
**User's
Manual**

**YFGW510
Field Wireless Access Point**

IM 01W02E01-01EN

vigilantplant[®]

YFGW510 Field Wireless Access Point

IM 01W02E01-01EN

This document contains important information about using the YFGW510 field wireless access point properly and safely. Please read this document thoroughly before using this product.

The configuration of the field wireless system is described in the User's Manual of the YFGW410 field wireless management station (IM 01W02D01-01EN). Read that document first.

CONTENTS

Introduction	i
Safety Precautions	ii
About Radio Wave.....	ii
Documentation Conventions.....	iii
Information of Revision	iv

PART-A. OVERVIEW OF FIELD WIRELESS SYSTEM

A1. Introduction.....	A1-1
A2. System Configuration.....	A2-1

PART-B. FUNCTIONS OF YFGW510

B1.	Functions of YFGW510	B1-1
B2.	Structure and Parts of YFGW510.....	B2-1
B2.1	Front View	B2-1
B2.2	Rear View	B2-2
B2.3	Side View.....	B2-4
B3.	LED Display Function	B3-1
B4.	Mechanical Operating Parts.....	B4-1
B5.	Checking the Product	B5-1

PART-C. INSTALLATION

C1.	Installation Environment	C1-1
C2.	Power Supply and Grounding	C2-1
C2.1	Power Supply	C2-1
C2.2	Grounding.....	C2-1
C3.	Requirements for Installation	C3-1
C3.1	Requirements for Installation Locations.....	C3-1
C3.2	Notes on Installation.....	C3-2
C4.	Mounting	C4-1
C5.	Wiring.....	C5-1
C5.1	Power Supply Cable Connection	C5-1
C5.2	Grounding Cable Connection.....	C5-3
C5.3	Network Cable Connection	C5-4
C5.3.1	Metal Network Cable Connection	C5-4
C5.3.2	Optical Network Cable Connection.....	C5-5
C5.4	Installation and wiring of Antenna	C5-7
C5.4.1	Mounting ISA100.11a antenna to YFGW510	C5-7
C5.4.2	Remote Installation and Wiring of ISA100.11a Antenna	C5-8
C5.4.3	Installation and Wiring of Wireless LAN Antenna	C5-12
C6.	Explosion Proof Wiring.....	C6-1

PART-D. SETUP

D1.	Initial Configuration	D1-1
D2.	Setup Tool	D2-1
D2.1	System Requirements	D2-1
D2.1.1	Hardware	D2-1
D2.1.2	Software	D2-1
D2.1.3	Connection Example.....	D2-2
D2.2	Installation Procedure	D2-3
D2.2.1	Driver for Infrared adapter.....	D2-3
D2.2.2	Field Wireless Access Point Setup Tool.....	D2-4
D3.	Configuration Method.....	D3-1
D3.1	Window Design	D3-1
D3.2	Display/Edit Mode Switching.....	D3-2
D3.3	Backbone Interface.....	D3-4
D3.4	Maintenance	D3-6
D3.5	Setting of Wireless LAN 1 (WLAN C1)	D3-8
D3.6	Setting of Wireless LAN 2 (WLAN C2)	D3-10
D3.7	Setting of WLAN Redundancy.....	D3-11
D3.8	Version Information	D3-12

PART-E. OPERATION AND MAINTENANCE

E1.	Routine Maintenance	E1-1
E2.	Additions and Replacements.....	E2-1
E3.	Maintenance in Hazardous Areas.....	E3-1
E4.	Components Having Defined Life Spans	E4-1

PART-F. TROUBLESHOOTING

F1. Status Information.....	F1-1
F2. Status Indication and Responsive Measures	F2-1

PART-G. SPECIFICATIONS

G1.	Standard Specifications	G1-1
G1.1	Communication Interface Specifications.....	G1-1
G1.2	General Specifications	G1-2
G1.3	Regulatory Compliance Statements.....	G1-3
G2.	Model, Suffix Codes and Option Codes.....	G2-1
G3.	External Dimensions.....	G3-1
G3.1	100BASE-TX/100BASE-FX Specifications	G3-1
G3.2	Single Communication Wireless LAN Client Specifications	G3-3
G3.3	Redundant Communication Wireless LAN Client Specifications	G3-5

Introduction

This document describes the YFGW510 field wireless access point, which is a core component of field wireless networks, conforming to ISA100.11a, a wireless communication standard for industrial automation that was drawn up by the International Society of Automation (ISA). Outline, setup, settings, start-up, operation and maintenance of the entire field wireless system including the field wireless network and field wireless backbone are described in the User's Manual of the YFGW410 field wireless management station (IM 01W02D01-01EN). Read that document first.

Safety Precautions



IMPORTANT

Read the safety precautions for this product that are described in Read Me First (IM 01W02E01-11EN).

About Radio Wave



IMPORTANT

- This product is equipped with a wireless module which is designated as a certification of construction type as a wireless facility for 2.4 GHz band low-power data communication system of the Radio Act.
Refer to G1.3 Regulatory Compliance Statements for detail.
Due to the designated certification of construction type, users may be subject to legal punishment in case of:
 - Disassembling or modifying the wireless module or antenna in this instrument
 - Peeling off the certification label attached to the wireless module in this instrument
 - Microwave ovens and other industrial, scientific and medical equipment, as well as local wireless stations (license required) and specific low-power wireless stations (license not required) for identifying mobile objects used in the production line of a factory, use the same frequency band as this product. Prevent interference with other wireless stations.
 - Check that local wireless stations and specific low-power wireless stations are not being used in the vicinity before using this product.
 - If this product causes radio interference in a local wireless station used for identifying mobile objects, change the working frequency or stop the emission of radio waves immediately. For details on how to prevent radio interference, contact our service office.
 - Although this product has been designed to resist high frequency electrical noise, if a radio transceiver is used near the transmitter or its external wiring, the transmitter may be affected by high frequency noise pickup. To test this, start out from a distance of several meters and slowly approach the transmitter with the transceiver while observing the measurement loop for noise effects. Thereafter use the transceiver outside the range where the noise effects were first observed.
-

■ FCC compliance

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

Co-Located:

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance 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.

RF Exposure Compliance

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body (excluding extremities: hands, wrists, feet and ankles).

■ Industry Canada (IC) compliance

This Class A digital apparatus complies with Canadian ICES-003.

French: Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

French: Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter IC Number 8999A-WIC003 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Antenna type:	Gain:
Sleeve	2.14dBi, 50 Ω
Collinear	9dBi, 50 Ω
Patch compound	15dBi, 50 Ω

French: Le présent émetteur radio IC Number 8999A-WIC003 a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Antenna type:	Gain:
Sleeve	2.14dBi, 50 Ω
Collinear	9dBi, 50 Ω
Patch compound	15dBi, 50 Ω

RF Exposure Compliance:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body (excluding extremities: hands, wrists, feet and ankles).

French: Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le dispositif rayonnant et le corps (à l'exception des extrémités : mains, poignets, pieds et chevilles).

Documentation Conventions

■ Typographical Convention

The following typographical conventions are used throughout this document:

● Conventions commonly used throughout this document

Character string to be entered

The characters to be entered are shown in one-byte characters as follows:

Example:

FIC100.SV=50.0

“△”Mark

Indicates a space between character strings to be entered.

Example:

.AL △ PIC010 △ -SC

Character string enclosed by brackets ({ })

Indicates an option that can be omitted.

Example:

.PR △ TAG {△. Sheet name}

● Conventions used to show key or button operations:

Characters enclosed by brackets ([])

Characters enclosed by brackets within any description on a key or button operation, indicate either a key on the HIS (Human Interface Station) keyboard, a key on the operation keyboard, a button name on a window, or an item displayed on a window.

Example:

To perform the function, press the [OK] key.

Characters enclosed by angle-brackets (<>)

Characters enclosed by angle-brackets show the title of the screen during explanation of the software operation.

■ Symbols

The symbols used in this document are described in Read Me First (IM 01W02E01-11EN).

■ Drawing Conventions

Some drawings may be partially emphasized, simplified or omitted for the convenience of description.

Some screen images depicted in the user's manual may have different display positions or character types (e.g., upper/lower case). Also note that some of the images contained in this user's manual are display examples.

Information of Revision

Document Name: YFGW510 Field Wireless Access Point

Document Number: IM 01W02D01-01EN

Edition	Date	Page	Revised Item
1st	August 2012		New Issue

PART-A. OVERVIEW OF FIELD WIRELESS SYSTEM

A1. Introduction

Read the User's Manual of the YFGW410 field wireless management station (IM 01W02D01-01EN) before reading this document.

The YFGW510 field wireless access point is a core component of field wireless networks based on ISA100.11a, a wireless communication standard for industrial automation. YFGW510 serves as an access point (master device for field wireless devices) and forms the wireless backbone network for the YFGW410 field wireless management station and the YFGW610 field wireless media converter.

A2. System Configuration

This section describes the configuration for the field wireless system including YFGW510.

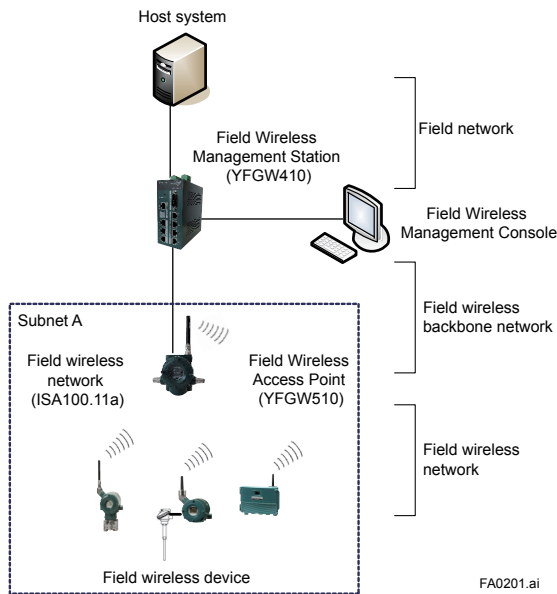


Figure A2-1 Minimum configuration

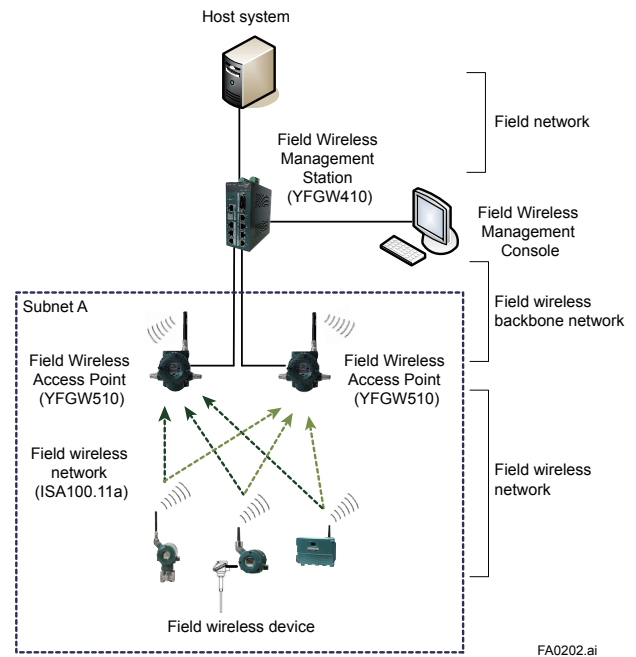


Figure A2-2 YFGW510-redundant configuration

Figure A2-1 shows the minimum configuration with a single YFGW510, and Figure A2-2 shows the YFGW510-redundant configuration employing the Duocast technology (each wireless field device communicates with two YFGW510s).

The wireless backbone network consists of the YFGW410 field wireless management station, the YFGW510 field wireless access point and the YFGW610 field wireless media converter. Any of the following connection methods can be selected.

1. Metal network cable (100BASE-TX)
2. Optical fiber network cable (100BASE-FX)
YFGW610 must be installed between YFGW510 and YFGW410 for optical fiber network connection to convert it to metal network connection.
3. Wireless LAN connection
Recommended access points for wireless LAN must be installed between YFGW510 and YFGW410 for wireless LAN connection to convert it to metal network connection.
For recommended wireless LAN access points, see the User's Manual of YFGW410 field wireless management station (IM 01W02D01-01EN).

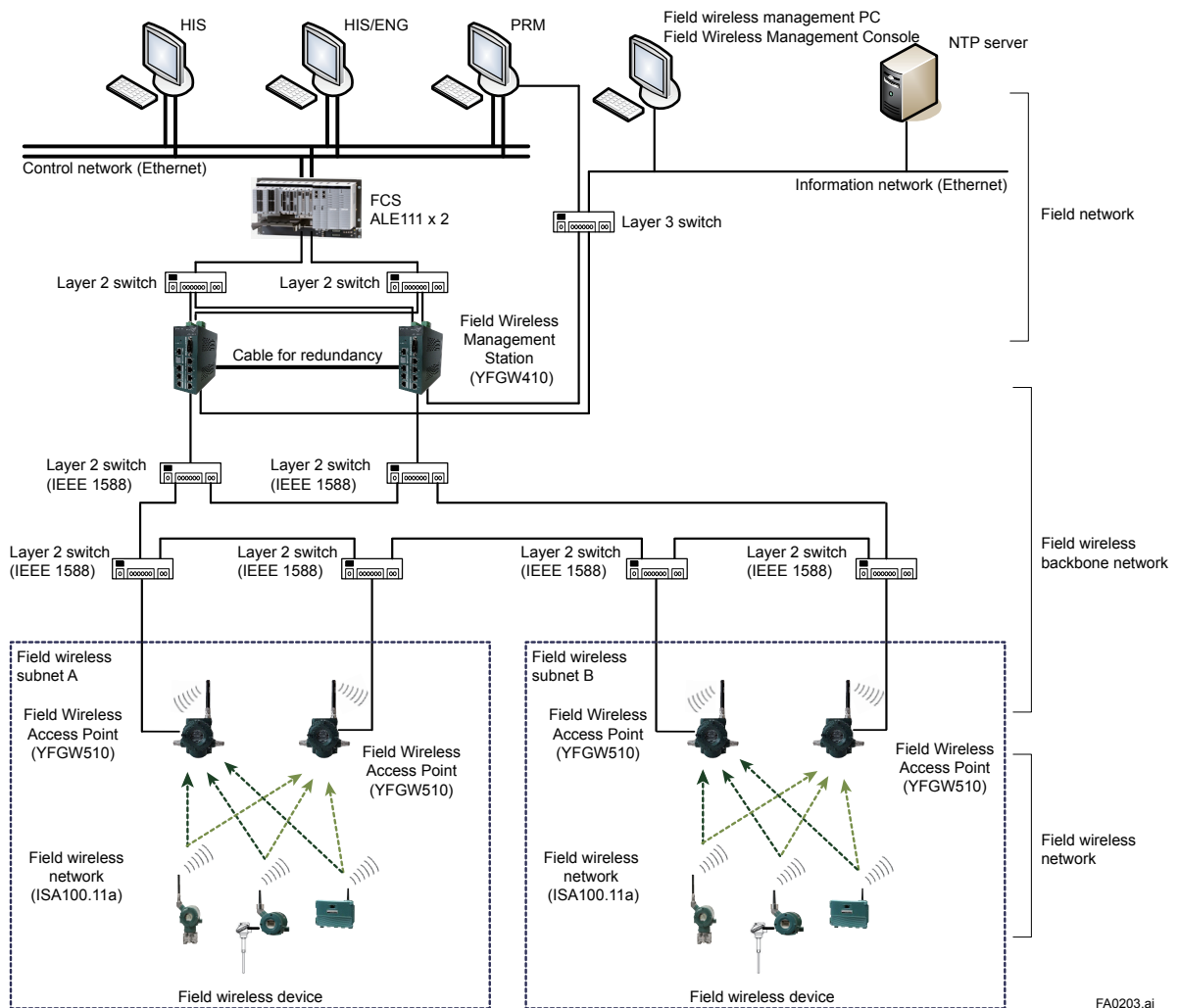


Figure A2-3 YFGW410/YFGW510-redundant configuration

Figure A2-3 shows the YFGW410/YFGW510-redundant system configuration.

The switching hub between YFGW410 and YFGW510 must support the rapid spanning tree protocol (RSTF) to prevent Ethernet packets from looping, and the IEEE1588 (precision time protocol).

For recommended switching hubs, see the User's Manual of YFGW410 field wireless management station (IM 01W02D01-01EN).

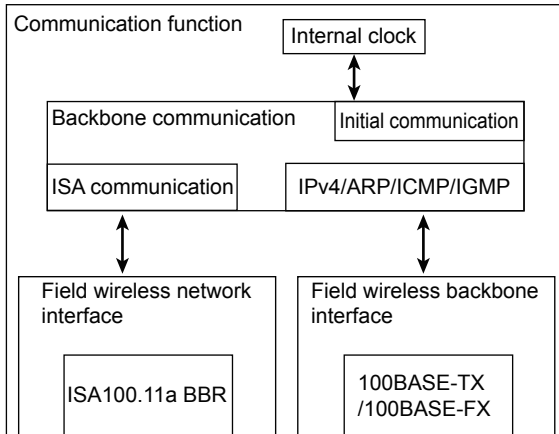
As shown above, field wireless networks can come with various system configurations.

FA0203.ai

PART-B. FUNCTIONS OF YFGW510

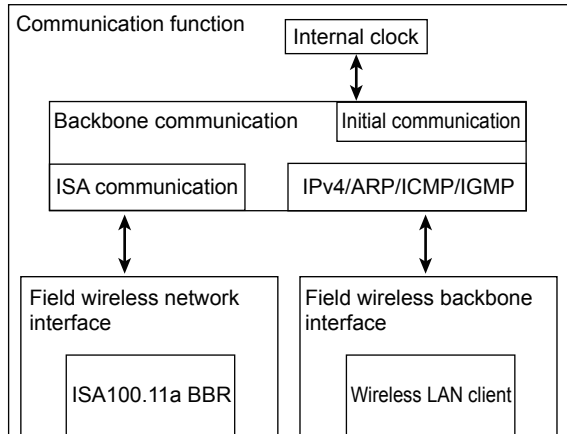
B1. Functions of YFGW510

The following block figures show communication functions of YFGW510 for each specification code.



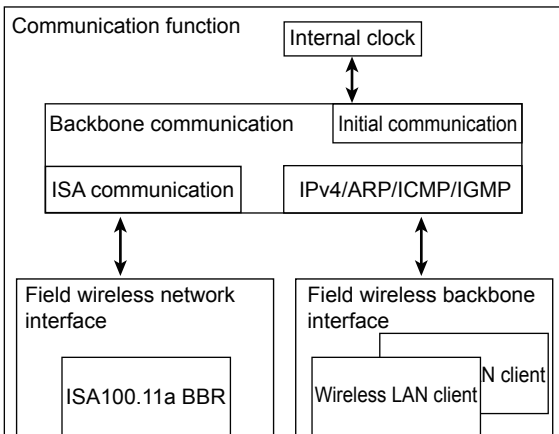
FB0101.ai

Figure B1-1 100BASE-TX/100BASE-FX specification (-A1, -A2)



FB0102.ai

Figure B1-2 Wireless LAN client specification (-C4)



FB0103.ai

Figure B1-3 Redundant wireless LAN specification (-C5)

As shown above, the functions of the field wireless backbone interface differ depending on specifications.

YFGW510 with the 100BASE-FX specifications is equipped with a media converting board for metal network/optical fiber network. The metal network cable and optical fiber network cable cannot be used at the same time.

In the wireless LAN specifications, neither metal network cable nor optical fiber network cable can be used.

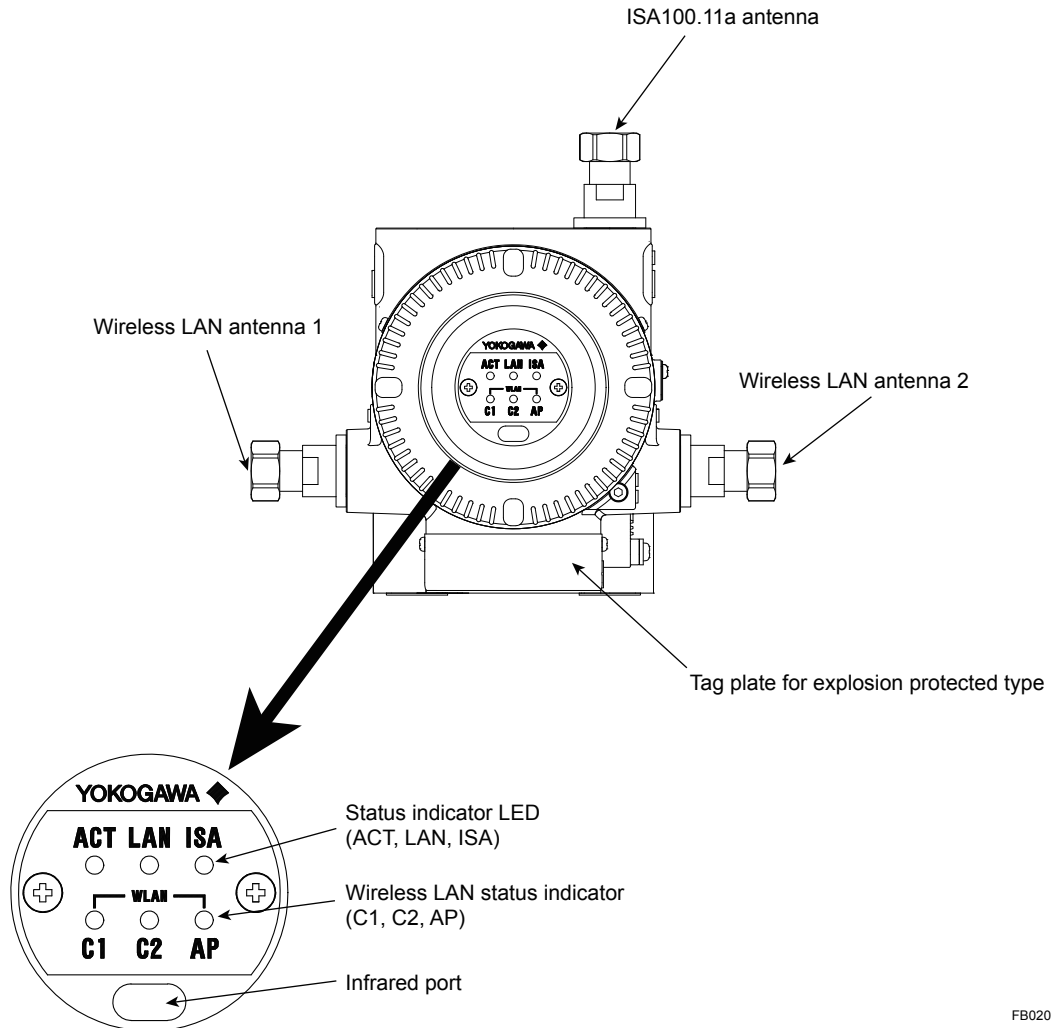
YFGW510 with the redundant wireless LAN specifications uses either wireless LAN port as a communication path. For the selection of a wireless LAN port and the conditions for switching communication paths, see D3.7 Setting of WLAN Redundancy.

ISA100.11a BBR of the field wireless network interface is for the ISA100.11a field wireless communication.

Initial communication shown in the block figure is an infrared communication port for setting parameters through the glass window on the front face of YFGW510.

B2. Structure and Parts of YFGW510

B2.1 Front View



FB0201.ai

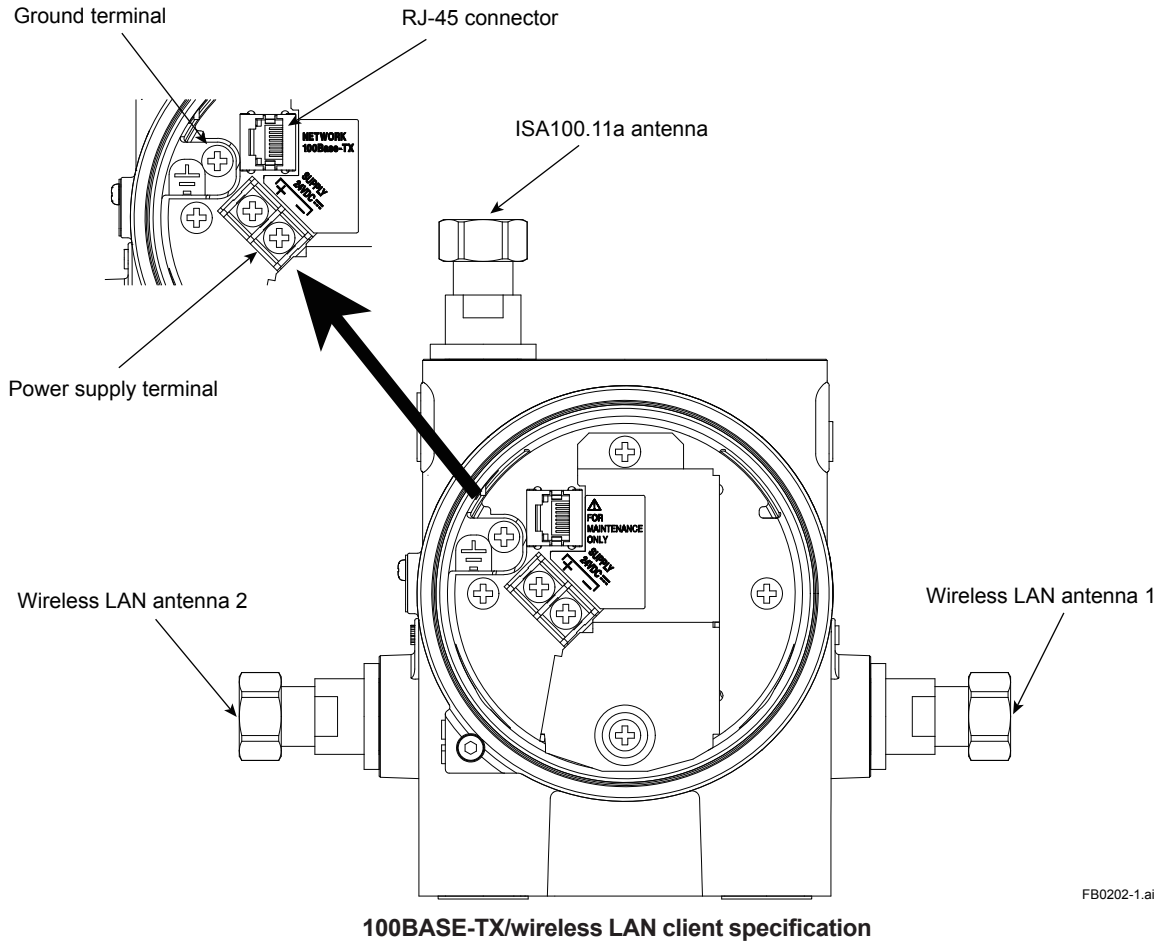
Figure B2-1 Front view

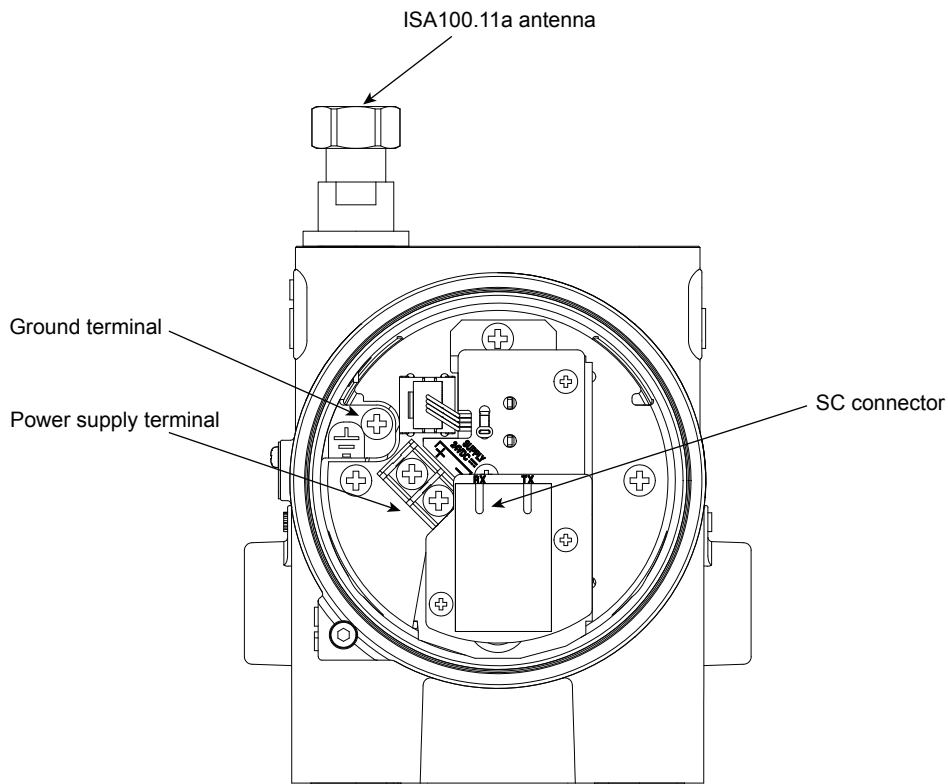
One to three antenna connectors are provided, depending on the specifications. For all specifications, the ISA100.11a antenna connector is on top. The wireless LAN antenna connector 1 on the left side of the body is for single communication and the antenna connector 2 is added on the right side for redundant communication.

The ISA100.11a antenna can be directly mounted on the connector, or remotely connected by using an extension cable. The wireless LAN antenna(s) must be placed vertically and more than 1 m apart from the ISA100.11a antenna. Thus, they must be connected by using antenna extension cables.

YFGW510 does not have any switches or buttons that can be mechanically operated from the outside of the housing.

B2.2 Rear View





FB0202-2.ai

100BASE-FX specification

Figure B2-2 Rear view of YFGW510

The power supply cable, grounding cable and field wireless backbone cable are connected on the back face of YFGW510. The electrical connection is provided on the bottom.

In the 100BASE-FX specification, a media converter module is added to the 100BASE-TX specification.

Although the RJ-45 connector is provided in the wireless LAN specification, it is for maintenance only and cannot be used for communication.

B2.3 Side View

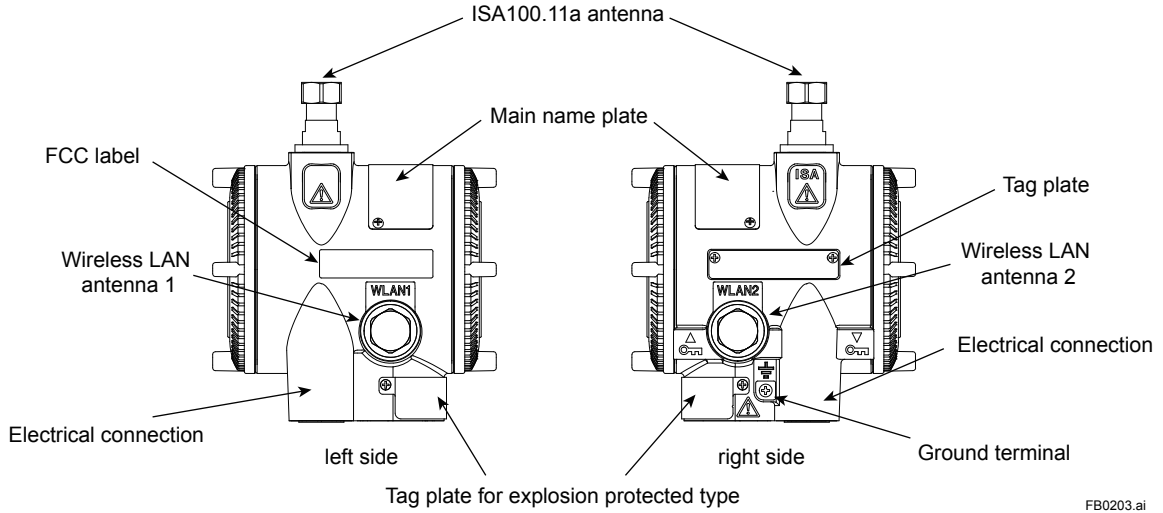


Figure B2-3 Side view of YFGW510

The wireless LAN antenna connector(s) are equipped on the side(s) only for wireless LAN specifications.

B3. LED Display Function

- The functions of the status indicator LED on the front face are as follows.

LED	Function
ACT	Display the operating status of YFGW510
LAN	Display the operating status of the communication interface (100BASE-TX/100BASE-FX)
ISA100	Display the operating status of ISA100.11a antenna
C1	Display the operating status of wireless LAN antenna 1
C2	Display the operating status of wireless LAN antenna 2
AP	Not used for YFGW510

■ Displaying the operating status

The relation of the device status and LED status is as follows.

LED	Power off	Starting up	Connect- ing	Normal	Mainte- nance	Abnormal
ACT	OFF	Orange	Orange blink	Green	Red blink	Red

Details of the device status are as follows.

Status	Description
Power off	Power supply is OFF.
Starting up	Power supply is turned on and the device is being initialized.
Connecting	Startup has completed and the device is trying to connect to YFGW410.
Normal	The results of the self-diagnosis (communication, operation) are all normal.
Maintenance	YFGW510 is being set up (device tags and parameters for wireless LAN, etc. are being set up through the infrared communication).
Abnormal	Any of the results of the self-diagnosis (communication, operation) is abnormal.

■ Displaying the communicating status

The relation of the communication status and LED status is as follows.

LED	Power off	Starting up	Signal search	Link down	Link up	Commu- nicating	Mainte- nance	Abnor- mal
LAN	OFF	OFF	N/A	OFF	Green	Green blink	OFF	Red
ISA100	OFF	OFF	N/A	N/A	Green	Green blink	OFF	Red
WLAN-C1	OFF	OFF	Orange blink	OFF	Green blink	Green	OFF	Red
WLAN-C2	OFF	OFF	Orange blink	OFF	Green blink	Green	OFF	Red
WLAN-AP	—	—	—	—	—	—	—	—

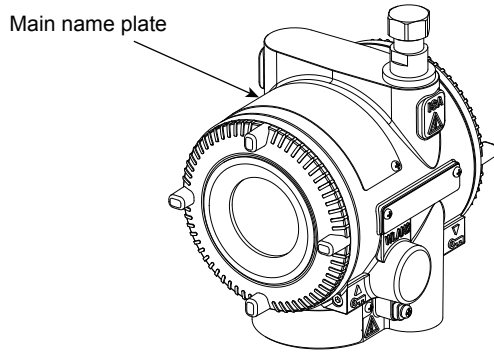
B4. Mechanical Operating Parts

YFGW510 does not have any switches or buttons that can be mechanically operated from outside of the housing.

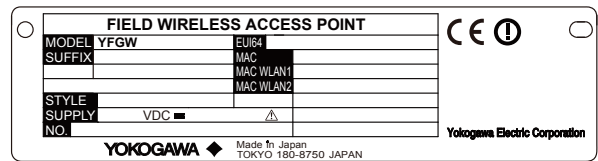
B5. Checking the Product

When you receive YFGW510, please check that the product specifications match your order, all items are included and that there is no damage, stains or other problems.

■ Main unit



FB0501.ai

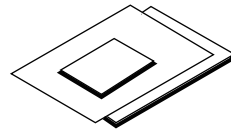


FB0502.ai

■ Standard accessories

- **Manual**

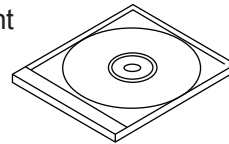
IM01W02E01-11EN Read Me First



FB0503.ai

- **Software media (F9195TA)**

IM01W02E01-01EN YFGW510 Field Wireless Access Point
Configuration tool for field wireless access point



FB0504.ai

- **Mounting bracket**

- **ISA100.11a antenna (when models with the standard antenna specified)**

- **Wireless LAN antenna 1 and 3-m antenna extension cable (when models with the detachable antenna specified)**

- **Wireless LAN antenna 2 and 3-m antenna extension cable (when models with the detachable antenna specified)**

PART-C. INSTALLATION

This section describes installation for YFGW510.

Follow the steps below to install YFGW510.

1. Installation of YFGW510
2. Wiring of the power supply, grounding cable, signal cables and mounting/wiring of antenna(s)

C1. Installation Environment

YFGW510 should be installed in appropriate conditions to ensure its stable operation.

The table below shows details of the installation environment for YFGW510.

Item		Environment	Note
Power supply	Rated voltage	24 V DC	
	Voltage range	10 to 26.4 V DC	
	Momentary power failure	1 ms or less (instant disconnection)	
	Ripple ratio	1%p-p or less	
Terminal		M4 screw terminal (power supply and ground)	
Maximum power consumption		3.5 W	
Grounding		Class D grounding (100 ohms or less)	No sharing with other devices
Temperature range	Operating	-40 to 65°C	
	Transport/storage	-40 to 85°C	
Humidity range	Operating	0 to 100% RH (No condensation)	
	Transport/storage	0 to 100% RH (No condensation)	
Temperature gradient	Operating	±10°C/h or less	JEIDA29 class B
	Transport/storage	±20°C/h or less	
Protection degree		IP66	IEC529
Vibration resistance		Displacement amplitude: 0.21 mm (10 to 60 Hz)	
		Acceleration amplitude: 3 G (60 to 2000 Hz)	
Shock resistance		50 G 11 ms (de-energized, with half-sine wave pulse in three directions)	IEC68-2-27
Altitude		3000 m or less	
Noise resistance	Electric field	3 V/m or less (80 MHz to 1 GHz)	
	Electrostatic discharge	4 kV or less (contact discharge), 8 kV or less (aerial discharge)	
Cooling		Natural air cooling	
Mounting		2-inch pipe	With dedicated brackets



IMPORTANT

- Avoid direct sunlight.
- Keep away conductive particles such as iron and carbon.
- Avoid corrosive gases such as hydrogen sulfide, sulfurous acid, chlorine and ammonia.

**IMPORTANT**

This product is equipped with a wireless module which is designated as a certification of construction type as a wireless facility for 2.4 GHz band low-power data communication system of the Radio Act.

Refer to G1.3 Regulatory Compliance Statements for detail.

Before use, confirm that the location of installation satisfies the above standard.

**IMPORTANT**

- Microwave ovens and other industrial, scientific and medical equipment, as well as local wireless stations (license required) and specific low-power wireless stations (license not required) for identifying mobile objects used in the production line of a factory, use the same frequency band as this product. Prevent interference with other wireless stations.
 - Check that local wireless stations and specific low-power wireless stations are not being used in the vicinity before using this product.
 - If this product causes radio interference in a local wireless station used for identifying mobile objects, change the working frequency or stop the emission of radio waves immediately. For details on how to prevent radio interference, contact our service office.
-

C2. Power Supply and Grounding

An appropriate power supply is necessary for the stable operation of YFGW510.

C2.1 Power Supply

Connect the power supply to the terminal block of the main unit.

SEE ALSO For details of the power supply and power consumption of YFGW510, see C1. Installation Environment.

Inrush Current

When starting up, inrush current may run into the device. As shown in the table below, this current is, even though short-lived, significantly larger (10 times or more) than the steady state current. Make sure that the power supply and protector can endure the inrush current.

Item	Specification	Remarks
Inrush current	8 A (5 ms or less)	At 26.4 V DC

SEE ALSO For details of power supply wiring, see C5.1 Power Supply Cable Connection.



IMPORTANT

YFGW510 does not have a power switch. Provide a breaker or switch for the power line to turn ON/OFF the device.

- Configuration data may be corrupted if a power failure occurs during download to YFGW410, YFGW510 and field wireless devices. Configuration data is not corrupted even if a power failure occurs at the time of the usual operation.
- Please supply the power from the permanent power supply to avoid.

C2.2 Grounding

Appropriate grounding is necessary for the stable operation of YFGW510. Class D grounding (the third class grounding) with the grounding resistance of 100 ohms or less is necessary. To connect the grounding cable to YFGW510 directly, use the ground terminal on the right side of the main body.

SEE ALSO For details of ground wiring, see C5.2 Grounding Cable Connection.

C3. Requirements for Installation

C3.1 Requirements for Installation Locations

The installation of YFGW510 and field wireless devices must meet the following conditions:

- The field wireless equipment should be mounted in the place where no obstacle exists around the antenna. Especially, YFGW510 should be mounted in the condition that no obstacle exists around the antenna.
- If there is a pipe for mounting or plumbing in the direction except for the communication partners, the antenna should be more than 30 cm apart from them.
- When the wireless LAN antenna or wireless field antenna do not meet above requirements, use an extension cable to place the antenna where radio waves will not be affected by obstacles.
- All antennas must be in the upright position.
- The antenna of field wireless equipment must be installed at least 1.5 meter above the ground (floor)
- The YFGW510 should be installed at a location as close as possible to the center of the field wireless network.
- Ensure that the field wireless devices that are located within the wireless communication range are within the line of sight of each other. In the star topology, the YFGW510 must meet this condition.

C3.2 Notes on Installation

Pay attention to the following points at the installation of YFGW510 and field wireless devices.

■ Installation Location

This device is designed to work under the severe environmental condition. However, it is necessary to pay attention to the following conditions for the stable and long-term precise operation.

● Exposure to Direct Sunlight

If the device is placed at a location that may be exposed to direct sunlight, it is necessary to make the insulation measure. However, the antenna must be covered with the material which does not block the radio wave.

● Ambient Temperature

Avoid locations subject to wide temperature variations or a significant temperature gradient. If the location is exposed to radiant heat from plant equipment, provide adequate thermal insulation and/or ventilation. Do not install the device in a location where high temperature and high humidity may last for a long time.

● Ambient Atmosphere

Do not install the device in a corrosive atmosphere. If this cannot be avoided, there must be adequate ventilation as well as measures to prevent the rain water from penetrating or remaining in the conduits.

● Vibration and Impact

Although the device is designed to be resistant to vibration and impact, an installation site should be selected where vibration and impact are kept to a minimum.

■ Installation of Explosion Proof Compliant Device

The explosion proof compliant equipment can be installed in the hazardous area of specific gases. This device must be installed in accordance with the regulations of the country where the device is installed.

- Installation: Check that the ambient temperature is not beyond the limit.
- Wiring: Put all the power cables in protective ducts. If possible, also put the network cables (optical fiber cable or metal cable) in protective ducts.
- Maintenance: After confirming that there is no dangerous gas in the ambience, open the housing or protective ducts.

C4. Mounting

Mount YFGW510 on the 2-inch (2B) pipe, placed vertically or horizontally, using the dedicated bracket. YFGW510 is accessed through its four or six sides. Make sure that the mounting pipe, the device, connectors or cables will not interfere with radio wave signals. This is achieved by using the dedicated bracket. YFGW510 does not support any other mounting method.

■ Mounting on vertical pipe (Communications interface: 100BASE-TX/100BASE-FX)

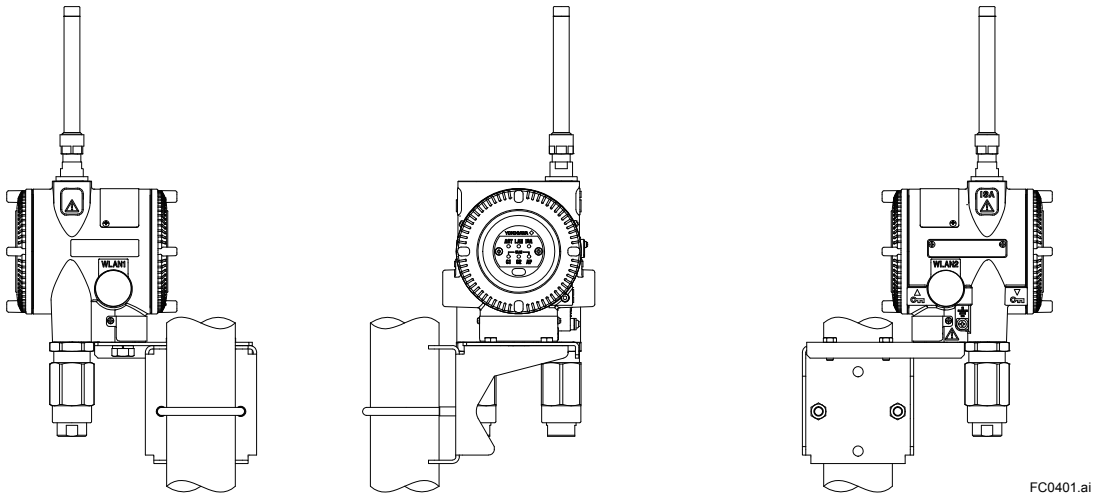


Figure C4-1 Mounting on vertical pipe (Communications interface: 100BASE-TX/100BASE-FX)

Assemble the bracket and attach YFGW510 to the bracket. Fasten it to the pipe using the U-bolts.

For wiring procedure using cable connectors, see the section on wiring.

■ **Mounting on vertical pipe (Communications interface: Wireless LAN client)**

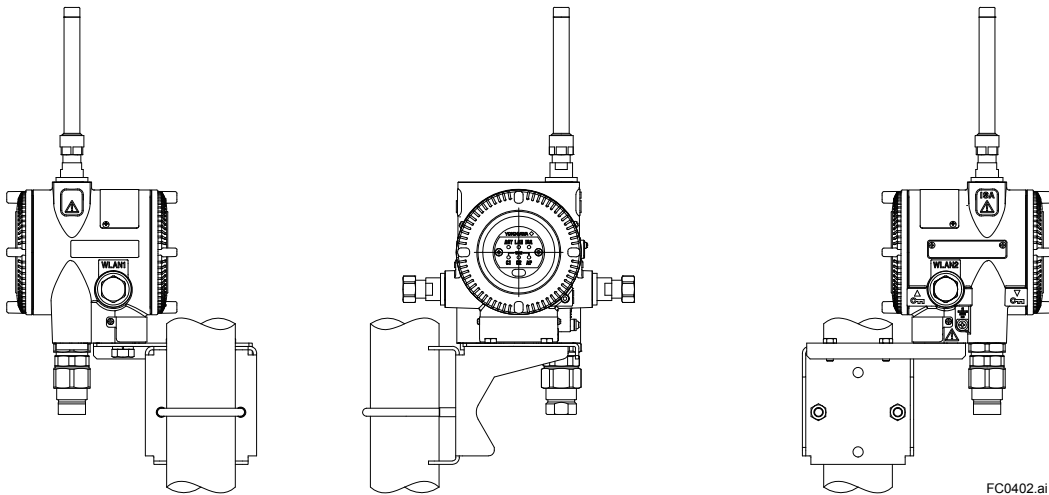


Figure C4-2 Mounting on vertical pipe (Communications interface: Wireless LAN client)

When used for a single-line wireless LAN, YFGW510 is equipped only with the connector for wireless LAN antenna on the left side of the device.

Assemble the bracket and attach YFGW510 to the bracket. Fasten it to the pipe using the U-bolts.

For wiring procedure using cable connectors, see the section on wiring.

The wireless LAN antenna must be placed away from the ISA100.11a antenna, using an extension cable. For details, see the section on antenna installation

■ **Mounting on horizontal pipe (Communications interface: 100BASE-TX/100BASE-FX)**

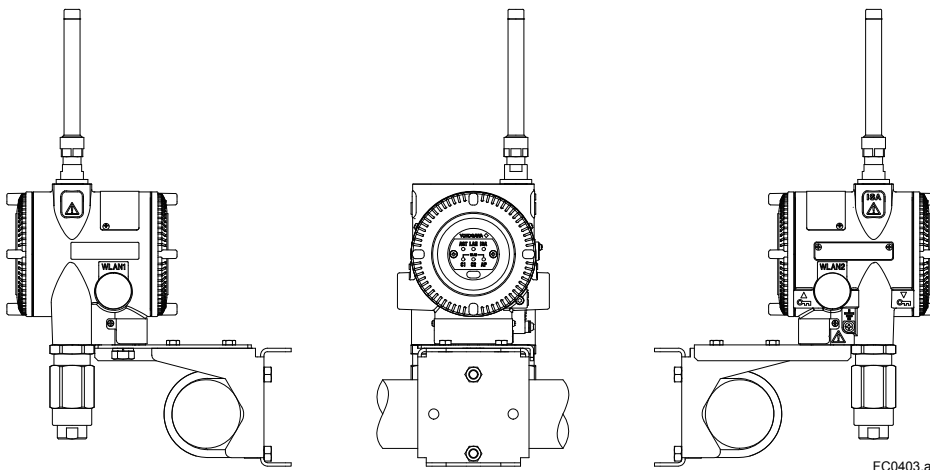


Figure C4-3 Mounting on horizontal pipe (Communications interface: 100BASE-TX/100BASE-FX)

Assemble the bracket and attach YFGW510 to the bracket. Fasten it to the pipe using the U-bolts.

For wiring procedure using cable connectors, see the section on wiring.

■ **Mounting on horizontal pipe (Communications interface: Wireless LAN client)**

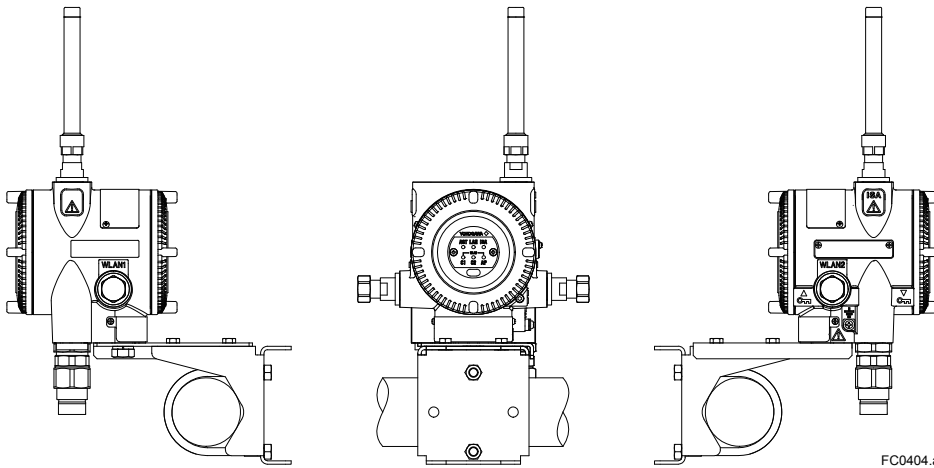


Figure C4-4 Mounting on horizontal pipe (Communications interface: Wireless LAN client)

For use with a single-line wireless LAN, YFGW510 is equipped only with the connector for a wireless LAN antenna on the left side of the device.

Assemble the bracket and attach YFGW510 to the bracket. Fasten it to the pipe using the U-bolts.

For wiring procedure using cable connectors, see the section on wiring.

The wireless LAN antenna must be placed away from the ISA100.11a antenna, using an extension cable. For details, see the section on antenna installation.

C5. Wiring

This chapter describes connection of the power supply cable, grounding cable and network cable to the installed YFGW510, mounting of antennas and cable connection.

- Use cables with a 70°C rating or higher for explosion-proof devices.
- Explosion-proof device must be wired in compliance with related laws and regulations.

C5.1 Power Supply Cable Connection

This section describes power supply cable wiring.

● Wiring

Pull the power supply cable into the device through the power cable ground. Connect the power supply cable to the power supply terminal in the device.

● Recommended power supply capacity

Output voltage range: 12 to 24V DC (Supplied from power supply to YFGW510)

Output capacity: 10 W or more *

* When starting up YFGW510, an inrush current flows as described in C2.1 Power Supply. Make sure that the power source has current output capacity at least three times normal current consumption and enough to withstand the inrush current as described below.

● Inrush current

When power is turned on, an input current flows, which is higher than its normal state. See C2.1 Power Supply about inrush current. Ensure that the power supply and protective devices can withstand this current.

● Cable (Insulated for industrial equipment)

Examples

- 600 V polyvinyl chloride insulated wires (IV): JIS C3307
- Polyvinyl chloride insulated wires for electrical apparatus (KIV): JIS C3316
- 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV): JIS C3317
- Heatproof vinyl insulated wires VW-1 (UL1015/UL1007)

Wire size

- Core: AWG14 to 13 (2 to 2.6 mm²)

Terminal treatment

- Ring terminal for M4: With insulation covers

● **Power supply cable connection procedure**

1. Insert the power supply cable through the power supply cable gland into the housing.
2. Screw the cable gland into the housing to fasten it.
3. Connect the + cable to the + terminal and the – cable to the – terminal.
4. For shielding the power supply cable, connect the grounding cable to the ground terminal next to the power terminal.

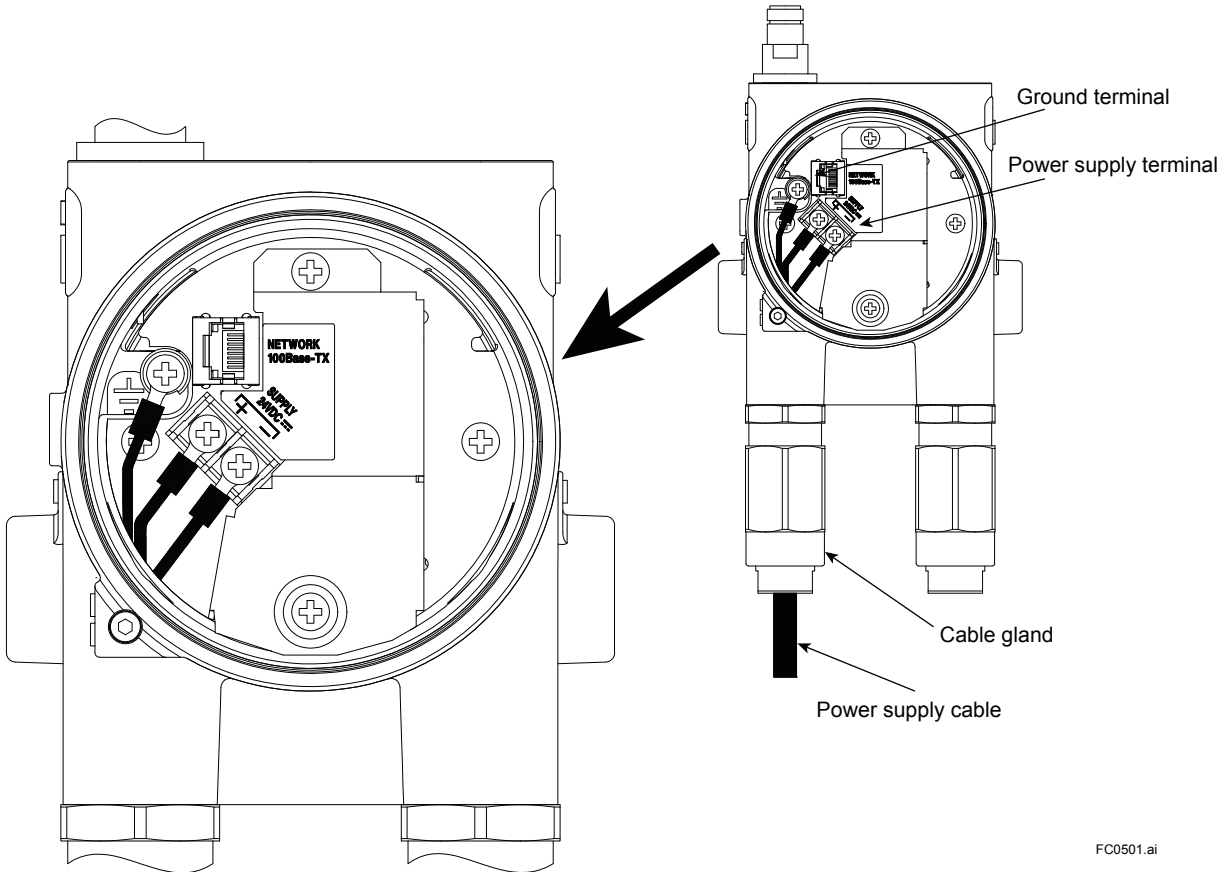


Figure C5-1 Connecting power supply cable

FC0501.ai

C5.2 Grounding Cable Connection

This section describes ground wiring.

Class D grounding (the third class grounding) with the grounding resistance of 100 Ω or less is necessary. To connect the grounding cable to YFGW510 directly, use the ground terminal on the right side of the main device. Do not share the ground wiring with other devices.



IMPORTANT

The explosion proof compliant device always needs the grounding.

● Applicable Cable (Insulated wire for industrial equipment)

Examples:

- 600 V polyvinyl chloride insulated wires (IV): JIS C3307
- Polyvinyl chloride insulated wires for electrical apparatus (KIV): JIS C3316
- 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV): JIS C3317
- Heatproof vinyl insulated wires VW-1 (UL1015/UL1007)

Wire size

- Core: AWG14 to 13 (2 to 2.6 mm²)

Terminal treatment

- Ring terminal for M4: With insulation covers

● Connection of Cable

Connect the grounding cable to the ground terminal of YFGW510. The ground terminal is located at the bottom on the right side of the housing.

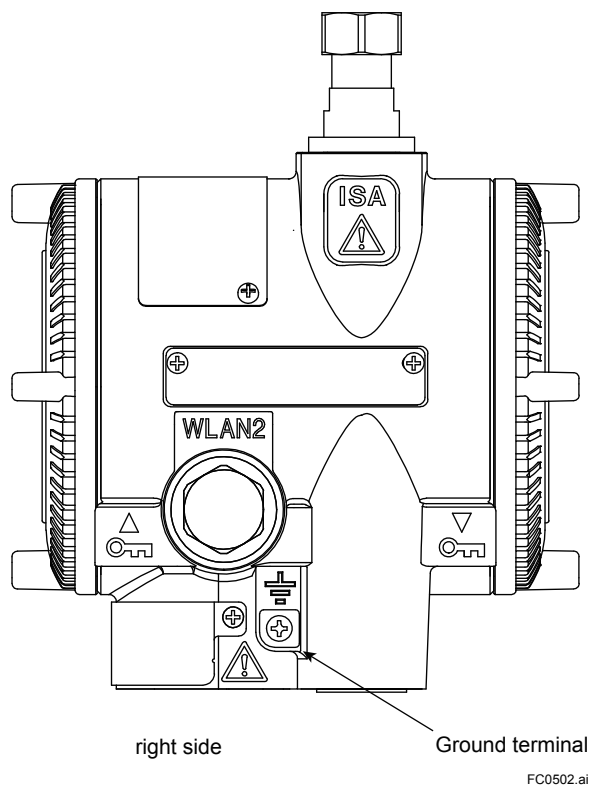


Figure C5-2 Connecting grounding cable

C5.3 Network Cable Connection

C5.3.1 Metal Network Cable Connection

- **Caution for use with metal network cable**

The metal network cable is intended for indoor wiring. In outdoor wiring, it is recommended the optical network cable in order to eliminate the influence of electromagnetic noise due to lightning and keep transmission distance. An optical fiber network cable is recommended if outdoor wiring is required because of transmission range and influence of electromagnetic noise due to lightning or other similar factors.

- **Cable**

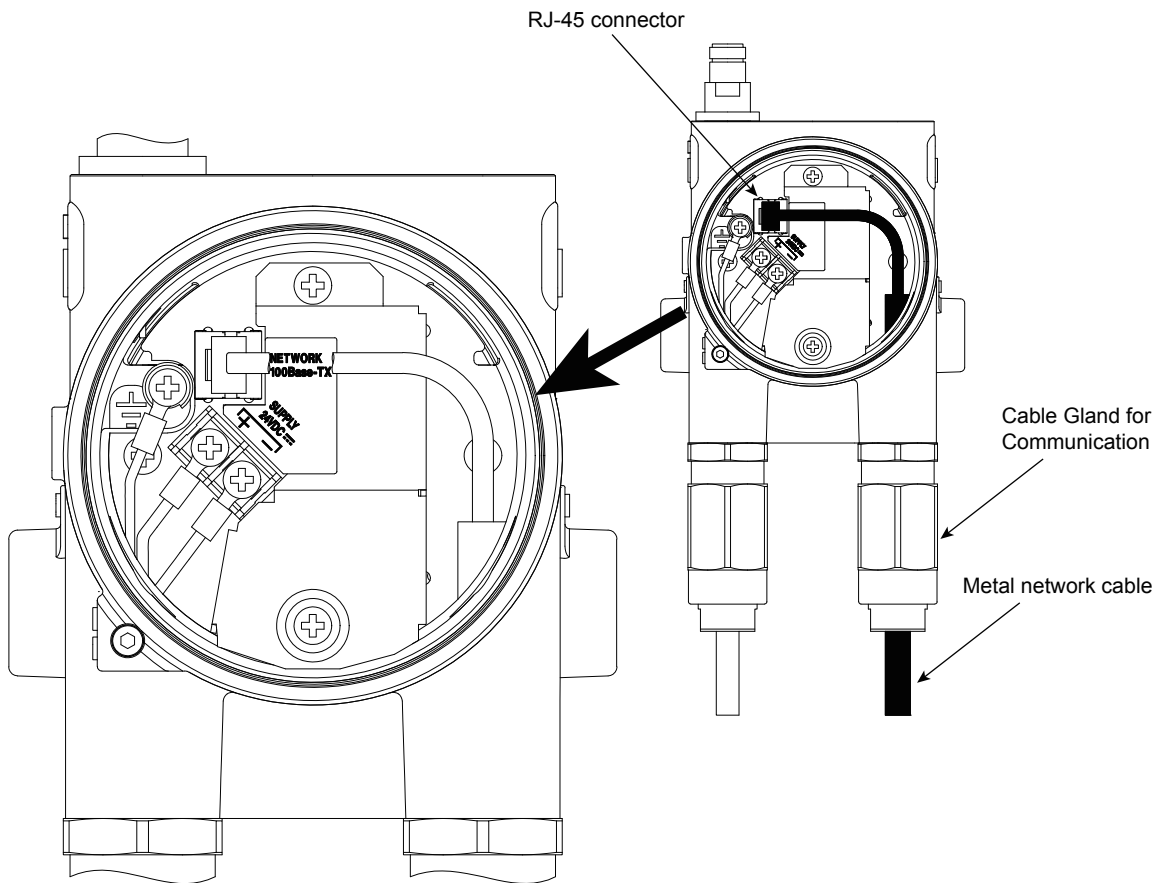
Item	Specification
	Metal network cable
Standard	100BASE-TX
Connector	RJ-45 *
Cable	Category 5 or higher
Transmission range	100 m (Max.)

* RJ-45 connector attaching to the YFGW510-side end of the cable is larger than the cable gland hole. The RJ-45 does not go through the gland. Follow wiring procedures as described below.

- **Metal network cable connection procedure**

Connect the metal network cable using the following procedure.

1. Insert the metal network cable through the YFGW510 network cable gland and pressure-weld the RJ-45 connector to the end of the cable. Be sure to use a 100BASE-TX cable.
2. Insert the RJ-45 connector through the communications connection and screw in the cable gland.
3. Connect the metal network cable to the RJ-45 connector.



FC0503.ai

Figure C5-3 Connecting metal network cable

C5.3.2 Optical Network Cable Connection

- Cable

Item	Specification
	Optical network cable
Standard	100BASE-FX
Connector	SC connector (1-pole × 2)*
Cable	Multimode fiber (central wavelength: 1300 nm) 50/125 μm or 62.5/125 μm The inner tension member must be nonmetal, such as FRP.
Transmission range	2 km (Max.)

* A double ferrule SC connector does not go through the connection hole. Be sure to use a short-boot SC connector.



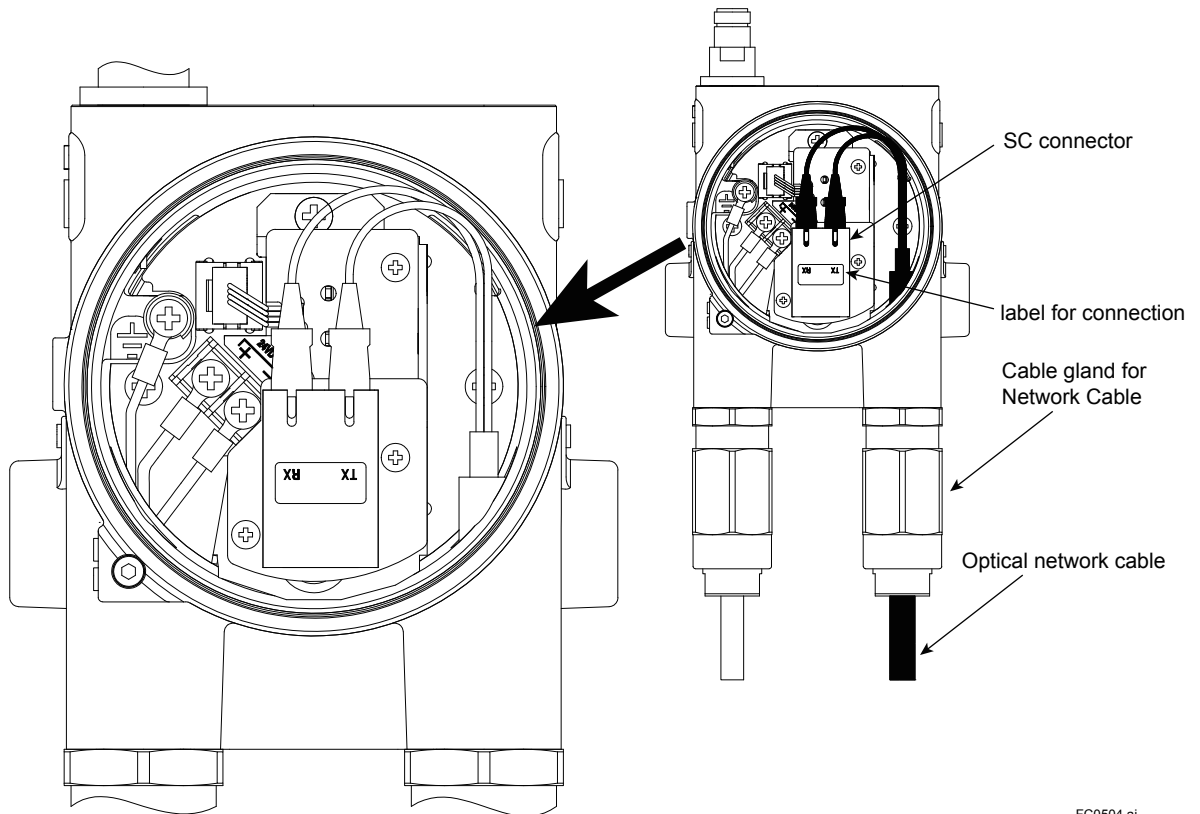
IMPORTANT

To connect YFGW410 and YFGW510 using an optical network cable, the YFGW610 field wireless media converter is required for YFGW410. YFGW610 is used for conversion between 100BASE-TX and 100BASE-FX.

● **Optical network cable connection procedure**

Connect the optical network cable in the following procedure.

1. Insert the optical network cable through the YFGW510 network cable gland.
2. Insert the connector through the YFGW510 connection and screw in the cable gland.
3. Connect the optical network cable to the SC connector of the device. Do not bend the optical network cable at a sharp angle.
4. The optical network cable consists of a pair of wires. One wire is used for sending signals and the other for receiving signals (TX/RX). The polarity of the YFGW510 SC connector is indicated on the connector label. If polarity is indicated, follow the indication. If not, the wires can be connected to either port. The polarity can be easily changed on YFGW610.



FC0504.ai

Figure C5-4 Connecting optical network cable

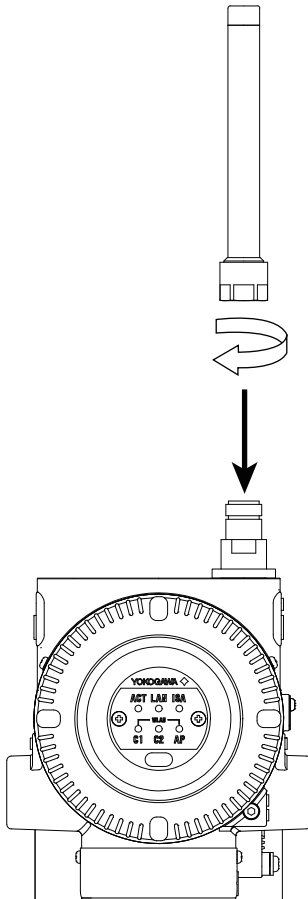
C5.4 Installation and wiring of Antenna

This section describes mounting of antennas to YFGW510, and installation of external antennas and their wiring.

C5.4.1 Mounting ISA100.11a antenna to YFGW510

This section explains the procedure for mounting the ISA100.11a antenna directly into the connector on top of the device.

Screw the antenna into the antenna connector on the top of the device. Ensure that the antenna is properly mounted. Protect the connector with tape to increase resistance to environmental impact.



FC0505.ai

Figure C5-5 Mounting ISA100.11a antenna connector

● Antenna mounting procedure

1. Turn counter-clockwise the cover of the antenna connector on the top of YFGW510 to remove.
2. Mount the provided antenna into the antenna connector. Tighten the antenna connector with a torque of 2 to 3 N•m.
3. Protect the joint of the antenna and connector with tape.
 - Clean the connection to be protected.
 - Wind the butyl rubber self-bonding tape around the connection. See the manual of the tape about the winding.
 - To protect the butyl rubber self-bonding tape from the environment such as ultraviolet rays and so on, wind vinyl tape (or a vinyl type self-bonding tape) on it.

- **Tape**
 - Butyl rubber self-bonding tape
 - Vinyl tape or a vinyl type self-bonding tape

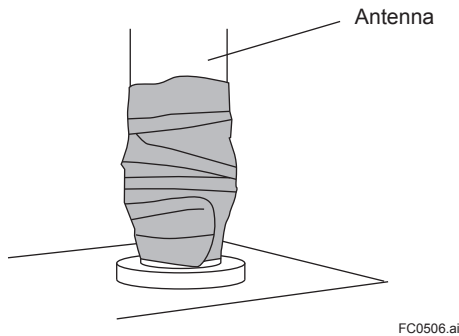


Figure C5-6 Sealing of antenna connector



IMPORTANT

The ISA100.11a antenna connector for the YFGW510 supports 2-dBi standard antennas only. A high-gain antenna, available as an optional accessory, must be installed as a remote antenna with an antenna extension cable, as described in the next section.

C5.4.2 Remote Installation and Wiring of ISA100.11a Antenna

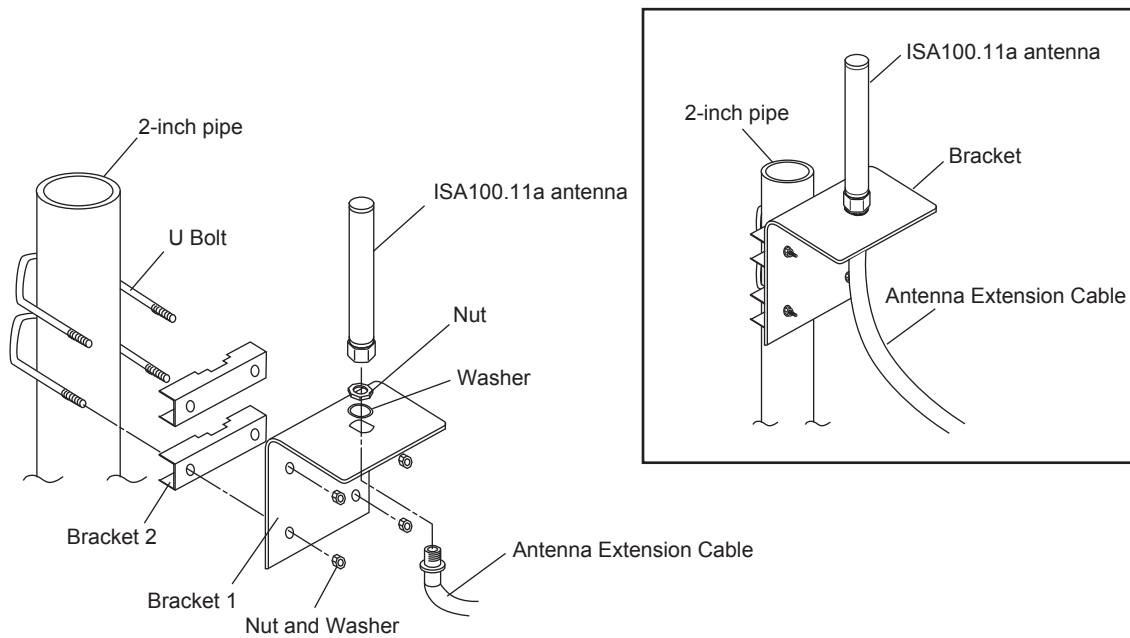
This section explains the procedure for installing the ISA100.11a antenna away from YFGW510, using an external antenna extension cable.

■ Installing the antenna

Install the antenna in an appropriate location for wireless communication, referring to C3.1 Requirements for Installation Locations. Make sure that the mounting of the antenna on a 2-inch pipe has enough strength to withstand strong winds and vibrations. The antenna must be kept upright.

- **Fastening the antenna**

Fasten the antenna to the pipe using the brackets provided with the antenna extension cable.



FC0507.ai

Figure C5-7 Fastening external antenna

● **Mounting procedure of antenna**

1. Fix the antenna extension cable to the bracket 1 with the provided nut as shown in the figure above.
2. Fix the bracket 1 to the 2-inch (2B) pipe by using the provided a pair of U bolts and bracket 2.
3. Screw the antenna into the antenna connector of the antenna extension cable on the bracket 1.
Tighten the antenna connector with a torque of 2 to 3 N·m.
4. Protect the joint of the antenna and the connector with tape. For details on taping, see C5.4.1 Mounting ISA100.11a antenna to YFGW510.

■ **Antenna wiring and improvement of environment resistance**

● **Specification for extension antenna cable
(Only by order of option)**

- Specification: 8D-SFA(PE)
- Outside diameter: 11.1 mm
- Minimum bend radius: 67 mm (when fixing)
167 mm (when wiring)
- Cable end treatment: N type connector, one end is male and the other is female.

* “When fixing” shows the bending radius for fixing (the state is maintained for a long time). “When wiring” shows the bending radius while checking the wiring position. This bending radius is set larger than that for fixing in order to prevent damage to the cable because the cable is likely to be repeatedly bent when checking the final wiring position.

● **Wiring of extension antenna cable**

1. Use the provided extension antenna cable to connect the antenna connector with the external antenna. Tighten the connector of the antenna extension cable with a torque of 2 to 3 N·m. Refer to the specification about the limitation of bend radius when fixing or wiring.
2. When using two extension cables, the provided arrester should be inserted between these cables.
3. Before the wiring work, confirm the polarities (male/female) of the connectors of antenna, extension antenna cable, and arrester.
Tighten the connector of the antenna extension cable with a torque of 2 to 3 N·m.

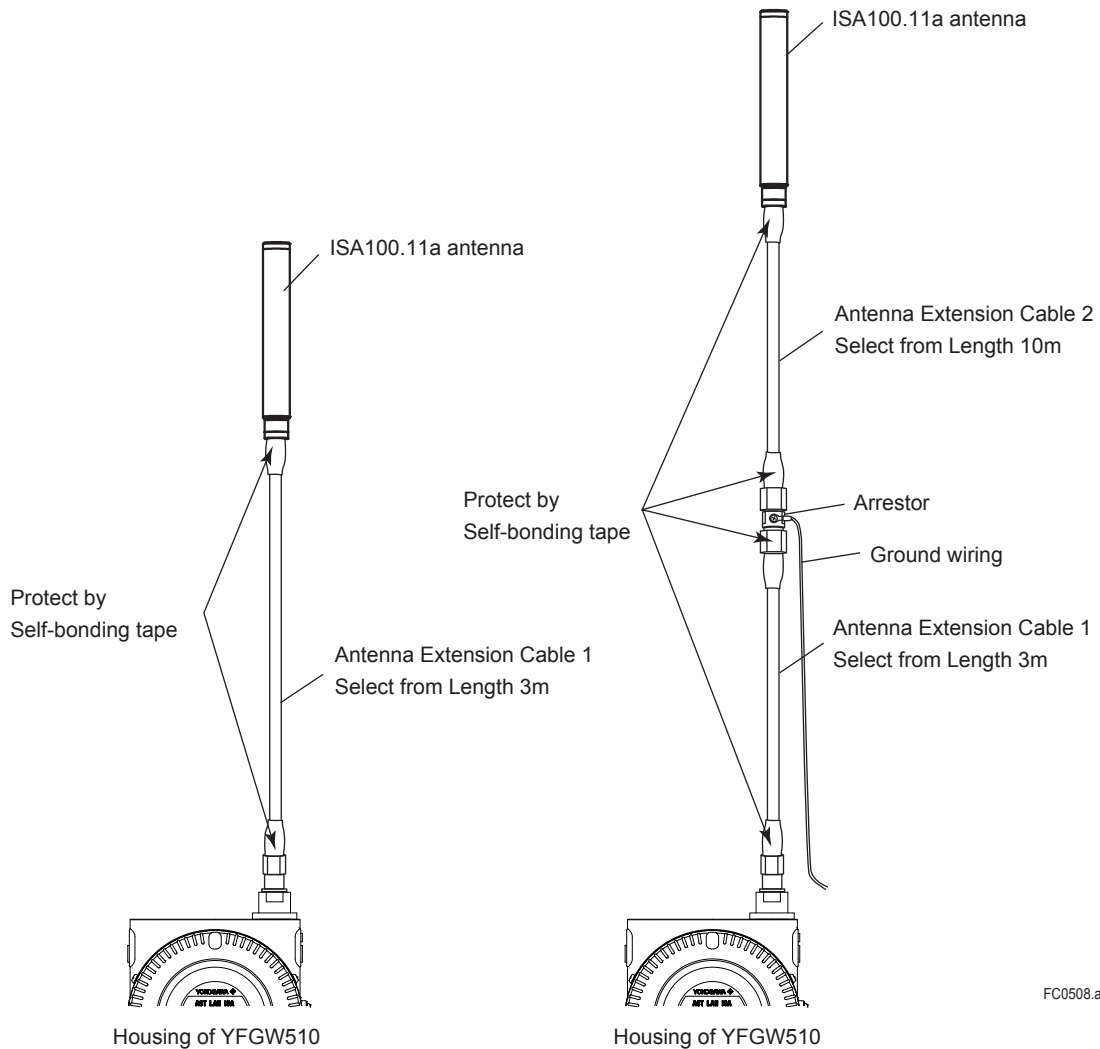


Figure C5-8 Wiring for remote antenna

● **Ground wiring of arrester for antenna extension cables**

To connect two antenna extension cables, an arrester for lightning protection is provided. Place the arrester between the two extension cables. Connect the grounding cable to the ground terminal of the arrester.

Connect the grounding cable to the grounding terminal on the main body. Class D grounding (the third class grounding) with the grounding resistance of 100 Ω or less is necessary. Do not share the ground with other devices.

● **Grounding cable (Insulated for industrial equipment)**

Examples

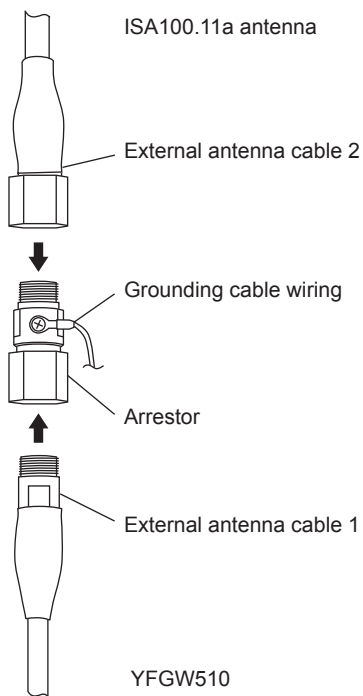
- 600 V polyvinyl chloride insulated wires (IV): JIS C3307
- Polyvinyl chloride insulated wires for electrical apparatus (KIV): JIS C3316
- 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV): JIS C3317
- Heatproof vinyl insulated wires VW-1 (UL1015/UL1007)

Wire size

- grounding cable

Terminal treatment

- Ring terminal for M4: With insulation cover



FC0509.ai

Figure C5-9 Wiring for arrestor