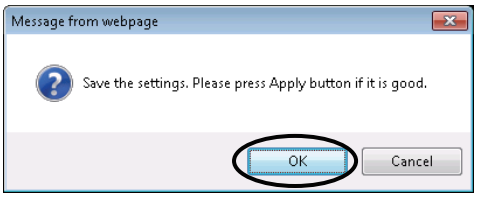


8

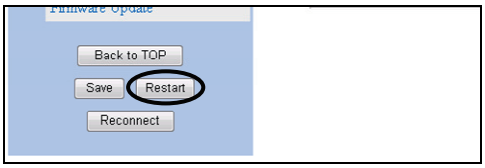
On the menu, click the "Save" button.

The current settings information is saved to the internal flash memory.
The settings remain in the flash memory even after the power is turned off.

9 Click "OK" to save the settings information.



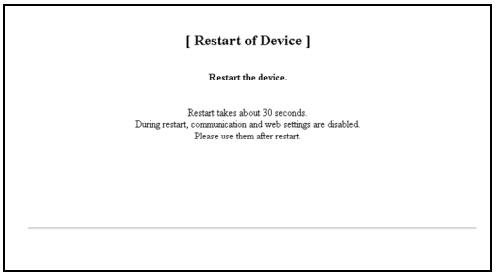
10 On the menu, click the "Restart" button.



11 Click "OK" to restart this product.

12 It takes approximately 30 seconds to restart.

After you have restarted, close the web browser.



13 Change the IP address for the configuration PC to an address that can communicate with the IP address set in this product.

14 After restarting this product, check the settings and remove the LAN cable from this product.

15 Turn off the power supply from the PoE power supply device and disconnect the LAN cable.

16 If you are storing or shipping this product after you have unpacked it, wrap it in a vinyl sheet and protect the LAN cable connector from dust and foreign particles. Otherwise, they can cause a poor good contact with the LAN cable.

3-4 Prepare for installation

(1) Check the orientation of the metal mounting bracket

1 Check the orientation of the metal mounting bracket

On the back of the antenna there is a "V" symbol and an "H" symbol. When the unit is shipped from the factory, the "V" symbol is at the top.

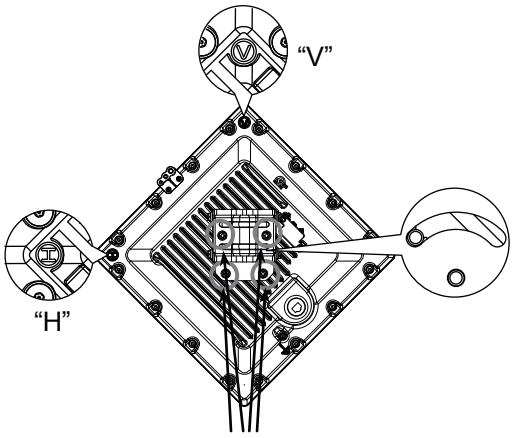
The antenna is vertically polarized when the "V" symbol is put at the top or bottom.
If you put the "H" symbol at the top or bottom, the antenna becomes horizontally polarized.

The symbol at the top/bottom needs to be the same as the opposed device. If they are different, they will not be able to communicate properly.

2 Put the H symbol at the top/bottom in the following situations.

- If there are no open wireless channels in vertical polarization and you want to use horizontal polarization.
- SINELINK pairs have been installed side-by-side in close proximity and you are concerned about radio wave interference.

3 When putting the H symbol at the top or bottom, remove the four M6 nuts for the metal mounting bracket on the back of the main unit (back of the antenna). Rotate the metal mounting bracket 90˚ anti-clockwise and tighten the M6 nuts. The torque for tightening the M6 nuts is 5.59 to 6.66 [N▪m] (57 to 68 [kgf▪cm]).



Attach with four M6 bolts

[Items to check]

☐ The same symbol (V or H) is at the top or bottom on the main device and the opposed device.

☐ The M6 nuts have been tightened with a torque of 5.59 to 6.66 [N▪m] (57 to 68 [kgf▪cm]).

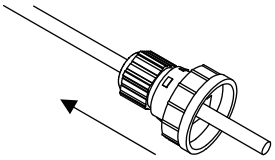
(2) Install the drip-proof cap on the LAN cable

⚠ Caution

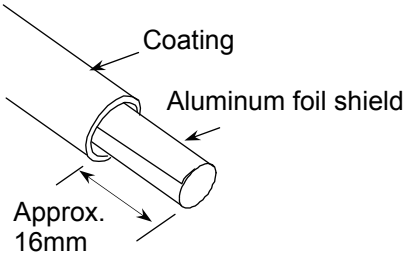
Be careful of the following point when working with LAN cables.

- When cutting and swaging LAN cables and working with them, protect your body using protective glasses and gloves. Cable core, drain wires, and aluminum foil shield can cause injuries.

1 Slide the cap and the base nut over the cable.

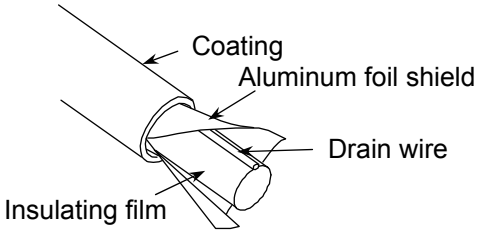


2 Strip the coating from the LAN cable and cut it off.
Be careful not to cut the aluminum foil shield.

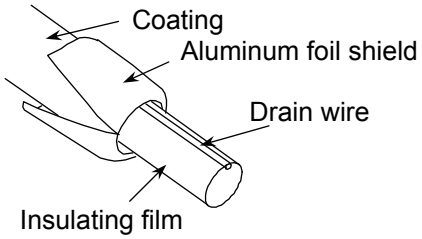


* The construction of the cable may vary depending on the type of cable that you are using. Usually, aluminum foil shields, insulating films, and drain wires are used in STP cables but not in UTP (unshielded twisted pair) cables.

3 Find the overlapping part of the aluminum foil shield and separate the aluminum foil shield from the insulating film.
Be careful not to tear the aluminum foil shield.

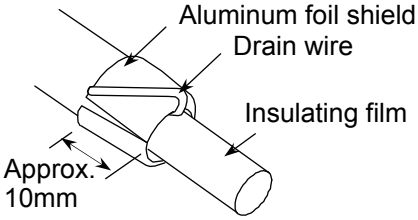


4 Fold the aluminum foil shield back over the coating.
Wrap it so that it is smooth around the coating.

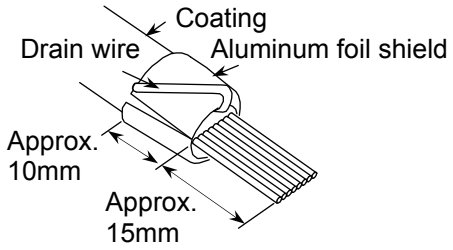


5 Cut the aluminum foil shield so that it is even.

Firmly bend the drain wire back from the cable to the aluminum foil shield so that it lays diagonally across the foil. Cut it to the same length as the aluminum foil shield.

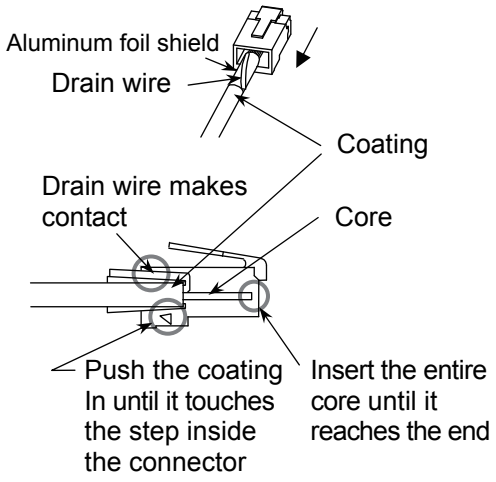


6 Peel back the insulating film and line the core up with the RJ45 connection.
For information on lining up the core, refer to "7-8 Example of RJ45 connector connection".



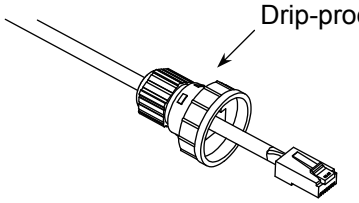
7 Insert the cable into the shielded RJ-45 connector.
Push it in until the core meets the tip of the RJ-45 connector and the coating meets with the step inside the RJ-45 connector.

Make sure that the drain wire is in contact with the shielded part at the top, inside of the RJ-45 connector. If the contact with the shielded part inside the shielded RJ-45 connector is bad, the cable will not be grounded.

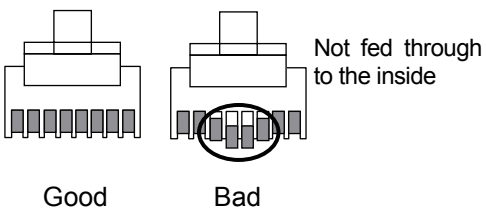


8 Confirm that the step in 1 above has been completed properly.

Before crimping, confirm again that the drip-proof cap has been slid onto the cable.

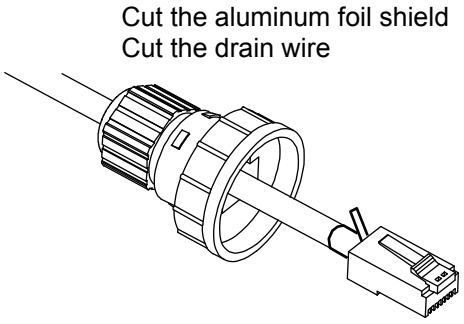


9 Crimp the shielded RJ-45 connector.
Look at the shielded RJ-45 connector from the front and check that all of the connector pins have been fed through to the inside.

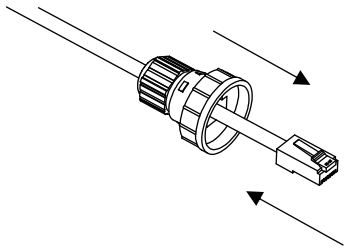


If the crimp is not successful, use the provided RJ-45 connector (Tyco Electronics AMP shielded RJ-45 connector 5-569530-3).
If you use a different RJ-45 connector, the connection might not be drip-proof, resulting in damage to the LAN cable connector for this product.

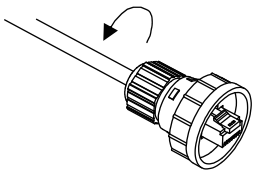
10 Cut the excess aluminum foil shield and drain wire.



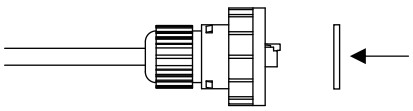
11 Pull the shielded RJ-45 connector into the drip-proof cap.



12 Tighten the base nut.
To make the connection drip-proof, tighten the nut until it no longer turns.



13 Stick on the gasket.



3-5 Installing

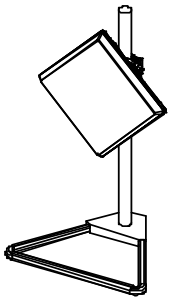
Once you have configured all of the settings through a web browser and completed preparations for installation, wire the cables and mount this product on the mounting pole.

Points of caution regarding the installation location and the mounting pole

- The metal mounting bracket is suitable for a mounting pole of ϕ25 to 51mm.
- Use a mounting pole that is sufficiently strong and install it securely at the installation location. Any movement, breaking or bending of the pole will result in unstable or terminated wireless communication.
- Do not install this product in a location that cannot be penetrated by the opposed device. Wireless communication is not possible in an environment in which the electromagnetic waves are shielded.
- Do not install this product in a location where shielding objects, such as people or other objects will pass between it and the opposed device. Doing so will result in unstable wireless communication or disconnections.
- Do not mount this product on a mounting pole that is subject to vibration or shock. Doing so might cause device failure. If you are installing in a location that is subject to vibration or shock, purchase a mounting pole that has adequate vibration and shock absorption and mount this product on that mounting pole.

Example of indoor installation

When performing a simple indoor installation close to a window, mount this product on a mounting pole such as a BS antenna stand.



Example of a BS antenna stand
Yagi Antenna BS stand
(BS-ST1B)

Install the stand securely so that it does not move or fall over.

Warning

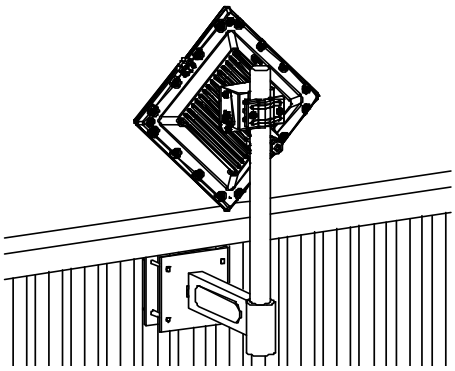
Install the repeater in a secure and stable location.

- Installing the repeater in an unstable rack or on an incline may cause the repeater to fall or topple, resulting in injury.
- Ensure that the surface on which the repeater is placed, the mounting location, and the support poles are sufficiently strong.
- When mounting the repeater on support poles, such as a BS antenna stand, take precautions to avoid the wires becoming a tripping hazard.

Example of outdoor installation

When installing outdoors, mount this product on the appropriate type of mounting pole, such as a veranda/wall metal mounting bracket or roof mount.

Example of a veranda installation



Warning

Please be careful of the following points regarding the installation of this product outdoors.

- Do not perform installation work during bad weather (such as strong winds). Wind may blow over components and result in injury or damage. Slippery conditions from rain and snow may cause you to fall over and sustain injuries.
- Do not install the repeater in an area in which lightning may strike. Doing so might cause fire, electric shock, or equipment failure.
- When routing LAN cables indoors, use surge protectors (sold separately). Failure to connect such equipment might cause fire, electric shock, or equipment failure.
- If you are installing the repeater on a balcony, consult a builder to ensure that the veranda is strong enough. If it is not strong enough, the balcony may break, or the repeater may fall, resulting in injury.
- Ensure that the installation location and support poles are sufficiently strong.

Do not install or use the repeater in a location that might result in fire or explosion.

- Using the repeater in a location that is exposed to dust or flammable gases, such as propane gas or gasoline, may result in an explosion or fire. Do not install or use the repeater in a location that might result in fire or explosion.

(1) Install the mounting pole

1 Select the installation location for the mounting pole.

[Items to check regarding the installation location]

- ☐ The mounting pole can be firmly installed.
- ☐ There is an unobstructed path to the opposed device.
- ☐ Screening objects, such as people or other objects, do not pass between the installation location and the opposed device.
- ☐ If you are using propagation off the sea or a lake, install the pole as high as possible.
  This will reduce water surface reflection.
- ☐ There are no flammable or corrosive gases in the surrounding area.

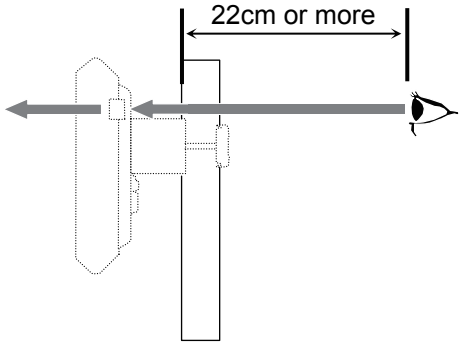
2 Prepare the mounting pole that you will use for installing this product.

You can use a mounting pole of ϕ25 to 51mm.
We recommend that you use a mounting pole of approximately 700mm in length for outdoor installations and 450mm in length for indoor installations.

3 Install the mounting pole in a vertical orientation.

Securely install the mounting pole in the installation location and shake it to see if it is strong enough.

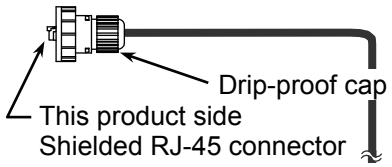
Check whether there is enough space to look through the antenna adjustment scope. Do not install the repeater on a pole if you are unable to look through the scope. If you cannot see into the scope, replace the pole with one that does allow you to see.



(2) Wire the cables

1 Wire the LAN cable with the drip-proof cap that was prepared in "3-4 Prepare for installation", and the grounding wire, to this product.

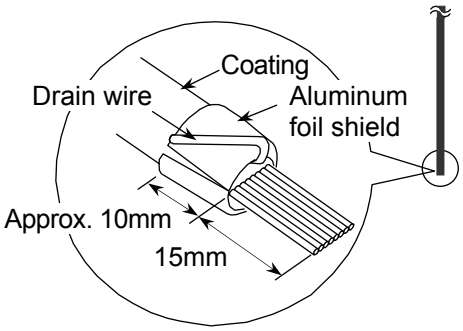
Wire the LAN cable and grounding wire with enough length to reach the installation location for this product with some length to spare. Route the LAN cable so that there is no tension on the cable and connectors.



2 Install the shielded RJ-45 connector on the LAN device end of the LAN cable.

Follow the same procedure that you used to install the shielded RJ-45 connector on this product end.
Refer to steps 2 to 7 in "3-4 (2) Install the drip-proof cap on the LAN cable".

Line the core up with the RJ45 connection.
For information on lining up the core, refer to "7-8 Example of RJ-45 connector connection".



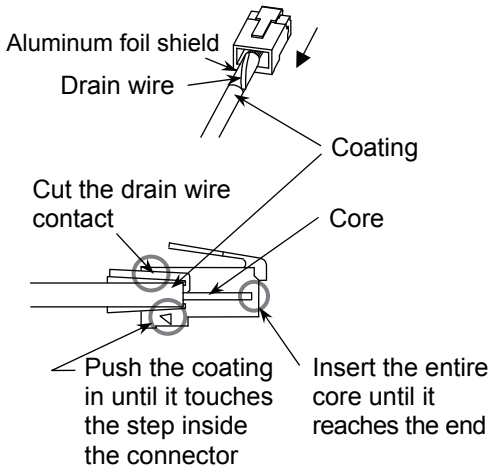
* The construction of the cable may vary depending on the type of cable that you are using. Usually, aluminum foil shields, insulating films, and drain wires are used in STP cables but not in UTP (unshielded twisted pair) cables.

Install a shielded RJ-45 connector at both ends of the STP cable and ground them appropriately through this product or PoE power supply equipment.

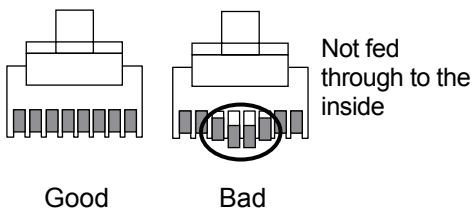
If you cannot ground the cables through the PoE power supply equipment, peel back the STP cable coating and properly ground the cable by connecting a grounding wire to the drain wire or aluminum foil shield.
If the equipment is not grounded properly, noise reduction will not be effective and communication will be negatively impacted.

3 Insert the cable into the shielded RJ-45 connector.
Push it in until the core meets the tip of the RJ-45 connector and the coating meets with the step inside the RJ-45 connector.

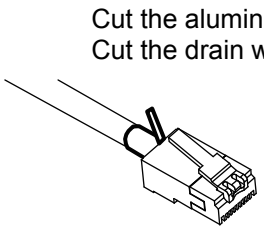
Make sure that the drain wire is in contact with the shielded part at the top, inside of the RJ-45 connector. If the contact with the shielded part inside the shielded RJ-45 connector is bad, the cable will not be grounded.



4 Crimp the shielded RJ-45 connector.
Look at the shielded RJ-45 connector from the front and check that all of the connector pins have been fed through to the inside.



5 Cut the excess aluminum foil shield and drain wire.



6 Use a LAN cable qualification tester to check the LAN cable wiring, communication quality, and cable length.

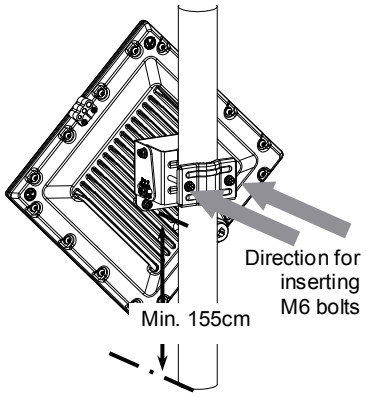
[Items to check regarding the LAN cables]

- ☐ All eight cores are wired straight.
- ☐ The shield for the STP cable is connected.
- ☐ There is no interference with communication on the 100BASE-TX.
- ☐ The cable length is less than 100m.
- ☐ Slight movements of the cable for the RJ-45 connector do not alter the quality of communication.

(3) Mount this product

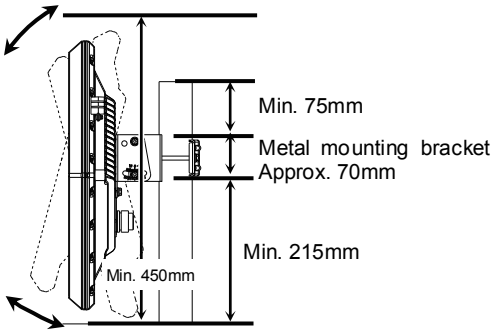
1 Select a mounting location for this product and use two M6 bolts to temporarily attach the metal mounting bracket to the mounting pole.

Insert the bolts in the direction of the arrow and temporarily fasten them so that this product does not fall.



Position the antenna adjustment scope so that it is easy to look through. If you look through the antenna adjustment scope in an unstable posture, the direction may not line up correctly.

2 Make sure that there is at least 155mm of mounting pole from the bottom of the metal mounting bracket. If there is not enough pole length, you may not be able to adjust the elevation angle.



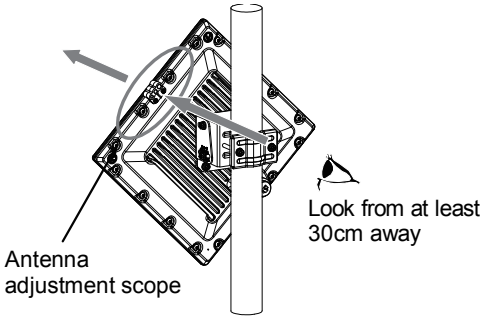
The M6 bolts have a retaining washer attached. You can move the retaining position by rotating or applying some pressure

(4) Adjust the direction with a scope

1 **How to look through the scope**

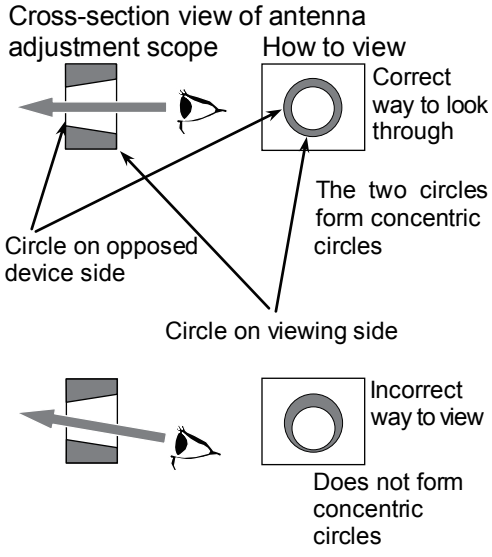
Look through the antenna adjustment scope with your eye at least 30cm away from the hole of the scope.

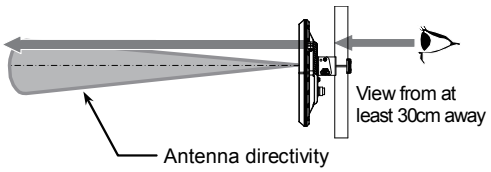
There are a number of holes of different diameters on the antenna adjustment scope. Use a large diameter hole to find the installation location of the opposed device and make rough adjustments. Use a small diameter hole to make alignments so that the installation location appears to be in the center.



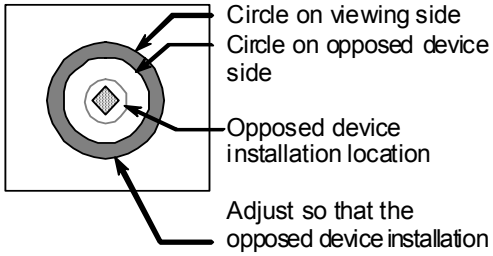
2 The holes for the antenna adjustment scope are slightly smaller on the opposed device side. When you look through, you can see the circle on the side that you are looking through in addition to the circle on the opposed device side.
Look through the scope from a position where the two circles look concentric.

By looking through the antenna adjustment scope holes properly, you can check the direction of the antenna face.





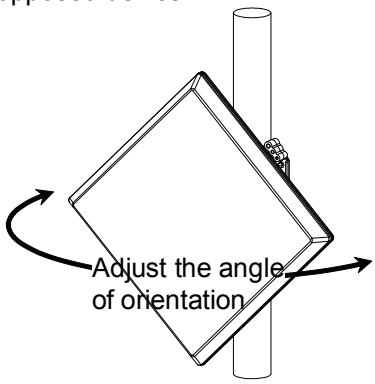
When looking through the scope holes, adjust the direction of the antenna so that the installation position of the opposed device appears to be in the center of the circle on the opposed device side.



3

Adjust the angle of orientation

Look through the antenna adjustment scope hole in the correct manner and adjust the angle of orientation to face the opposed device.



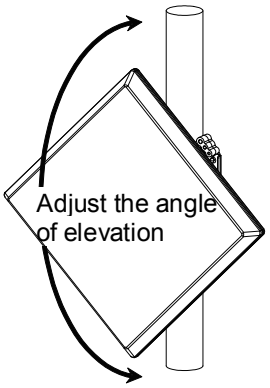
Adjust the orientation so that the installation position of the opposed device is centered left-to-right in the hole.

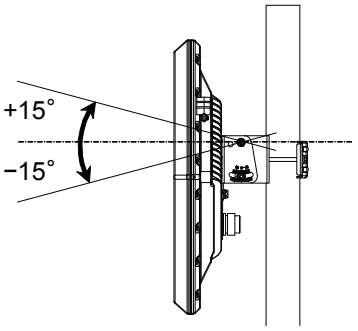
Vertical adjustment is made during the elevation angle adjustment.
If the distance to the opposed device is too long, you will not be able to identify the opposed device by sight. Adjust the angle of orientation using landmarks such as permanent structures.

4

Adjust the elevation angle

Look through the antenna adjustment scope hole in the correct manner and adjust the elevation angle to face the opposed device.





Adjust the elevation angle up to 15˚ up or down. The incline from horizontal (5˚, 10˚, 15˚) and the difference in height compared to the opposed device is shown in the following table according to the distance.

Distance	5˚	10˚	15˚
100m	8.7m	17.6m	26.8m
500m	43.7m	88.2m	134.0m
1000m	87.5m	176.3m	267.9m

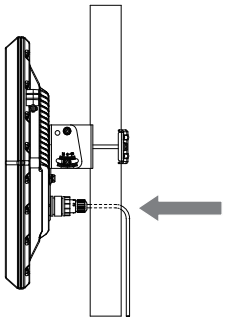
Adjust the orientation so that the installation position of the opposed device is vertically centered in the hole.

If it does not appear to be centered horizontally, adjust the angle of orientation again.
If the distance to the opposed device is too long, you will not be able to identify the opposed device by sight. Adjust the angle of elevation using landmarks such as permanent structures.

5 Check that there is no water or foreign particles in the LAN cable connector or RJ-45 connector.

If there are, remove them first.

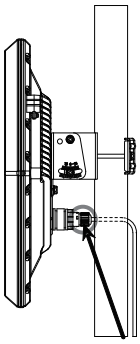
6 Plug the RJ-45 connector into the LAN cable connector on the main unit.



7 Twist the drip-proof cap.
Firmly tighten the connector by hand to keep out any drips.
The torque for tightening is 0.89 to 1.07 [N•m] (9 to 11 [kgf•cm]).

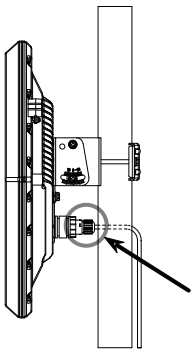
If there is a gap

- Make sure that you used the RJ-45 connector that was provided.
- Make sure that the RJ-45 connector has been pushed all the way into the drip-proof cap.

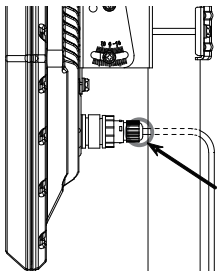


Tighten the drip-proof cap to secure it.
Firmly tighten the connector by hand to ensure that it is drip proof.

8 Tighten the additional drip-proof cap nuts.
The torque for tightening is 1.2 to 1.5 [N•m] (12 to 15 [kgf•cm]).



9 Route the LAN cable so that there is no tension on the connectors.



10 Insert the RJ-45 connector on the LAN device end of the LAN cable, into the PoE power supply device.

Route the LAN cable so that there is no tension on the connectors.

(5) If necessary, use the monitor cable to make fine adjustments

Make slight adjustments to the antenna direction using the monitor cable. Since a wireless connection with the opposed device is required to complete this step, look through the antenna adjustment scope and adjust the direction first.
If you are not making slight adjustments using the monitor cable, proceed to "(6) Attach the metal mounting bracket" below.

1 Prepare the monitor cable.

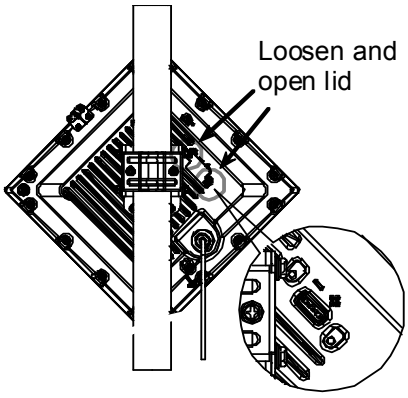
Only use our monitor cable sold as an option. The use of unsuitable cables will cause failures and incorrect operation.

Monitor cable

Connect to the Digital multimeter — Connect to the main unit

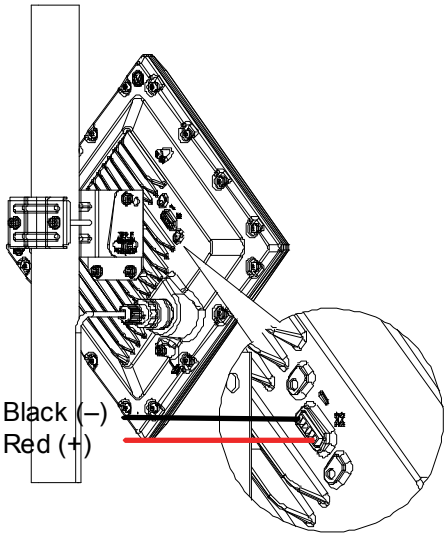
2 Before opening the lid for the received power monitor terminal, make sure that there is no water or foreign particles on or around the lid.
Be careful not to let any water or foreign particles inside.

3 Loosen the M4 hexagon socket bolts on the received power monitor terminal at the back of the main unit (back of the antenna) and open the lid of the received power monitor terminal.



4 Insert the monitor cable into the received power monitor terminal.

The main unit has a + symbol and a − symbol. Insert the monitor cable so that the red cable is on the + symbol side and the black cable is on the − symbol side.



5 Connect the alligator clip on the monitor cable to the digital multimeter.

Digital multimeter	Monitor cable
Negative electrode	Black cable (−)
Positive electrode	Red cable (+)

6 Start measuring the voltage with the digital multimeter.

If the power for the power supply device is off, the digital multimeter reading will be 0V.

7 Turn on the power to the power supply devices for both this product and the opposed device.

Power is supplied to this product and the opposed device. Check the lamp on the PoE power supply to confirm that power is being supplied to this product.

When you turn on the power to this product, the digital multimeter reading will go from 0V to approximately 3V and then it will read approximately 0.2 to 0.3V.
This reading does not change while the wireless is disconnected. In this case, look through the antenna adjustment scope to see if the direction of the antenna has changed.

8 When you establish a wireless connection with the opposed device, the digital multimeter changes according to the receive level.

9 To maximize a reading of the digital multimeter, make slight adjustments to the angle of orientation and angle of elevation for this device and the opposed device.

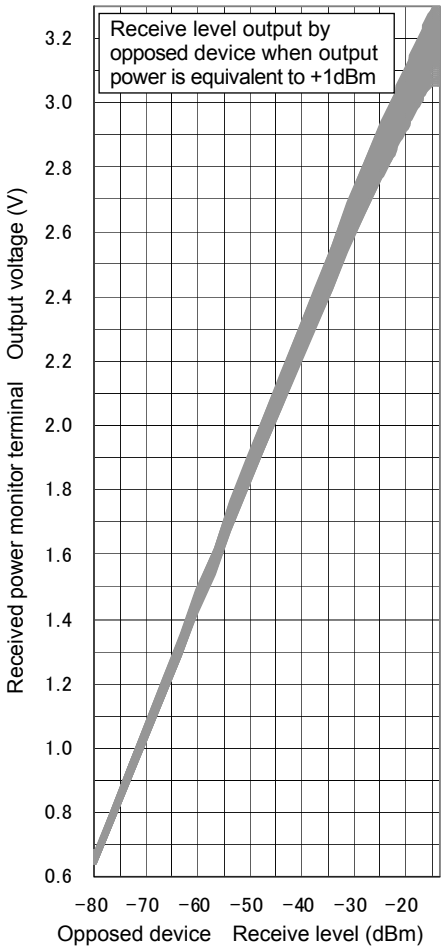
The output voltage for the received power monitor terminal shows the receive level for the opposed device when the output power for this device is equivalent to +1dBm.The variation in the output voltage is approximately 0.04V/dB.
For correspondance between the interval and the receive level, refer to "2-7 (1) Appropriate values for receive levels".

Adjust the antenna direction to maximize the digital multimeter reading.

Variances in the antenna direction may arise as a result of the slight adjustments for the digital multimeter, and the direction adjustment using the scope. If this happens, check the following.

- Make sure that you are using the scope correctly and looking through it correctly.
- If the receive level is varying as a result of a multipath, such as sea clutter, make sure that the antenna is correctly facing the peak direction.

Target for receive level during a wireless connection and the output voltage



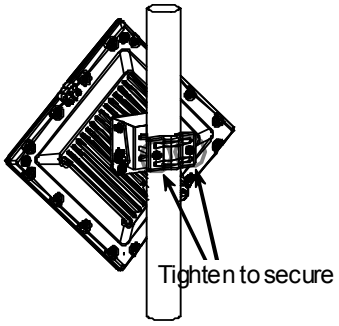
When wireless is disconnected:
Approx. 0.2 to 0.3V

When the power is off:
0V

(6) Attach the metal mounting bracket

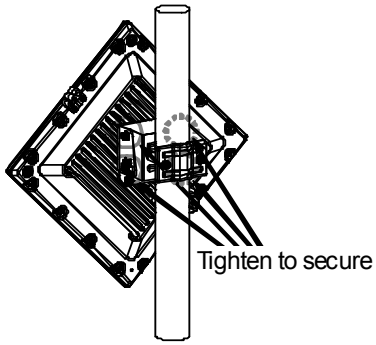
1 When you have finished adjusting the angle of orientation, mount on the mounting pole.

Firmly tighten the M6 bolts so that there is no slippage in the antenna direction.
Firmly tighten the bolts giving consideration to the shape and curvature of the pole.



2 When you have finished adjusting the angle of elevation, tighten the four M6 bolts and fix the angle of elevation for the metal mounting bracket.

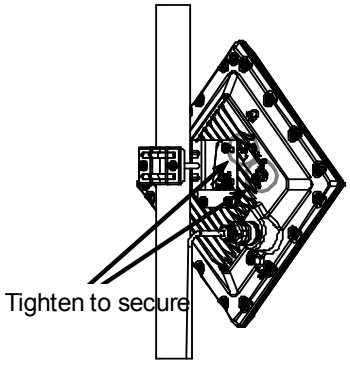
The torque for tightening the M6 nuts is 2.36 to 2.74 [N•m] (24 to 28 [kgf•cm]).



3 If you have used a monitor cable, remove the monitor cable from the main unit and cover by tightening the M4 hexagon socket bolts.

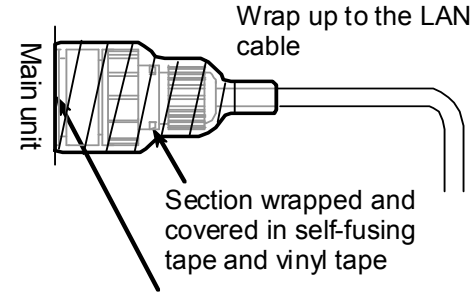
The torque for tightening the M4 hexagon socket bolts is 0.89 to 1.07 [N•m] (9.0 to 11.0 [kgf•cm]).

Before covering, check closely to make sure that there is no water or foreign particles inside.



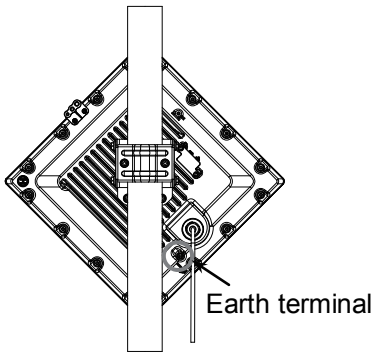
4 Wrap self-fusing tape over the drip-proof cap on the LAN cable connector on the main unit and then wrap vinyl tape on top of that.

Use about one meter of each tape.



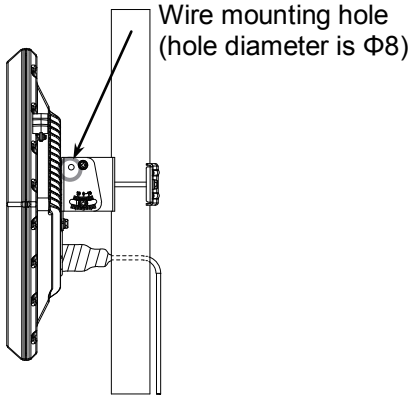
5 Connect the grounding wire with an M5 bolt.

Connect a grounding wire to the earth terminal (FG).



6 If required, take steps to prevent the equipment from falling.

To protect against the equipment falling, purchase the safety wire separately and use the wire installation holes on the metal mounting brackets.



3-6 Connecting to a LAN device

This product is an IEEE802.3af-compliant power receiving device. It connects to a LAN device, such as a switching hub, through PoE power supply equipment.
Verify the following details and then connect to a LAN device.

● LAN cables
- ☐ The total cable length from this product to the switching hub is not more than 100m.
- ☐ The LAN cables from this product to the switching hubs are all straight cables.
  (If the switching hub supports Auto MDI/MDI-X, you can also connect using a cross cable.)

● Switching hub
- ☐ 100BASE-TX (100Mbps full duplex) or equivalent.
  (This product supports 10Mbps communication and half-duplex communication)
- ☐ The setting for the connection port for connecting to this product is auto negotiation or 100Mbps full duplex fixed.
  This product supports auto negotiation. If connected devices do not support auto negotiation, link up using 100Mbps full duplex.

* This product is a repeater that relays all packets received from a LAN circuit, to the opposed device. It does not have a MAC address or VLAN filtering function. If you need to filter, perform filtering on a LAN device, such as a switching hub.

3-7 Checking the wireless status

Open the web maintenance window from a web browser on the configuration PC and check the wireless status. For information on the web maintenance window, refer to "4-7 Checking the wireless status".

(1) Appropriate receive level values

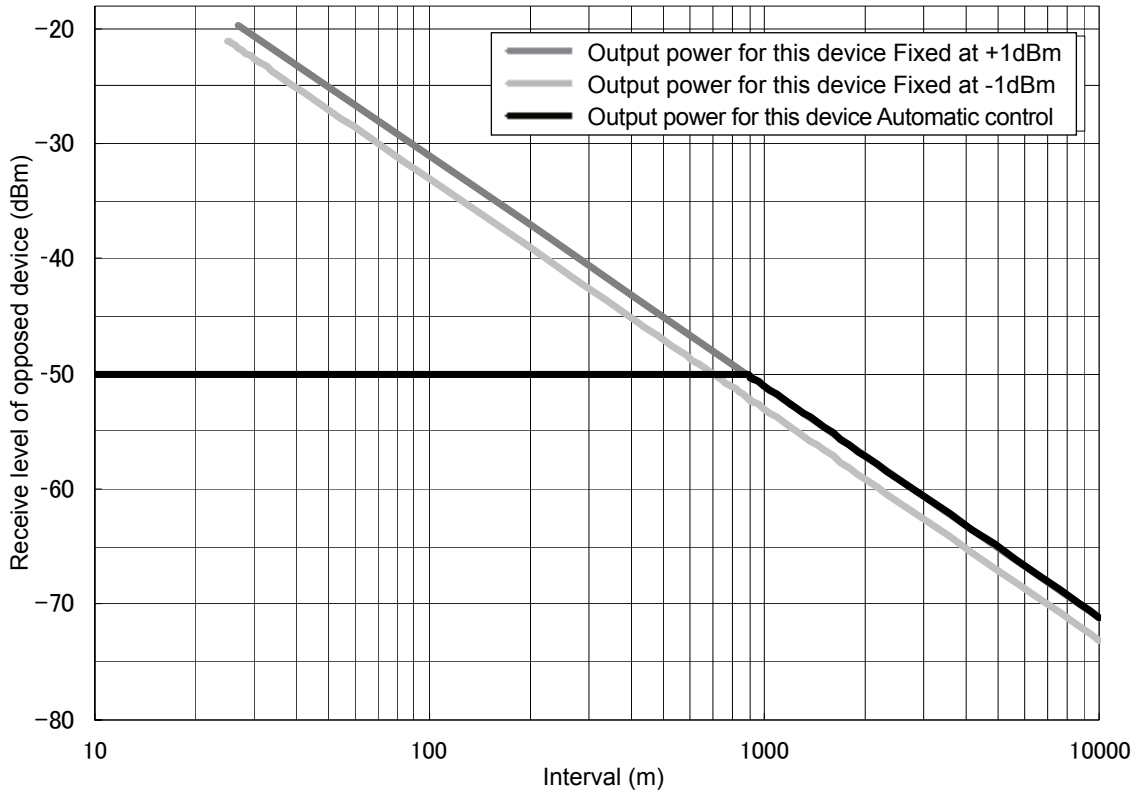
The interval and corresponding receive level (design value) when not raining is shown in the figure below.

Master and Slave Transmission Ratio (Master : Slave)	Output power	
	Master	Slave
5 : 5	Max +1dBm	Max +1dBm
8 : 2	Max -1dBm	

If the output power for this device is set to auto control, the receive level for the opposed device when nearby will be approximately -50dBm. In addition, the output voltage for the received power monitor terminal shows the receive level for the opposed device when the output power for this device is equivalent to +1dBm.
If the receive level is lower than the appropriate value, the antenna direction may have changed. Make adjustments as required.

If you are installing this product inside window glass or in a location that has obstructions, a low receive level may be measured as a result of attenuation from the glass or obstructions.

Chart of interval and corresponding receive levels (design values)

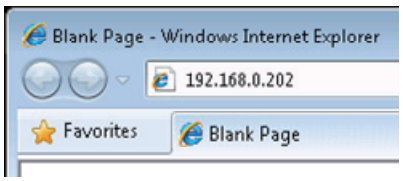


4. Performing Maintenance From a Web Browser

You can configure this product and check the status through a web browser on the configuration PC.

4-1 Logging in to the web maintenance window

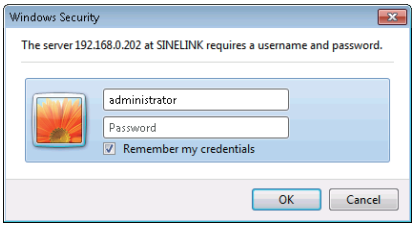
1 Open the web browser and enter the IP address for this product in the address bar to connect.
If you are not sure the IP address, contact the person who set the IP address in this product.



(Example of factory default settings)

2 Enter the user name and password.

- For the user name, enter the user name that you set.
  (The factory default setting is "**administrator**")
- For the password, enter the password that you set.
  (The factory default setting is not defined)



(Example of factory default settings)

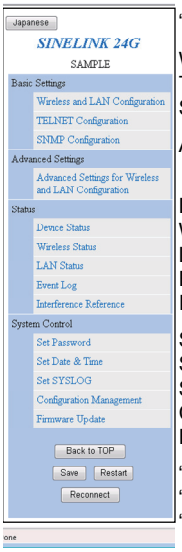
3 The main page is displayed.

In the web maintenance window, a menu is displayed on the left side and information is displayed on the right side.

When configuring this product's settings, click "Apply" in each settings window. If you open another window without clicking the "Apply" button, the entered information is not set and will be lost.
To save the settings you made, you also need to click the "Save" button on the menu on the left side. If you turn off the power without clicking the "Save" button, the settings you made are lost.

* Example for setting the Device Name as "SAMPLE"

4 On the menu on the left side, select the window that you want to display and click it using the mouse.



"Japanese" button

Wireless and LAN Configuration
TELNET Configuration
SNMP Configuration

Advanced Settings for Wireless and LAN Configuration

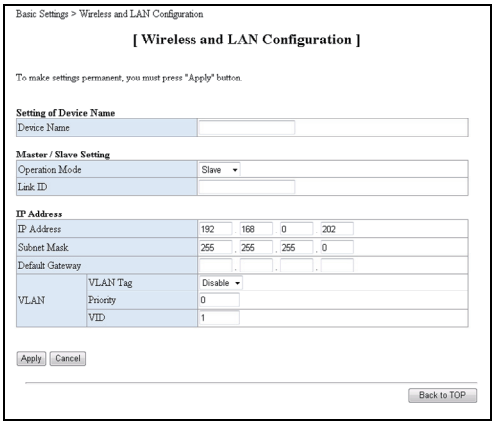
Device Status
Wireless Status
LAN Status
Event Log
Interference Reference

Set Password
Set Date & Time
Set SYSLOG
Configuration Management
Firmware Update

"Back to TOP" button
"Save" and "Restart" buttons
"Reconnect" button

4-2 Configuring basic wireless and LAN settings

1 To display the "Wireless and LAN Configuration" window, click "Wireless and LAN Configuration" on the menu.



Device Name

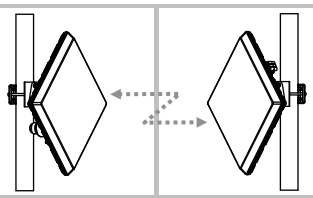
Enter any name. The information entered here is displayed under the product name in the menu on the left side of the web browser window.
You can enter up to 20 single-byte alphanumeric characters or symbols.
(Default value: none)

Operation Mode

Enter "Master" (primary station) or "Slave" (tributary station).
In wireless communication with an opposed device, you have to make one device the Master and the other device the Slave. You cannot perform wireless communication if both this device and the opposed device are Masters (or Slaves).
To apply the settings to operations, you need to issue instructions to reconnect to wireless.
(Default value: Slave)

Link ID

Enter the same strings as these on the opposed device. You cannot establish a wireless connection if you enter different strings.
You can enter up to six single-byte alphanumeric characters or symbols.
(Default value: Not set)

Opposed wireless commu-nication		
Operation Mode	Master	Slave
Link ID (Example)	ABCDEF	ABCDEF

[For preventing interference]
Set a different Link ID for each master and slave pair.
To ensure security, change the default ID.

If you set the same Link ID for multiple pairs, normal communication may not be possible (unable to communicate, pair combinations not acknowledged correctly, or unstable communication).

IP Address

Enter the IP address for this device. The input range is from Class A to Class C.
You have to save the setting and restart the device for the IP address settings to take effect.
(Default value: 192.168.0.202)

Subnet Mask

Enter the subnet mask for this device.
The input range is from 255.0.0.0 to 255.255.255.252.
You have to save the setting and restart the device for the subnet mask settings to take effect.
(Default value: 255.255.255.0)

Default Gateway

Enter the IP address of the default gateway for this device.
You have to save the setting and restart the device for the default gateway settings to take effect.
(Default value: Not set)

VLAN Tag

Enter whether to use a VLAN tag when you perform maintenance for this device from the configuration PC.

If you choose to use a VLAN tag, it continues maintenance communication with packets without VLAN until a VLAN packet is received. When a VLAN packet is received, it starts maintenance communication with VLAN packets.
Similarly, if you choose not to use a VLAN tag, it continues maintenance communication with VLAN packets until a packet without VLAN is received.

This product always relays both VLAN packets and packets without VLAN, regardless of the VLAN tag setting.
(Default value: Disable)

Priority

Enter a priority for VLAN tags sent to the configuration PC in communication on this device. The input range is from 0 to 7.
(Default value: 0)

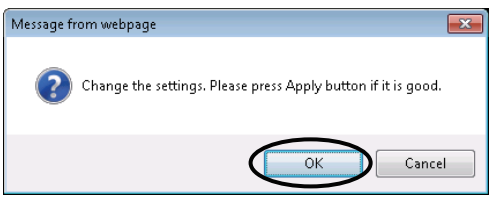
VID

Enter a VID to be used in communication on this device. The input range is from 1 to 4094.
(Default value: 1)

Enter a "IP Address" that is suitable for your LAN environment. If you make invalid entries, you cannot perform maintenance communication with this product.

2 Enter every setting, and then click the "Apply" button.

3 Click "OK" to set up this product.



4 On the menu, click the "Save" button.

The current settings information is saved to the internal flash memory.
The settings remain in the flash memory even after the power is turned off.

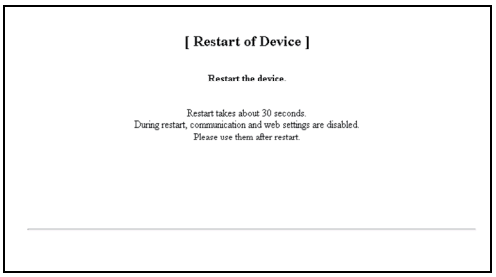
For details, refer to "4-16 Saving settings".

5 Click the "Restart" button.

For details, refer to "4-17 Restarting".

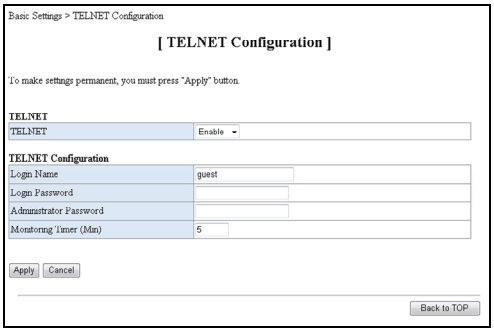
6 It takes approximately 30 seconds to restart.

After you have restarted, close the web browser.



4-3 Configuring TELNET

1 To open the "TELNET Configuration" window, click "TELNET Configuration" on the menu.



TELNET

Enter whether to use the TELNET server function of this product.
(Default value: Enable)

Login Name

Enter the login name for the TELNET server. You can enter up to 16 single-byte alphanumeric characters or symbols.
(Default value: guest)

Login Password

Enter the login password for the TELNET server. You can enter up to 16 single-byte alphanumeric characters or symbols.
(Default value: none)

Administrator Password

Enter the password for switching an account to the administrative user (administrator). You can enter up to 16 single-byte alphanumeric characters or symbols.
(Default value: none)

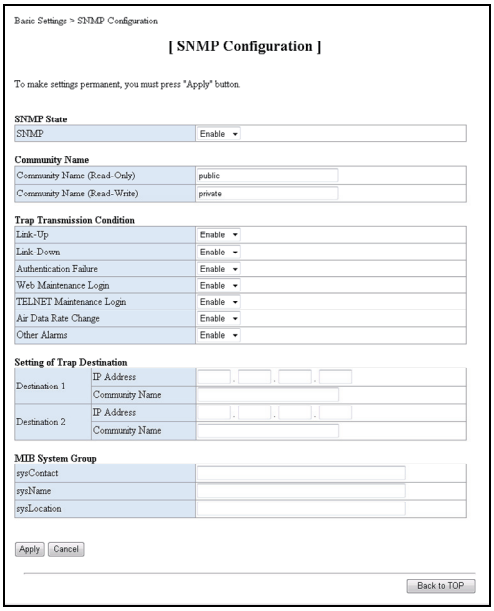
Monitoring Timer

Enter the time until TELNET is automatically disconnected after there is no key input. The input range is from 0 to 120 minutes. If you enter 0, monitoring to detect an absence of communication is not performed.
(Default value: 5)

2 Enter every setting, and then click the "Apply" button.

4-4 Configuring SNMP

1 To open the "SNMP Configuration" window, click "SNMP Configuration" on the menu.



SNMP
Enter whether to use the SNMP agent function of this product.
(Default value: Enable)

Community Name (Read-Only)
Enter the read-only community name for SNMP communication. You can enter up to 32 single-byte alphanumeric characters or symbols.
(Default value: public)

Community Name (Read-Write)
Enter the read-write community name for SNMP communication. You can enter up to 32 single-byte alphanumeric characters or symbols.
(Default value: private)

Link Up **Link Down**
Enter whether to send a SNMP trap when the connection status of a LAN or wireless changes.
(Default value: Enable)

Authentication Failure
Enter whether to send a SNMP trap when there is a read/write request under a community name that has not been set in this product.
(Default value: Enable)

Web Maintenance Login
TELNET Maintenance Login
Enter whether to send an SNMP trap when there is a login to the web maintenance/TELNET maintenance for this product.
(Default value: Enable)

Air Data Rate Change
Enter whether to send an SNMP trap when the wireless link speed changes. You can send a trap to the master only.
(Default value: Enable)

Other Alarms
Enter whether to send an SNMP trap in the event of warnings and recovery relating to conditions such as an abnormal temperature or no open wireless channels.
(Default value: Enable)

IP Address
Enter a destination IP address for SNMP traps.
(Default value: Not set)

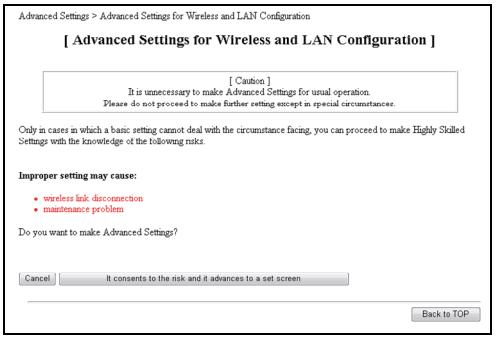
Community Name
Enter a destination community name for SNMP traps. You can enter up to 32 single-byte alphanumeric characters or symbols.
(Default value: Not set)

sysContact **sysName** **sysLocation**
Enter character strings that you want to set for the MIB-II system group sysContact, sysName, and sysLocation. You can enter up to 255 single-byte alphanumeric characters or symbols.
(Default value: Not set)

2 Enter every setting, and then click the "Apply" button.

4-5 Configuring advanced wireless and LAN settings

1 To display the "Advanced Settings for Wireless and LAN Configuration" confirmation window, click "Advanced Settings for Wireless and LAN Configuration" on the menu.

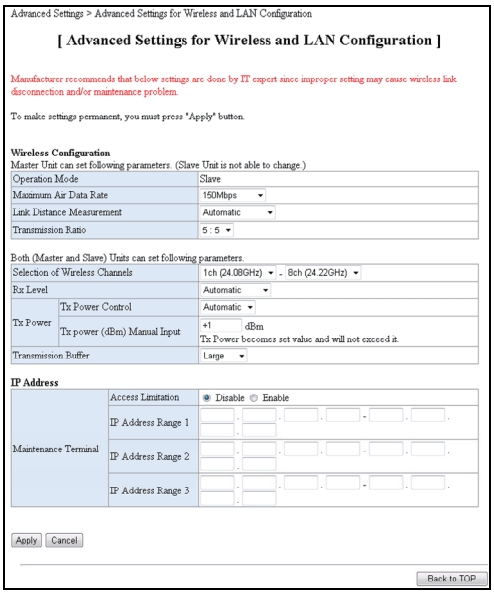


If you accept the risks associated with advanced settings, click the "It consents to the risk and it advances to a set screen" button.
If not, click "Cancel".

Risks Associated with Advanced Settings for Wireless and LAN Configuration

- wireless link disconnection
- maintenance may problem

2 To display the "It consents to the risk and it advances to a set screen" window, click "It consents to the risk and it advances to a set screen".



Operation mode

Shows the operation mode for this device.

Maximum Air Data Rate

For the maximum air data rate, enter any of 150Mbps/100Mbps/50Mbps-High/50Mbps-Low.
This product performs a adaptive modulation with the value entered in the master as the upper limit. Typically, if the receive level is the same, then the lower the wireless link speed, the less impact from interference and multipath fading.
(Default value: 150Mbps)

Interval Measurement

Enter whether to automatically measure the interval of the air data or to fix it at the maximum.
If the interval does not change, enter auto measurement. If it does change, set it at the maximum.

If you set it to auto measure, the distance is measured when wireless communication starts and the optimal wireless connection is established according to the interval.
If you set it at the maximum, the receive level on the master is measured at a low value. The differences in master measurements for each rate are shown below.

Rate	Difference
150Mbps	3 to 4dB
100Mbps	2 to 3dB
50Mbps-High	No difference
50Mbps-Low	No difference

To apply the settings to operations, you need to issue instructions to reconnect to wireless.
(Default value: Automatic)

Transmission Ratio

Enter whether to set the master to slave transmission ratio to 5:5 or 8:2.
If you set it to 5:5, the master to slave transmission speed will be the same.
If you set it to 8:2, the transmission speed for the master will be faster than 5:5 but the transmission speed for the slave will be slower by the same amount.
Set it to 8:2 when wireless communication traffic tends to be downbound (sending from the master to a slave) and the transmission speed is insufficient.
(Default value: 5:5)

Selection of Wireless Channels

Enter the range of wireless channels that will be automatically selected.
Set the range so that the entire range set in the master can be included in the range set in the slave.

Master CH range ⊆ Slave CH range

To apply the settings to operations, you need to issue instructions to reconnect to wireless.
The input range is from 1 to 8.
(Default value: 1 to 8)

Automatic Interval Switching

Enter whether to automatically switch the receive level distance or set it to distant.
If the interval does not change, enter auto distance switching. If it does change, set it to distant.

If you set it to long distant, control the output power of the opposed device so that the receive level does not exceed -30dBm.
If you set it to auto switch, "Wireless input exceeded" is displayed in the "Device status" window and the "Wireless Status" window, and the value displayed for the receive level will be incorrect.
To apply the settings to operations, you need to issue instructions to reconnect to wireless.
(Default value: Automatic)

Automatic Control

Enter whether to automatically control the output power or to fix it.
Normally, set to Automatic. If you need to fix the output power when looking at the receive level of the opposed device and checking the direction of the antenna, and when adjusting the radio propagation, set this value to fixed.
When you enter automatic control, the output power is automatically adjusted so that the receive level for the opposed device is around -50dBm.
(Default value: Automatic)

Output power (dBm)

Enter the output power when the output power is fixed. Enter the lowest required value.
The input range is from -25 to +1dBm.
(Default value: +1)

Transmission Buffer

For the wireless send buffer capacity, enter any of Large/Medium/Small.
When data is received from a LAN, this producttemporarily stores it in the wireless send buffer. The data is then sent in order when it becomes possible to perform a wireless send. If the wireless send buffer is full, the received data is discarded.
If you increase the capacity of the wireless send buffer, less data is discarded but there are longer delays when the buffer is full. Reducing the capacity has the reverse effect.
If you change the size of the wireless send buffer, LAN and wireless send/receives stop temporarily. Sending/receiving is resumed after changes to the size are complete.
(Default value: Large)

Access Limitation

Enter whether or not to limit access to this product.
If you select not to limit, this product maintenance cannot be performed from devices outside of the IP address range.
(Default value: Enable)

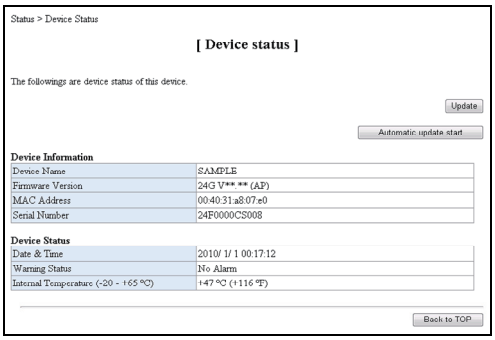
IP Address Range

Enter the range of IP addresses that are allowed access.
Make suitable entries for your LAN environment in the settings of IP address range.
If you make invalid entries, you cannot perform maintenance communication with this product.
(Default value: Not set)

3 Enter every setting, and then click the "Apply" button.

4-6 Checking the device status

1 To display the "Device status" window, click "Device Status" on the menu.



Device Name

Shows the device name which is set.

Firmware Version

Shows the version of firmware that is currently running.

MAC Address

Shows the MAC address for this product.

Serial Number

Shows the serial number for this product.

Date & Time

Shows the current time for the internal clock.
When the power is turned off and then on, or an error in the clock time became large, reset the correct date and time in the "Setting for Date & Time" window.

Warning Status

Shows warning information when a warning occurs.

Warning Status
"**Currently no warnings**" There are no errors
"**LAN not connected**" The LAN has been disconnected
"**Wireless not connected**" The wireless communication has been disconnected
"**No open wireless channels**" Could not find any wireless channels that are not being used (Only shows the master)
"**Deterioration in the wireless receive S/N ratio**" The quality of the wireless link has deteriorated
"**Wireless input exceeded**" The wireless input has been exceeded
"**Device temperature increased**" A temperature anomaly has occurred
"**Hardware failure …**" A hardware error has been detected

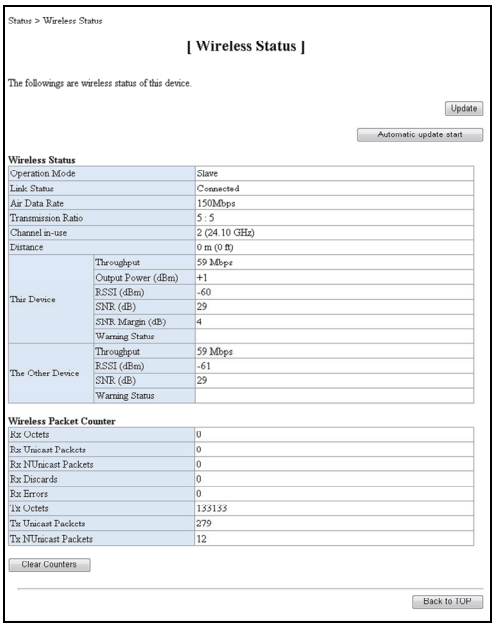
Internal Temperature

Shows the internal temperature for this device.

If you click the "Automatic update start" button, automatic updates for this window start and the button changes to "Automatic update stop". To stop automatic updates, click the "Automatic update stop" button.

4-7 Checking the wireless status

1 To display the "Wireless Status" window, click "Wireless Status" on the menu.


Status > Wireless Status

[Wireless Status]

The followings are wireless status of this device.

Update

Automatic update start

Wireless Status

Operation Mode		Slave
Link Status		Connected
Air Data Rate		150Mbps
Transmission Ratio		5 : 5
Channel in-use		2 (24.10 GHz)
Distance		0 m (0 ft)
This Device	Throughput	59 Mbps
	Output Power (dBm)	+1
	RSSI (dBm)	-60
	SNR (dB)	29
	SNR Margin (dB)	4
	Warning Status	
The Other Device	Throughput	59 Mbps
	RSSI (dBm)	-61
	SNR (dB)	29
	Warning Status	

Wireless Packet Counter

Rx Octets	0
Rx Unicast Packets	0
Rx NUnicast Packets	0
Rx Discards	0
Rx Errors	0
Tx Octets	155155
Tx Unicast Packets	279
Tx NUnicast Packets	12

Clear Counters

Back to TOP

Operation Mode
Shows the operation mode for this product.

Link Status
Shows the status of the connection with the opposed device.

Air Data Rate
Displays the air data rate. This product makes the adaptive modulation.
The speed switches between 150Mbps/100Mbps/50Mbps-High/50 Mbps-Low, depending on the conditions.

Transmission Ratio
Shows a transmission ratio of master to slave.
5:5 or 8:2 is displayed, depending on the conditions.

Channel in-use
Shows the wireless channel number that this product uses.

Distance
Shows the distance of the wireless link.
The distance is displayed in units of 12m and may include errors of approximately 0 to +36m.
If the interval measurement is set to maximum, "---" is displayed.

Throughput
Shows the throughput for this device or the opposed device.
This product switches the throughput according to the transmission ratio and the air data rate of the master and slave.

Transmission ratio 5:5

Air Data Rate	Throughput	
	Master	Slave
150Mbps	59Mbps	
100Mbps	39Mbps	
50Mbps-High	19Mbps	
50Mbps-Low	13Mbps	

Transmission ratio 8:2

Air Data Rate	Throughput	
	Master	Slave
150Mbps	95Mbps	23Mbps
100Mbps	62Mbps	15Mbps
50Mbps-High	31Mbps	7Mbps
50Mbps-Low	22Mbps	5Mbps

Output Power
Shows the output power for this product.
When the output power is less than -25dBm, the value will be inaccurate due to measurement errors.

RSSI
Shows the rssi for this device or the opposed device.

SNR
Shows the quality of the receive signal for this device or the opposed device.

SNR Margin
Shows the receive S/N ratio margin at the current air data rate.
When this value is small, the link speed might drop one level, depending on the wireless status.

Warning Status

Shows the warning status for this device or the opposed device.

Warning Status
(Blank) There are no errors
"**No open wireless channels**" Could not find any wireless channels that are not being used (Only shows the master)
"**Wireless input exceeded**" The wireless input has been exceeded

Rx Octets

Tx Octets

Shows the total number of octets for packets that have been transmitted/received.

Rx Unicast Packets

Tx Unicast Packets

Shows the number of unicast packets that have been transmitted/received.

Rx NUnicast Packets

Tx NUnicast Packets

Shows the total number of multicast packets and broadcast packets that have been transmitted/received.

Rx Discards Packets

Shows the number of packets that have been transmitted from the opposed device and discarded.

Rx Errors

Shows how many times packets have been transmitted from the opposed device but have resulted in an error and could not be received.
If the packet continues to be an error, the number of packets that could not be received, and the number of errors, may not match.

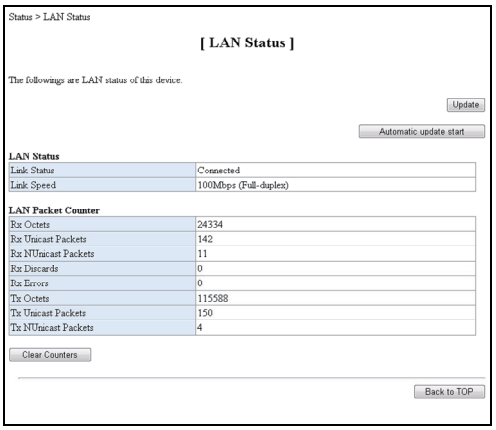
If you click the "Automatic update start" button, automatic updates for this window start and the button changes to "Automatic update stop".

To stop automatic updates, click the "Automatic update stop" button.

To reset the wireless packet counter to 0, click the "Clear Counters" button.

4-8 Checking the LAN status

1 To display the "LAN Status" window, click "LAN Status" on the menu.



Link Status
Shows the status of the connection with the LAN device.

Link Speed
Shows the LAN link speed.

Rx Octets
Tx Octets
Shows the total number of octets for packets that have been transmitted/received.

Rx Unicast Packets
Tx Unicast Packets
Shows the number of unicast packets that have been transmitted/received.

Rx NUnicast Packets
Tx NUnicast Packets
Shows the total number of multicast packets and broadcast packets that have been transmitted/received.

Rx Discards Packets
Shows the number of damaged packets that have been sent from the LAN device.

Rx Errors
Shows how many times packets have been transmitted from a LAN device but have resulted in an error and could not be received.

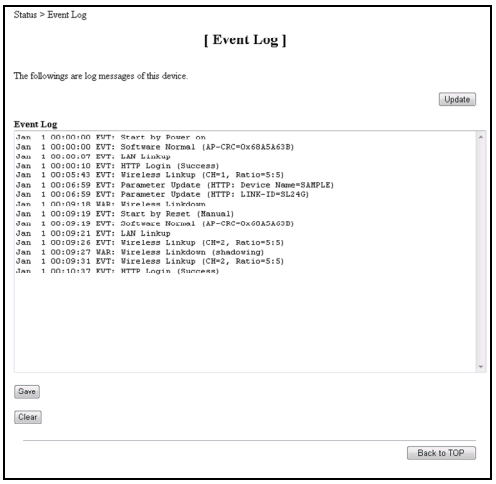
If the packet continues to be an error, the number of packets that could not be received, and the number of errors, may not match.

If you click the "Automatic update start" button, automatic updates for this window start and the button changes to "Automatic update stop". To stop automatic updates, click the "Automatic update stop" button.

To reset the LAN packet counter to 0, click the "Clear Counters" button.

4-9 Displaying a log

1 To open the "Event Log" window, click "Event Log" on the menu.



Event Log

Shows the log for this product.

The log shows the most recent 63 items since the power was turned on.

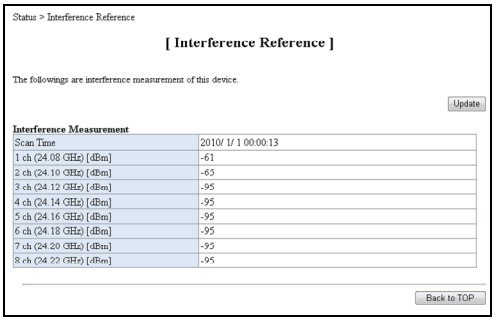
Each log shows the date, time, event type, and details. For information on logs, refer to "7-4 Log details"

To save a log, click the "Save" button.

To clear all logs, click the "Clear" button.

4-10 Displaying the interference wave

1 To open the "Interference Reference" window, click "Interference Reference" on the menu.



Scan Time

Shows the date and time that the interference was measured prior to the wireless connection.

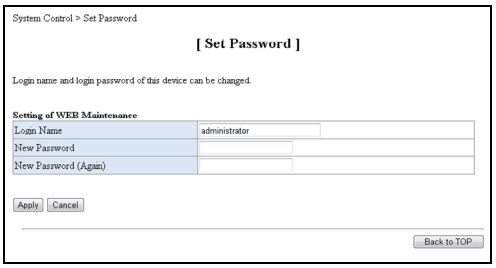
Each Wireless CH

Shows the interference wave level (peak value) for each wireless channel prior to the wireless connection.

If a master wireless send is performed, the receive level from the master is also measured as an interference wave in the slave.

4-11 Changing login information

1 To display the "Set Password" window, click "Set Password" on the menu.



Login Name

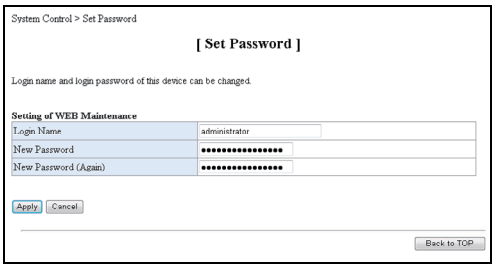
Enter the login name for the web maintenance.
You can enter up to 16 single-byte alphanumeric characters or symbols.
(Default value: **administrator**)

New Password

New Password (Again)

Enter a new password.
You can enter up to 16 single-byte alphanumeric characters or symbols.
(Default value: Not set)

2 Enter the login name and password, and then click the "Apply" button.

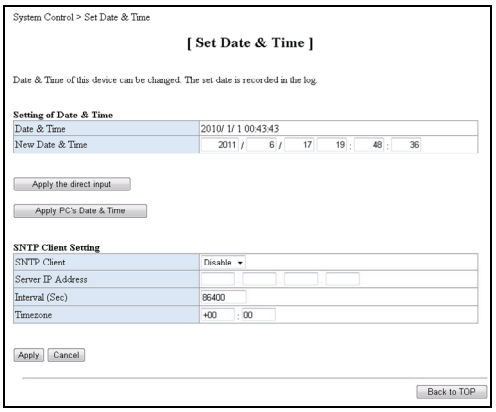


The new login name and password are now effective.

When you change the login name and password, always keep a separate record of the information so that you do not forget it. If you forget your login name and password, you will not be able to perform device maintenance. Charges apply to reset login information at the factory.

4-12 Setting the time

1 To open the "Set Date & Time" window, click "Set Date & Time" on the menu.



Date & Time

Shows the current time for the internal clock.
When the power is turned off and then on, or an error in the clock time became large, reset the correct date and time in this window.

New Date & Time

Enter the new date and time.

After you enter the date and time, click "Apply the direct input".
The date and time of the internal clock changes to the entered date and time.

To set to the date and time of the configuration PC, click "Apply PC's Date & Time".
The date and time of the internal clock becomes the same as the configuration PC date and time.

SNTP Client
Enter whether to use the SNTP client function.
(Default value: Disable)

Server IP Address
Enter the IP address for SNTP server.
(Default value: Not set)

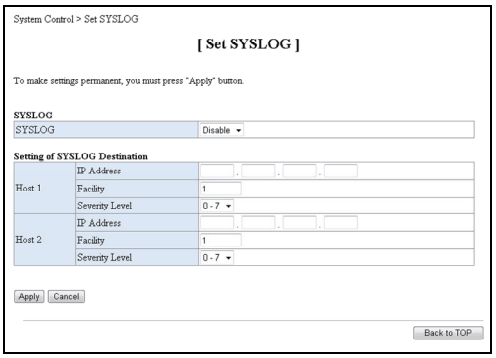
Interval (Sec)
Enter the period for retrieving the time.
The input range is from 16 to 262144 seconds.
(Default value: 86400)

Timezone
Enter the timezone.
The input range is from -12:00 to +14:00.
(Default value: +9:00)

2 Enter the SNTP client function, and then click the "Apply" button.

4-13 Configuring SYSLOG

1 To open the "Set SYSLOG" window, click "Set SYSLOG" on the menu.



SYSLOG
Enter whether to use the SYSLOG function.
(Default value: Disable)

IP Address
Enter the IP address for the SYSLOG server.
(Default value: Not set)

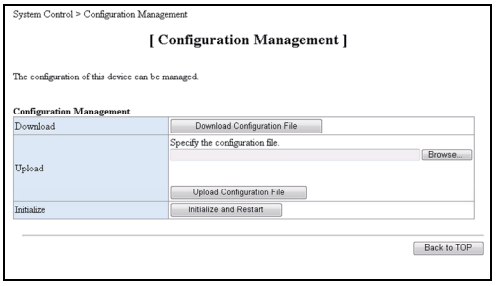
Facility
Enter the facility.
The input range is from 0 to 23.
(Default value: 1)

Severity Level
For the sent log severity level, enter either 0 / 0-1 / 0-2 / 0-3 / 0-4 / 0-5 / 0-6 / 0-7.
(Default value: 0-7)

2 Enter every setting, and then click the "Apply" button.

4-14 Managing settings

1 To display the "Configuration Management" window, click "Configuration Management" on the menu.



Download

To save the configuration for this device in the configuration PC, click the "Download Configuration File" button.
The downloaded configuration file contains the information on settings that have been changed from the factory default settings, but the various password settings, TELNET disabled setting, and date and time settings are not applied.

Upload

To start sending the configuration file to this product, click the "Upload Configuration File" button. After the file has been sent, this product saves it in the flash memory and restarts.
The settings for this product will be changed to the information recorded in the configuration file applied to the factory default settings.

Initialize

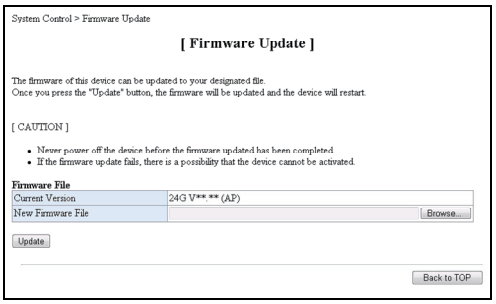
To change this product settings back to the factory default settings and automatically restart, click the "Initialize and Restart" button.
The settings saved in the flash memory also change back to the factory default settings.

2 It takes approximately 30 seconds to restart.

If you update and reset the settings remotely using a LAN, the LAN settings will be changed and you will no longer be able to log in remotely after restarting.
If this happens, connect a PC to the switching hub that this product is connected to, and reconfigure the settings.

4-15 Updating firmware

1 To display the "Firmware Update" window, click "Firmware Update" on the menu.



Current Version

Shows the version of firmware that is currently running on this product.

Updated Firmware File

Enter the name of the firmware file to be sent to this product.

2 Check the important points regarding updating firmware.

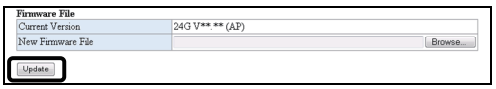
IMPORTANT NOTES ON USE

Update the firmware at your own risk. Hitachi Kokusai Electric assumes no responsibility for damages arising out of the firmware update, whether direct or indirect.

Never do power off device before the firmware is completed. Also, be careful not to interrupt communication (for example, remove the LAN cable).
There is possibility not to be able to activate device when the firmware update fails.

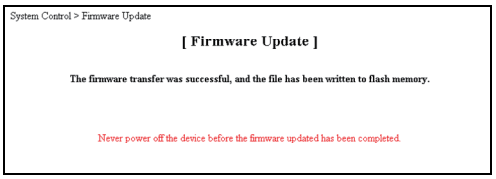
For this product repeaters that have already been installed and are in operation, perform the firmware updates sequentially starting from the devices that are installed a long way away.
If the master and slave have different firmware versions, you may not be able to establish a wireless connection.

3 Enter the firmware file name, and then click "Update".



4 To start sending the configuration file from the configuration PC to this product, click the "OK" button.

5 Once the firmware file is successfully sent, the firmware is updated.

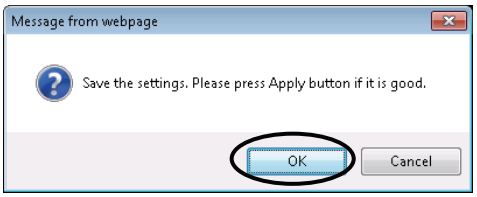


6 Once the firmware file is successfully updated, the system restarts.
It takes approximately 30 seconds to restart.
After you have updated the firmware, close the web browser.

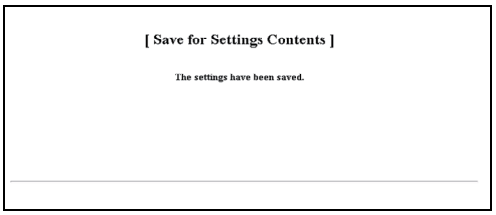
4-16 Saving settings

1 On the menu, click the "Save" button.

2 Click "OK" to save the settings information into the flash memory.

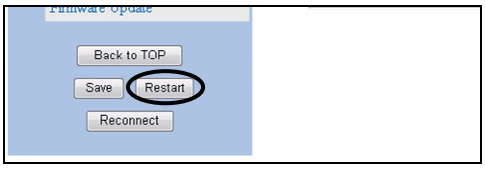


3 Do not turn off the power before the save operation is completed.

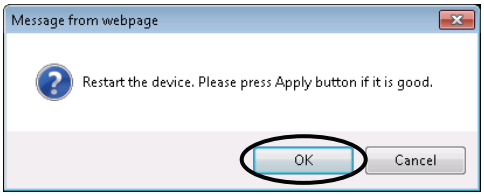


4-17 Restarting

1 On the menu, click the "Restart" button.

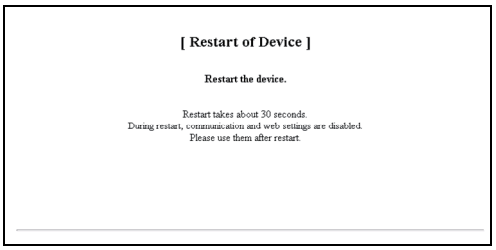


2 Click "OK" to restart this product.



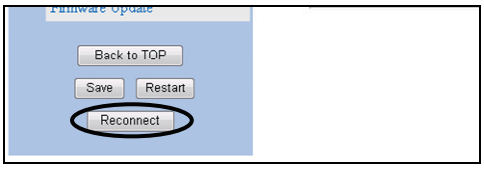
3 It takes approximately 30 seconds to restart.

After you have restarted, close the web browser.

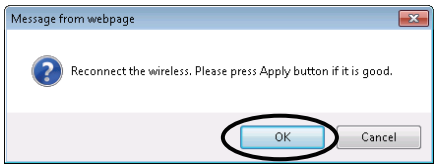


4-18 Reconnecting wireless connection

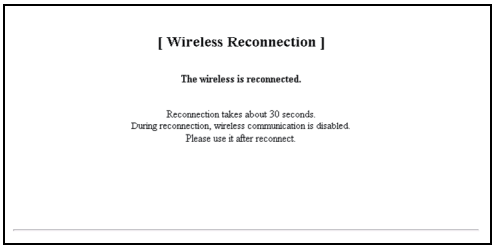
1 Click the "Reconnect" button.



2 Click "OK" to disconnect the wireless connection.



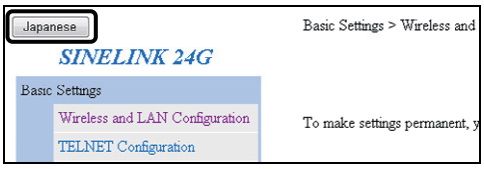
3 The wireless connection changes to the disconnected status.



4 The wireless connection is automatically reconnected.

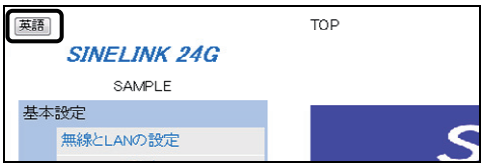
4-19 Changing the display language

1 Click the "Japanese" button.



2 The japanese page is displayed.

3 Click the "英語" button.



4 The english page is displayed.

5. Performing Maintenance From TELNET

You can configure and view the status of this product using command inputs from TELNET.

5-1 How to perform operations using TELNET

5-1-1 Configuration procedure

Use the following procedure to configure settings in TELNET.

1. Enter a user name and password to log in to TELNET as a general user.
(Default value: the user name is "guest" and a password is not set)

   The ">" command prompt is displayed.

2. Enter the administrator command and the password for an administrator user to log in as an administrator.
(Default value: an administrator user password is not set)

   The "$" command prompt is displayed.

3. Use the various commands to change settings.
Changes to settings are immediately applied to operations (except for some commands).

4. Check operations after settings have been changed.

5. Run the save command to save the settings information to the flash memory.
Even if you change settings, the settings are not saved in the flash memory until you run the save command.
However, the tftp get config command and the initialize command can save the settings in flash memory without the need to run the save command.

6. Run the logout command to log out of TELNET.
If you changed settings using the ip address command, restart using the restart command.

5-1-2 Command input characters

The characters that you can input in commands are alphanumeric characters and symbols between ASCII code 0x20 and 0x7e.
If you enter a "space" (0x20) or a "?" (0x3f) in character strings such as names, enclose these characters in double quotations marks (0x22).
You can enter a character string of up to 288 characters for one command and need to enter a line break/Enter (0x0d) at the end of the command.

5-1-3 Support of control keys

This product supports the following control keys.

Key	Role
BS	Deletes one character
TAB	Command completion
← or ctrl-b	Moves to the left by one character
→ or ctrl-f	Moves to the right by one character
↓ or ctrl-n	Goes to the next newest record
↑ or ctrl-p	Goes to the next oldest record
ctrl-a	Goes to the beginning of the line
ctrl-d	Deletes one character at the cursor
ctrl-e	Goes to the end of the line
ctrl-k	Deletes all characters after the cursor

5-1-4 About TFTP

The TFTP client function (tftp get/put command) of this product provides you to download/upload settings and update firmware from a user-provided TFTP server.

5-1-5 Command input format

The format for command inputs in this manual is as follows:

- Command name **Bold** text indicates a command name.
- Parameters *Italic* text indicates the parameters for each command.
- Optional Parameters enclosed in parenthesis ([ ]) indicates that the parameter is optional.

5-2 List of commands

The following list shows a list of commands and the page numbers in this manual that describe each command.

5-3 Help

5-3-1 Displaying the list of commands

Input format:	**?**
	help
Executing user	General user, administrator
Operation:	Shows a list of commands that can be input.

5-3-2 Displaying the command help

Input format:	**A whitespace and "?" at the end of the command**
Executing user	General user, administrator
Operation:	Shows command input options.

5-4 Device settings

5-4-1 Setting the login name

Input format: **telnet name** *loginname*
no telnet name

Input options
loginname Login name: 1 to 16 single-byte alphanumeric characters or symbols. (Default value: guest)

Executing user: General user, administrator

Operation: Sets the login name for TELNET.
To delete a login name, add "no" to the beginning of the line.

5-4-2 Setting the login password

Input format: **telnet password** *password*
no telnet password

Input options
password Login password: 1 to 16 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user: General user, administrator

Operation: Sets the login password for TELNET.
To delete a login password, add "no" to the beginning of the line.

5-4-3 Setting the administrator password

Input format: **administrator password** *password*
no administrator password

Input options
password Administrator password: 1 to 16 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user: Administrator

Operation: Sets the password for administrators.
To delete an administrator password, add "no" to the beginning of the line.

5-4-4 Setting the timezone

Input format: **timezone** *offset*

Input options
offset Timezone offset: -12:00 to +14:00 (default value: +9:00)

Executing user: Administrator

Operation: Sets the timezone offset.

5-4-5 Setting the date

Input format: **date** *date*

Input options
date yyyy/mm/dd
yyyy : Year (A.D.)
mm : Month
dd : Day
(Default value: 2010/01/01)

Executing user: Administrator

Operation: Sets the date. This setting returns to the default value when the power is turned off.

5-4-6 Setting the time

Input format: **time** *time*

Input options
- *time* hh:mm:ss (Default value: 00:00:00)
  - hh : Time (24-hour time)
  - mm : Minutes
  - ss : Seconds

Executing user: Administrator

Operation: Sets the time. This setting returns to the default value when the power is turned off.

5-4-7 Setting the enabling/disabling of the SNTP client

Input format: **sntp** *switch*

Input options
- *switch* Enables/disables the SNTP client function: (default value:disable)
  - enable Enables the SNTP client function.
  - disable Disables the SNTP client function.

Executing user: Administrator

Operation: Sets the enabling/disabling of the SNTP client

5-4-8 Sets the IP address for the SNTP server

Input format: **sntp host** *ipaddress* [*interval*]
no sntp host

Input options
- *ipaddress* IP address for the SNTP server: (default value:not set)
- *interval* Update interval for the SNTP server time (seconds): 16 to 262144 (seconds). (Default value: 86400)

Executing user: Administrator

Operation: Sets the IP address for the SNTP server.
To delete an SNTP server, add "no" to the beginning of the line.

5-4-9 Setting the device name

Input format: **device name** *devicename*
no device name

Input options
- *devicename* Device name: 1 to 20 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user: Administrator

Operation: Sets the name of this device.
To delete the name for this device, add "no" to the beginning of the line.

5-4-10 Setting the enabling/disabling of SYSLOG

Input format: **syslog** *switch*

Input options
- *switch* Enables/disables the SYSLOG client function: (default value:disable)
  - enable Enables the SYSLOG client function.
  - disable Disables the SYSLOG client function.

Executing user: Administrator

Operation: Sets the enabling/disabling of the SYSLOG client

5-4-11 Setting the IP address for the SYSLOG server

Input format: **syslog** *host ipaddress* [*facility*] [*serveritylevel*]
no syslog *host*

Input options
host host1 SYSLOG server 1
host2 SYSLOG server 2
ipaddress IP address for the SYSLOG server: (default value: not set)
facility SYSLOG facility: 0 to 23 (default value: 1)
severitylevel Maximum severity sent by SYSLOG: 0 to 7 (default value: 7)
0: Only severity0(Emergency) is sent.
1: severity0-1(Alert) is sent.
2: severity0-2(Critical) is sent.
3: severity0-3(Error) is sent.
4: severity0-4(Warning) is sent.
5: severity0-5(Notice) is sent.
6: severity0-6(Informational) is sent.
7: severity0-7(Debug) is sent.

Executing user Administrator

Operation : Sets the IP address for the SYSLOG destination.
To delete a SYSLOG destination, add "no" to the beginning of the line.

5-4-12 Setting the timer for no communication

Input format: **telnet timeout** *time*

Input options
time Timeout time for the TELNET no communication status (minutes): 0 to 120 (minutes). (Default value: 5)
If you set 0, no communication monitoring is not performed.

Executing user General user, administrator

Operation: Sets the TELNET timeout period when there is no communication.

5-5 IP communication-related settings

5-5-1 Setting the IP address

Input format: **ip address** *ipaddress subnetmask* [*defaultGateway*]

Input option
- *ipaddress* IP address for this device: (default value: 192.168.0.202)0
- *subnetmask* Subnet mask: (default value: 255.255.255.0)
- *defaultGateway* IP address for the default gateway: (default value: not set)

Executing user: Administrator

Operation:
Sets the IP address for this device.
Enter suitable values for your LAN environment. If you make invalid entries, you cannot perform maintenance communication with this product.
You have to save the setting and restart the device for the IP address settings to take effect.

5-5-2 Setting IP access permissions

Input format: **ip access limitation** *switch*

Input options
- *switch* Enables/disables IP access permissions: (default value: disable)
  - enable Enables IP access permissions
  - disable Disables IP access permissions

Executing user: Administrator

Operation: Sets the enabling/disabling of IP access permissions

5-5-3 Setting the IP access list

Input format: **ip access** *list start end*
no ip access *list*

Input options
- *list* list1 List 1
  list2 List 2
  list2 List 3
- *start* the first IP address that is allowed access: (default value: not set)
- *end* the last IP address that is allowed access (default value: not set)

Executing user: Administrator

Operation:
Sets the IP access list.
To delete a list, add "no" to the beginning of the line.
Make suitable entries for your LAN environment in the settings of IP access list. If you make invalid entries, you cannot perform maintenance communication with this product.

5-5-4 Setting VLAN usage

Input value: **vlan** *switch*

Input options
- *switch* Enables/disables use of a VLAN in communication with this device (default value: disable)
  - enable VLAN is used in communication with this device
  - disable VLAN is not used in communication with this device

Executing user: Administrator

Operation:
Sets the enabling/disabling of a VLAN in TCP/IP communication with this device.
If you enter enable, it continues maintenance communication with packets without VLAN until a VLAN packet is received. When a VLAN packet is received, it starts maintenance communication with VLAN packets.
Similarly, if you enter disable, it continues maintenance communication with VLAN packets until a packet without VLAN is received.

5-5-5 Setting the VLAN ID

Input format:	**vlan id** *vid* [*priority*]	
Input options	*vid*	VLAN ID (VID): 1 to 4094. (Default value: 1)
	priority	The priority value when sending from this device: 0 to 7. (Default value: 0)
Executing user	Administrator	
Operation:	Sets the VID and priority in the VLAN tag.	

5-6 Wireless-related settings

5-6-1 Setting operation mode

Input format: **wireless operationmode** *mode*

Input option *mode* Operation mode (default value: slave)
- master Sets to master
- slave Sets to slave

Executing user Administrator

Operation: Sets the wireless operation mode.
To apply the settings to operations, you need to issue instructions to reconnect to wireless.

5-6-2 Setting the link ID

Input format: **wireless linkid** *linked*
no wireless linkid

Input options *linkid* Link ID: 1 to 6 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user Administrator

Operation: Sets the wireless link ID.
To delete a link ID, add "no" to the beginning of the line.

5-6-3 Setting the range of wireless channels used

Input format: **wireless channel** *start end*

Input options *start* The first automatically selected wireless channel: 1 to 8 (CH). (Default value: 1)
end The last automatically selected channel: 1 to 8 (CH). (Default value: 8)

Executing user Administrator

Operation: Sets the range of wireless channels that will be automatically selected.
To apply the settings to operations, you need to issue instructions to reconnect to wireless.

5-6-4 Setting the output power auto control

Input format: **wireless atpc** *switch*

Input options *switch* Enables/disables auto control of the output power: (default value: enable)
- enable Enables auto control of the output power
- disable Fixes the output power

Executing user Administrator

Operation: Set the enabling/disabling of the auto control function for the output power.

5-6-5 Setting the output power

Input format: **wireless txpower** *txpower*

Input options *txpower* Fixed value for the output power: -25 to +1(dBm). (Default value: +1)

Executing user Administrator

Operation: Sets the output power value.

5-6-6 Setting the maximum air data rate

Input format: **wireless maxairdatarate** *datarate*

Input options *datarate* Sets the upper limit of the air data rate: (default value: 150m)

150 m	90Mbps
100m	100Mbps
50m-high	50Mbps-High
50m-low	50Mbps-Low

Executing user Administrator

Operation: Sets the upper limit of the air data rate.

5-6-7 Setting the link distance measurement

Input format: **wireless distance measurement** *switch*

Input options *switch* Distance auto measurement/maximum fixed (default value: automatic)

automatic	Automatically measures the distance of the wireless link
maximum	Sets the wireless link distance to maximum

Executing user Administrator

Operation: Set the enabling/disabling of automatic execution of the distance measurement.
To apply the settings to operations, you need to issue instructions to reconnect to wireless.

5-6-8 Setting the wireless transmission ratio for the master

Input format: **wireless mastertxratio** *ratio*

Input options *ratio* The master and slave transmission ratio: (default value: 50)

50	The master and slave transmission ratio is 50% to 50%
80	The master and slave transmission ratio is 80% to 20%

Executing user Administrator

Operation: Sets the wireless transmission ratio for the master.

5-6-9 Setting the size of the wireless transmission buffer

Input format: **wireless txbufsize** *size*

Input options *size* Size of the wireless transmission buffer (default value: 255)

0	Sets a small transmission buffer size
15	Sets a medium transmission buffer size
255	Sets a large transmission buffer size

Executing user Administrator

Operation: Sets the size of the wireless transmission buffer.
If you change the size of the wireless transmission buffer, LAN and wireless transmission/receive will stop temporarily. Transmitting/receiving is resumed after changes to the size are complete.

5-6-10 Setting automatic interval switching

Input format: **wireless interval switching** *switch*

Input options *switch* Automatic interval switching/maximum fixed (default value: automatic)

automatic	Enables automatic switching
longdistance	Fixes to the long distance

Executing user Administrator

Operation: Sets the enabling/disabling of automatic interval switching
To apply the settings to operations, you need to issue instructions to reconnect to wireless.

5-7 Web maintenance settings

5-7-1 Setting the enabling/disabling of HTTP

Input format: **http** *switch*

Input options
- *switch* — Enables/disables the HTTP server function: (default value: enable)
  - enable — Enables the HTTP server function.
  - disable — Disables the HTTP server function.

Executing user: Administrator

Operation: Sets the enabling/disabling of HTTP access.

5-7-2 Setting the HTTP login name

Input format: **http name** *name*
no http name

Input options
- *name* — HTTP login name: 1 to 16 single-byte alphanumeric characters or symbols. (Default value: administrator)

Executing user: Administrator

Operation: Sets the login name for HTTP.
To delete a login name, add "no" to the beginning of the line.

5-7-3 Setting the HTTP password

Input format: **http password** *password*
no http password

Input options
- *password* — Login password: 1 to 16 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user: Administrator

Operation: Sets the login password for HTTP.
To delete a login password, add "no" to the beginning of the line.

5-7-4 Setting the HTTP language

Input format: **http language** *language*

Input options
- *language* — Language of HTTP pages. (Default value: english)
  - english — Display in English
  - japanese — Display in Japanese

Executing user: Administrator

Operation: Sets the language of HTTP pages.

5-8 SNMP settings

5-8-1 Setting the enabling/disabling of the SNMP function

Input format: **snmp** *switch*

Input options
- *switch* — Enables/disables the SNMP function: (default value: enable)
  - enable — Enables the SNMP function
  - disable — Disables the SNMP function

Executing user: Administrator

Operation: Sets the enabling/disabling of SNMP access.

5-8-2 Setting the community name

Input format: **snmp community** *attribute communityname*
no snmp community *attribute*

Input options
- *attribute*
  - read-write — Read and write
  - read-only — Read only
- *communityname* — Community name: 1 to 32 single-byte alphanumeric characters and symbols. (Read-write default value: private) (Read-only default value: public)

Executing user: Administrator

Operation: Sets the community name.
To delete the community name setting, add "no" to the beginning of the line.

5-8-3 Setting the trap destination

Input format: **snmp trap** *host ipaddress* [*communityname*]
no snmp trap *host*

Input options
- *host*
  - host1 — Trap destination 1
  - host2 — Trap destination 2
- *ipaddress* — IP address: (default value: not set)
- *communityname* — Community name: 1 to 32 single-byte alphanumeric characters and symbols. (Default value: Not set)

Executing user: Administrator

Operation: Sets the destination for traps. Sets the IP address for the trap destination.
To delete the trap destination setting, add "no" to the beginning of the line.

5-8-4 Setting the sysContact

Input format: **snmp syscontact** *sysContact*
no snmp syscontact

Input options
- *sysContact* — sysContact: 1 to 255 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user: Administrator

Operation: Sets the sysContact.
To delete the sysContact, add "no" to the beginning of the line.

5-8-5 Setting the sysName

Input format: **snmp sysname** *sysName*
no snmp sysname

Input options *sysName* sysName: 1 to 255 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user Administrator

Operation: Sets the sysName.
To delete the sysName, add "no" to the beginning of the line.

5-8-6 Setting the sysLocation

Input format: **snmp syslocation** *sysLocation*
no snmp syslocation

Input options *sysLocation* sysLocation: 1 to 255 single-byte alphanumeric characters or symbols. (Default value: Not set)

Executing user Administrator

Operation: Sets the sysLocation.
To delete the sysLocation, add "no" to the beginning of the line.

5-8-7 Setting the linkUp trap

Input format: **snmp trap linkup** *switch*

Input options *switch* Enables/disables the linkUp trap: (default value: enable)
enable Enables the linkUp trap
disable Disables the linkUp trap

Executing user Administrator

Operation: Sets the enabling/disabling of sending linkUp traps.

5-8-8 Setting the linkDown trap

Input format: **snmp trap linkdown** *switch*

Input options *switch* Enables/disables the linkDown trap: (default value: enable)
enable Enables the linkDown trap
disable Disables the linkDown trap

Executing user Administrator

Operation: Sets the sending of linkDown traps.

5-8-9 Setting the AuthenticationFailure trap

Input format: **snmp trap authenfailure** *switch*

Input options *switch* Enables/disables the Authentication Failure trap: (default value: enable)
enable Enables the AuthenticationFailure trap
disable Disables the AuthenticationFailure trap

Executing user Administrator

Operation: Sets the enabling/disabling of sending AuthenticationFailure traps.

5-8-10 Setting the HTTP login trap

Input format: **snmp trap httplogin** *switch*

Input options
switch Enables/disables the HTTP login trap: (default value: enable)
enable Enables the HTTP login trap
disable Disables the HTTP login trap

Executing user Administrator

Operation: Sets the enabling/disabling of sending web maintenance login traps.

5-8-11 Setting the TELNET login trap

Input format: **snmp trap telnetlogin** *switch*

switch Enables/disables the TELNET login trap: (default value: enable)
enable Enables the TELNET login trap
disable Disables the TELNET login trap

Executing user Administrator

Operation: Sets the sending of TELNET login traps.

5-8-12 Setting the wireless speed change trap

Input format: **snmp trap wirelessspeedchange** *switch*

Input options
switch Enables/disables the wireless speed change trap: (default value: enable)
enable Enables the wireless speed change trap
disable Disables the wireless speed change trap

Executing user Administrator

Operation: Sets the enabling/disabling of sending wireless speed change traps.

5-8-13 Setting other alarm traps

Input format: **snmp trap alarm** *switch*

Input options
switch Enables/disables other alarm traps: (default value: enable)
enable Enables other alarm traps
disable Disables other alarm traps

Executing user Administrator

Operation: Sets the enabling/disabling of sending traps when other alarms occur.

5-9 Operations

5-9-1 Logging in to an administrator

Input format: **administrator**
Executing user General user, administrator
Operation: Logs in to an administrator

5-9-2 Logging out from an administrator

Input format: **exit**
Executing user Administrator
Operation: Returns to the general user.

5-9-3 TELNET logout

Input format: **logout**
bye
Executing user General user, administrator
Operation: Terminates the TELNET connection.

5-9-4 Saving settings in flash memory

Input format: **save**
Executing user General user, administrator
Operation: Saves settings information to the internal flash memory.
The settings remain in the flash memory even after the power is turned off.

5-9-5 Uploading settings

Input format: **tftp put config** *ipaddress filename*
Input options *ipaddress* IP address for the TFTP server
filename File name
Executing user Administrator
Operation: Saves this product settings on the TFTP server.
The configuration file that is saved is the details of settings that have been changed from the default factory settings,
but the various password settings, TELNET availability settings, and data and time settings are not applied.

5-9-6 Downloading settings

Input format: **tftp get config** *ipaddress filename*
Input options *ipaddress* IP address for the TFTP server
filename File name
Executing user Administrator
Operation: Writes the configuration file from the TFTP server onto this product and restarts.
The settings for this product will be changed to the information recorded in the configuration file applied to the factory default settings.

5-9-7 Initializing settings

Input format: **initialize**
Executing user Administrator
Operation: Resets the settings saved in the flash memory back to the factory default settings and restarts.
The date and time is not initialized.

5-9-8 Updating firmware

Input format: **tftp get firmware** *ipaddress filename*
Input options *ipaddress* IP address for the TFTP server
filename File name
Executing user Administrator
Operation: Writes the firmware from the TFTP server onto this product and restarts.

5-9-9 Reconnecting wireless

Input format: **reconnect**
Executing user Administrator
Operation: Disconnects wireless, and then reconnects.

5-9-10 Restarting this product

Input format: **restart**
Executing user Administrator
Operation: Restarts this product.

5-9-11 Clearing the LAN counters

Input format: **clear counter lan**
Executing user Administrator
Operation: Resets the various counters for the LAN interface to 0.

5-9-12 Clearing the wireless counters

Input format: **clear counter wireless**
Executing user Administrator
Operation: Resets the various counters for the wireless interface to 0.

5-9-13 Clearing logs

Input format: **clear log**
Executing user Administrator
Operation: Clears the log.

5-9-14 ping

Input format:	**ping** *ipaddress* [-n *count*] [-l *size*] [-w *timeout*]	
Input options	*ipaddress*	IP address
	count	Number of pings to send: 1 to 4294967295. (Default value: 3)
	size	Size of pings: 0 to 1408. (Default value: 32)
	timeout	Timeout time (seconds): 1 to 100 (seconds). (Default value: 1)
Executing user	General user, administrator	
Operation:	Sends pings.	

5-9-15 Comments

Input format:	**#**
	rem
Executing user	General user, administrator
Operation:	Comments is simply discarded, and this does not affect the operations.

5-10 Viewing

5-10-1 Viewing settings

Input format: **show config**
Executing user Administrator
Operation: Shows the settings.

5-10-2 Viewing logs

Input format: **show log**
Executing user General user, administrator
Operation: Shows the logs for this device.

5-10-3 Viewing the device operation status

Input format: **show status device**
Executing user General user, administrator
Operation: Shows the operation status for this device.

5-10-4 Viewing the LAN operation status

Input format: **show status lan**
Executing user General user, administrator
Operation: Shows the operation status for the LAN interface.

5-10-5 Viewing the wireless operation status

Input format: **show status wireless**
Executing user General user, administrator
Operation: Shows the operation status for the wireless interface.

5-10-6 Viewing the interference wave level

Input format: **show status interference**
Executing user General user, administrator
Operation: Shows the status of the interference wave when connecting to wireless

5-10-7 Viewing a summary of wireless operations

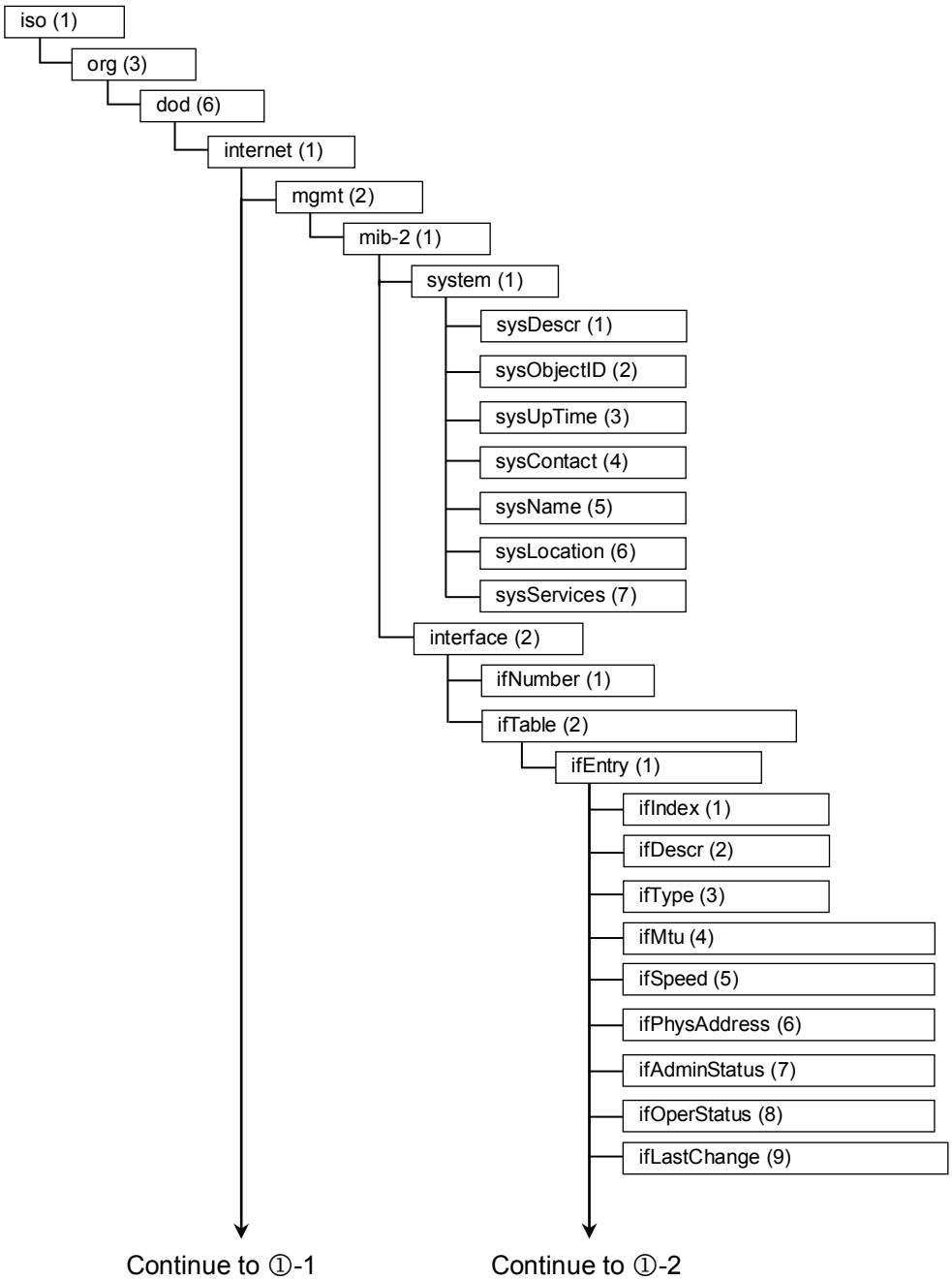
Input format: **show summary wireless** [*interval*]
Input options *interval* Cycle for redisplaying (seconds): 1to 3600 (seconds). (Default value: 1)
Executing user General user, administrator
Operation: Shows a summary of wireless operations at the specified interval
Press any key to stop running the command and return to the command prompt.

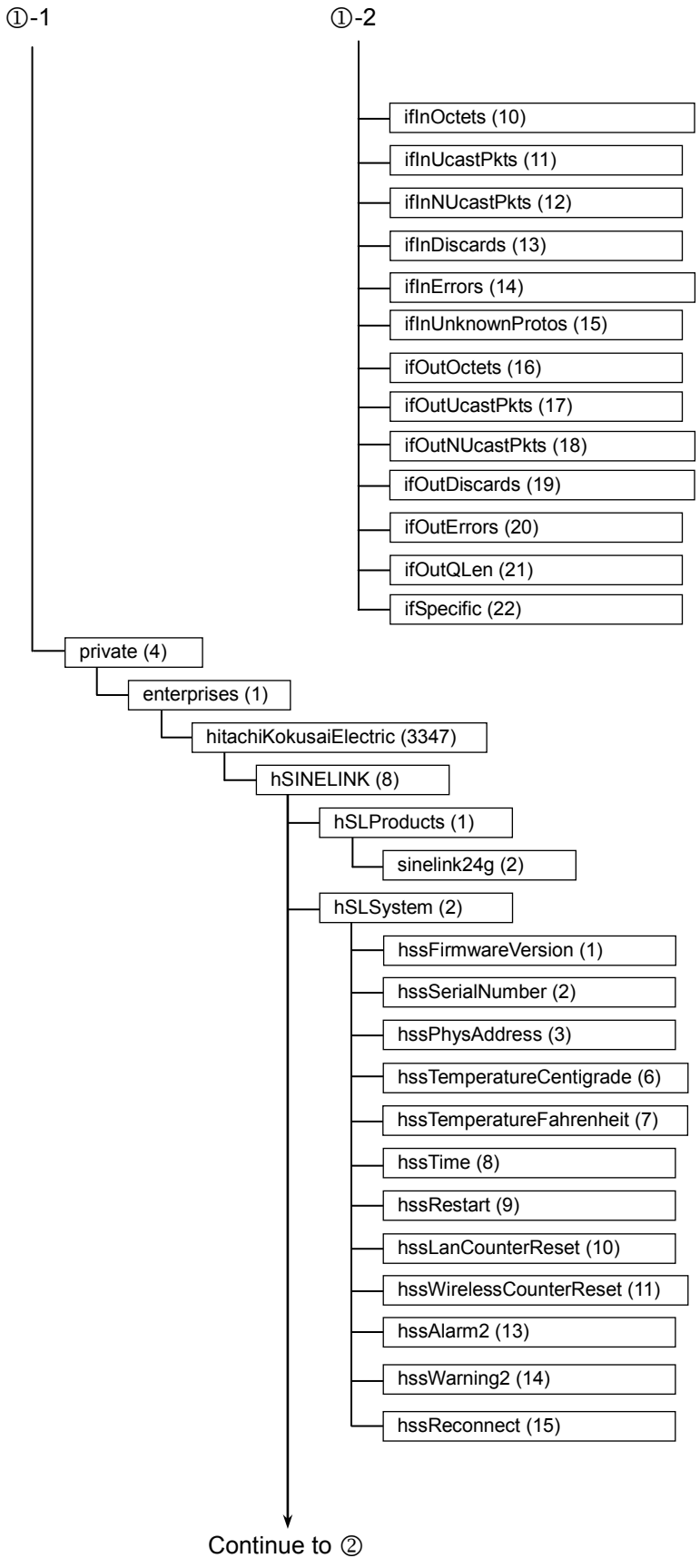
6. Performing Maintenance From SNMP Manager

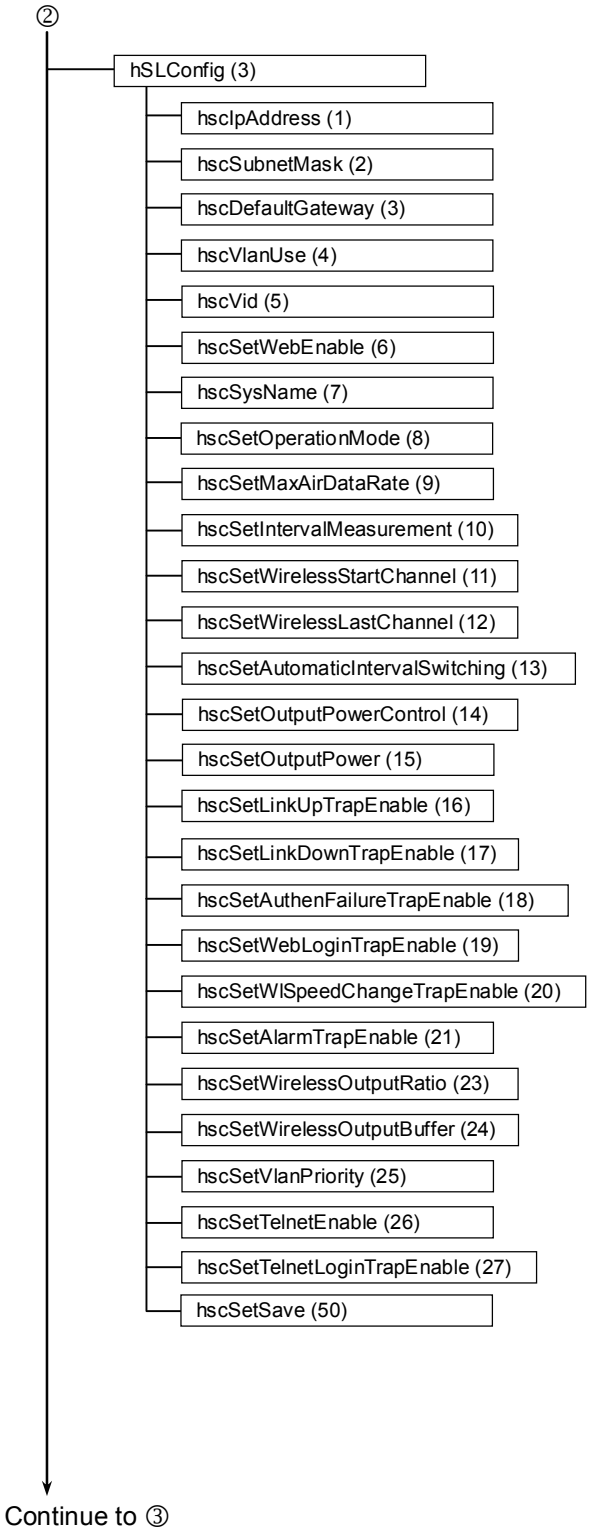
This product has a MIB viewing function via SNMPv1.

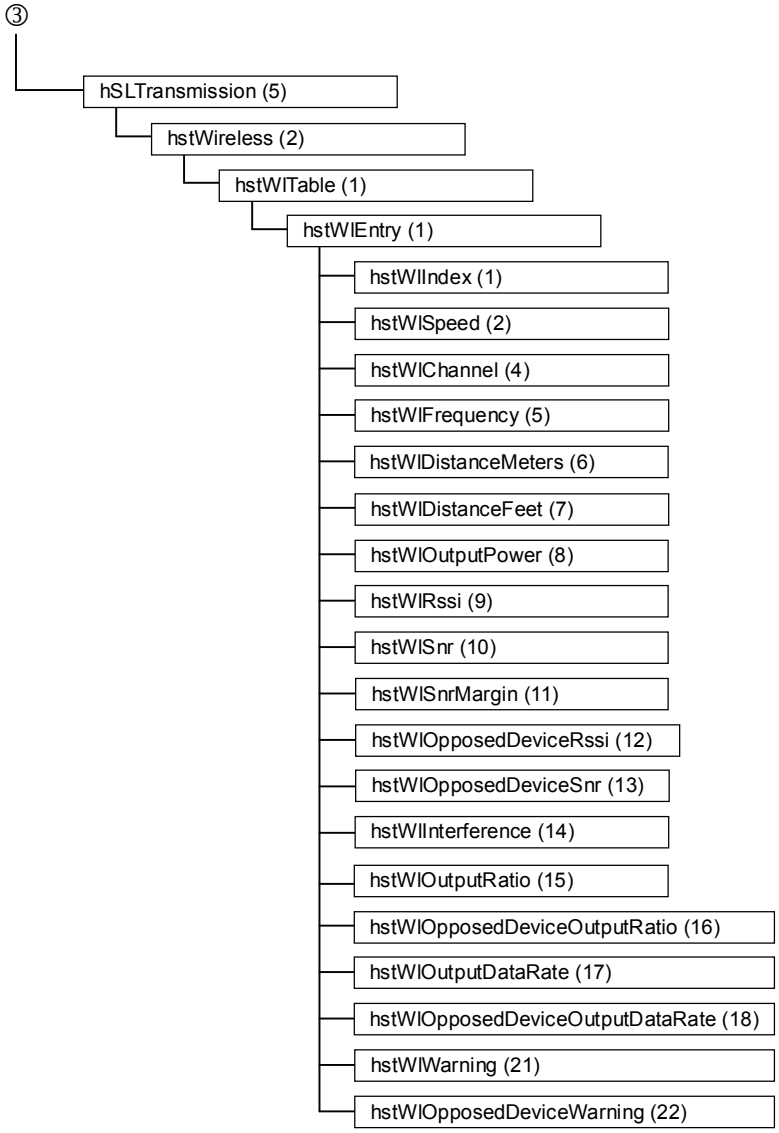
6-1 Supported MIB

This product supports MIB-II system group and private MIBs.
The MIBs supported in this product are shown in the system diagram below.




①-1
①-2
ifInOctets (10)
ifInUcastPkts (11)
ifInNUcastPkts (12)
ifInDiscards (13)
ifInErrors (14)
ifInUnknownProtos (15)
ifOutOctets (16)
ifOutUcastPkts (17)
ifOutNUcastPkts (18)
ifOutDiscards (19)
ifOutErrors (20)
ifOutQLen (21)
ifSpecific (22)
private (4)
enterprises (1)
hitachiKokusaiElectric (3347)
hSINELINK (8)
hSLProducts (1)
sinelink24g (2)
hSLSystem (2)
hssFirmwareVersion (1)
hssSerialNumber (2)
hssPhysAddress (3)
hssTemperatureCentigrade (6)
hssTemperatureFahrenheit (7)
hssTime (8)
hssRestart (9)
hssLanCounterReset (10)
hssWirelessCounterReset (11)
hssAlarm2 (13)
hssWarning2 (14)
hssReconnect (15)
Continue to ②


②
hSLConfig (3)
hscIpAddress (1)
hscSubnetMask (2)
hscDefaultGateway (3)
hscVlanUse (4)
hscVid (5)
hscSetWebEnable (6)
hscSysName (7)
hscSetOperationMode (8)
hscSetMaxAirDataRate (9)
hscSetIntervalMeasurement (10)
hscSetWirelessStartChannel (11)
hscSetWirelessLastChannel (12)
hscSetAutomaticIntervalSwitching (13)
hscSetOutputPowerControl (14)
hscSetOutputPower (15)
hscSetLinkUpTrapEnable (16)
hscSetLinkDownTrapEnable (17)
hscSetAuthenFailureTrapEnable (18)
hscSetWebLoginTrapEnable (19)
hscSetWlSpeedChangeTrapEnable (20)
hscSetAlarmTrapEnable (21)
hscSetWirelessOutputRatio (23)
hscSetWirelessOutputBuffer (24)
hscSetVlanPriority (25)
hscSetTelnetEnable (26)
hscSetTelnetLoginTrapEnable (27)
hscSetSave (50)
Continue to ③


③
hSLTransmission (5)
hstWireless (2)
hstWITable (1)
hstWIEntry (1)
hstWIIndex (1)
hstWISpeed (2)
hstWIChannel (4)
hstWIFrequency (5)
hstWIDistanceMeters (6)
hstWIDistanceFeet (7)
hstWIOutputPower (8)
hstWIRssi (9)
hstWISnr (10)
hstWISnrMargin (11)
hstWIOpposedDeviceRssi (12)
hstWIOpposedDeviceSnr (13)
hstWIInterference (14)
hstWIOutputRatio (15)
hstWIOpposedDeviceOutputRatio (16)
hstWIOutputDataRate (17)
hstWIOpposedDeviceOutputDataRate (18)
hstWIWarning (21)
hstWIOpposedDeviceWarning (22)

6-2 Standard MIB

This product supports system groups and interface groups (MIB-II).

system group

Object Identifier {Object ID}	Access	SYNTAX	Description
system { 1.3.6.1.2.1.1 }	NA		MIB-II System group
sysDescr { system 1 }	RO	DisplayString	Company name and product name
sysObjectID { system 2 }	RO	OBJECT IDENTIFIER	Authentication ID of this product
sysUpTime { system 3 }	RO	TimeTicks	Time that has passed since this product was started (1/100 second counter)
sysContact { system 4 }	RW	DisplayString	Contacts for this product. Input range is up to 255 characters.
sysName { system 5 }	RW	DisplayString	Name assigned to this product for management. Input range is up to 255 characters.
sysLocation { system 6 }	RW	DisplayString	Physical location of this product. Input range is up to 255 characters.
sysServices { system 7 }	RO	INTEGER	A value that indicates the service. Fixed at 1.

* NA (not-accessible), RO (read-only), RW (read-write)

interface group

Object Identifier {Object ID}	Access	SYNTAX	Description
interface { 1.3.6.1.2.1.2 }	NA		MIB-II interface group
ifNumber { interface 1 }	RO	INTEGER	Number of network interfaces
ifTable { interface 2 }	NA		Table that stores the interface information
ifEntry { ifTable 1 }	NA		Interface information list
ifIndex { ifEntry 1 }	RO	INTEGER	Index value for the interface information LAN port is 1 and the wireless port is 2.
ifDescr { ifEntry 2 }	RO	DisplayString	Information about the interface
ifType { ifEntry 3 }	RO	INTEGER	Interface type LAN port : ethernetCsmacd(6) Wireless port : other(1)
ifMtu { ifEntry 4 }	RO	INTEGER	Maximum number of octets for PDUs that can be sent and received
ifSpeed { ifEntry 5 }	RO	Gauge	Interface speed
ifPhysAddress { ifEntry 6 }	RO	PhysAddress	Interface address
ifAdminStatus { ifEntry 7 }	RW	INTEGER	Status that are expected by the interface. up(1) only
ifOperStatus { ifEntry 8 }	RO	INTEGER	Current status of the interface Any of up(1), down(2), or testing(3)

Object Identifier {Object ID}	Access	SYNTAX	Description
ifLastChange { ifEntry 9 }	RO	TimeTicks	sysUpTime value when the interface changed to the current status
ifInOctets { ifEntry 10 }	RO	Counter	Total number of received octets
ifInUcastPkts { ifEntry 11 }	RO	Counter	Number of unicast packets that have reached at the upper layer
ifInNUcastPkts { ifEntry 12 }	RO	Counter	Number of non-unicast packets that have been received at the upper layer
ifInDiscards { ifEntry 13 }	RO	Counter	Number of receive packets that had no error but were discarded without reaching the upper layer
ifInErrors { ifEntry 14 }	RO	Counter	Number of receive packets that had errors and did not reach the upper layer
ifInUnknownProtos { ifEntry 15 }	RO	Counter	Number of receive packets that had been discarded due to unknown or unsupported protocol Fixed at 0.
ifOutOctets { ifEntry 16 }	RO	Counter	Total number of transmitted octets
ifOutUcastPkts { ifEntry 17 }	RO	Counter	Number of unicast packets that have been received from the upper layer
ifOutNUcastPkts { ifEntry 18 }	RO	Counter	Number of non-unicast packets that have been received from the upper layer
ifOutDiscards { ifEntry 19 }	RO	Counter	Number of packets that were discarded even though no errors were detected
ifOutErrors { ifEntry 20 }	RO	Counter	Number of packets that could not be transmitted due to an error
ifOutQLen { ifEntry 21 }	RO	Gauge	Length of the transmission packet queue Fixed at 0
ifSpecific { ifEntry 22 }	RO	OBJECT IDENTIFIER	A reference to the MIB that defines the media characteristics for this interface

* NA (not-accessible), RO (read-only), RW (read-write)

6-3 Private MIB

This product supports the following private MIBs.
(1) hSLSystem group
(2) hSLConfig group
(3) hSLTransmission group

The MIB definition files for private MIBs are on the User's Manual CD-ROM.
If the MIB definition files are different versions, such as when you add this product to a network running with MIB definition files for earlier products, use the MIB definition files with the new created dates.

hSLSystem group

Object Identifier {Object ID}	Access	SYNTAX	Description
hSLSystem { 1.3.6.1.4.1.3347.8.2 }	NA		System-related information group
hssFirmwareVersion { hSLSystem 1 }	RO	DisplayString	Firmware Version
hssSerialNumber { hSLSystem 2 }	RO	DisplayString	Serial Number
hssPhysAddress { hSLSystem 3 }	RO	PhysAddress	MAC address
hssTemperatureCentigrade { hSLSystem 6 }	RO	INTEGER	Internal device temperature (in 1˚C units)
hssTemperatureFahrenheit { hSLSystem 7 }	RO	INTEGER	Internal device temperature (in 1˚F units)
hssTime { hSLSystem 8 }	RO	DisplayString	Device date and time. Format is "YYYY/MM/DD HH:MM:SS"
hssRestart { hSLSystem 9 }	RW	INTEGER	Restart the device nothing(1), restart(2)
hssLanCounterReset { hSLSystem 10 }	RW	INTEGER	Clears the LAN transmission/receive counter nothing(1), reset(2)
hssWirelessCounterReset { hSLSystem 11 }	RW	INTEGER	Clears the wireless transmission/receive counter nothing(1), reset(2)
hssAlarm2 { hSLSystem 13 }	RO	INTEGER	Alarm occurrence status Each digit is noAlarm(0),alarm(2) 10 digits FPGA1 communication error 1-digit PLL Unlock alarm Example: When a PLL Unlock occurs, the value is 2
hssWarning2 { hSLSystem 14 }	RO	INTEGER	Warning occurrence status Each digit is noWarning(0),warning(2) 1000 digits Wireless input exceeded 100-digit No open wireless channels (master only) 10-digit Abnormal temperature 1-digit Software error Example: When only the alarm "no open wireless channels" occurs, the value is 200
hssReconnect { hSLSystem 15 }	RW	INTEGER	Wireless reconnect nothing(1), reconnect(2)

* NA (not-accessible), RO (read-only), RW (read-write)

hSLConfig group

Object Identifier {Object ID}	Access	SYNTAX	Description
hSLConfig { 1.3.6.1.4.1.3347.8.3 }	NA		Configuration-related group
hscIpAddress { hSLConfig 1 }	RO	IpAddress	IP address for this device
hscSubnetMask { hSLConfig 2 }	RO	IpAddress	Subnet mask for this device
hscDefaultGateway { hSLConfig 3 }	RO	IpAddress	Default gateway for this device
hscVlanUse { hSLConfig 4 }	RO	INTEGER	Enables/disables use of a VLAN tag in communication with this device notUsed(1), used(2)
hscVid { hSLConfig 5 }	RO	INTEGER	VID used in communication on this device
hscSetWebEnable { hSLConfig 6 }	RW	INTEGER	Enable/disables web maintenance enable(1), disable(2)
hscSysName { hSLConfig 7 }	RW	OctetString	Name of the device Input range for this product is up to 20 single-byte alphanumeric characters or symbols
hscSetOperationMode { hSLConfig 8 }	RW	INTEGER	Operation mode master(1), slave(2)
hscSetMaxAirDataRate { hSLConfig 9 }	RW	INTEGER	Maximum air data rate max150Mbps(1), max100Mbps(2), max50MbpsHigh(8), max50MbpsLow(9)
hscSetIntervalMeasurement { hSLConfig 10 }	RW	INTEGER	Interval measurement automatic(1), maximumFixing(2)
hscSetWirelessStartChannel { hSLConfig 11 }	RW	INTEGER	Wireless channels/frequency (start) to be used Input values for this product are from 1 to 8
hscSetWirelessLastChannel { hSLConfig 12 }	RW	INTEGER	Wireless channels/frequency (end) to be used Input values for this product are from 1 to 8
hscSetAutomaticIntervalSwitching { hSLConfig 13 }	RW	INTEGER	Automatic interval switching automatic(1), longRange(2)
hscSetOutputPowerControl { hSLConfig 14 }	RW	INTEGER	Control of the wireless output power automatic(1), manual(2)
hscSetOutputPower { hSLConfig 15 }	RW	INTEGER	Wireless output power Input range for the product is from -25 to +1
hscSetLinkUpTrapEnable { hSLConfig 16 }	RW	INTEGER	Send a trap for a link up enable(1), disable(2)
hscSetLinkDownTrapEnable { hSLConfig 17 }	RW	INTEGER	Send a trap for a link down enable(1), disable(2)
hscSetAuthenFailureTrapEnable { hSLConfig 18 }	RW	INTEGER	Send a trap when SNMP authentication fails enable(1), disable(2)
hscSetWebLoginTrapEnable { hSLConfig 19 }	RW	INTEGER	Send a trap at web maintenance login enable(1), disable(2)
hscSetWlSpeedChangeTrapEnable { hSLConfig 20 }	RW	INTEGER	Send a trap when the wireless link speed changes enable(1), disable(2)
hscSetAlarmTrapEnable { hSLConfig 21 }	RW	INTEGER	Send a trap when other alarms occur enable(1), disable(2)
hscSetWirelessOutputRatio { hSLConfig 23 }	RW	INTEGER	Wireless output ratio of master and slave ratio5v5(50), ratio8v2(80)

Object Identifier {Object ID}	Access	SYNTAX	Description
hscSetWirelessOutputBuffer { hSLConfig 24 }	RW	INTEGER	Size of the wireless output buffer largeSize(255), mediumSize(15), smallSize(0)
hscSetVlanPriority { hSLConfig 25 }	RO	INTEGER	VLAN priority of transmission packets in communication for this device
hscSetTelnetEnable { hSLConfig 26 }	RW	INTEGER	Enable/disables TELNET maintenance enable(1), disable(2)
hscSetTelnetLoginTrapEnable { hSLConfig 27 }	RW	INTEGER	Send a trap at TELNET login enable(1), disable(2)
hscSetSave { hSLConfig 50 }	RW	INTEGER	Saves the settings nothing(1), save(2)

* NA (not-accessible), RO (read-only), RW (read-write)

hSLTransmission group

Object Identifier {Object ID}	Access	SYNTAX	Description
hSLTransmission { 1.3.6.1.4.1.3347.8.5 }	NA		Media information group
hstWireless { hSLTransmission 2 }	NA		Wireless media group
hstWlTable { hstWireless 1 }	NA		Table that stores the wireless information
hstWlEntry { hstWlTable 1 }	NA		List of wireless information
hstWlIndex { hstWlEntry 1 }	RO	INTEGER	Index of wireless information. Same value as the wireless port index (2)
hstWlSpeed { hstWlEntry 2 }	RO	Gauge	Line speed (bit/s)
hstWlChannel { hstWlEntry 4 }	RO	DisplayString	Wireless channel
hstWlFrequency { hstWlEntry 5 }	RO	DisplayString	Wireless frequency
hstWlDistanceMeters { hstWlEntry 6 }	RO	DisplayString	Link distance (m)
hstWlDistanceFeet { hstWlEntry 7 }	RO	DisplayString	Link distance (feet)
hstWlOutputPower { hstWlEntry 8 }	RO	DisplayString	Output power (dBm)
hstWlRssi { hstWlEntry 9 }	RO	DisplayString	Receive level (dBm)
hstWlSnr { hstWlEntry 10 }	RO	DisplayString	Receive S/N ratio (dB)
hstWlSnrMargin { hstWlEntry 11 }	RO	DisplayString	Receive S/N ratio margin (dB)
hstWlOpposedDeviceRssi { hstWlEntry 12 }	RO	DisplayString	Receive level for the opposed device (dBm)
hstWlOpposedDeviceSnr { hstWlEntry 13 }	RO	DisplayString	S/N ratio of the opposed device (dB)

<table>
<tr><th>Object Identifier
{Object ID}</th><th>Access</th><th>SYNTAX</th><th>Description</th></tr>
<tr><td>hstWlInterference
{ hstWlEntry 14 }</td><td>RO</td><td>DisplayString</td><td>Interference wave level before wireless connection (0.1dBm)

Each interference wave level from the first used wireless channel to the last channel. Comma separated.
Example: The values for the interference wave levels before wireless connection in the following table are "-630, -590, -640."
<table>
<tr><td>Wireless channel</td><td>CH1</td><td>CH2</td><td>CH3</td></tr>
<tr><td>Interference wave level (dBm)</td><td>-63</td><td>-59</td><td>-64</td></tr>
</table>
</td></tr>
<tr><td>hstWlOutputRatio
{ hstWlEntry 15 }</td><td>RO</td><td>DisplayString</td><td>Wireless output ratio
20%(20), 50%(50), 80%(80), wireless disconnected (---)</td></tr>
<tr><td>hstWlOpposedDeviceOutputRatio
{ hstWlEntry 16 }</td><td>RO</td><td>DisplayString</td><td>Wireless output ratio for the opposed device
20%(20), 50%(50), 80%(80), wireless disconnected (---)</td></tr>
<tr><td>hstWlOutputDataRate
{ hstWlEntry 17 }</td><td>RO</td><td>Gauge</td><td>Wireless output data rate (bit/s)</td></tr>
<tr><td>hstWlOpposedDeviceOutputData Rate
{ hstWlEntry 18 }</td><td>RO</td><td>Gauge</td><td>Wireless output data rate for the opposed device (bit/s)</td></tr>
<tr><td>hstWlWarning
{ hstWlEntry 21 }</td><td>RO</td><td>INTEGER</td><td>Wireless warning occurrence status
Each digit is noWarning(1),warning(2)
10 digits Wireless input exceeded
1 digit No open wireless channels (Master only)
Example: When only the alarm "wireless input exceeded" occurs, the value is 21</td></tr>
<tr><td>hstWlOpposedDeviceWarning
{ hstWlEntry 22 }</td><td>RO</td><td>INTEGER</td><td>Wireless warning occurrence status for the opposed device
Each digit is noWarning(1),warning(2)
10 digits Wireless input exceeded
1 digit Fixed at one
Example: When the alarm "wireless input exceeded" occurs, the value is 21</td></tr>
</table>

* NA (not-accessible), RO (read-only), RW (read-write)

6-4 Supported traps

This product supports the following traps.

Supported Trap	Trap Code			
	Enterprise	Generip -trap	Specific -trap	VARIABLES
coldStart ● This product has been powered on ● Restarted after changing settings ● Restarted after finishing a firmware update	Same as sysObjectID	0	0	–
warmStart ● Restarted this product using a method other than a cold start	Same as sysObjectID	1	0	–
linkDown ● LAN/wireless link has been disconnected	Same as sysObjectID	2	0	ifIndex
linkUp ● LAN/wireless link has been connected	Same as sysObjectID	3	0	ifIndex
authenticationFailure ● Received an SNMP message with an incorrect community name	Same as sysObjectID	4	0	–
hSLWebLogin ● Logged in to web maintenance	hSINELINK { 1.3.6.1.4.1.3347.8 }	6	332	–
hSLWlSpeedChange ● Wireless link speed changed (Master only send)	hSINELINK { 1.3.6.1.4.1.3347.8 }	6	335	hstWlIndex hstWlSpeed
hSLTelnetLogin ● Logged in to TELNET maintenance	hSINELINK { 1.3.6.1.4.1.3347.8 }	6	336	–
hSLAlarm2 ● Alarm occurrence/recovery (pllUnlock, FPGA1 communication error, wireless input exceeded, no open wireless channels, abnormal temperature, software error)	hSINELINK { 1.3.6.1.4.1.3347.8 }	6	337	hssAlarm2 hssWarning2

7. Appendix

7-1 Product specifications

<table>
<tr><th colspan="2">Item</th><th colspan="3">Specification</th><th>Remarks</th></tr>
<tr><td colspan="2">Applicable standards</td><td colspan="3">FCC Part 15.249</td><td></td></tr>
<tr><td colspan="2">Communication configuration</td><td colspan="3">Point to Point</td><td></td></tr>
<tr><td colspan="2">Range of available frequencies</td><td colspan="3">24.05 to 24.25GHz</td><td></td></tr>
<tr><td colspan="2">Number of available channels</td><td colspan="3">8 channels (vertical polarization/horizontal polarization)
24.08 to 24.22 GHz (20 MHz Step)</td><td>You can use horizontal polarization by rotating the device 90˚</td></tr>
<tr><td colspan="2">Occupied bandwidth</td><td colspan="3">28MHz or lower</td><td></td></tr>
<tr><td rowspan="2">Antennas</td><td>Configu-ration</td><td colspan="3">26cm angle, Planar array antenna</td><td>V or H</td></tr>
<tr><td>Gain</td><td colspan="3">34dBi
Half-value angle: 3 degrees</td><td>Round up to decimal points</td></tr>
<tr><td colspan="2">Duplex operation</td><td colspan="3">TDD (Time division duplex) method</td><td>Link Symmetry=5:5 or 8:2</td></tr>
<tr><td colspan="2">Field Strength</td><td colspan="3">128 dBuV/m or less</td><td>Distance of Measurement: 3 m</td></tr>
<tr><td colspan="2" rowspan="4">Modulation method</td><td>Modulation method</td><td colspan="2">Air Data Rate</td><td rowspan="4">Adaptive control based on link quality</td></tr>
<tr><td>64QAM</td><td colspan="2">150Mbps</td></tr>
<tr><td>16QAM</td><td colspan="2">100Mbps</td></tr>
<tr><td>QPSK</td><td colspan="2">50Mbps</td></tr>
<tr><td colspan="2" rowspan="2">Maximum throughput</td><td rowspan="2">Wireless link speed</td><td colspan="2">Maximum throughput (Mbps)</td><td rowspan="10">Downlink / uplink</td></tr>
<tr><td>Master/Slave Link Symmetry</td><td>Interval measurement: Automatic measurement setting (when distance is 1 km)</td><td>Interval measurement: Maximum fixed</td></tr>
<tr><td rowspan="4">8:2</td><td>150 Mbps</td><td>95/23</td><td>91/22</td></tr>
<tr><td>100 Mbps</td><td>62/15</td><td>59/14</td></tr>
<tr><td>50 Mbps-High</td><td>31/7</td><td>29/7</td></tr>
<tr><td>50 Mbps-Low</td><td>22/5</td><td>21/5</td></tr>
<tr><td rowspan="4">5:5</td><td>150 Mbps</td><td>59/59</td><td>56/56</td></tr>
<tr><td>100 Mbps</td><td>39/39</td><td>37/37</td></tr>
<tr><td>50 Mbps-High</td><td>19/19</td><td>18/18</td></tr>
<tr><td>50 Mbps-Low</td><td>13/13</td><td>13/13</td></tr>
<tr><td colspan="2" rowspan="2">Average time delay (Reference data)</td><td rowspan="2">Wireless link speed</td><td colspan="2">Average time delay (ms)</td><td rowspan="10">When the load is less than the throughput

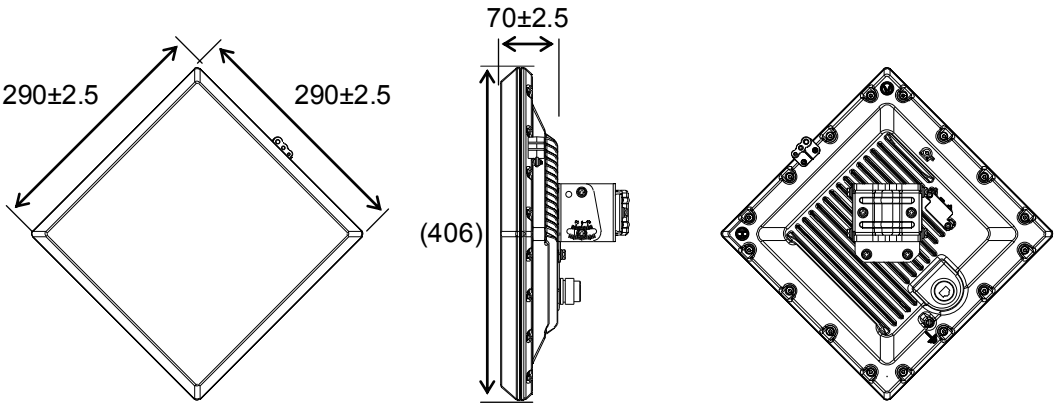
Downlink / Uplink</td></tr>
<tr><td>Master/Slave Link Symmetry</td><td>For a 64 byte packet</td><td>For a 1518 byte packet</td></tr>
<tr><td rowspan="4">8:2</td><td>150 Mbps</td><td>Approx. 0.4/0.8</td><td>Approx. 0.9/1.7</td></tr>
<tr><td>100 Mbps</td><td>Approx. 0.4/0.9</td><td>Approx. 0.9/2.1</td></tr>
<tr><td>50 Mbps-High</td><td>Approx. 0.4/1.3</td><td>Approx. 1.1/3.2</td></tr>
<tr><td>50 Mbps-Low</td><td>Approx. 0.5/1.6</td><td>Approx. 1.4/4.3</td></tr>
<tr><td rowspan="4">5:5</td><td>150 Mbps</td><td>Approx. 0.7</td><td>Approx. 1.0</td></tr>
<tr><td>100 Mbps</td><td>Approx. 0.7</td><td>Approx. 1.1</td></tr>
<tr><td>50 Mbps-High</td><td>Approx. 0.8</td><td>Approx. 1.4</td></tr>
<tr><td>50 Mbps-Low</td><td>Approx. 0.8</td><td>Approx. 2.0</td></tr>
</table>

Item	Specification	Remarks
Interference prevention function	Based on the link ID identifier	
Carrier sense function	Yes	
Interference avoidance function	If there is continued interference during carrier sense or wireless communication, the wireless channel is automatically changed after the appropriate adjustments are made.	
Antenna power control	Monitors the receive power of the opposed device and optimizes the output power	Shortest communication distance 5m
Excess input protection	Yes	
Security functions	・Unique wireless protocol and data scrambling ・Web maintenance and TELNET maintenance login password	
Maintenance function	The following items can be controlled over a LAN: ・Control using HTTP, SNMP and TELNET ・Wireless settings, SYSLOG, SNTP settings ・Status and log display ・Settings information, firmware updates	IEEE802.1Q: Supports maintenance with VLAN tags
SNMP	SNMPv1 ・MIB-II system, interface groups ・Private MIBs ・Traps	
LAN interface	100BASE-TX	100Mbps full duplex
Maximum packet length	1536 bytes	
Received power monitor terminal	Outputs DC voltage based on the receive power of the opposed device and the output power of this device.	
Power consumption	IEEE802.3af PD CLASS 0 compliant 12.95W or less	
Power supply	Through DC added to a LAN cable Supply length: 100m or less	
Size	Approx. 290(W) x 290(H) x 70(D) mm	Not including the metal mounting bracket
Mass	Approx. 3.5 kg	Not including the metal mounting bracket
Accuracy of the built-in clock	Error: 2 to 3 mins/month	
Waterproof	IPX4 (IEC 60529)	
Dust protection	IP5X (IEC 60529)	
Survival wind speed	Up to 90m/sec	No damage
Wind pressure load (at a wind speed of 90m/s)	・For main unit 490 N (50 kgf)	Not including the safety factor Theoretical calculation value
Diameter of the pole for attaching the metal mounting bracket	ϕ25 to 51 mm	
Operating temperature range	-20˚C to +50˚C (including when the power is turned ON)	Ambient temperature
Operating humidity range	Up to 95%	
Corrosion protection	Sea air resistant specification	The equipment has resistance to sea air, but it is not completely resistant to corrosion. Perform the installation and maintenance appropriately.
Environmental conditions	No flammable or corrosive gases	

7-2 External view

External View of Main Unit

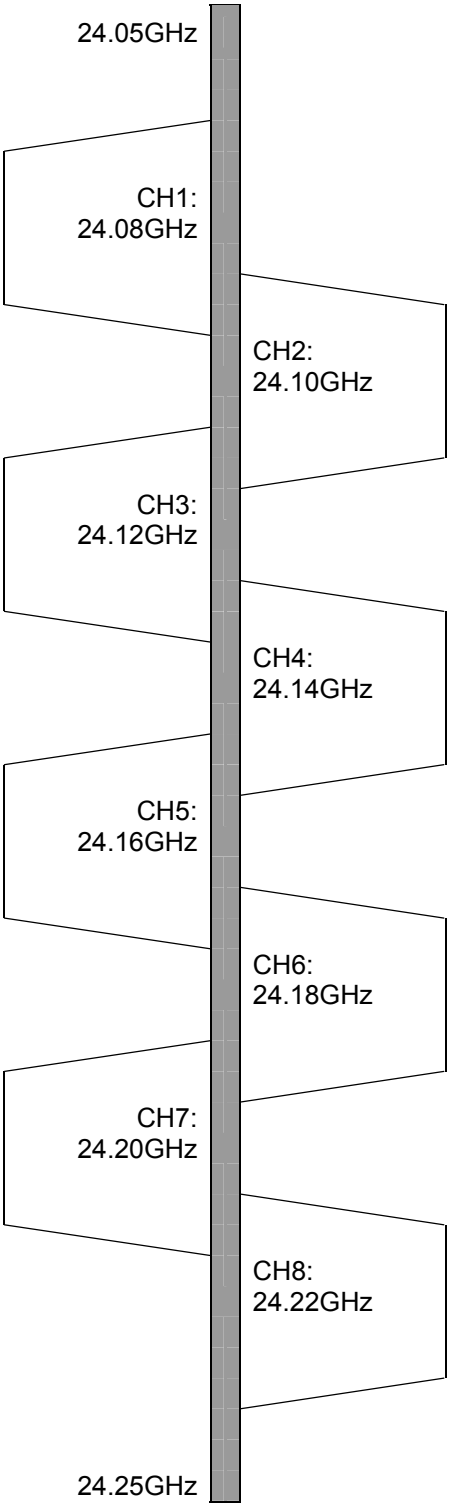
Unit: mm



Numerical values in parenthesis ( ) indicate reference values.

7-3 Wireless channel numbers

The wireless channel numbers and corresponding carrier waves for this product are shown below.



7-4 Log details

The details for the main logs and the SYSLOG severity levels of this product are shown below.

Message	Details	Severity
Parameter Update ・・・	Settings were changed	Informational (6)
Parameter Abnormal ・・・	Settings were configured incorrectly	Informational (6)
Packet Clear ・・・	Number of LAN or wireless receive packets was cleared	Informational (6)
LAN Linkup	LAN was connected	Informational (6)
LAN Linkdown	LAN was disconnected	Warning (4)
Wireless Linkup ・・・	Wireless link was connected (Wireless Link Speed 50Mbps-Low)	Informational (6)
Wireless Linkdown ・・・	Wireless link was disconnected	Warning (4)
Wireless Link Speed (QPSK-Low ・・・ (Only shows the master)	Wireless link speed changed to 50Mbps-Low	Informational (6)
Wireless Link Speed (QPSK-High ・・・ (Only shows the master)	Wireless link speed changed to 50Mbps-High	Informational (6)
Wireless Link Speed (16QAM ・・・ (Only shows the master)	Wireless link speed changed to 100Mbps	Informational (6)
Wireless Link Speed (64QAM ・・・ (Only shows the master)	Wireless link speed changed to 150Mbps	Informational (6)
SNR Abnormal ・・・ (Only shows the master)	Quality of the wireless link decreased	Warning (4)
SNR Recover ・・・ (Only shows the master)	Quality of the wireless link recovered	Informational (6)
Over Input Abnormal	The wireless input has been exceeded	Warning (4)
Temperature Abnormal ・・・	Temperature abnormality occurred	Error (3)
Temperature Recover ・・・	Temperature abnormality was resolved	Informational (6)
Wireless Refresh ・・・	Restarted because the disconnected state of the wireless continued	Informational (6)
Start by Power on.	Started by turning the power on	Informational (6)
Start by Reset (Manual)	Started by performing a restart operation	Informational (6)
Software Normal ・・・	Startup log	–

Message	Details	Severity
Software Update Failure	The firmware upgrade failed	Informational (6)
No Channel Open ▪ ▪ ▪ (Only shows the master)	Could not find any wireless channels that are not in use	Error (3)
HTTP Login ▪ ▪ ▪	Web maintenance login	Informational (6)
TELNET Login ▪ ▪ ▪	Logged in to TELNET	Informational (6)
SNMP Authentication Failure	SNMP authentication failed	Informational (6)
SNTP Update ▪ ▪ ▪	Updated the SNTP time	Informational (6)
PLL Unlock ▪ ▪ ▪ FPGA1 COM Error	Wireless part failed The device might not work properly due to factors such as power source noise. If this happens, you can cancel the operation by turning the power off and then back on.	Critical (2)

7-5 Abnormal operations

Symptoms	Cause and Resolution
SINELINK is not working properly and I do not know the cause	There may be an error in the settings. * When it does not work anyway, initialize the settings and configure them again. For details, refer to "4-14 Managing settings."
After installation, SINELINK no longer works	Remove the drip-proof cap and check the state of the LAN cable connector. If there are water drops, foreign particles, or traces of water exposure in the LAN cable connector, there is a possibility that internal parts have been damaged.
There is a gap of more than 1.0mm between the LAN cable connector on the main unit and the drip-proof cap, and the cap will not tighten down any further.	Check whether the provided shielded RJ-45 connector (Tyco Electronics AMP Product 5-569530-3) has been used. If you use a different RJ-45 connector, the connection might not be drip-proof, resulting in damage to the LAN cable connector for this product.
	Check whether the RJ-45 connector has been inserted all the way in the drip-proof cap.
The power sometimes turns off/on	Wire the cables so that the LAN cable that is connected to this product does not creep over and run closely alongside the power cable. This might make the operations unstable.
	Exogenous noise sometimes penetrates the LAN cables. If you are using a UTP cable for the LAN cable, replace it with an STP cable and properly connect both ends to ground. If you are using an STP cable, check that both ends are grounded properly.
	Power supply noise sometimes penetrates the LAN cables through the PoE power supply equipment. If there is a lot of noise in the power line, we recommend that you install a noise filter or uninterruptible power supply equipment.
	There might be a bad contact in the PoE power supply equipment and LAN cable connector. Make sure that the LAN cable is not being forcefully bent or twisted.
Restart	If the wireless link is disconnected for a long continued period, this product automatically restarts.
"Hardware failure" alarm is displayed	An error has been detected on the hardware of this product. Turn the power to this product off and back on and check whether the same alarm is still displayed. If the alarm is still displayed, there might be a problem with the hardware. If the alarm is no longer displayed, the problem may have been the result of improper operations caused by power supply noise. If there is a lot of noise in the power line, we recommend that you install a noise filter or uninterruptible power supply equipment.
PoE power supply equipment is supplying power, but this product is not working.	The protection circuit on this product might be running. You can cancel the protection circuit by turning the power off and then back on. If you are using PoE power supply equipment that continues supplying power even when the protection circuit is running, turn the power off and back on by removing the LAN cable that is connected to this product.

Symptoms	Cause and Resolution
PoE power supply equipment is supplying power, but this product is not working.	If there is a lot of noise in the power line, we recommend that you install a noise filter or uninterruptible power supply equipment.
	Exogenous noise sometimes penetrates the LAN cables. If you are using a UTP cable for the LAN cable, replace it with an STP cable and properly connect both ends to ground. If you are using an STP cable, check that both ends are grounded properly.
The output from the receive power monitor terminal stays at 0V.	Check that the PoE power supply equipment is connected properly and that power is being supplied.
	Check that this product and the digital volt meter are connected properly.
	Check that the digital volt meter is set properly.
	Make sure that the alligator clip for the monitor cable is not shorting (short circuiting).
The output from the receive power monitor terminal stays at 0.2 to 0.3V.	Check that the opposed device is being supplied with power.
	Use the antenna adjustment scope to see if the direction of the antenna has changed.
	Check that the installation environment has any problem, such as that there is an obstruction between this point and the opposed device.
	Check that the polarization matches the opposed device polarization. On the back of the antenna, check whether the V symbol or the H symbol is in the up position and make sure that the same symbol is in the up position on the opposed device.
	There may be an error in the wireless settings. In the operation mode settings, check that one side is the master and the other side is the slave. Check that the link ID settings are the same in both the master and the slave.
	There may be an error in the wireless settings. If the setting for the usage range of wireless channels on a slave has been changed from the default settings, check that all of that range on the master have been included in that range on the slave. When the output power is set at a fixed value, you cannot connect it if the value is too much smaller than the appropriate value for your installation environment. If you set the automatic distance switching to a fixed long distance, it may not connect if the output power for short distance does not reduce to a value that is appropriate for the installation environment.
	Make sure that there is no trash on the antenna. Since the characteristics can be degraded if there is snow on the antenna, remove any snow.
	Check whether there are any alarms between this device and the opposed device. If there are no open wireless channels, refer to "3-4 (1) Check the orientation of the metal mounting bracket" and rotate the metal mounting bracket.

Symptoms	Cause and Resolution
The output for the receive power monitor terminal is different from the receive level for the opposed device for web maintenance.	The output for the receive power monitor terminal indicates the receive level for the opposed device when the output power for this device is equivalent to +1dBm so that direction adjustments can be performed even when the output power is set to auto control. If the output power for this device is lower than +1dBm, the value will be better than the opposed device receive level for web maintenance.
LAN will not link up	Check that the PoE power supply equipment is connected properly and that power is being supplied.
	Check that each pin on the RJ-45 connector for the LAN cable has been swaged correctly. If pins are not swaged correctly, the contact between the LAN port for SINELINK/the PoE power supply equipment might be bad. If you insert a LAN cable that has not been swaged correctly into this product, you might damage the LAN cable connector for this product.
	You can connect LAN to an auto negotiation device or a 100mbps full duplex device. Do not connect to a 10mbps device or a half-duplex device.
	Use a "LAN cable qualification tester" to check whether the LAN cable connection, communication quality, and cable length are correct.
	Make sure that the total length of the LAN cable from this product to the switching hub does not exceed 100m.
	Check whether the LAN cable is correct. When connecting this product to a switching hub, use a straight cable. When connecting directly to a PC, use a crossover cable. When connecting to an Auto-MDI/MDI-X device, you can use either LAN cable.
	There might be a bad contact in the PoE power supply equipment and LAN cable connector. Make sure that the LAN cable is not being forcefully bent or twisted.
	The protection circuit on this product might be running. You can cancel the protection circuit by turning the power off and then back on. If you are using PoE power supply equipment that continues supplying power even when the protection circuit is running, turn the power off and back on by removing the LAN cable that is connected to this product. If there is a lot of noise in the power line, we recommend that you install a noise filter or uninterruptible power supply equipment. Exogenous noise sometimes penetrates the LAN cables. If you are using a UTP cable for the LAN cable, replace it with an STP cable and properly connect both ends to ground. If you are using an STP cable, check that both ends are grounded properly.
LAN data results in a receive error	The devices connected to the LAN might be half duplex. Connect to an auto negotiation device or a 100Mbps full duplex device.
	Check that each pin on the RJ-45 connector for the LAN cable has been swaged correctly. If pins are not swaged correctly, the contact between the LAN port for this product/the PoE power supply equipment might be bad. If you insert a LAN cable that has not been swaged correctly into this product, you might damage the LAN cable connector for this product.

Symptoms	Cause and Resolution
LAN data results in a receive error	Use a "LAN cable qualification tester" to check whether the LAN cable connection, communication quality, and cable length are correct.
	There might be a bad contact in the PoE power supply equipment and LAN cable connector. Make sure that the LAN cable is not being forcefully bent or twisted.
	There might be foreign particles in the contact area for the RJ-45 connector and the LAN port for this product/the PoE power supply equipment. Remove the LAN cable and take out any foreign particles.
Unable to communicate with this product in the factory default state	When configuring this product device with the factory default state in a row, check that the ARP tables on the configuration PC have been updated. If they have not been updated, connect the configuration PC and the PoE power supply equipment first and then connect the PoE power supply equipment to this product, or restart the configuration PC, and update the ARP tables.
The web browser settings window and the network password input window do not appear	Check that the IP address, subnet mask, and gateway for the configuration PC have been set correctly.
	If the web browser is set to "Use proxy server," these windows might not appear.
	Use the specified web browser.
	Confirm that the password is correct.
	Check that the LAN path from the configuration PC to this product is connected properly. If there are problems such as a disconnection, these windows will not appear.
	If web maintenance has been set to "disable" from SNMP manager or a TELNET terminal, you cannot perform maintenance from a web browser.
	If access permissions have been set for this product access, you cannot perform SINELINK maintenance from a device that is outside of the IP address range.
Unable to log in from the network password input window in the web browser	Check that the user name and password are correct.
	If the network password input window is displayed while maintenance is already being performed in a web browser, close and reopen the web browser and then access the window.
Unable to perform maintenance operations properly in a web browser	Enable Java Script in the settings on your PC.
	Use the specified web browser.
The network password input window may appear while performing maintenance in a web browser	The network password input window is displayed when you turn the power to this product off and back on, restart, and update firmware.
	The network password input window is displayed when you change a password.

Symptoms	Cause and Resolution
The network password input window may appear while performing maintenance in a web browser	When another configuration PC or web browser successfully logs in during maintenance operations, the network password input window appears on the configuration PC that is currently performing maintenance.
No response to the TELNET terminal	Check that the IP address, subnet mask, and gateway for the TELNET terminal have been set correctly.
	Check that the LAN path from the TELNET terminal to this product is connected properly. If there are problems such as a disconnection, the response will not be received.
	Check that the TELNET function settings are set to "Use."
	If access permissions have been set for this product access, you cannot perform SINELINK maintenance from a device that is outside of the IP address range.
Unable to log in from a TELNET terminal	Check that the user name and password are correct.
Unable to change settings from a TELNET terminal	Enter the administrator command and the password for an administrator user to log in as an administrator.
No response to SNMP manager	Check that the IP address, subnet mask, and gateway for SNMP manager have been set correctly.
	Check that the LAN path from SNMP manager to this product is connected properly. If there are problems such as a disconnection, the response will not be received.
	Check that the community name for SNMP manager is the same as the community name set in this product.
	Check that the SNMP agent function settings are set to "Use."
	If access permissions have been set for this product access, you cannot maintain this product from a device that is outside of the IP address range.
When accessing from SNMP manager, a noSuchName error occurs.	Check whether the Object ID set in SNMP manager is correct. When accessing a table object ID (hsPortTable, hstWlTable), set 1 (LAN port) or 2 (wireless port) in the index for the object ID end to be set in SNMP manager.
When resetting the range of used channels from SNMP manager, a badValue error occurs	Check whether the wireless channel for which Set-Request made from SNMP manager is correct. If an error occurs when resetting the range of used channels, change the range setting to all channels (CH1 to CH8) and then set the range of used channels.
Settings changed from SNMP manager are not applied	Check that the Set-Request is made for the correct value for each object ID.
I made a mistake in the settings and accidentally set the access to this product to "Limited". I want to change it back to "Do not restrict."	Immediately after powering on the product, you can change the settings from the configuration PC that you can no longer communicate with due to the access permissions. Perform this task on a network that is not transferring packets with VLAN tags, and in an environment in which wireless communication with the opposed device is not possible.

Symptoms	Cause and Resolution
I made a mistake in the settings and accidentally set the VLAN tag setting to "Enable". I want to change it back to "Disable".	To change the VLAN tag setting back to "Disable" on a network that does not transfer packets with VLAN tags, you can change the settings from a configuration PC without using VLAN tags, immediately after powering up this product. Perform this task in an environment in which wireless communication with the opposed device is not possible. On a network that does transfer packets with VLAN tags, communicate with this product using packets with VLAN tags that have the same VID as this product setting, and change the settings.
Unable to connect to the wireless link	Check that the opposed device is being supplied with power.
	Use the antenna adjustment scope to see if the direction of the antenna has changed.
	Check that the installation environment has any problem, such as that there is an obstruction between this point and the opposed device.
	Check that the polarization matches the opposed device polarization. On the back of the antenna, check whether the V symbol or the H symbol is in the up position and make sure that the same symbol is in the up position on the opposed device.
	Make sure that there is no trash on the antenna. Since the characteristics can be degraded when the antenna is fouled, remove any debris from the antenna.
	There may be an error in the wireless settings. In the operation mode settings, check that one side is the master and the other side is the slave. Check that the link ID settings are the same in both the master and the slave.
	There may be an error in the wireless settings. If the setting for the usage range of wireless channels on a slave has been changed from the default settings, check that all of that range on the master have been included in that range on the slave. When the output power is set at a fixed value, you cannot connect it if the value is too much smaller than the appropriate value for your installation environment. If you set the automatic distance switching to a fixed long distance, it may not connect if the output power for short distance does not reduce to a value that is appropriate for the installation environment.
	Check whether there are any alarms between this device and the opposed device. If there are no open wireless channels, refer to "3-4 (1) Check the orientation of the metal mounting bracket" and rotate the metal mounting bracket.
Wireless circuit disconnects sometimes	When the wireless disconnects, check to see if there is any obstruction interrupting the wireless link.
	There may be an error in the wireless settings. When the output power is set at a fixed value, the wireless connection will easily drop if the value is too much smaller than the appropriate value for your installation environment. If you set the automatic distance switching to a fixed long distance, it may disconnect if the output power for short distance does not reduce to a value that is appropriate for the installation environment.

Symptoms	Cause and Resolution
Wireless circuit disconnects sometimes	Check whether there are any power source abnormalities such as power supply noise or a drop in the power supply voltage.
	Shake the mounting pole to see if it is strong enough. If the mounting pole sways, wireless communication will be unstable.
	It is possible that it is being affected by multipath fading. Change the installation location or increase the ground height to mount this product in a place where the problem occurs less frequently.
Wireless circuit receive errors are occurring frequently	Check whether the direction of the antenna has moved.
	It is possible that an interference wave is being received. Restart the master and check whether it switches to another channel.
	There may be an error in the wireless settings. When the output power is set at a fixed value, receive errors will occur more easily due to attenuation from rain if the value is too much smaller than the appropriate value for your installation environment. If you set the automatic distance switching to a fixed long distance, it may disconnect if the output power for short distance does not reduce to a value that is appropriate for the installation environment.
	Make sure that there is no trash on the antenna. Since the characteristics can be degraded if there is snow on the antenna, remove any snow.
	When the wireless disconnects, check to see if there is any obstruction interrupting the wireless link.
	Shake the mounting pole to see if it is strong enough. If the mounting pole sways, wireless communication will be unstable.
	It is possible that it is being affected by multipath fading. Change the installation location or increase the ground height to mount this product in a place where the problem occurs less frequently.
	Check for problems in the installation environment.
	Check whether there are any alarms between this device and the opposed device.
Wireless link speed is slow	If the setting for the wireless link speed for the master has been changed from the default value, it will not be any faster than the set wireless link speed.
	Check whether the direction of the antenna has moved.
	Make sure that there is no trash on the antenna. Since the characteristics can be degraded if there is snow on the antenna, remove any snow.
	Check whether the link distance is appropriate. If the link is longer than the appropriate distance, it might be slow due to attenuation from rain.
	Check that the installation environment has any problem, such as that there is an obstruction between this point and the opposed device.

Symptoms	Cause and Resolution
Wireless link speed is slow	There may be an error in the wireless settings. When the output power is set at a fixed value, it will be slow due to attenuation from rain if the value is too much smaller than the appropriate value for your installation environment. If you set the automatic distance switching to a fixed long distance, it may become slow if the output power for short distance does not reduce to a value that is appropriate for the installation environment.
	Receive S/N ratio margin might not be sufficient. The wireless link speed changes dynamically according to the receive S/N ratio margin.
	Check whether there are any alarms between this device and the opposed device.
The wireless master and slave transmission ratio does not go to 8:2	Check the wireless transmission ratio for the master.
Data from a wireless disconnection is sent when reconnecting	When the wireless disconnects, the data received from a LAN is stored in the wireless transmission buffer. If you set the capacity for the wireless transmission buffer to low, you can decrease the quantity of data that is sent when reconnecting.
The "Wireless input exceeded" warning appears	If you have set the automatic distance switching to switch automatically, the "Wireless input exceeded" warning is displayed when the devices are installed in close proximity to each other. Normally you can still operate without any issues, but the value displayed in the receive level will not be correct.
In multiple adjacent wireless opposed devices, the same wireless channel is automatically selected	If you start the masters at the same time, the same wireless channel might be selected automatically. Switch the master and slave to avoid starting them at the same time, or set ranges for the wireless channels in each master so that they do not overlap.
I want to reduce the effects of snow and rain	Install the antenna in a location that is less exposed to snow and rain.
Temperature abnormalities occur	Temperature abnormalities might occur due to the effects of the ambient temperature and direct solar radiation. Reduce the effects of direct solar radiation by positioning SINELINK in a location that is well ventilated and not in direct sunlight.
I want to restart from a remote location	To restart automatically, click the "Restart" button.

7-6 Contact information

If this product is not working properly, check the recommendations in "7-5 Abnormal operations". If you are still unable to resolve the problem, contact the vendor who sold you the product.
For inquiries regarding systems or networks that have been built by combining this product with other products, consult the vendor that provided you with the system.

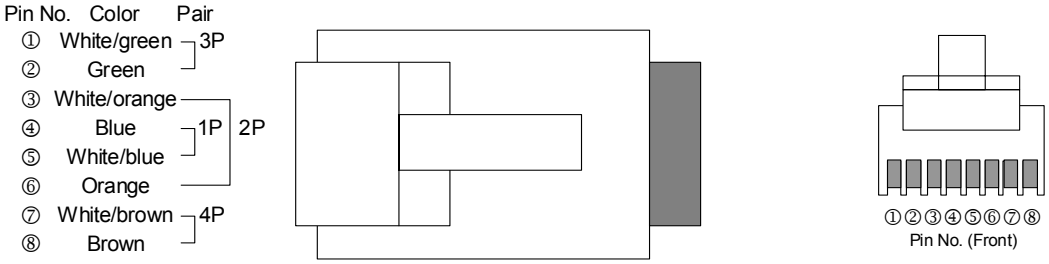
Repair support is available for this product for five years from the date that manufacturing of the product was completed. However, repair support may not be provided under certain conditions, even if it is still within the repair support period.
Although the settings information stored in this product is reset at the time of repairs, we do not create a backup of the settings.

7-7 Method of disposal

When disposing of this unit, do so in accordance with the laws of local authorities. For detailed information, contact local authorities.

7-8 Example of RJ-45 connector connection

The following example shows an installation with T568A connection of RJ-45 connector to LAN cable.
Use the same connection on both ends of the LAN cable that connects this product to the PoE power supply equipment and the LAN cable that connects PoE power supply equipment to a switching hub.



When connecting the RJ-45 connector, do not untwist the LAN cable too much. Untwisting it too much may result in an inability to communicate.

7-9 List of default settings

The factory default settings for this product are shown below.

Setting (1/4)				Default value	Remarks
Wireless and LAN settings	Name settings	Device name		(Not set)	
	Wireless settings	Operation mode		Slave	
		Link ID		(Not set)	
	LAN settings	IP address		192.168.0.202	
		Subnet mask		255.255.255.0	
		Default gateway		(Not set)	
		VLAN	VLAN tags	Not used	
			Priority	0	
			VID	1	
TELNET settings	TELNET settings	TELNET		Use	
	TELNET maintenance settings	Login name		guest	
		Password		(Not set)	
		Administrator password		(Not set)	
		Timer for the No Communication Monitor		5 minutes	

Setting (2/4)				Default value	Remarks
SNMP settings	SNMP settings	SNMP		Use	
	Community name settings	Community name (Read-Only)		public	
		Community name (Read-Write)		private	
	Trap send condition settings	Link up		Send	
		Link down		Send	
		Authentication failure		Send	
		Web maintenance login		Send	
		TELNET maintenance login		Send	
		Air Data Rate Change		Send	
		Other alarms		Send	
	Trap send destination settings	Destination 1	IP address	(Not set)	
			Community name	(Not set)	
		Destination 2	IP address	(Not set)	
			Community name	(Not set)	
	MIB system group settings	sysContact		(Not set)	
		sysName		(Not set)	
		sysLocation		(Not set)	

Setting (3/4)				Default value	Remarks
Wireless and LAN advanced settings	Wireless settings	Maximum air data rate		150Mbps	
		Interval measurement		Automatic measurement	
		Master and slave transmission ratio		5:5	
		Selection of Wireless Channels		1 to 8	
		Automatic interval switching		Automatic	
		Output power	Automatic control	Automatic control	
			Output power (dBm)	+1	
		Transmission Buffer		Large	
	LAN settings	Maintenance terminal	Access restrictions	Do not restrict	
			IP address range 1	(Not set)	
			IP address range 2	(Not set)	
			IP address range 3	(Not set)	
Setting login information	Web maintenance settings	Login name		administrator	
		Password		(Not set)	

Setting (4/4)				Default value	Remarks
Settings for Date & Time	SNTP client settings	SNTP client		Not used	
		Server IP address		(Not set)	
		Auto update interval		86400	
		Timezone		+00:00	
SYSLOG settings	SYSLOG settings	SYSLOG		Not used	
	SYSLOG host settings	Host 1	IP address	(Not set)	
			Facility	1	
			Severity level	0 to 7	
		Host 2	IP address	(Not set)	
			Facility	1	
			Severity level	0 to 7	

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