
**User's
Manual**

**YFGW410
Field Wireless
Management Station**

IM 01W02D01-01EN

vigilantplant®

YFGW410 Field Wireless Management Station

IM 01W02D01-01EN 4th Edition

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Introduction

This document describes the YFGW410 Field Wireless Management Station (hereafter simply referred to as YFGW410), which is a core component of the field wireless system that based on ISA100.11a, the wireless communication standard for industrial automation specified by the International Society of Automation (ISA).

Functions of the YFGW410 are explained in the outline of the field wireless system, and in the installation, configuration, startup and operations of the field wireless network.

The operation of Field Wireless Management Console, which is built in to the YFGW410 and used as a tool for setup and management of a field wireless network through YFGW410, is also explained in this document.

Safety Precautions



IMPORTANT

Be sure to read the safety precautions for this product described in “YFGW410 Field Wireless Management Station Read Me First (IM 01W02D01-11EN)”.

This instrument has been tested and certified as being explosion proof. Be sure to read the safety precautions and explosion proof specifications described in “YFGW410 Field Wireless Management Station Read Me First (IM 01W02D01-11EN)” before the installation and operation of this instrument.

■ Transportation of products containing lithium batteries:

This product contains lithium batteries. Primary lithium batteries are subject to transportation regulations by the U.S. Department of Transportation, and are also covered by the International Air Transport Association (IATA), the International Civil Aviation Organization (ICAO), and the European Ground Transportation of Dangerous Goods (ARD). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements regarding lithium batteries before shipping.

■ How to dispose of batteries:

The following is an explanation about the new EU Battery Directive (DIRECTIVE 2006/66/EC). This directive is only valid in the EU.

Batteries are included in this product. Batteries in this product cannot be removed by yourself. Dispose of them together with this product.

If you dispose of this product within the EU, contact your local Yokogawa Europe B.V. office.

Do not dispose of them as domestic household waste.

Battery type: lithium thionyl chloride primary battery



CAUTION

The symbol (see above) means they shall be sorted out and collected as ordained in ANNEX II in DIRECTIVE 2006/66/EC.

Documentation Conventions

■ Typographical Convention

The following typographical conventions are used throughout the manuals:

● Conventions commonly used throughout manuals

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 in curly brackets ({ })

Indicates an optional characters that can be omitted.

Example:

PR △ TAG {△. Sheet name}

● Conventions used to show key or button operations:

Characters enclosed in square brackets ([])

Characters enclosed in square brackets show the names of buttons used during the explanation of the software operation.

Example:

To execute the command, click [OK].

Characters enclosed in angle brackets (< >)

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

Characters enclosed in corner brackets ([])

Characters enclosed in corner brackets show a tab or an item of the screen during the explanation of the software operation.

■ Symbols used in the manual

The symbol used in the manual are described in “YFGW410 Field Wireless Management Station Read Me First” (IM 01W02D01-11EN).

■ Drawing Conventions

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

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

Information of User's Manual Revision

Material Name : YFGW410 Field Wireless Management Station

Material Number : IM 01W02D01-01EN

Edition	Date	Page	Revised Item
1st	August 2012	-	New Issue
2nd	February 2013	- Part A B3-2, C4-8 D3-15 D4-29, D4-31 G1-1, G1-3 G2-1, G2-2 G2-5 G2-6 G3-1	Revise descriptions about a number of connectable devices, and typography. Change a number of connectable devices. Add description about RS-485. Revised descriptions about HoppingPattern. Add description about a radio prohibit function. Change communication services and its capability. Change a number of connectable devices, and add list of communication services. Add description about a number of connectable output devices. Add description about a capability for the host system. Add Glossary
3rd	November 2015	Introduction ii, C5-1, E3-1, G1-1 to 2 C4-6 D1-2, D4-1, D4-15, D4-26 to 33, D5-30 to 32, E2-1 to 2 D1-2 D2-7 D3-1 to 4 D4-47, 55 D4-65 D4-60 D4-70, 72 D5-27 to 28 F2-4 to 5	Revise description about explosion proof. Add description about the tightening torque of the frame ground M4 screw. Revise description about the provisioning. Add description about the bundling of FieldMate Lite edition. Add description about conflicting operations. Add D3 Provisioning chapter. Add x4 and x8 as Retry Mode. Add description about the condition to start sending the data written to Modbus holding register. Add references for BBR_STATUS and data status. Add description about the added function of configuration export. Revise the table of messages according to the change of log messages. Add F2.3 Data Status Specification section.
4th	March 2016	C4-9 D2-3 D2-6 to 7 D4-6 to 7, D4-10 D4-59 to 60, D4-66 to 68 D5-7 D5-23 D5-27 to 28 F2-2 to 3	Revise description about support for Modbus/RTU communication parameter setting. Change System Requirements Add description about warnings can be displayed at launch of Field Wireless Management Console. Add and revise description about support for Field Serial communication parameter setting. Add and revise description about support for read parameter assignment to Modbus Holding Registers. Revise description about the device status display in Graphic Viewer. Revise description about the device status display in Backbone Device List. Revise log messages. Revise description about YFGW410 LED indicator.

Part A Outline of Field Wireless System Configuration

The YFGW410, the YFGW510 Field Wireless Access Point (hereafter simply referred to as YFGW510), the YFGW610 Field Wireless Media Converter (hereafter simply referred to as YFGW610) and field wireless devices are used to build an industrial wireless network that based on to ISA100.11a, the wireless communication standard for industrial automation specified by the International Society of Automation (ISA).

This part describes the typical configuration of field wireless system that can be established using these devices.

A1. Minimum System Configuration

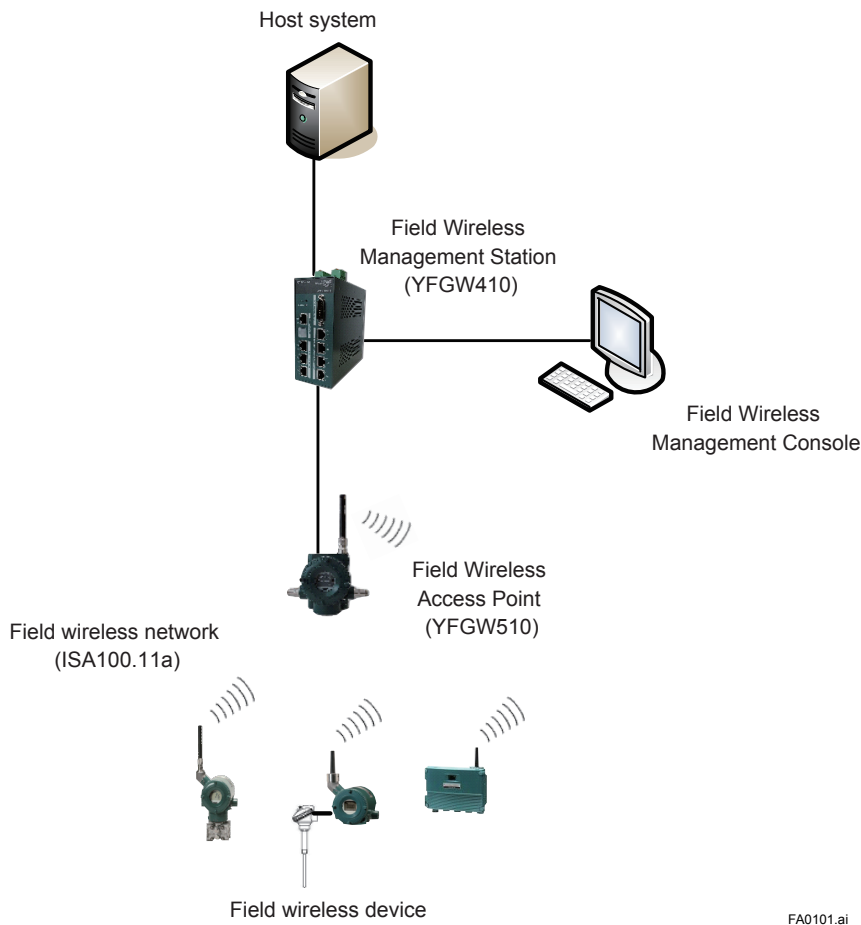


Figure A1-1 Minimum system configuration example (The field wireless backbone using metal network)

This is the minimum configuration to monitor and record the process data of field wireless devices.

This system consists of field wireless devices, the YFGW510, YFGW410, and data monitoring and recording devices (DAQSTATION, STARDOM and others) or the host system (DCS, SCADA and others) supporting the Modbus/TCP communication.

The field wireless subnet (the field wireless network consisting of the YFGW510 and field wireless devices) can be connected up to 100 field wireless devices. In this configuration, up to 100 field wireless devices can be connected.

Up to 20 field wireless subnets can be connected to the YFGW410.

Any of the three types of field wireless backbone can be selected for between YFGW410 and YFGW510.

- The metal network composed of the YFGW510 (100BASE-TX model), shown in Figure A1-1
- The optical fiber network shown in Figure A1-2, composed of the YFGW610 connected to the YFGW410, uses the YFGW510 (100BASE-FX model) for signal transmission via optical fiber cables.
- The wireless LAN network shown in Figure A1-3, composed of other manufactures' wireless LAN access point (connected to the YFGW410) for wireless LAN communication with the YFGW510 (wireless LAN client model).

The Field Wireless Management Console, which is the program built in to the YFGW410, is used for configuration and management of a field wireless network. This program can be started and operated by the PC connected via the field network interface or via the maintenance interface of the YFGW410.

Certain parameters need to be set on the following devices to configure and start the wireless network. For the relevant procedure, see the Provisioning and Configuration section.

- YFGW410 The device parameters, wireless network configuration, communication with host system, and others
- YFGW510 The device parameters
Wireless LAN parameters if the wireless LAN client model is selected
- Field wireless devices Provisioning and sensor parameters, and others

Once the field wireless network has started, the field wireless device parameters can be set and those devices can be managed from the Plant Resource Manager (PRM) connected to the host network. If the security policy for the host system is acceptable, the FieldMate can be used for parameter setup and maintenance. The FieldMate is connected to the YFGW410 via the maintenance interface.



IMPORTANT

When CENTUM VP is running, set and adjust the parameters of the field wireless device from PRM.

When CENTUM VP is not running, or when a non-Yokogawa host system is connected, the parameters can be set and adjusted using FieldMate.

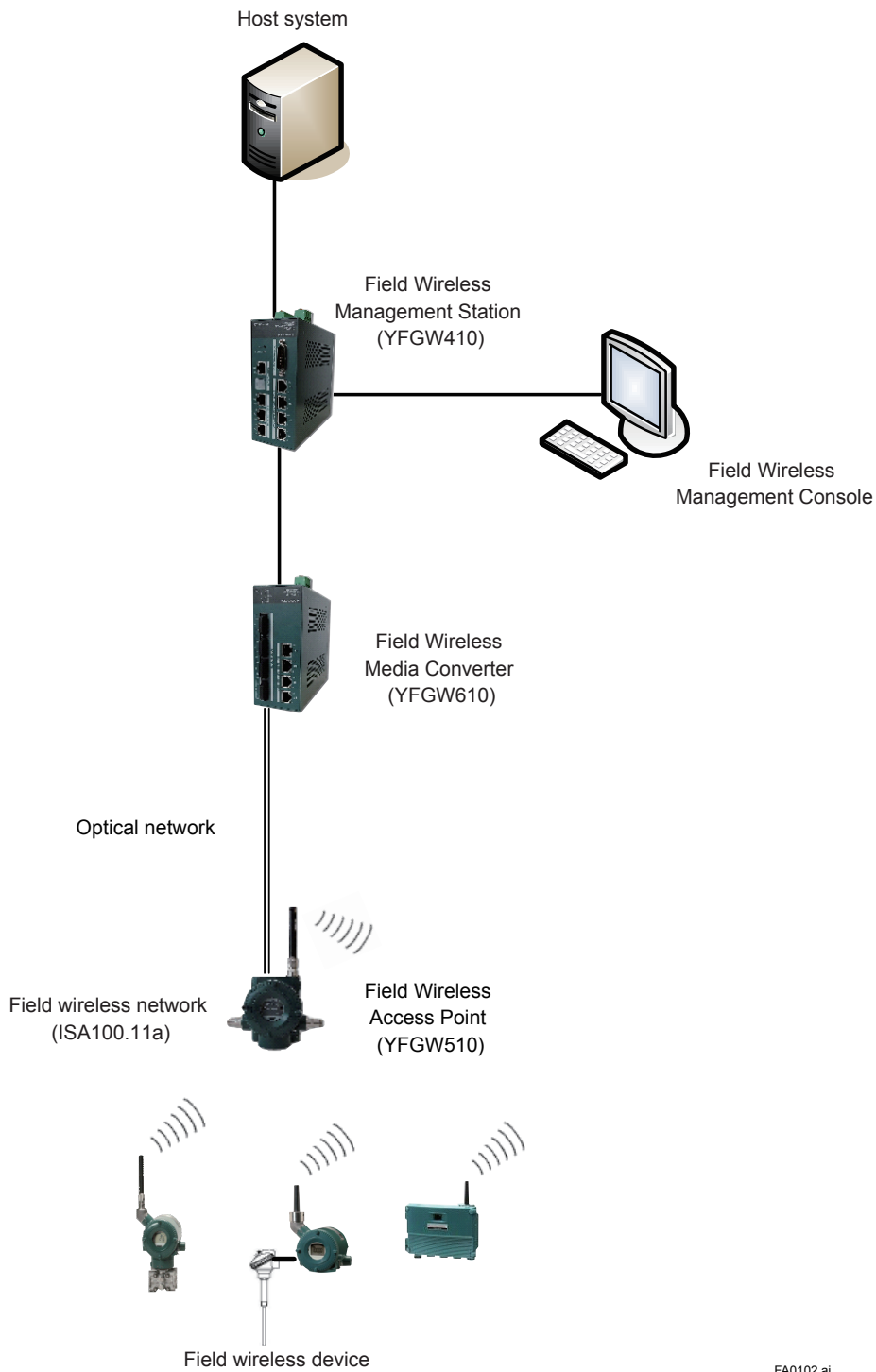


Figure A1-2 Minimum system configuration example (The field wireless backbone using optical network)

In this configuration, YFGW610 and YFGW510 are connected through optical network cables. The YFGW610 needs to be installed near YFGW410 for media conversion between optical network and metal network. This is a useful method if the distance is too far from YFGW410 to YFGW510. Also in order to eliminate the influence of electromagnetic noise due to lightning and keep transmission distance.

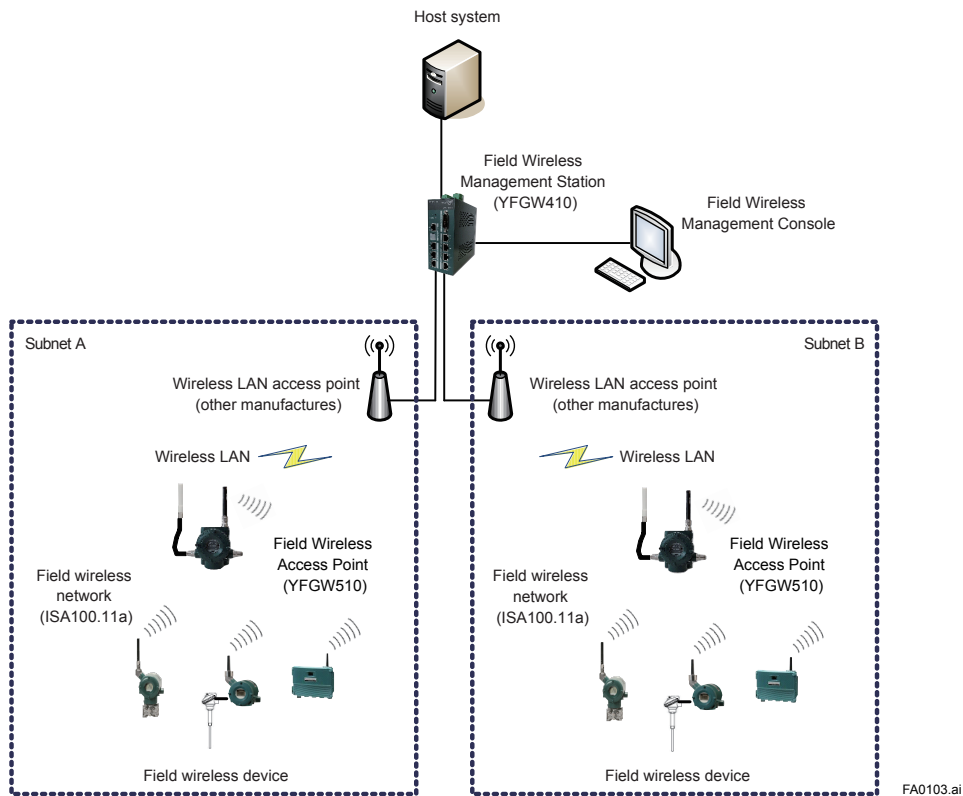


Figure A1-3 Minimum system configuration example (The field wireless backbone using wireless LAN network)

In this configuration example, the wireless LAN access point (other manufactures) is installed on the field wireless backbone, and each YFGW510 is connected to the field wireless backbone via the wireless LAN. If YFGW510 are connected via the wireless LAN, a single YFGW510 can be connected to a single field wireless subnet. Using YFGW510 wireless LAN redundancy model and two wireless LAN access points, the wireless LAN communication can be made redundant.

Similar to the other field wireless backbone network, up to 20 field wireless subnets can be connected to the YFGW410. Up to 100 field wireless devices can be connected in each field wireless subnet, and up to 500 field wireless devices can be connected to the YFGW410.

For the recommended wireless LAN access points, see Section G2.7 Recommended Device List.

A2. Minimum System Configuration with Redundant Field Wireless Network

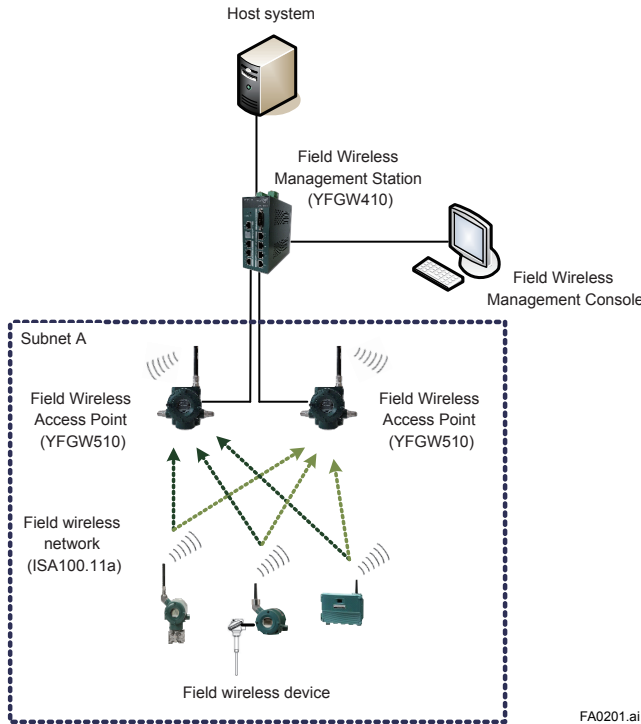


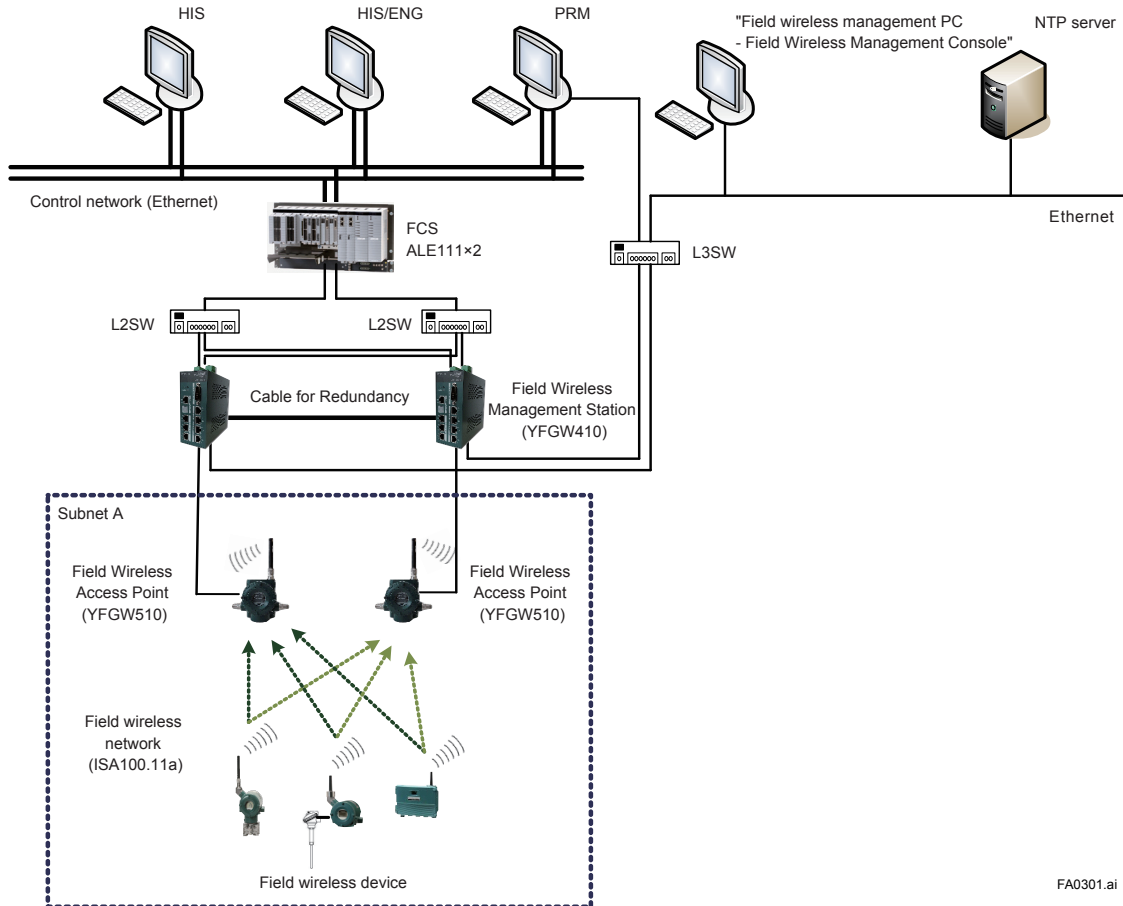
Figure A2-1 Minimum system configuration with redundant field wireless network

This is redundant field wireless network configuration. Two YFGW510 are installed in the field wireless network, and the field wireless devices communicate with the both YFGW510 (Duo-cast). The communication path from the field wireless devices to the YFGW410 is made redundant.

This system redundancy can prevent various types of interference in the field wireless network environment and can maintain the high quality connection.

Up to 100 field wireless devices can be connected to a single field wireless subnet.

A3. YFGW410 in Redundant Configuration



FA0301.ai

Figure A3-1 Redundant system configuration of YFGW410

In this example, the both of YFGW410 and YFGW510 are made redundant system. In using the Duocast, the field wireless devices are made fully redundant and a highly reliable system.

Two YFGW410 virtually operate as a single machine, and the backbone devices and host system devices access to this virtual machine.

When one of YFGW410 is out of service by failure, another YFGW410 continue operation. One failure does not affect a field wireless system.

Up to 100 field wireless devices can be connected to a single field wireless subnet even in the redundant configuration. Up to 500 field wireless devices can be connected to YFGW410.

The host system is DCS, SCADA system, or the device management application.



IMPORTANT

When CENTUM VP is running, set and adjust the parameters of the field wireless device from PRM. When CENTUM VP is not running, or when a non-Yokogawa host system is connected, the parameters can be set and adjusted using FieldMate.



IMPORTANT

When CENTUM VP is used with YFGW410 in redundant configuration, CENTUM VP R5.02.00 or higher is required. For details, see the Communication with Subsystems Using FIO user's manual (IM 33K03L20-50E).

A4. YFGW410 in High-Level Redundancy Configuration

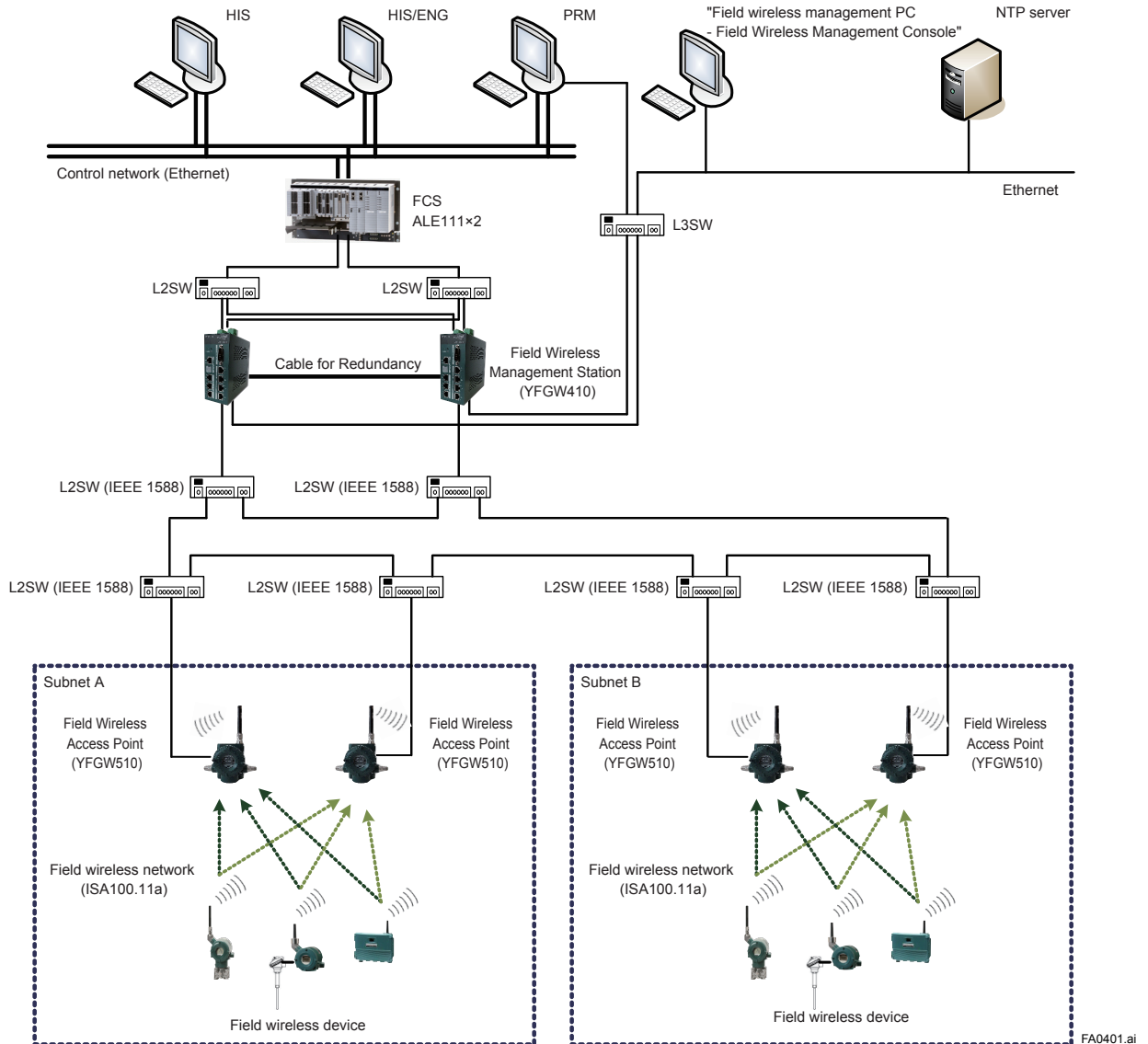


Figure A4-1 High-Level redundancy system configuration of YFGW410

In this configuration, the system consists of redundant YFGW410 and redundant Modbus/TCP client of the host system. Yokogawa's Modbus/TCP client can be made redundant using the FCS (Field Control Station) of CENTUM VP. For details, see the CENTUM VP User's Manual (IM 33K03L20-50E for R5, or IM 33M01A30-40E for R4).

The YFGW410 in redundant configuration operates as a single virtual machine for the Modbus/TCP clients. Although the YFGW410 has the L2SW functions, the field wireless backbone network can be expanded by adding another L2SW between the field wireless backbone devices. The L2SW needs to be used which supports the IEEE 1588 v2 precision time protocol and the RSTP or another loop detect functions. If a L2SW is used that is not supporting the IEEE 1588 v2 protocol and RSTP function, its operation is not guaranteed. Enable the IEEE 1588 v2 precision time protocol of L2SW, and operate the switch in E2E 2-step TC mode. Also, enable the RSTP or another loop detect function.

In the redundant YFGW410, need to connect the system to the YFGW510 using following method:

- Direct connection between YFGW410 and YFGW510 (shown in Figure A3-1)
- A single L2SW is installed for each backbone device. The L2SW have to connect as a loop. (shown in Figure A4-1).

For the recommended L2SWs whose operations have been proven on the field wireless backbone system, see Section G2.7 Recommended Device List. If a non-recommended L2SW is used, its operation is not guaranteed even when the above functional requirements are satisfied.



IMPORTANT

When connecting the L2SW between YFGW410 and YFGW510, requirements for operation to the backbone network are the following.

- Use IEEE1588 v2 compliant product to L2SW.
 - Enable Rapid Spanning Tree Protocol (RSTP) or another loop detection function.
-



IMPORTANT

When CENTUM VP is running, set and adjust the parameters of the field wireless device from PRM.

When CENTUM VP is not running, or when a non-Yokogawa host system is connected, the parameters can be set and adjusted using FieldMate.



IMPORTANT

When CENTUM VP is used with YFGW410 in redundant configuration, CENTUM VP R5.02.00 or higher is required. For details, see the Communication with Subsystems Using FIO user's manual (IM 33K03L20-50E).

Part B YFGW410 Product Description

B1. Introduction

This chapter outlines the functions and hardware configuration of the YFGW410.

YFGW410 is a core device in the field wireless network, and it is used for configuration and management of a field wireless network and for data transfer to the host system. A single YFGW410 is always required for the field wireless network, and two YFGW410s are required for redundancy system.

The YFGW410 can be mounted on the DIN rails, and it is usually mounted on the panel or wall in the cabinet.

B2. YFGW410 Function Outline

The following outlines the YFGW410 functions.

YFGW410 has the System Manager, Security Manager, and Gateway functions. Also, this device has the switching hub functions to connect the host system, PC to operate Field Wireless Management Console and other applications.

B2.1 System Manager

The System Manager controls the wireless communication of field wireless devices, configures the field wireless backbone devices, and provides the database function.

The management function of the field wireless device establishes a communication path to each field wireless device, monitors the Join or Leave status of each field wireless device, and notifies the Field Wireless Management Console with an abnormality. Also, this function determines the communication availability in conjunction with the Security Manager.

The management function of the field wireless backbone device is used to initialize the IP address, network address and others of the YFGW410 and YFGW510.

The database function of the field wireless network is used to manage the network information data contained in the YFGW410 and to control the data synchronization during redundant YFGW410 system configuration.

B2.2 Security Manager

The Security Manager has the functions for field wireless device authentication and for encryption key management.

The Security Manager allows field wireless devices to join to the network with the Join key, Session key and others. This manager is used to create, update, and delete an authentication/encryption key during communication.

B2.3 Gateway

The YFGW410 bridges between the field wireless network and the host system.

During Modbus communication, the field wireless device data is transmitted to the host system. The Read Input Register, Read Holding Register, and Write Holding Register functions are supported. Before transmitting data to the host system, it is necessary to map the transmission process value, device status, alert information and other data to registers.

In the ISA100.11a protocol communication, the information about field wireless network state and device state of this network is transmitted when requested by the host system. Also, the gateway relays a request and its response between the host system and field wireless devices.

The Gateway can cache the diagnosis data acquired through communication with the field wireless device in the YFGW410's internal memory. The efficient communication to wireless field devices can use a wireless band flexibly and improve the response to the host system.



IMPORTANT

When access to the Modbus registers that are not mapped in YFGW410, a non-zero data may be contained.

**IMPORTANT**

Writing to the Holding Register of Modbus by CENTUM VP requires R5.02.00 or higher. For details, see the Communication with Subsystems Using FIO user's manual (IM 33K03L20-50E).

B2.4 Wireless Network Configuration and Management Functions and Others

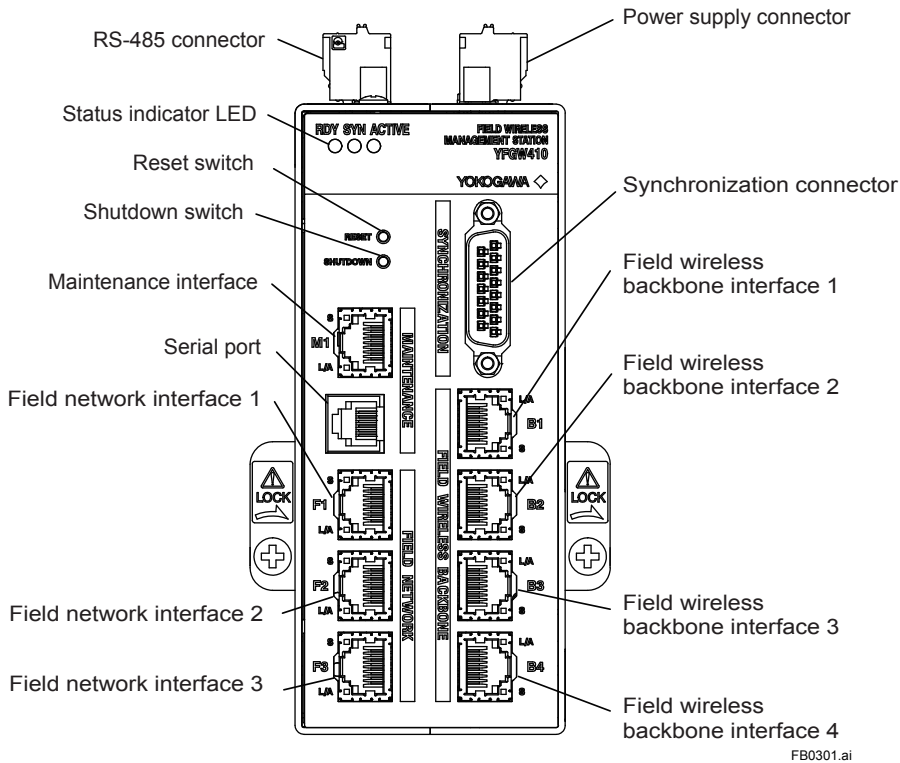
The YFGW410 has the software tools for configuration and management of field wireless network on the Web page of this device. Connect to YFGW410 via Internet Explorer (IE) that are installed on the field wireless management PC.

Secure communication between the software tools and YFGW410 is ensured by using encryption technology. Furthermore, YFGW410 can prevent the access from unintended host system and network by using the access control list.

YFGW410 is validated as it achieves Wurdtech Achilles Level 1 Certification. For details about the certification, contact Yokogawa.

B3. Structure and Parts of YFGW410

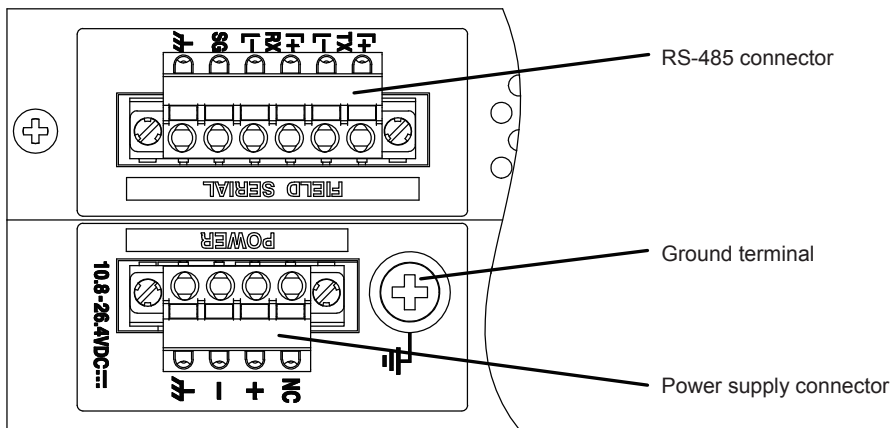
B3.1 Front View



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Figure B3-1 YFGW410 front view

B3.2 Top View



FB0302.ai

Figure B3-2 YFGW410 top view

B3.3 Side and Rear Views

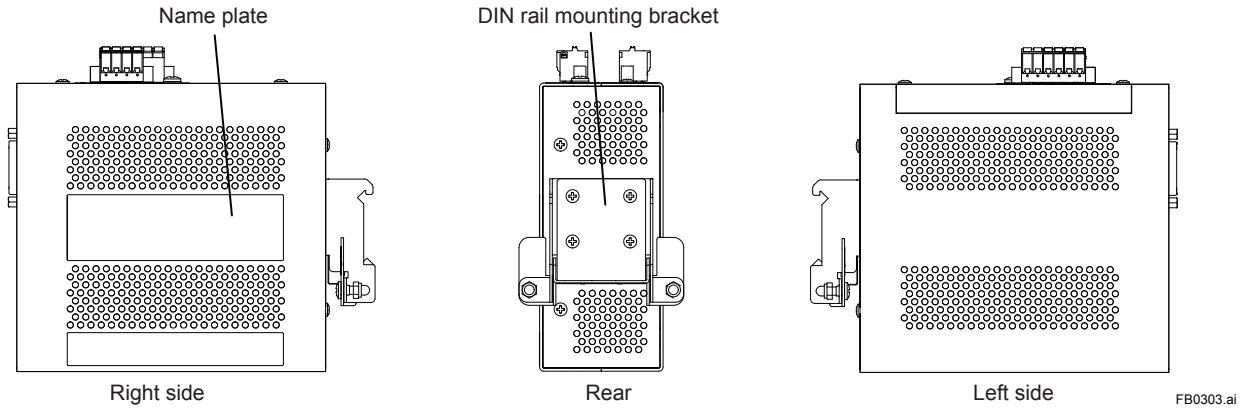


Figure B3-3 YFGW410 side and rear views

B3.4 RS-485 Configuration Switches

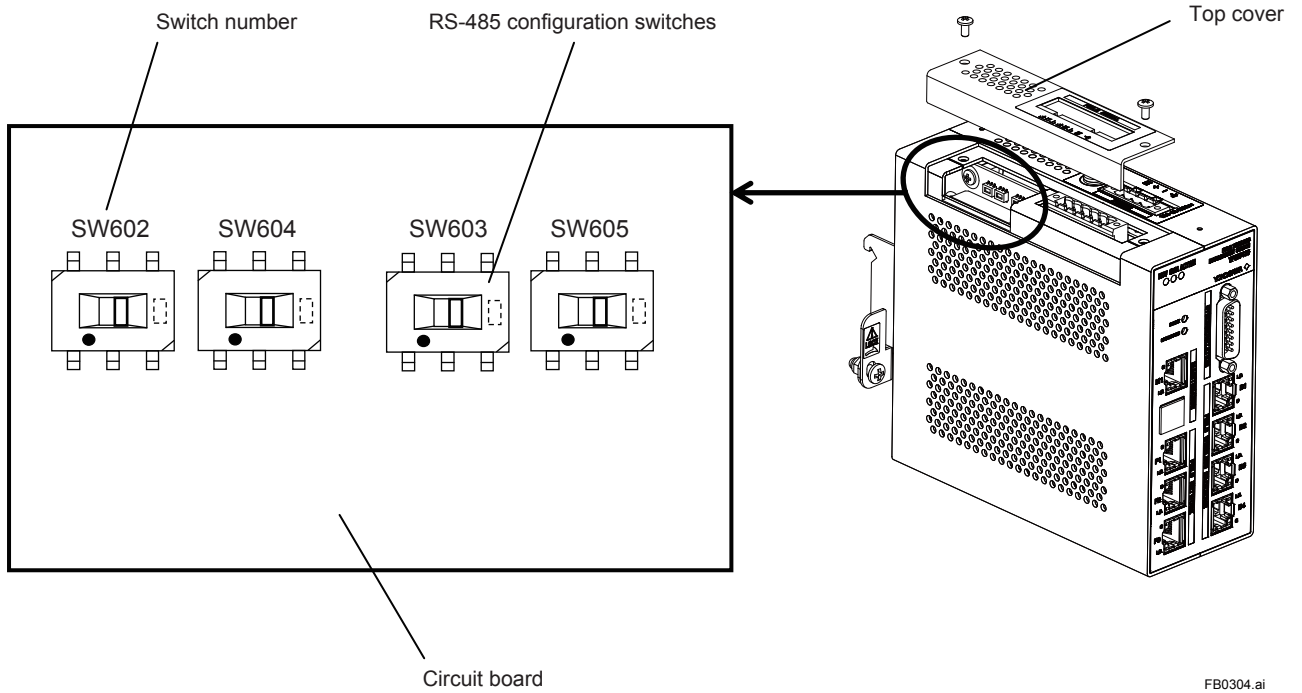


Figure B3-4 RS-485 Configuration Switches

B3.5 Outline of Component Functions

Table B3-1 Outline of the YFGW410 component functions

Name	Function	Reference
RS-485 connector	Connects to the host system that uses Modbus/RTU communication.	C4.4
RS-485 configuration switches	Configures connection type to the host system (4-wire / 2-wire)	C4.4
Status indicator LED	A combination of three RDY, SYN, and ACTIVE LEDs indicates the YFGW410 operation status.	F2.2
Reset switch	Resets the YFGW410.	B3.6
Shutdown switch	Shuts down the YFGW410.	B3.7
Maintenance interface	Connects the Field Wireless Management Console for setup and maintenance of a field wireless network. The PC, that has the FieldMate for setup and management of field wireless devices via wireless network, can also be connected (if used for the system without CENTUM VP).	C4.4
Serial port	Used for YFGW410 maintenance only. (Do not use this port during normal network configuration and operation.)	C4.1
Field network interface 1 to 3	Connects to the host system that uses the Modbus/TCP, ISA100.11a or other protocol communication.	C4.4
Power supply connector	Supplies electric power to the YFGW410.	C4.2
Synchronization connector	Connects two YFGW410 devices to each other for synchronous communication in the redundancy configuration. Plug the terminating connector into it if the system is not redundant.	C4.4
Field wireless backbone interface 1 to 4	Connects YFGW510, YFGW610, and the wireless LAN access point to configure the field wireless backbone.	C4.4
DIN rail mounting bracket	Secures the YFGW410 onto DIN rails using brackets.	C3.3

B3.6 Reset Switch

Resets YFGW410. Hold the Reset switch for more than six seconds, the database in the YFGW410 is initialized. If the database is initialized, the entire setup information of the device is cleared. Always make a backup copy of the database before starting its initialization.



IMPORTANT

When initializing the database, don't power off until RDY LED becomes green. Otherwise initialization will be failed and YFGW410 may not work correctly.

B3.7 Shutdown Switch

Shuts down YFGW410. Hold the Shutdown switch more than six seconds. Once shut down the YFGW410, start it again by turning the power supply OFF first, and then turn it ON again.

B4. Checking the Product

When you receive the product, please check the contents.

Check that the product specifications match your order, that all parts are included, and that there is no damage, stains, or other problems.

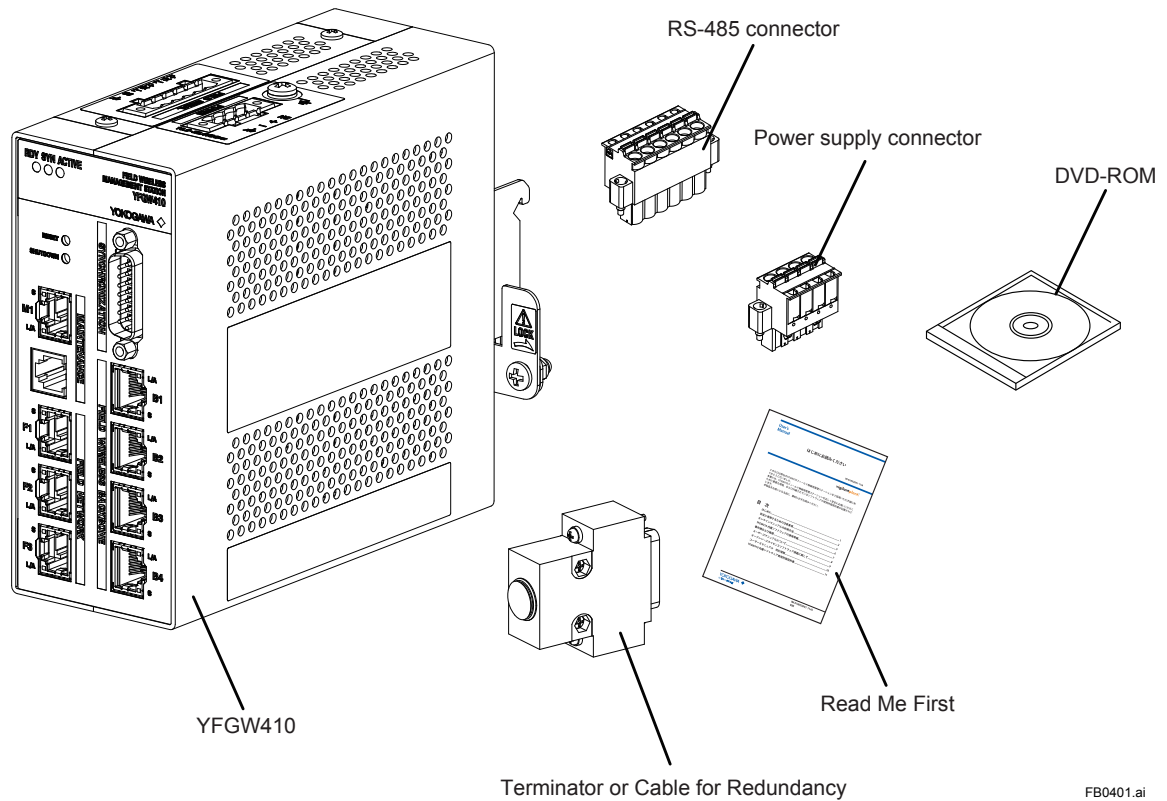


Figure B4-1 Checkout of delivered products

- Read Me First (IM01W02D01-11EN YFGW410 Field Wireless Management Station Read Me First)
When specified manual language as an English.
- DVD-ROM (F9194TA)
When specified Software Media as DVD-ROM.
- Terminator or Cable for Redundancy
It depends on selection of Sync Connector Termination.
If With Terminator is specified, Terminator is included. Otherwise Cable for Redundancy is included.
- Power supply connector and RS-485 connector
These are included as standard.

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Part C Installation

This part describes the installation of the YFGW410.

Follow the steps below to use of the product.

1. YFGW410 installation
2. Power, ground, and signal cable connection

C1. Installation Environment

The system must be installed in an appropriate environment to ensure stable system operation.

The following defines the detailed specifications of the YFGW410 installation environment.

Table C1-1 Installation environment specifications

Item		Specifications	Applicable standards
Ambient temperature	Operating	-40 to 65°C (at altitude below 2000 meters) -40 to 55°C (at altitude between 2000 and 3000 meters)	
	Transport or storage	-40 to 85°C	
Ambient humidity	Operating	5 to 95% relative (without condensing)	
	Transport or storage	5 to 95% relative (without condensing)	
Temperature gradient	Operating	Within +/-10°C per hour	JEIDA 29 Class B
	Transport or storage	Within +/-20°C per hour	
Protection class		IP20	IEC529
Vibration resistance		0.15 mm P-P (5 to 58 Hz) 1 G (58 to 150 Hz)	IEC68-2-6
Impact resistance		15 G, 11 ms (no conductive, and 3-direction half sine waves)	IEC68-2-27
Altitude		Up to 3000 meters (due to restricted ambient temperature)	
Noise level	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)	
Grounding		Class D grounding	
Cooling		Natural cooling	
Mounting		Mounted on DIN rails.	
Power supply	Voltage range	10.8 to 26.4 VDC	
	Rated voltage	24 VDC	
	Allowable ripple	Less than 1% p-p	
Power consumption		10 W	



CAUTION

When ambient temperature is beyond 50 °C, a temperature of the surface is very high. Please be careful not to touch with bare hands.



IMPORTANT

- The temperature specification during operation indicates the criterion of the temperature at the air intake of the bottom portion of modules. Do not block ventilation holes, as it may hinder the air-cooling capabilities of the body. When installing YFGW410 in a cabinet, note that the temperature specification is not in respect to the ambient temperature of the cabinet. Provide cooling fans in the cabinet if needed.
- Avoid exposing YFGW410 to direct sunlight.
- Prevent condensation under any circumstance.
- The dust level of the room should not exceed 0.3 mg/m³. Under any circumstance, avoid iron flakes, carbon particles, or any other type of dust that are conductive.
- Avoid existence of corrosive gases such as hydrogen sulfide, sulfurous acid gas, chlorine, and ammonia.
- YFGW410 should not share a ground wire with other devices.

■ YFGW410 Vibration Criteria

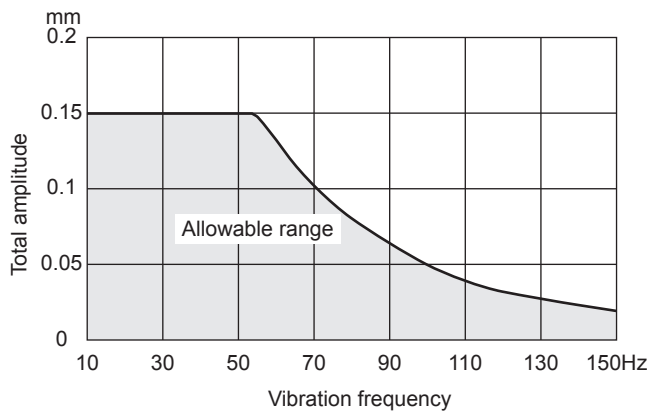
Ensure that if the frequency of vibration at the installation location is 58 Hz or less, the total amplitude is maintained less than 0.15 mm. If the vibration frequency is greater than 58 Hz, find a location that will meet the following condition:

$$\text{Acceleration (m/s}^2\text{)} = 2\pi^2 \times A \times F^2 \times 10^{-3} < 9.8 (=1 \text{ G})$$

A: Total amplitude (mm)

F: Frequency (Hz)

The range of allowable total amplitudes is shown below.



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Figure C1-1 Allowable Vibration Range

■ Radio Device Noise to YFGW410

The following shows general requirements when using a radio device such as transceivers; however, as a general rule, close the cabinet door when using a radio device:

- Transceivers that have 3 W of output power or less should be at least 1 m away. Transceivers that have 10 W of output power or less should be at least 2 m away.
- Radio devices that have 1 W of output power or less including cellular phones and cordless phones should be at least 1 m away.
- The field wireless device radio output is about 10 mW. There is no impact for YFGW410, but keep to 1m than the same way as the 1 W output radio device.

C2. Power Supply and Grounding

An appropriate power supply is necessary for the stable operation of YFGW410.

C2.1 Power Supply

Connect the power source to the spring terminal block located on the top of YFGW410.

**SEE
ALSO**

For power supply and current consumption of the YFGW410, also see GS 01W02D01-01EN

■ 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.

Table C2-1 Inrush current specifications

Item	Specifications	Remarks
Inrush current	30 A, 2 ms or less	At 26.4 VDC

**SEE
ALSO**

For wiring of the YFGW410 power supply, see Section C4.2 Power Supply Cable Connection.



WARNING

- 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.
- When power failure is detected, the system may take a certain amount of time to recover to the normal operation status.
- Please supply the power from the permanent power supply to avoid.



IMPORTANT

- YFGW410 does not have a power switch. Provide a breaker or switch for the external power line to turn ON/OFF the device.
- The overcurrent protection circuit of the power supply, it is recommended to use the automatic-recover type with the reverse L-shaped.

C2.2 Grounding

Appropriate grounding is necessary for the stable operation of YFGW410. Class D grounding (the third class grounding) with the ground resistance of 100 ohms or less is necessary. To connect the ground cable to YFGW410 directly, use the frame ground (FG) terminal on the top side of the mainbody.

SEE
ALSO For grounding of the YFGW410, see Section C4.3 Grounding.

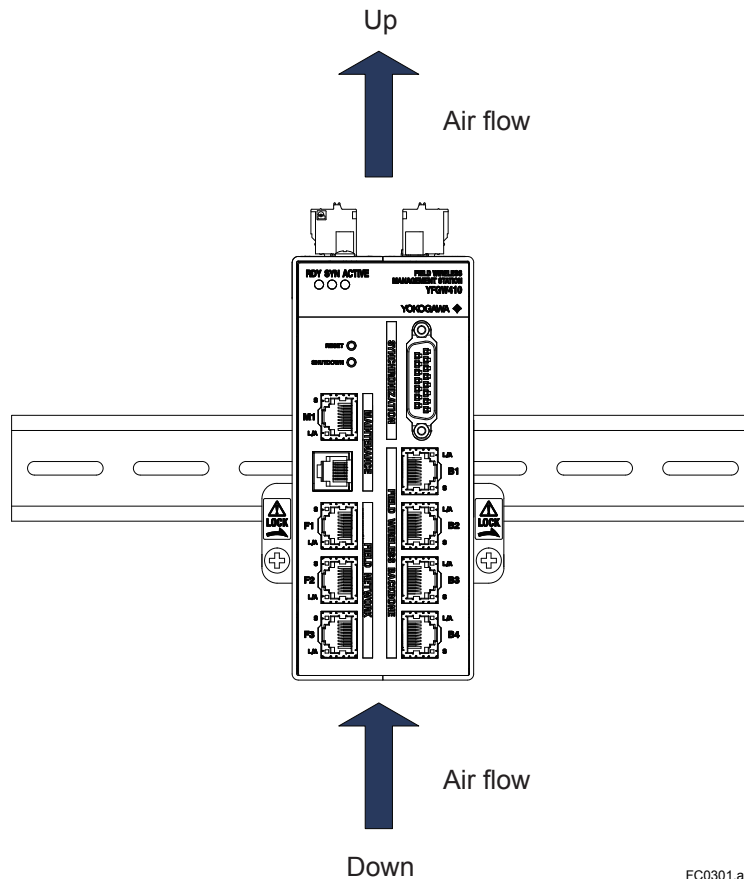
C3. Mounting

YFGW410 can be mounted on the DIN rails, and it is usually mounted on the panel or wall in the cabinet.

No other type of mounting is allowed.

C3.1 Mounting Direction

YFGW410 is designed to be cooled by natural air. Install an YFGW410 so that the ventilation air flows upward from its bottom to top as shown below. Mount in the correct direction.



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Figure C3-1 YFGW410 mounting direction



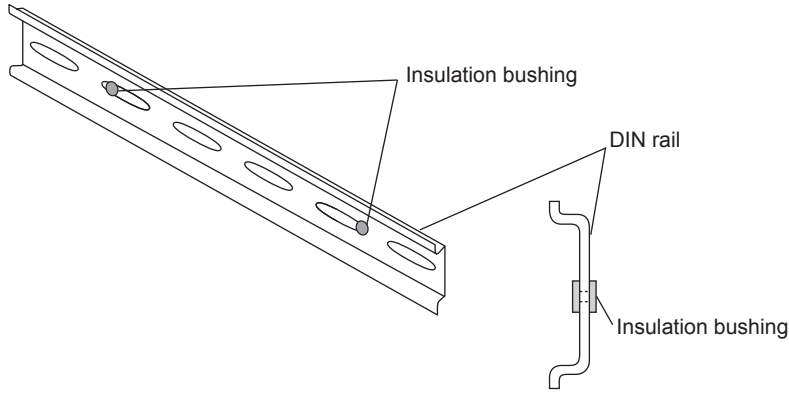
IMPORTANT

- Be sure to turn off the power before installing or removing YFGW410.
- Do not install the body blocking the ventilation holes on the top and bottom.
- At the top side, to prevent the cooling air current from being blocked, be sure to place the body at least 150 mm away from other devices. This space is also used as a work area for the power supply cable connection.
- At the bottom side, to prevent the cooling air current from being blocked, be sure to place the body at least 100 mm away from other devices.
- At the side panel, to prevent the cooling air current from being blocked, be sure to place the body at least 50 mm away from other devices. This space is also used as a work area for the power supply cable connection.
- Do not expose to direct sunlight.

C3.2 Mounting to DIN Rails

First, install the DIN rails on the panel or the cabinet wall. Secure the DIN rails by tightening the appropriate number of screws. Be careful that the rails do not get bent or deformed due to the weight of the YFGW410 or cable tension.

To securely ground YFGW410, insert an insulation bushing between the DIN rails and mounting panel and tighten the screws. Insulate the DIN rails from the metal surface of the mounting panel.

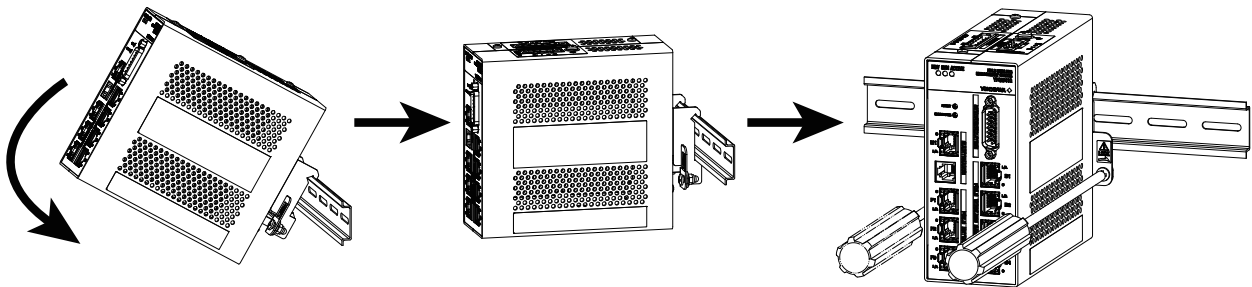


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Figure C3-2 Use of insulation bushing

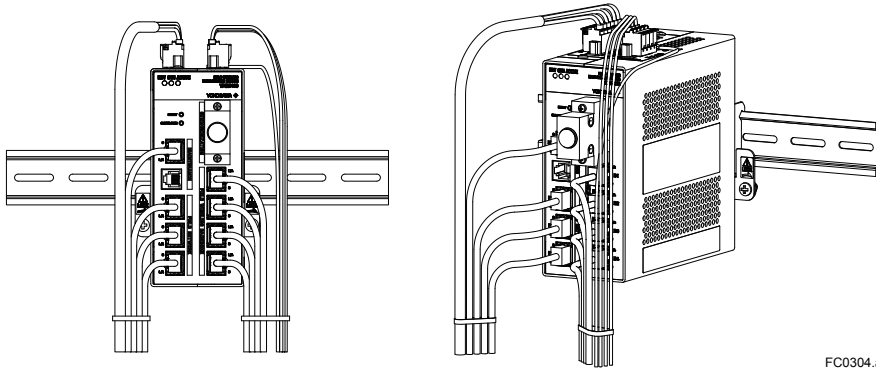
C3.3 Installation of the YFGW410

1. Loosen the screws at both sides of the DIN rail mounting bracket (located on the rear panel of the YFGW410), by rotating these screws in the reverse direction from the “Lock” position. The screws do not drop even when fully loosened.
2. As shown in Figure C3-3, hook the top edge of the DIN rail mounting bracket onto the top of the DIN rail, and return the YFGW410 back to the horizontal position. Then, hook the bottom edge of the mounting bracket onto the bottom of the DIN rail.
3. Tighten the screws at both ends of the DIN rail mounting bracket, by rotating them toward the “Lock” position. Tighten screws securely to ensure there is no clearance between the bracket and the DIN rails.
4. Remove the YFGW410 by following the procedure described above in reverse.
After you have tightened the screws, loosen them by three turns.



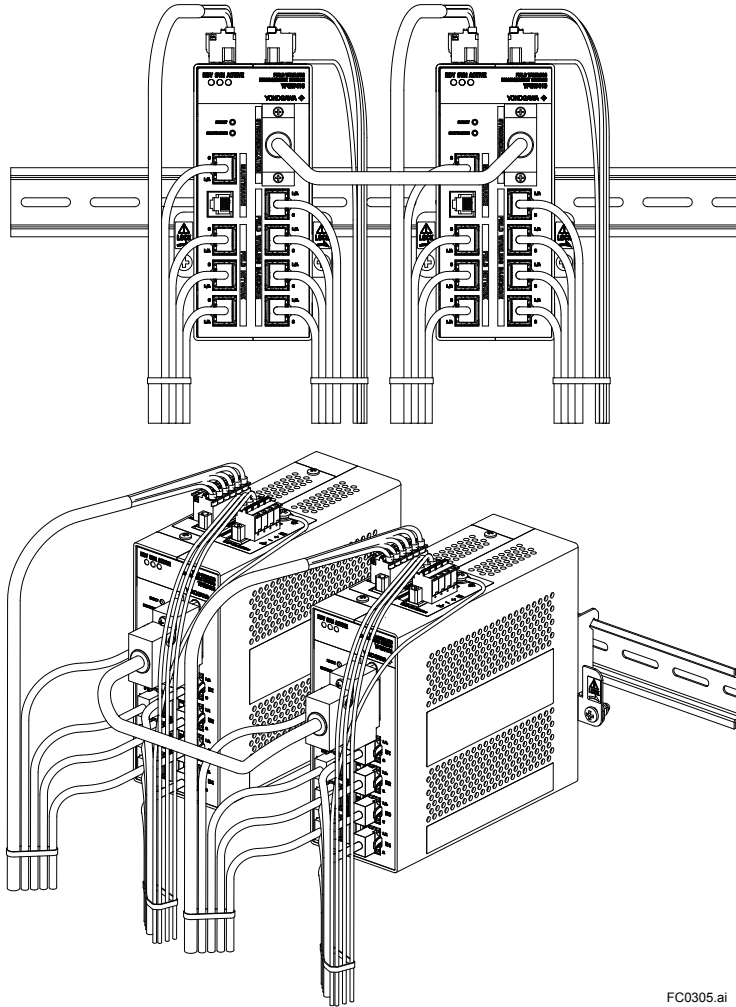
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Figure C3-3 Mounting of the YFGW410 on DIN rails



FC0304.ai

Figure C3-4 Mounting example



FC0305.ai

Figure C3-5 Mounting example (in redundant configuration)

C4. Wiring

This chapter explains the power, grounding, and communication cable connection to the YFGW410.

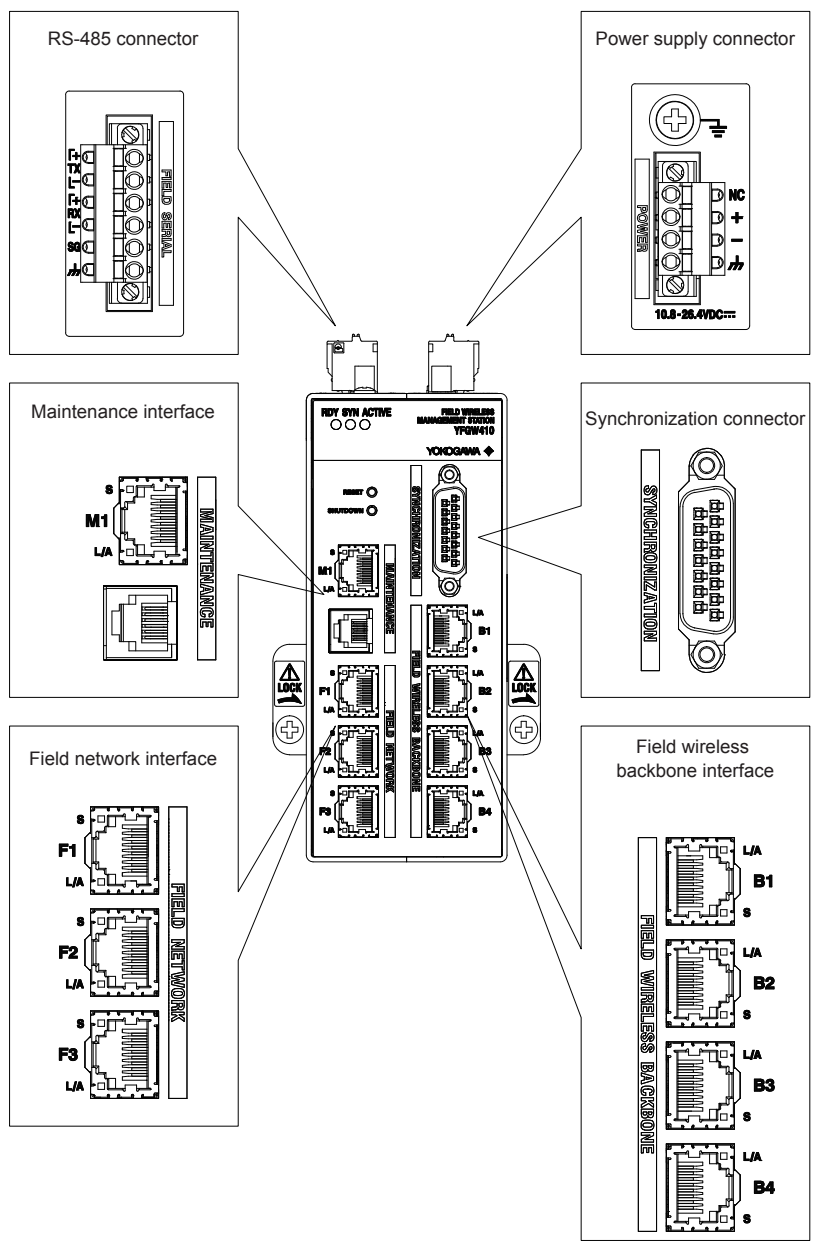
C4.1 Terminals and Communication Ports Connection

The YFGW410 has spring terminals to connect the power supply cable and serial communication cables. Use the screw to connect the ground terminal with a ring-type crimp to the frame ground.

Use the RJ-45 connectors for Ethernet, and connect the metal network cables to the field wireless backbone device interface, field network interface, and maintenance interface.

Plug the cable for redundancy or the terminator to the synchronization connector.

The customer does not need to connect any cable to the serial port.



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Figure C4-1 Terminals and Communication Ports View

C4.2 Power Supply Cable Connection

The YFGW410 has a 4-pin power supply connector (with a spring terminal; Phoenix Contact's FKC 2.5/4-STF) and the socket on the mainbody. The spring terminal base is secured by two screws at both ends. To separate the terminal from the socket, loosening these screws.

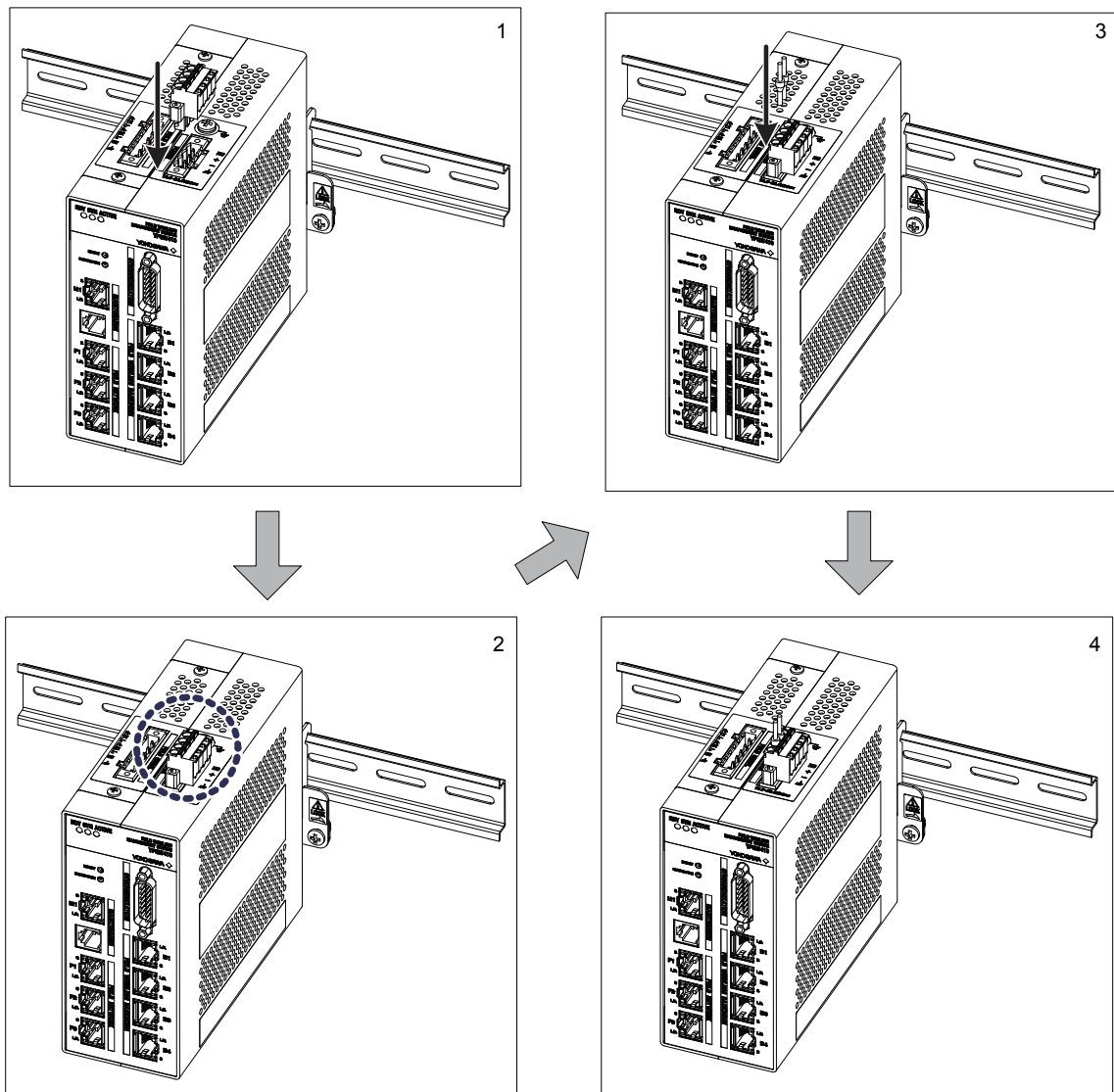
There is enough space for cabling at the top and side panels of the YFGW410, leave the spring terminals on the mainbody (as shown in Figure C4-2) and connect the positive and negative power lines as indicated.

If there is insufficient space, separate the spring terminals from the socket, route the cables, and secure the mainbody.



IMPORTANT

Be careful to connect the power supply cable with correct polarity. Because the YFGW410 does not have a power switch, add a power switch or a circuit breaker to the external power line.



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Figure C4-2 Power supply cable connection procedure

To disconnect the power supply cable from the spring terminal, push down the orange areas around the cable inlet and pull out the power supply cable from the socket.

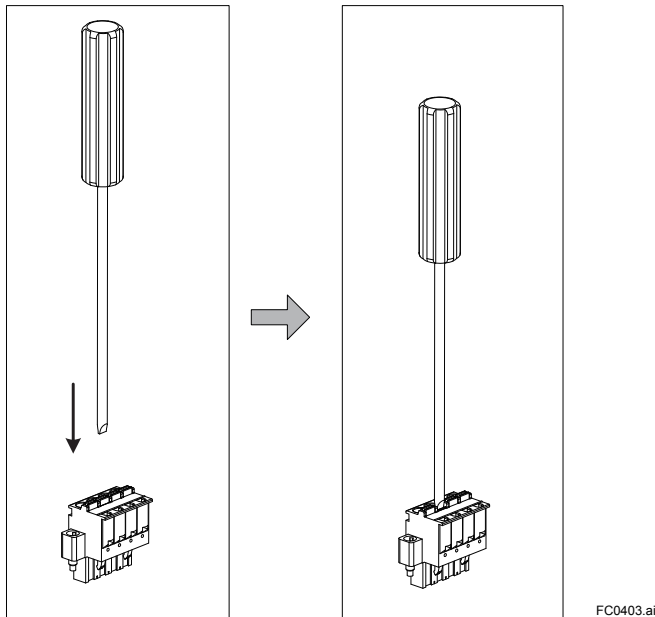


Figure C4-3 Disconnecting the power supply cable

● Applicable cables

Insulated cables for industrial equipment such as;

- 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)
- Control cables (vinyl insulated vinyl sheath cable) (CVV); JIS C3401

● Wire Size

Without sleeve: 0.2 mm² to 2.5 mm² (AWG24 to 14)

With sleeve: 0.2 mm² to 2.5 mm² (AWG24 to 14)

● **Wiring to spring terminals:1 (without sleeve)**

- When using a solid conductor, strip the insulated cover and connect it.

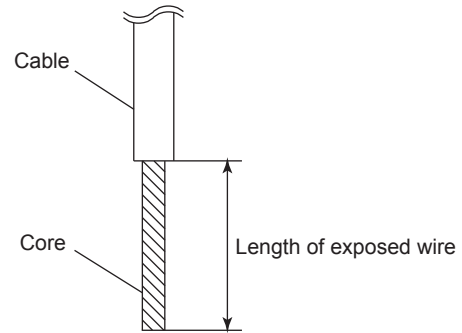
Strip the solid conductor by 10 mm.

- When using a stranded conductor, strip the insulated cover and twist and connect it.

Strip the stranded conductor for 10 mm.

Never solder the stranded conductor when connecting cables.

Be careful not to cause the loosely stranded conductor to come in contact with adjacent terminals or others. Insert the cable leads into the terminal block securely.



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● **Wiring to spring terminals:2 (with sleeve)**

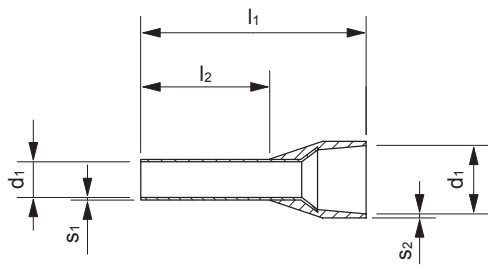
The sleeve can prevent cable leads from untwist when you connect the cable. Select a sleeve to match the cable size. If the length of cable leads does not match the length of sleeve (l_2), strip the cable to the correct length. Strip the cable for a length so that the core wire slightly extends from the metal tube of the sleeve. If this causes the length of the metal tube of the sleeve to be slightly shorter than the stripping length, this is no problem.

The wiring cables and applicable sleeves are listed in the table below.

Use the same manufacturer for sleeves and tools.

Example of tool: Phoenix Contact's CRIMPFOX 6

For details on sleeves and crimp tools, contact to Phoenix Contact Inc.



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Table C4-1 List of power cables

Cable			Dimensions (mm)						Phoenix Contact's type
Section area (mm ²)	AWG	Strip length (mm)	I ₁	I ₂	d ₁	S ₁	d ₂	S ₂	
0.25	24	10	10.5	6.0	0.8	0.15	2.0	0.25	AI 0.25-6 BU
0.34	22	10	10.5	6.0	0.8	0.15	2.0	0.25	AI 0.34-6 TQ
		10	12.5	8.0	0.8	0.15	2.0	0.25	AI 0.34-8 TQ
0.5	20	10	12.0	6.0	1.1	0.15	2.5	0.25	AI 0.5-6 WH
		10	14.0	8.0	1.1	0.15	2.5	0.25	AI 0.5-8 WH
		10	16.0	10.0	1.1	0.15	2.5	0.25	AI 0.5-10 WH
0.75	20	10	12.0	6.0	1.3	0.15	2.8	0.25	AI 0.75-6 GY
		10	14.0	8.0	1.3	0.15	2.8	0.25	AI 0.75-8 GY
		10	16.0	10.0	1.3	0.15	2.8	0.25	AI 0.75-10 GY
1.0	18	10	12.0	6.0	1.5	0.15	3.0	0.3	AI 1-6 RD
		10	14.0	8.0	1.5	0.15	3.0	0.3	AI 1-8 RD
		10	16.0	10.0	1.5	0.15	3.0	0.3	AI 1-10 RD
1.5	16	10	12.0	6.0	1.8	0.15	3.4	0.3	AI 1.5-6 BK
		10	14.0	8.0	1.8	0.15	3.4	0.3	AI 1.5-8 BK
		10	18.0	10.0	1.8	0.15	3.4	0.3	AI 1.5-10 BK
2.5	14	10	14.0	8.0	2.3	0.15	4.2	0.3	AI 2.5-8 BU
		10	16.0	10.0	2.3	0.15	4.2	0.3	AI 2.5-10 BU



IMPORTANT

- Use the same manufacturer for sleeves and tools.
- Use sleeve tools that match the wire thickness.
- Insert the wire to be connected completely into the pressure clamp terminal and attach it securely.
- Secure the cable to cable clamps, etc. so that the weight of the cable applied to the terminal is minimized.
- Strip the cable for a length so that the core wire slightly extends from the metal tube of the sleeve. If this causes the length of the metal tube of the sleeve to be slightly shorter than the stripping length, this is no problem.

C4.3 Grounding

Appropriate grounding is necessary for the stable operation of YFGW410. The YFGW410 has two ground terminals: the frame ground (FG) terminal secured by the M4 screw at the side of power supply connector (on the top side of the mainbody), and the ground terminal at the power supply spring terminal.

Connect the ground cable from the frame ground (FG) terminal to the ground. Connect the cable shield or others to the power supply spring terminal. The internal wiring of YFGW410 mainbody is connected as shown in the following figure.

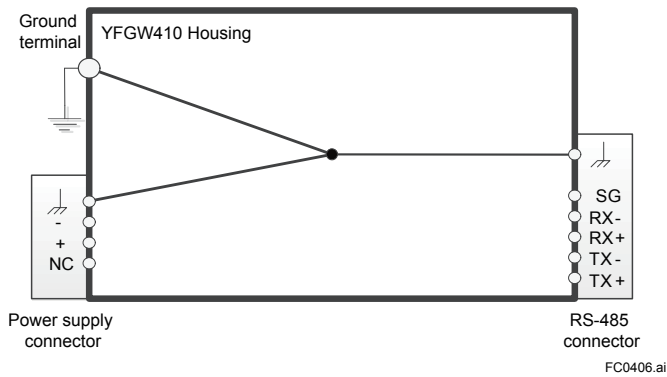
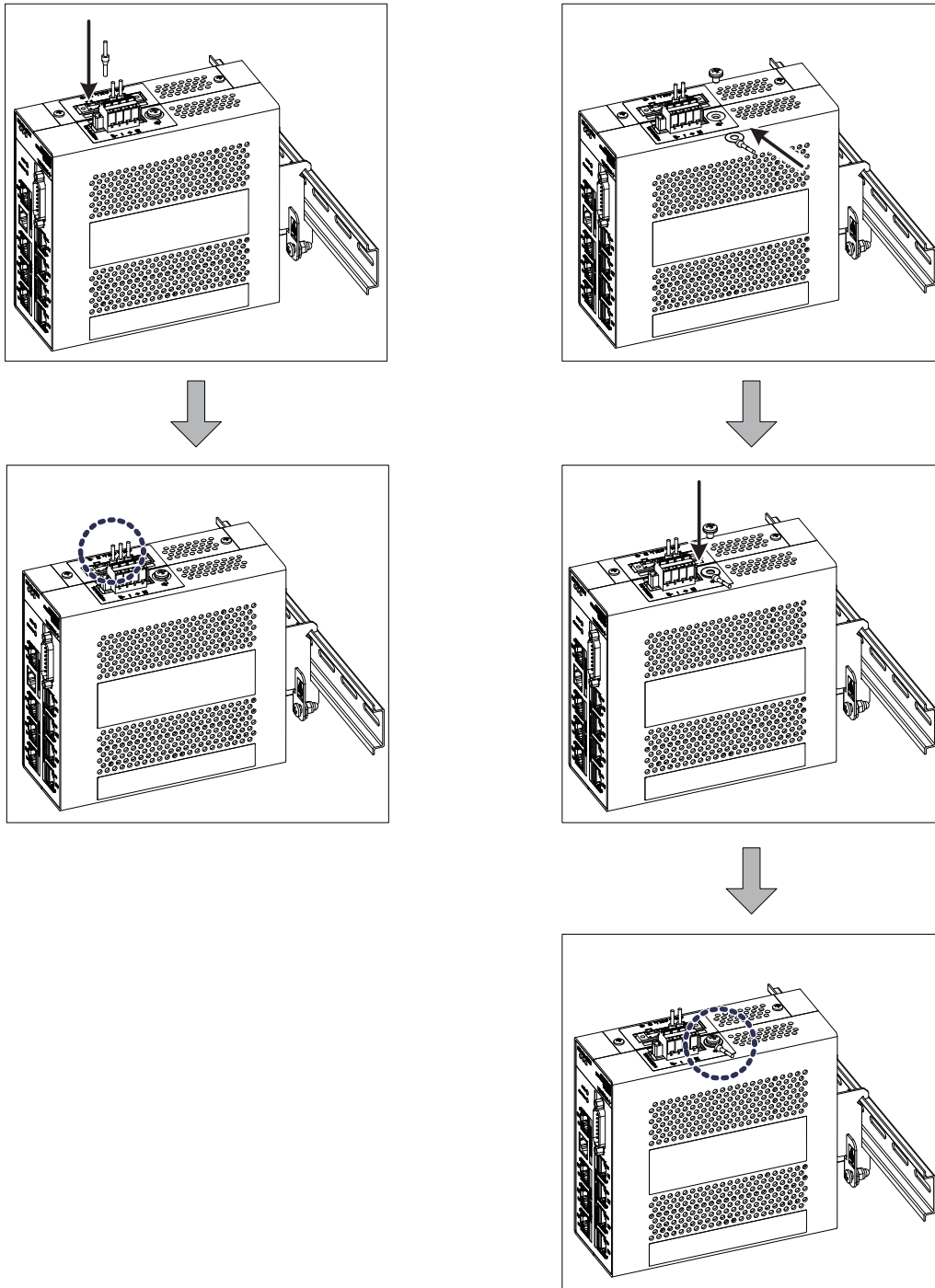


Figure C4-4 Internal connection of the ground terminal

To ensure stable grounding, insulate the panel or DIN rails with YFGW410 from the metal surface of external cabinet, rack and others by using insulation bushings or others. Then, connect the cable from YFGW410 to the ground. Class D grounding (the third class grounding) with the ground resistance of 100 ohms or less is necessary. To connect the ground cable to YFGW410 directly, use the frame ground (FG) terminal (M4 screw) on the top side of the mainbody. Secure the M4 screws at a tightening torque of 1.2 to 1.5 Nm. YFGW410 should not share a ground wire with other devices.



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Figure C4-5 Ground terminal connection procedure

● Applicable cables

Insulated cables for industrial equipment such as;

- 600V polyvinyl chloride insulated wires (IV); JIS C3307
- Polyvinyl chloride insulated wires for electrical apparatus (KIV); JIS C3316
- 600V 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 mm² to 2.6 mm²)

● Termination

Use a ring tongue terminal for M4 terminals: with an insulation sleeve

C4.4 Communication Cable Connection

■ Field wireless backbone device

Connect the 100BASE-TX compliance cable, terminated with an RJ-45 connector, to the field wireless backbone device interface on the front panel of the YFGW410.

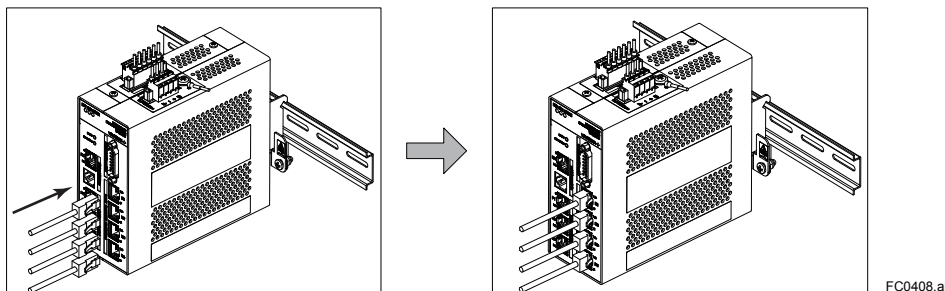


Figure C4-6 Connection to field wireless backbone

■ Field network

Connect the 100BASE-TX compliance cable, terminated with an RJ-45 connector, to the field network interface on the front panel of the YFGW410.

Generally, connect the host system which transmits data using the ISA100.11a protocol to the F1 port of YFGW410. Connect the host system which transmits data using the Modbus/TCP protocol to the F2 or F3 port.

■ RS-485

YFGW410 supports to communicate with the host system, which supports Modbus/RTU communication, via the RS-485 connector on top of the main body. 4-wire and 2-wire types are provided for connection with the host system. Selecting connection type is set by RS-485 configuration switches. YFGW410 supports only 1 to 1 connection.

RS-485 connector is a 6-pin connector with a spring terminal (Phoenix Contact FKC 2.5/6-STF). For details of wiring, see C4.2 Power Supply Cable Connection. Regarding RS-485 communi-

cation cables, use shielded twisted pair cables (cables for RS-422/RS-485 communication are recommended).



IMPORTANT

All RS-485 configuration switches are set to OFF by default. When connecting cables to the RS-485 connector, set RS-485 configuration switches to fit actual connection before power on.

● **Connection in 4-wire Type**

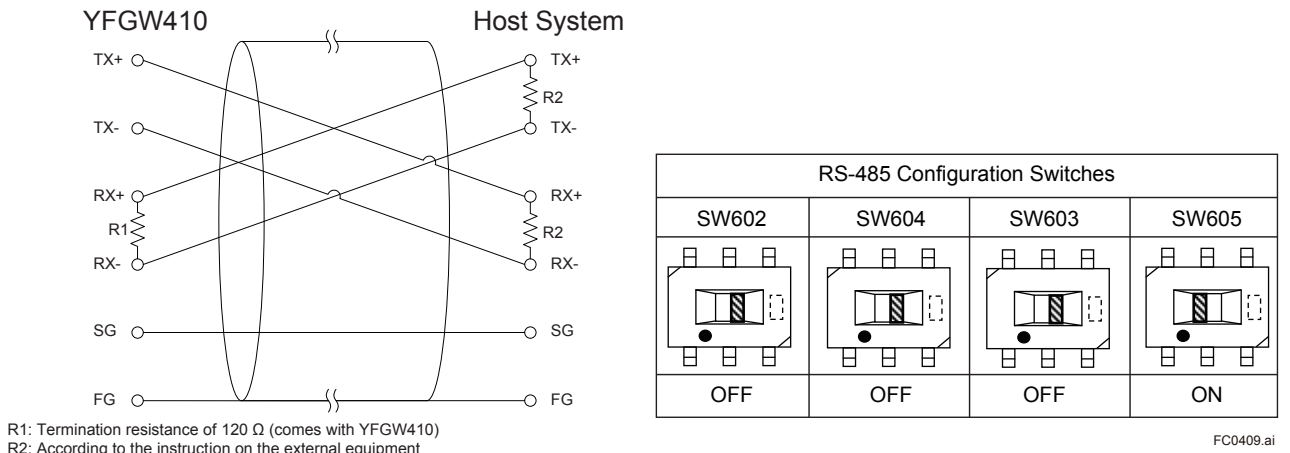


Figure C4-7 Connection and Configuration in 4-wire Type

● **Connection in 2-wire Type**

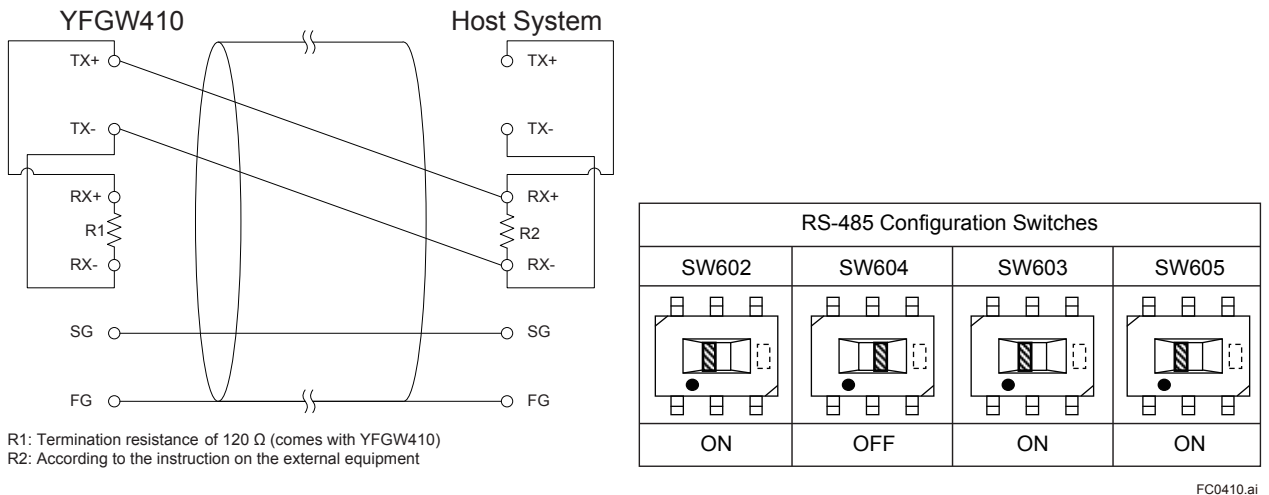


Figure C4-8 Connection and Configuration in 2-wire Type

■ Maintenance interface

Connect the 100BASE-TX compliance cable, terminated with an RJ-45 connector, to the maintenance interface (M1) on the front panel of the YFGW410. Connect the Field Wireless Management Console to this port for configuration of a field wireless network and the YFGW410.



IMPORTANT

When CENTUM VP is running, set and adjust the parameters of the field wireless device from PRM.

When CENTUM VP is not running, or when a non-Yokogawa host system is connected, the parameters can be set and adjusted using FieldMate.

■ Synchronization connector

In order to build redundancy YFGW410, connect an attached cable for redundancy to the synchronization connector in the front of YFGW410. When using single YFGW410, connect the terminator to the synchronization connector. If nothing has connected with a synchronization connector, YFGW410 does not operate.



IMPORTANT

- The cable for redundancy has the D-sub 15-pin connector at both ends. Secure the cable connector to the synchronization connector using screws. When cables other than an attached cable for redundancy are connected, these operation is not guaranteed.
 - If nothing has connected with a synchronization connector, YFGW410 does not operate.
-

C5. Explosion-Proof Wiring

Be sure to read the precautions for the explosion-proof type product including wiring described in “YFGW410 Field Wireless Management Station Read Me First (IM 01W02D01-11EN)”.

Part D System Construction

This part describes the flow and work content of the engineering in order to construct a Field Wireless System.

D1. Engineering Procedures

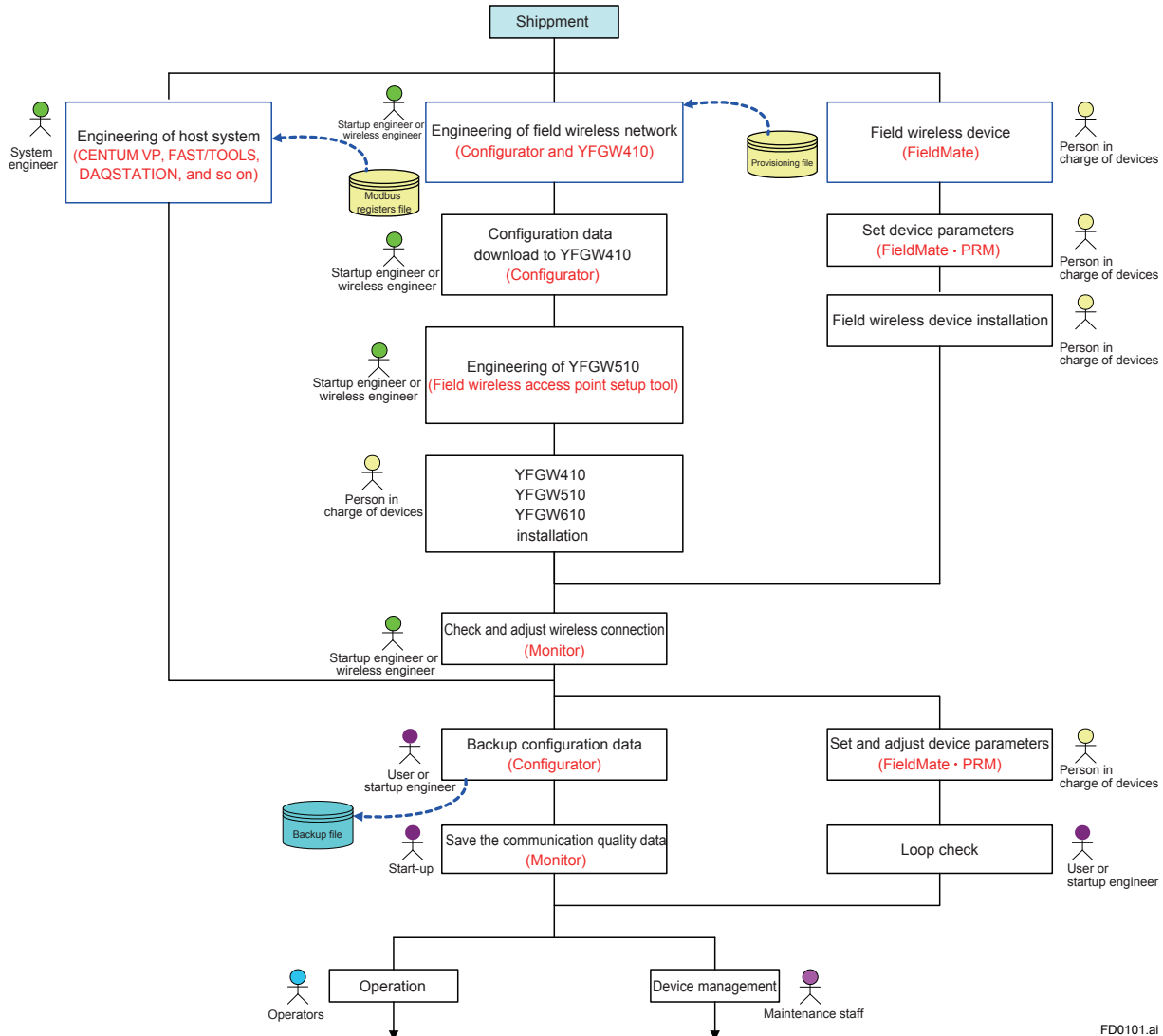


Figure D1-1 Engineering Flow for Wireless System Construction

The explanations in this document are based on the assumption that all engineering in the network construction is executed after the delivery of the components for the Field Wireless System to the customer. When Yokogawa Electric Corporation receives an order that includes the engineering, the procedure may differ from the flow shown in Figure D1-1.

As shown in Figure D1-1, in order to construct a Field Wireless System that has been specifically designed according to a customer's request, the following types of engineering are necessary:

- (1) Provisioning and setting of the field wireless device
- (2) Construction of the Field Wireless System
- (3) Engineering of the host system

■ (1): Provisioning and Setting of the Field Wireless Device

Provisioning is configuration of the required information into a field wireless device in order to integrate it with the field wireless network. This task is necessary in order to prevent third parties from making improper connections to the field wireless network through methods such as tampering or spoofing. Devices on which provisioning has not been carried out or onto which the incorrect information is configured cannot be integrated with the field wireless network.

As shown in Figure D1-1, the following tasks are necessary before letting a field wireless device join to the field wireless network.

- Provisioning
The information that the field wireless device requires in order to be integrated with the field wireless network is configured. This task must be executed before the device is installed. YFGW410 supports OOB (Out-of-band), OTA (Over-the-air) provisioning. For details, see Chapter D3 Provisioning.
- Setting and Adjustment of parameters
In the case of field wireless devices manufactured by Yokogawa Electric Corporation, the person in charge of devices can make settings and adjust the parameters via infrared data communication before installing the device, by using FieldMate. This task can also be performed via a field wireless network after the device is installed.

When performing OOB provisioning and parameter settings/adjustment before installing the device, use FieldMate R2.03.00 or later versions.

The DVD-ROM of this product includes FieldMate Lite edition. For a field wireless system, use applicable version of FieldMate and Device Files checked by the website (<http://www.field-wireless.com/>) For details, see Part N ISA100 Device Configuration in the FieldMate User's Manual (IM 01R01A01-01E).

■ (2): Construction of the Field Wireless System

This task comprises the construction of a field wireless network by the wireless system engineer (including the start-up engineer) based on the detailed design information of the field wireless network by setting the YFGW410, the YFGW510 Field Wireless Access Point, and the field wireless device.

The task includes constructing the network for the Field Wireless System, downloading information to the YFGW410, setting the YFGW510, verifying the startup and running status of the field wireless network, and, if necessary, correcting the network configuration, and setting and adjusting the parameters of the field wireless device via the field wireless network. The task of network construction includes enabling or disabling redundancy in the YFGW410, registering and setting the functions of the field wireless device, setting up the communication paths, and defining process data in the Modbus registers.

For the detailed procedures, see Sub-section D4.2.8 "Modbus Settings" in this document.

The tasks of downloading information to the YFGW410 and verifying the startup and running status of the field wireless network are assumed to be performed by the wireless system engineer (including the start-up engineer) after the device has been delivered to the user's plant site and installed.

The task of setting and adjusting the device parameters is supposed to be performed by the person in charge of the devices.

■ (3): Engineering of the Host System

This task is the engineering of the host (control/monitoring) system by the system engineer.

The task targets system applications for which process data can be read/written using Modbus, as well as applications for which the process values and parameters of the field wireless device can be read/written using the ISA100.11a protocol.

Some examples of target applications are shown below.

Modbus/TCP	STARDOM, DAQWORX, DAQSTATION, DAQMASTER, CENTUM VP, FAST/TOOLS, other companies' implementations of DCS/SCADA
Modbus/RTU	DAQMASTER and other companies' implementations of DCS/SCADA
ISA100.11a	PRM, FieldMate
OPC	Applications that correspond to OPC servers (CENTUM VP, FAST/TOOLS, etc.)

For details, see the User's Manual for the relevant host system.



IMPORTANT

When CENTUM VP R4 is used, R4.02.30 or higher is required. For details, see Reference Subsystem Communication (Using FIO) (IM 33M01A30-40E).

When CENTUM VP R5 is used, R5.02.00 or higher is required.

If CENTUM VP is used with YFGW410 in redundant configuration or writing output values to field wireless devices, CENTUM VP R5 is required. For details, see the Communication with Subsystem Using FIO user's manual (IM 33K03L20-50E).

D2. Tools to be Used for the Engineering

In Figure D1-1 Engineering Flow for Wireless System Construction, the tools described in this User's Manual are shown in parentheses alongside the tasks.

This chapter describes the following tools included in Figure D1-1.

- Configurator
- Monitor
- Field wireless access point setup tool
- FieldMate
- PRM (Plant Resource Manager)

D2.1 Overview of the Tools

■ Configurator

This tool is included in the Field Wireless Management Console that is built into the YFGW410. It is used for constructing the field wireless network.

It creates the configuration information for the wireless network configuration that is managed by the YFGW410 based on the detailed design information of the wireless network. It also creates configuration data based on the provisioning information of the field wireless device, which contain information such as the devices to be integrated into the network, the roles of those devices, the function settings for the data renewal cycles, etc., data allocations for the Modbus registers, and other information.

These pieces of information are downloaded to the YFGW410 and the field wireless device.

Configurator is launched from the Field Wireless Management Console on the YFGW410 via an instance of Internet Explorer on a PC that is connected to maintenance interface or field network interface.

■ Monitor

This tool is included with the Field Wireless Management Console that is built into the YFGW410. It is used for monitoring the running status of Field Wireless System constructed .

Monitor displays the Packet Error Rate (PER), the Received Signal Strength Indicator (RSSI), and the field wireless network configuration figures for each wireless communication path, as well as displaying information about the field wireless device such as the battery life.

It is used for determining the communication stability when the Field Wireless System is started and for monitoring daily status during operation.

Monitor is launched from the Field Wireless Management Console on the YFGW410 via an instance of Internet Explorer on a PC that is connected to maintenance interface or field network interface.

■ Field wireless access point setup tool

The field wireless access point setup tool makes the settings that YFGW510 requires in order to be integrated with the field wireless network (device tag and password).

This tool is a Windows PC application that is provided with YFGW510.

In the case of the wireless LAN option, it is also used to set parameters related to wireless LAN (SSID, network key, etc.).

For details of operation, see the YFGW510 User's Manual (IM01W02E01-01JA).

■ FieldMate

This is a separately provided application for setting the parameters of the field device.

In the Field Wireless System, the field wireless device is provisioned and configured via infrared data communication. Prepare the infrared adapter specified in the FieldMate User's Manual (IM 01R01A01-01E).

If the host system for YFGW410 is not CENTUM VP manufactured by Yokogawa and there is no PRM (mentioned later in this document), you can set the parameters by connecting a PC on which FieldMate is installed to maintenance interface of YFGW410.

For details of operation, see the FieldMate User's Manual (IM 01R01A01-01E).

■ PRM (Plant Resource Manager)

This is a separately provided application for monitoring the status of the field device, and setting and managing the parameters. It is used to create FDT projects on the FDT framework. Monitoring, configuration, and control are provided via a connection to the field wireless device using DTM.

The PC on which PRM is installed is connected to field network interface of YFGW410.

For details of operation, see the Plant Resource Manager Reference (IM 33Y05Q10-11E).

D2.2 Using the Field Wireless Management Console

The Field Wireless Management Console that is built into YFGW410 contains two tools: Configurator and Monitor.

The basic usage rights for the tool are as follows:

- Field Wireless Management Console: 1 license
- Configurator: 1 client
- Monitor: 3 clients

D2.2.1 System Requirements

- **PC environment**

Item	Recommended system requirements
CPU	Intel Core i5-2520M or equivalent, or higher
RAM	2 GB or more
HDD	40 GB or larger (at least 15 GB of free space)
Communication interface	Ethernet-compatible network ports
Display	Color: True Color (32 bits or more) recommended Resolution: 1280 x 800 or higher recommended

- **PC software system requirements^{*1*2*3}**

OS	Type
Windows 10 Pro	32/64 bit
Windows 8.1 Pro Update	32/64 bit
Windows 7 Professional Service Pack 1	32/64 bit
Windows Server 2012 R2 Standard Update	64 bit
Windows Server 2008 R2 Enterprise Service Pack 1	64 bit
Windows Server 2008 Enterprise Service Pack 2	32 bit

*1: Japanese or English versions are supported.

*2: Microsoft .NET Framework 4.6 or 4.5.2 is required.

*3: The 64 bit OS is compatible when using WOW64 (Windows 32-bit on Windows 64-bit).

- **Internet Explorer (IE) compatibility requirements**

The tool works with the IE version bundled with each OS.

Target OS	IE version
Windows 10 Pro (32/64 bit)	IE11
Windows 8.1 Pro Update (32/64 bit)	IE11
Windows 7 Professional Service Pack 1 (32/64 bit)	IE11
Windows Server 2012 R2 Standard Update (64 bit)	IE11
Windows Server 2008 R2 Enterprise Service Pack 1 (64 bit)	IE11
Windows Server 2008 Enterprise Service Pack 2 (32 bit)	IE9

D2.2.2 Launching the Tool

- **Connecting and launching YFGW410**

When YFGW410 is factory default, before power on, connecting the power, synchronization connector and field network interface 1 is required. In addition, for a redundant configuration, two YFGW410s should be connected each other with Cable for Redundancy.

The host system should be connected to field network interface 1, and the PC which executes the Field Wireless Management Console should be directly connected to maintenance interface.

If there is no host system, connect the PC which executes the Field Wireless Management Console to field wireless interface 1.

For details, see Part A Outline of Field Wireless System Configuration and C4 Wiring.

**IMPORTANT**

When launching YFGW410, if nothing is connected to field network interface 1, or if the connected device is not running, YFGW410 may detect an error and may not launch properly.

**IMPORTANT**

The network should be configured that the PC which executes the Field Wireless Management Console can access to YFGW410 through a field network interface, during an operational state.

● PC settings

- When connecting the PC to the maintenance interface
The maintenance interface's IP address at the time of shipment from the factory is 192.168.200.101. If the IP address of the PC is set as 192.168.200.xxx (xxx being a number between 1 and 254, excluding between 101 and 106 and the addresses of other devices connected to the same network segment), communication with YFGW410 becomes possible.
- When connecting the PC to field network interface 1
The IP address of the F1 port at the time of shipment from the factory is 192.168.0.101. If the IP address of the PC is set as 192.168.0.xxx (xxx being a number between 1 and 254, excluding between 101 and 103 and the addresses of other devices connected to the same network segment), communication with YFGW410 becomes possible.

Because the Field Wireless Management Console is launched after it is downloaded to the PC from YFGW410, there is no need to install it on the PC.

**IMPORTANT**

The Field Wireless Management Console cannot be launched via a proxy server. In Internet Explorer, open the [Tools] menu, click [Internet Options], select the [Connections] tab, click [LAN settings], and deselect the checkbox next to [Use a proxy server for your LAN].

● Launching the Field Wireless Management Console

After checking YFGW410 to confirm that the RDY LED, which shows the running status, is lit green, launch Internet Explorer on the PC. To connect, enter the following URL in the address bar on Internet Explorer.

http://(IP address of the communication port on YFGW410 to which the PC is connected):8080

http://192.168.0.101:8080

When the connection is successfully made, the window shown in Figure D2-1 is displayed.



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Figure D2-1 Field Wireless Management Console launch window

This window has two buttons: [Configurator] and [Monitor].

- [Configurator] For constructing the field wireless network
- [Monitor] For monitoring the running status of the field wireless network

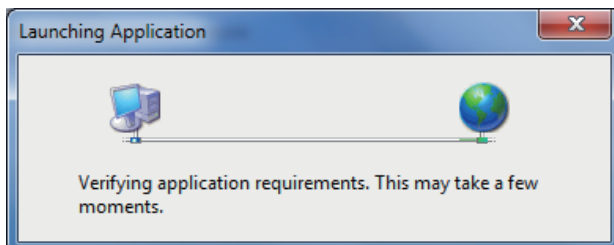


IMPORTANT

The Field Wireless Management Console becomes usable about one minute after the RDY LED, which shows the running status of YFGW410, turns green. Depending on the status of the RDY LED, access to the Field Wireless Management Console may not be possible. For the status of the LED that shows the running status, see Section F2.2 Status Indicators and Actions.

● Logging in

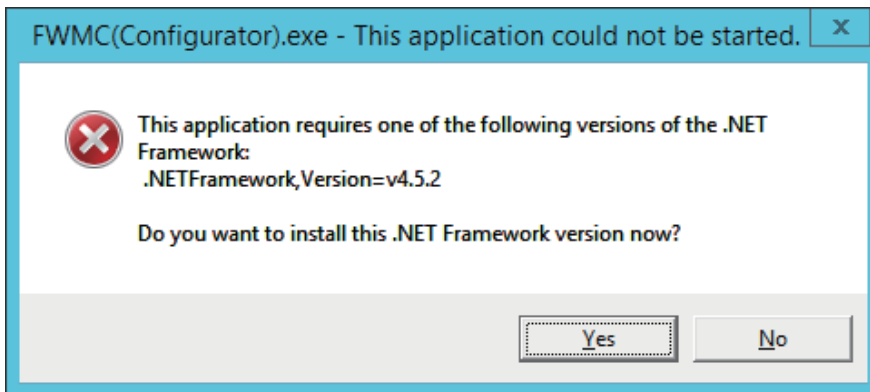
When the [Configurator] or [Monitor] button is clicked, a window is displayed to indicate that the application is running.



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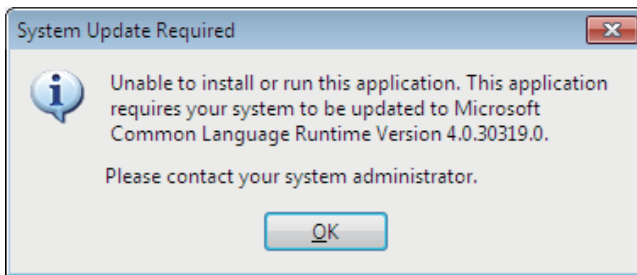
Unless .NET Framework specified in Sub-section D2.2.1 System Requirements is installed to the Windows PC , the following message will displayed and the application cannot be launched. In this case, install the appropriate .NET Framework to the PC.

- Windows 8.1/Server 2012 R2



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- Windows 7/Server 2008 R2/Server 2008



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- Windows 10
.NET Framework 4.6 is preinstalled on Windows 10. Please use that as is.

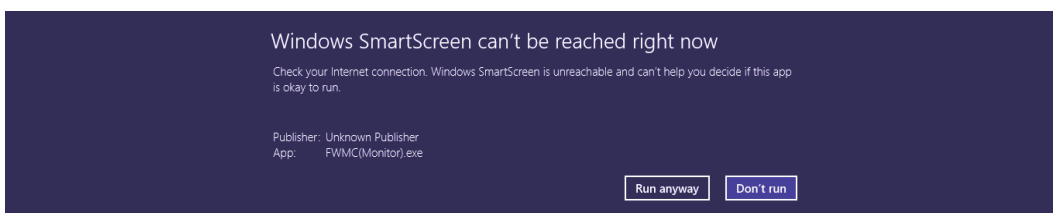


IMPORTANT

It may be necessary to change the security settings of Internet Explorer. To change the security level, follow the instructions on the window that is displayed.

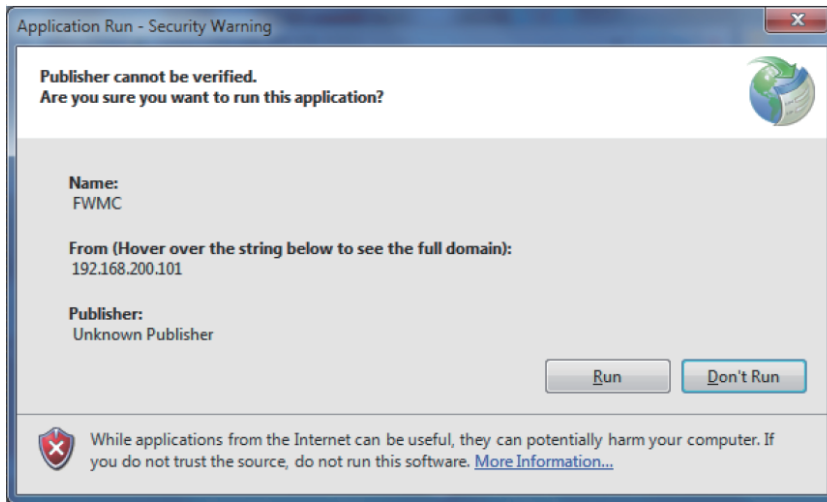
The following security alerts may appear on the window. When this window is displayed, click the [Run anyway] or [Run] button.

- Windows 8.1/10/Server 2012 R2



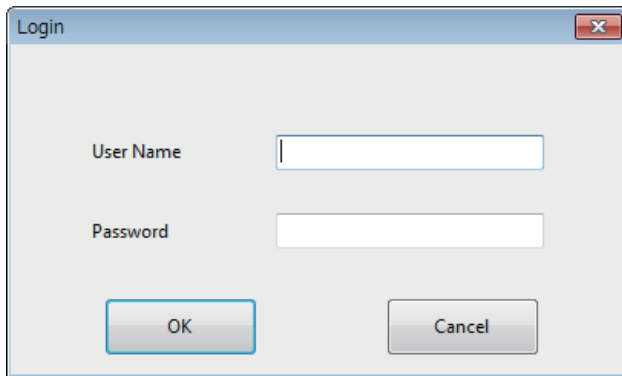
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- Windows 7/Server 2008 R2/Server 2008



FD0206.ai

When the application is successfully launched, the window shown in Figure D2-2 is displayed.



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Figure D2-2 Login window

Item	Description	Maximum number of characters	Initial setting
User Name	Login user name	Up to 16 single byte characters	Admin*1
Password	Login password	Up to 16 single-byte alphanumeric characters, including special characters (e.g. !,\$,#,%)	!admin

*1 Has administrator rights

Three types of user authority are provided, with the following functions available for each type of user.

User authority type	Description
Administrator	Authority for all operations: monitoring, setting, and control
Power User	Permission for monitoring, exporting data files, changing the redundancy status, and restarting the device
Regular User	Permission only for monitoring

The following table shows the operations that are permitted or otherwise for each type of user authority

Operation \ User authority	Administrator	Power User	Regular User	Reference
Launching Configurator	✓			D4
Launching Monitor	✓	✓	✓	D5

If a user has logged in as an Administrator or Power User on another PC, any new users can only log in as Regular Users.

For Monitor, the operable functions depend on the type of user authority. The following operable functions are available.

Function \ User authority	Administrator	Power User	Regular User	Reference
Change passwords (relevant ID)	✓	✓	✓	D4.2.11
Read device parameters	✓	✓		D5.2.3
Restart device	✓	✓		D5.2.3 D5.2.8
Change active / standby status of YFGW410	✓	✓		D5.2.3
Export monitoring data	✓	✓		D5.2.8
Download firmware	✓			D5.2.8
User account manager	✓			D4.2.11
OTA provisioning manager	✓			D5.2.8



IMPORTANT

If Configurator and Monitor are launched at the same time, operations must not be run on them simultaneously due to the following operation conflicts. Start a new operation only after the currently running one is completed.

- Downloading the field wireless network settings (Configurator)
- OTA provisioning (Monitor)
- Downloading firmware (Monitor)
- Reading device parameters (Monitor)
- Restarting device (Monitor)
- Changing active / standby status of YFGW410 (Monitor)



IMPORTANT

When access control is enabled for the Field Wireless Management Console, the following error is displayed in a dialog if an attempt is made to launch Configurator or Monitor from an unpermitted IP Address: “Communication Error: Failed to send or receive data.”

For details of access control, see Sub-section D4.2.1 YFGW410 Settings.

● Launching Configurator

In the Field Wireless Management Console launch window, click the [Configurator] button to go to the Login window, and then enter a User Name and Password. After you have successfully logged in, the following window is displayed.

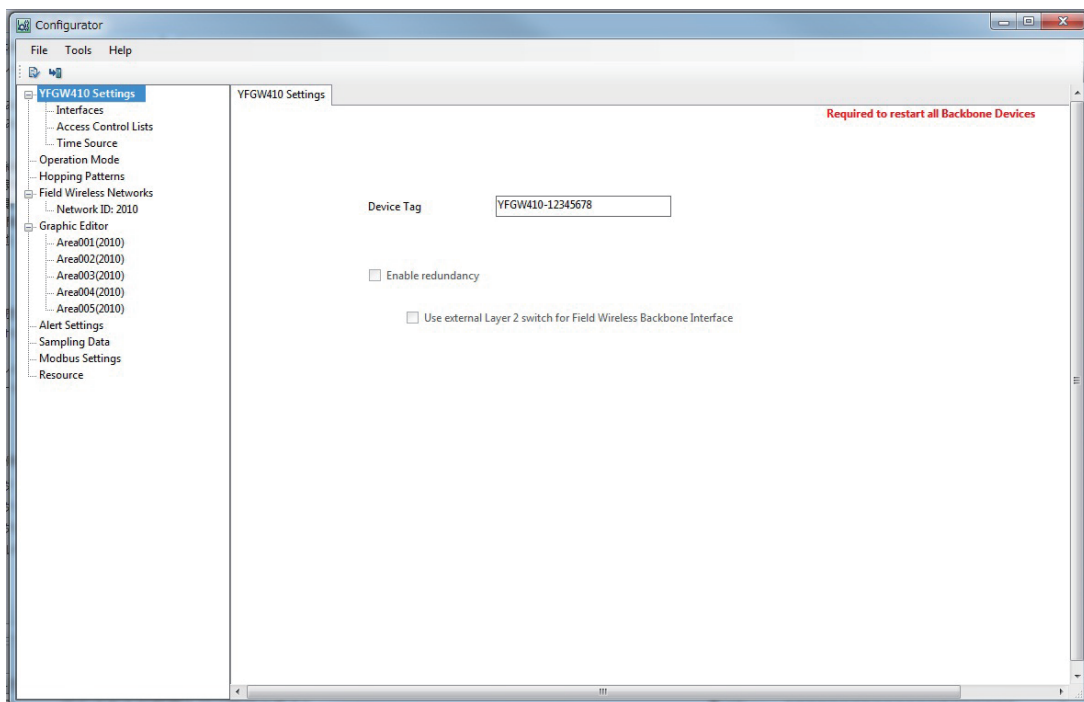


Figure D2-3 Configurator initial window

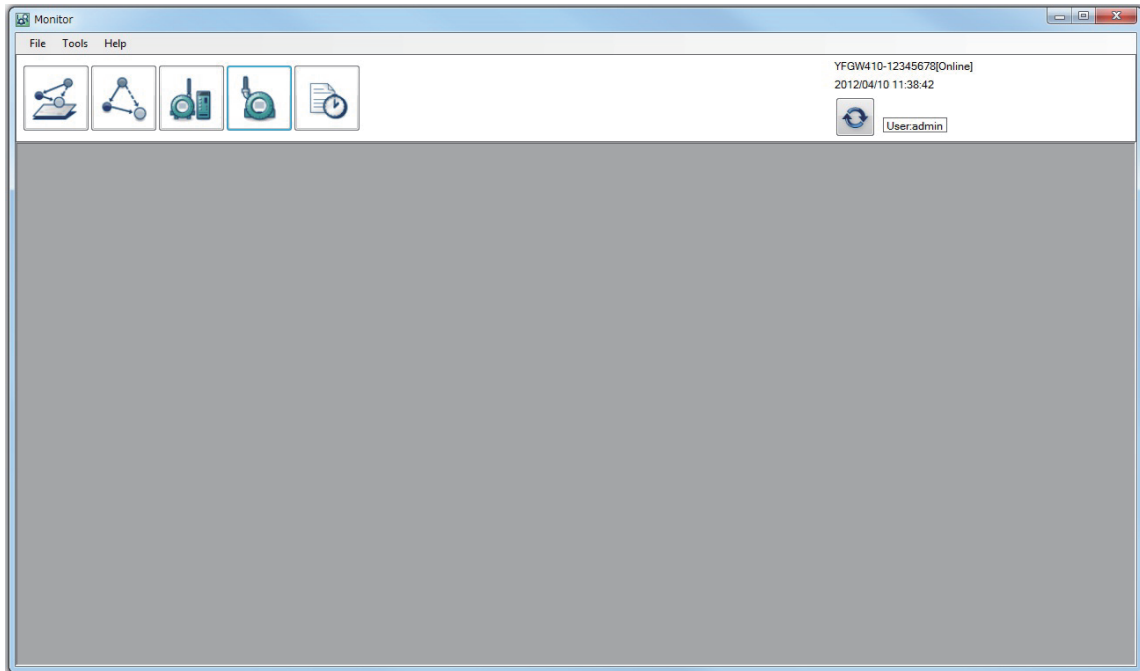
The operations of this window onwards are described in Chapter D4. Constructing a Field Wireless System, alongside the engineering details.

● Closing Configurator

To close Configurator, click the [x] button in the top right corner of the window, as shown in Figure D2-3. You can also close Configurator by clicking the [File] menu in the top left of the window and selecting [Exit], as shown in Figure D2-3. For details of operation, see Sub-section D4.2.11 Other Setting Operations.

● Launching Monitor

In the Field Wireless Management Console launch window, click the [Monitor] button to go to the Login window, then enter a User Name and Password. After you have successfully logged in, the following window is displayed. For the types of user authority and operable functions for each type, see “Logging in” for details.



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Figure D2-4 Monitor launch window

When Monitor starts, information managed by YFGW410 is automatically refreshed every minute.



IMPORTANT

If YFGW410 is unable to acquire the information when the window is updated due to causes such as a communication error, the following error is displayed in a dialog: “Communication Error: Failed to send or receive data”. In such case, check the following items:

- The RDY LED on YFGW410 is green.
- YFGW410 is connected to the PC.
- The IP address of the PC is permitted in access control. For information on access control, see Sub-section D4.2.1 YFGW410 Settings.

The operations of this window onwards are described in Chapter D5. Starting up the Field Wireless System, alongside the engineering details.

● Closing Monitor

To close Monitor, click the [x] button in the top right corner of the window, as shown in Figure D2-4. You can also close Monitor by clicking the [File] menu in the top left of the window and selecting [Exit], as shown in Figure D2-4. For details, see Sub-section D5.2.8 Functions Called from the Menu Bar.

D3. Provisioning

■ Task of Provisioning

Provisioning is a task to set the security and network information necessary for the field wireless devices to join the field wireless network. YFGW410 supports multiple provisioning methods and you can choose the suitable method depending on your requirement for security and convenience. Devices that are not provisioned or devices for which incorrect information is set cannot join the field wireless network.

● Parameters set by Provisioning

Provisioning sets the device tag, network ID, and join key of the field wireless device:

- Device Tag

A name assigned to the field wireless device for identifying the device. Set a name that is unique on the field wireless network.

- Network ID

The identifier of the field wireless network to which the field wireless device joins. Set a decimal value from 2 to 65535.

- Join Key

The Join Key is a 128-bit encryption key used for secure joining of the field wireless device. It is automatically generated by the provisioning.

● Provisioning methods supported by YFGW410

- OOB provisioning (Provisioning via infrared communication)

You can perform the provisioning to the field wireless device which supports infrared communication by using FieldMate.

FieldMate supports both OOB provisioning methods of "Uses a provisioning information file" and "Does not use a provisioning information file".

- OTA provisioning (Provisioning via wireless communication)

You can perform the provisioning to the field wireless device which only supports IS100.11a wireless communication.

■ Feature of each provisioning methods

By considering the tradeoff among cost, convenience and risk, chose the provisioning method suitable for your security policy.

● Guideline for choosing a provisioning method

- If a field wireless device has an infrared communication port, use OOB provisioning standardized by ISA100 Wireless Compliance Institute (WCI).
- In general, use the method “Uses a provisioning information file”. In this method, the provisioning information of the device is utilized by downloading it to YFGW410.
- In the case of the target field wireless device does not located at the same place as YFGW410 and the file sharing is not easy, you can use the method “Does not use a provisioning information file”.
- Only when the target ISA100.11a Registered Device does not support infrared communication, we recommend you to use OTA provisioning.



IMPORTANT

By specifying the following items as ordering information, Yokogawa’s field wireless devices are shipped after performing OOB provisioning “Does not use a provisioning information file” at the factory and you can skip the provisioning task.

- Device Tag
- Network ID

The following table shows the feature of provisioning methods.

Item	Provisioning methods		
	OOB provisioning		OTA provisioning
	Uses a provisioning information file	Does not use a provisioning information file	
Tools for provisioning	FieldMate R2.03 or later	FieldMate R3.01 or later	Field Wireless Management Console
Field wireless gateway	YFGW410 YFGW710	YFGW410 R1.05 or later	YFGW410 R1.05 or later
Field wireless device	EJX-B Series of Differential Pressure / Pressure Transmitters YTA510 Temperature Transmitter YTMX580 Multi-Input Temperature Transmitter FN Series Field Wireless Module ISA100.11a Registered Devices which have infrared communication port (*1)		ISA100.11a Registered Devices which do not have infrared communication port (*1)
Provisioning information file	Needed	Not needed	Not needed
Security strength	High	High	Middle

Item		Provisioning methods		
		OOB provisioning		OTA provisioning
		Uses a provisioning information file	Does not use a provisioning information file	
Procedure of registering the device	(1) The work before registering the device	By using FieldMate, perform OOB provisioning “Uses a provisioning information file”, and export a provisioning information file.	By using FieldMate, perform OOB provisioning “Does not use a provisioning information file”.	By using Configurator, select the channel used for OTA provisioning.
	(2) Registering the device	By using Configurator, import the provisioning information file, and register the device.	By using Configurator, specify the device tag etc., and register the device.	
	(3) The work after registering the device	By using Monitor, confirm the join status of the device.		By using Monitor, enable provisioning network and perform OTA provisioning, then confirm the join status of the device.

*1 The field wireless devices passing the ISA100.11a conformance certification by ISA100 Wireless Compliance Institute. (WCI).

The procedure of registering the device varies depending on the provisioning method as follows:

● **OOB provisioning “Uses a provisioning information file”**

- (1) By using FieldMate, perform OOB provisioning “Uses a provisioning information file”, export the provisioning information file and set the device parameter of the device. Refer to the FieldMate User’s Manual (IM 01R01A01-01E) for detailed instructions.
- (2) By using Configurator, import the provisioning information file and register the device. Refer to “Registering from a provisioning file” of Sub-section D4.2.4 Field Wireless Networks for detailed instructions.
After registering the device, set data publication period and assign the data to Modbus registers. Then download configuration data.
- (3) By using Monitor, check that the device is connected to the network and that all the detailed information such as the communications quality is normal.

● **OOB provisioning “Does not use a provisioning information file”**

- (1) By using FieldMate, perform OOB provisioning “Does not use a provisioning information file” and set the device parameter of the device. Refer to the FieldMate User’s Manual (IM 01R01A01-01E) for detailed instructions.
- (2) By using Configurator, specify the device tag and register the device. Refer to “Registering device information” of Sub-section D4.2.4 Field Wireless Networks for detailed instructions.
After registering the device, set data publication period and assign the data to Modbus registers. Then download configuration data.
- (3) By using Monitor, check that the device is connected to the network and that all the detailed information such as the communications quality is normal.

- **OTA provisioning**

- (1) By using Configurator, select the channel for OTA provisioning.
Refer to “Channels for provisioning” of Sub-section D4.2.3 Hopping Patterns for detailed instructions.
- (2) By using Configurator, specify the device tag and register the device.
Refer to “Registering device information” of Sub-section D4.2.4 Field Wireless Networks for detailed instructions.
After registering the device, set data publication period and assign the data to Modbus registers. Then download configuration data.
- (3) By using Monitor, enable provisioning network and perform OTA provisioning.
Refer to Sub-section “OTA Provisioning Manager” of D5.2.8 Functions Called from the Menu Bar for detailed instructions.
After that, by using Monitor, check that the device is connected to the network and that all the detailed information such as the communications quality is normal.

**IMPORTANT**

When performing OTA provisioning, it is required to clear provisioning information of the field wireless device in advance. Use FieldMate R3.01 or later to clear provisioning information of Yokogawa’s field wireless device.

**IMPORTANT**

By performing “Update Join Key” operation, the field wireless devices performed OOB provisioning “Does not use a provisioning information file” will be the same status of the device performed OOB provisioning “Uses a provisioning information file”. Note that reset provisioning information of the device is required when the device will be connected to other gateways or different field wireless subnets.

D4. Constructing a Field Wireless System

This chapter describes the procedure to construct a Field Wireless System.

D4.1 Setting Operation Items

To construct a wireless network, use the Field Wireless Management Console to start the Configurator and configure the following settings.

Tree pane item names	Operation overview
■ YFGW410 Settings	Set the device tag of the YFGW410 and the Layer2 switch of the Field Wireless Backbone Network during YFGW410 redundant operation
• Interfaces	Set the IP addresses of the Field Wireless Backbone Network and maintenance interface, and set use of field networks and their IP Addresses, and set Field Serial communication
• Access Control Lists	Register connections to the Access Control List of the ports of the YFGW410
• Time Source	Select the time synchronization method of the system
■ Operation Mode	Select the operation mode of the wireless network
■ Hopping Patterns	Set the transmission channels used by the field wireless subnet
■ Field Wireless Networks	Define the Network ID, hopping patterns, and their descriptions for the field wireless subnet
• Network ID 100	Define the information of the field wireless subnet (when Network ID is 100), register the Field Wireless Access Point that form the network, and register field wireless devices
■ Graphic Editor	Configure the display of the wireless device arrangement visually as a floor plan
■ Alert Settings	Set the tolerances to determine parameters warnings related to the wireless conditions displayed by the Monitor of the Field Wireless Management Console
■ Sampling Settings	Set the parameters related to the update time, such as process values
■ Modbus Settings	Select the method of mapping to the Modbus register, such as process values, and mapping to the Input registers and Holding registers
■ Resource	Display the usage rate of the wireless band of each field wireless subnet

After configuring the settings for the field wireless network, download the settings to the YFGW410, YFGW510, and field wireless devices.

D4.2 Detail of Configuration

This section describes the setting operation items and the procedure to configure a field wireless network using the Configurator of the Field Wireless Management Console.

D4.2.1 YFGW410 Settings

■ Device tag and redundancy setting

In the initial window of the Configurator (Figure D2-3), set the YFGW410 Device Tag and whether to use the Layer2 switch with the Field Wireless Backbone Network (between the YFGW410 and YFGW510) when YFGW410 is set to redundant operation.

The character input restrictions for device tags and the factory default setting are shown below. When editing a device tag, obey these restrictions.

Item	Description	Input character restrictions	Default setting
Device Tag	Device Tag	Up to 16 characters of following types: half-byte uppercase alphanumeric characters, hyphens, and underscores	YFGW410

The [Enable Redundancy] check box indicates redundancy of the YFGW410. It determines and displays single or redundant operation based on the connection status of the cable for redundancy or terminator connected to the Synchronization connector of the YFGW410.

Item	Description	Status of YFGW410	Check box
Enable Redundancy	YFGW410 operation mode setting	Single operation	Check box cleared
		Redundant operation	Check box selected

In addition, the [Use external Layer2 switch for Field Wireless Backbone Interface] check box indicates the use of the Layer2 switch. The default setting is displayed according to the YFGW410 redundancy settings. When the Layer2 switch is used with the Field Wireless Backbone Network, always select the check box while observing the important points listed in Chapter A4. YFGW410 in High-Level Redundancy Configuration.

Settings for the [Use external Layer2 switch for Field Wireless Backbone Interface] check box

Status of YFGW410	Check box		
	Initial value	Actual configuration	
		Layer2 switch present	No Layer2 switch present (direct connection)
Single operation	Check box selected	Check box selection is ignored (cannot be changed)	
Redundant operation	Check box selected	Check box selected	Check box cleared



IMPORTANT

When the setting information of this window is edited, all backbone devices must be restarted when the setting information is downloaded.

■ Network Interface (when set for single operation)

When [Interfaces] is selected in the menu tree of the Configurator, the following four tabs are displayed in the main window: [Field Wireless Backbone], [Field Network 1], [Field Network 2], and [Field Network 3].

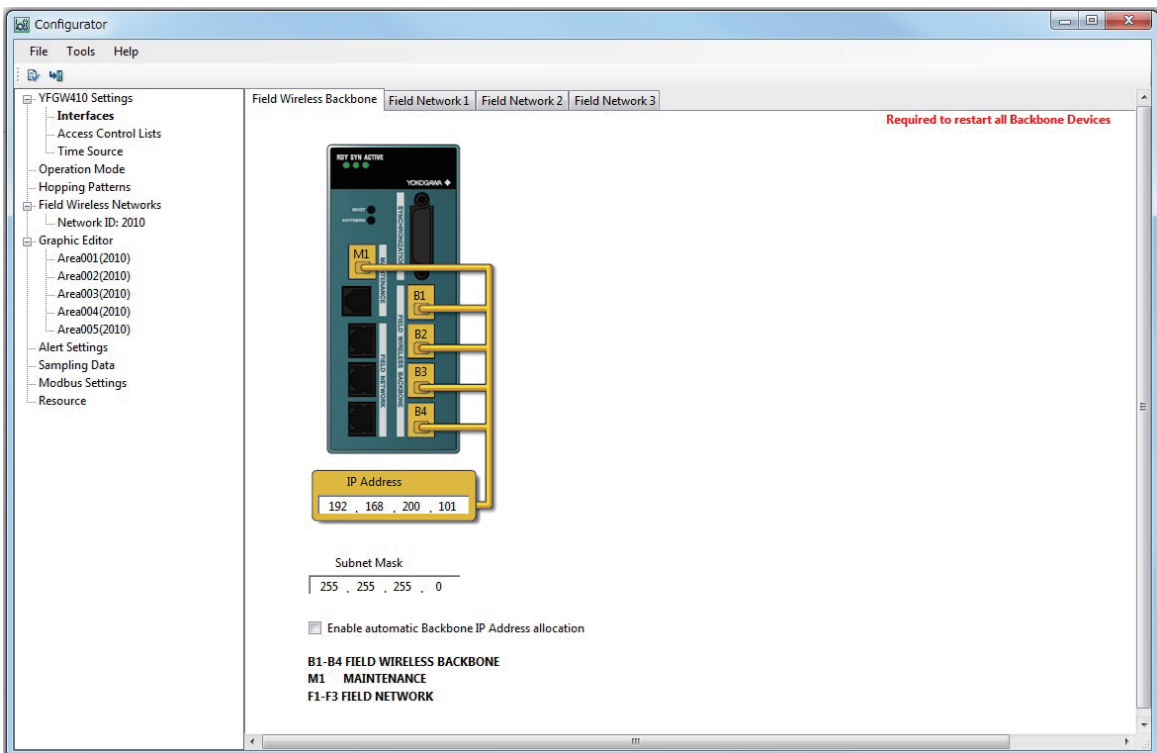


IMPORTANT

When the setting information of these tabs is edited, all backbone devices must be restarted when the setting information is downloaded.

● Field Wireless Backbone

When the YFGW410 is set for single operation and the [Field Wireless Backbone] tab is selected, the tab shown in Figure D4-1 appears in the main window.



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Figure D4-1 Field Wireless Backbone Setting Tab (for Single Operation)

At this tab, set the allocation method for the IP address and set the IP address and subnet mask settings of the Field Wireless Backbone Network in the YFGW410.

With the default setting, the [Enable Automatic Backbone IP Address allocation] check box is selected and the default settings shown below are automatically allocated.

To manually enter the [IP Address] and [Subnet Mask] settings, clear the [Enable Automatic Backbone IP Address allocation] check box.

Item	Description	Default setting
IP Address	IP address of Field Wireless Backbone Network	192.168.200.101
Subnet Mask	Subnet mask of Field Wireless Backbone Network	255.255.255.0

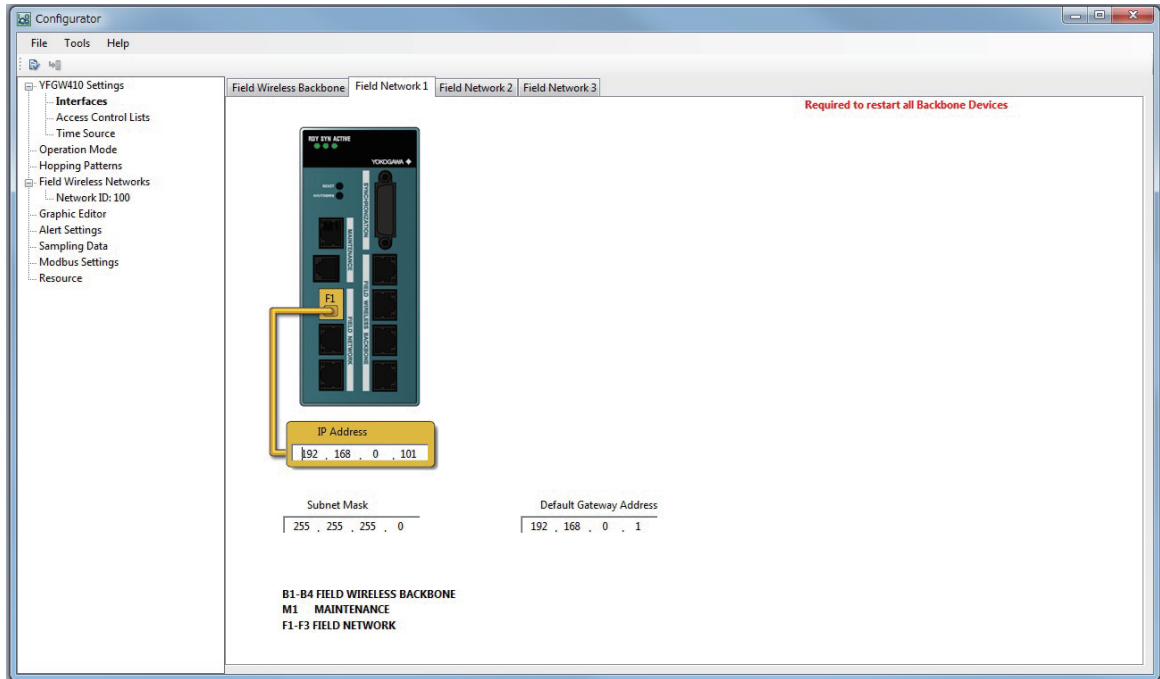


IMPORTANT

The following addresses are used internally by the YFGW410: the IP addresses shown in the chart above + 1. It is necessary to set IP Address settings such that there is no overlap with other devices.

● Field Network1

When the YFGW410 is set for single operation and the [Field Network1] tab is selected, the tab shown in Figure D4-2 appears in the main window.



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Figure D4-2 Field Network1 Setting Tab (for Single Operation)

The IP address, subnet mask, default gateway address of Field Network1 are configured here. The addresses of Field Network1 must always be set.

The [Default Gateway Address] specifies the IP address of the connection port for routers when they are connected and connecting to systems on different network segment (Plant Resource Manager(PRM), etc.) When a router is not used, we recommend setting the same address as the IP address.

Default settings are shown below. Make changes as necessary.

Item	Description	Default setting
IP Address	IP Address of Field Network1	192.168.0.101
Subnet Mask	Subnet mask of Field Network1	255.255.255.0
Default Gateway Address	Default gateway address of Field Network1	192.168.0.1



IMPORTANT

Always connect the host system to Field Network1.

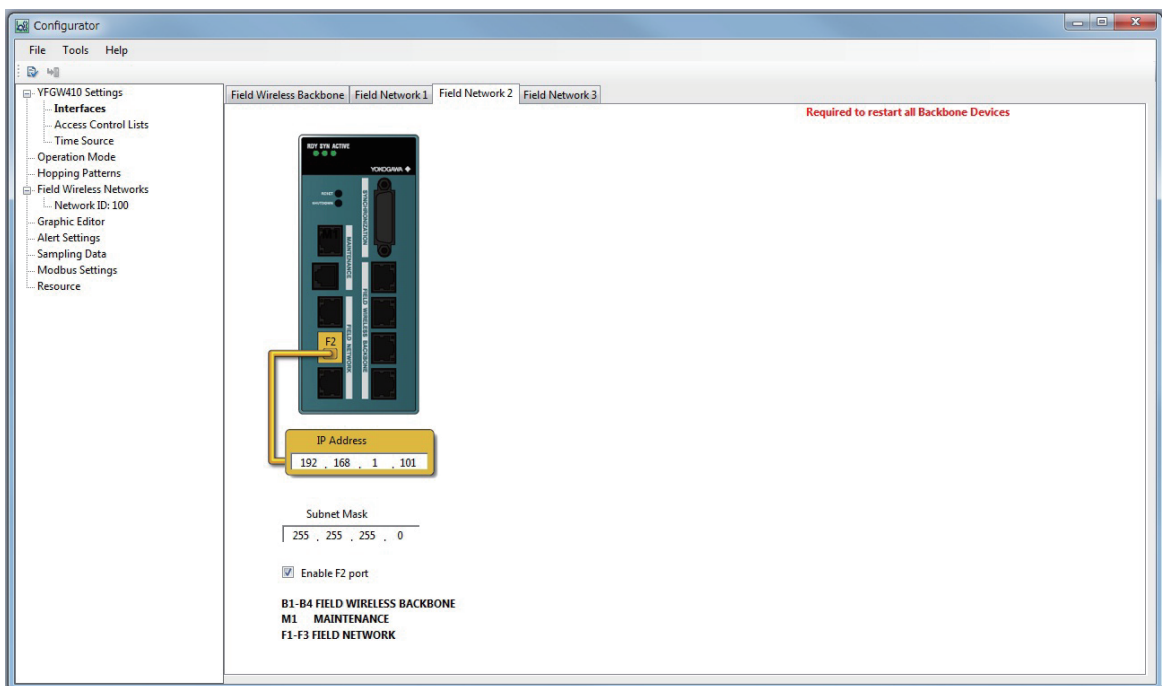
● Field Network2/3

When you are using only one network when connecting the YFGW410 to the host system, always connect to Field Network1.

When you must separate the network of the host system, use Field Network2, Field Network3, or both. To do so, in addition to the setting items for Field Network1, a setting to enable the relevant interface is added to the settings for Field Network2 and Field Network3.

This will be explained using Field Network2 as an example.

When the YFGW410 is set for single operation and the [Field Network2] tab is selected, the tab shown in Figure D4-3 appears in the main window.



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Figure D4-3 Field Network2 Setting Tab (for Single Operation)

At this tab, configure the [Enable F2 Port], [IP Address] and [Subnet Mask] settings.

When the [Enable F2 Port] check box is selected, the [IP Address] and [Subnet Mask] items can be configured.

Default settings are shown below. Make changes as necessary.

Item	Description	Default setting
Enable F2 Port	Enable Field Network2	Check box cleared (disabled)
IP Address	IP address of Field Network2	192.168.1.101
Subnet Mask	Subnet mask of Field Network2	255.255.255.0

When the YFGW410 is set for single operation and the [Field Network3] tab is selected, a window similar to Figure D4-3 appears.

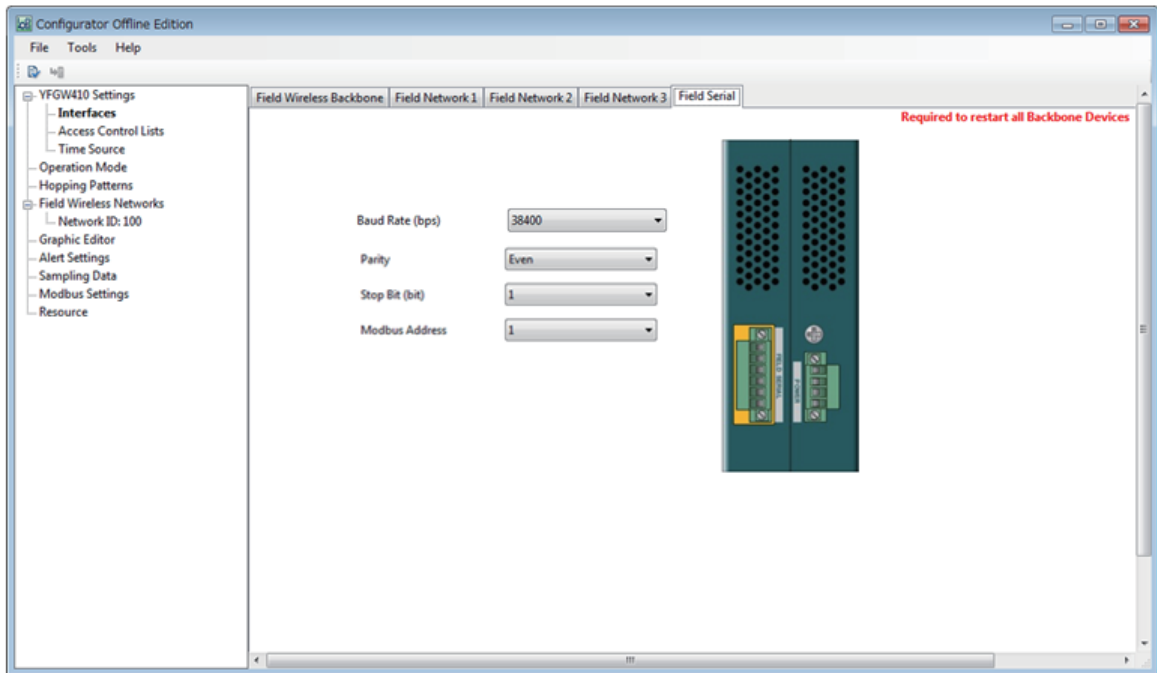
The settings are the same as those for Field Network2. Configure the settings as necessary. Default settings are shown below.

Item	Description	Default setting
Enable F3 Port	Enable Field Network3	Check box cleared (disabled)
IP Address	IP address of Field Network3	192.168.2.101
Subnet Mask	Subnet mask of Field Network3	255.255.255.0

● **Field Serial**

When you connect the host system that uses Modbus/RTU communication to the YFGW410 via the RS-485 connector on top of the main body, set the communication parameters by using [Field Serial] tab. For RS-485 wiring and configuration switches, see Section C4.4 Communication Cable Connection.

When [Field Serial] tab is selected, the tab shown in Figure D4-4 appears in the main window.



FD0404.ai

Figure D4-4 Field Serial Setting Tab

Possible and default value of Field Serial parameters are shown below. Make changes as necessary.

Item	Description	Possible setting (Default)
Baud Rate (bps)	Baud rate setting of RS-485 communication	9600, 19200, 38400 (38400)
Parity	Parity setting of RS-485 communication	None, Even, Odd (Even)
Stop Bit (bit)	Stop bit setting of RS-485 communication	1, 2 (1)
Modbus Address	Modbus/RTU address for YFGW410	1 to 254 (1)



IMPORTANT

Modbus/RTU supports to access up to 125 words at once. However, part of information may not be accessed through Modbus/RTU, because number of accessible words depended on a Modbus/RTU client. For details, see users' manual of the host system.

■ Network interface (when set for redundant operation)

When [Interfaces] is selected in the menu tree of the Configurator, the following four tabs are displayed in the main window: [Field Wireless Backbone], [Field Network 1], [Field Network 2], and [Field Network 3].

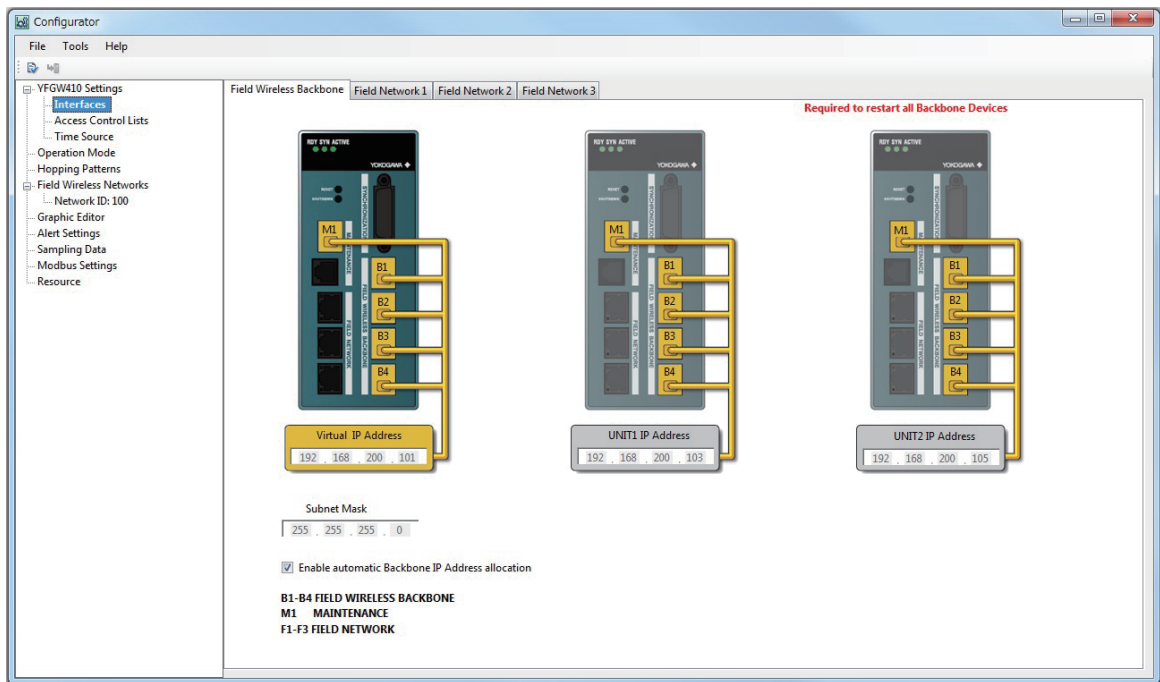


IMPORTANT

When the setting information of these tabs is edited, all backbone devices must be restarted when the setting information is downloaded.

● Field Wireless Backbone

When the YFGW410 is set for redundant operation and the [Field Wireless Backbone] tab is selected, the tab shown in Figure D4-5 appears in the main window.



FD0405.ai

Figure D4-5 Field Wireless Backbone Setting Tab (for Redundant Operation)

At this tab, select the acquisition method for the IP address of the Field Wireless Backbone Network in the YFGW410 and set the IP address and subnet mask settings.

With the default settings, the [Enable Automatic Backbone IP Address allocation] check box is selected and the default settings shown below are automatically allocated.

To manually enter the [IP Address] and [Subnet Mask] settings, clear the [Enable Automatic Backbone IP Address allocation] check box.

Item	Description	Default setting
Virtual IP Address	Virtual IP address of the Field Wireless Backbone Network used to access from the Field Wireless Access Point	192.168.200.101
UNIT1 IP Address	The IP Address of the Field Wireless Backbone Network of the YFGW410 connected to the UNIT1 connector of the cable for redundancy.	192.168.200.103
UNIT2 IP Address	The IP Address of the Field Wireless Backbone Network of the YFGW410 connected to the UNIT2 connector of the cable for redundancy.	192.168.200.105
Subnet Mask	Subnet mask of the Field Wireless Backbone Network	255.255.255.0

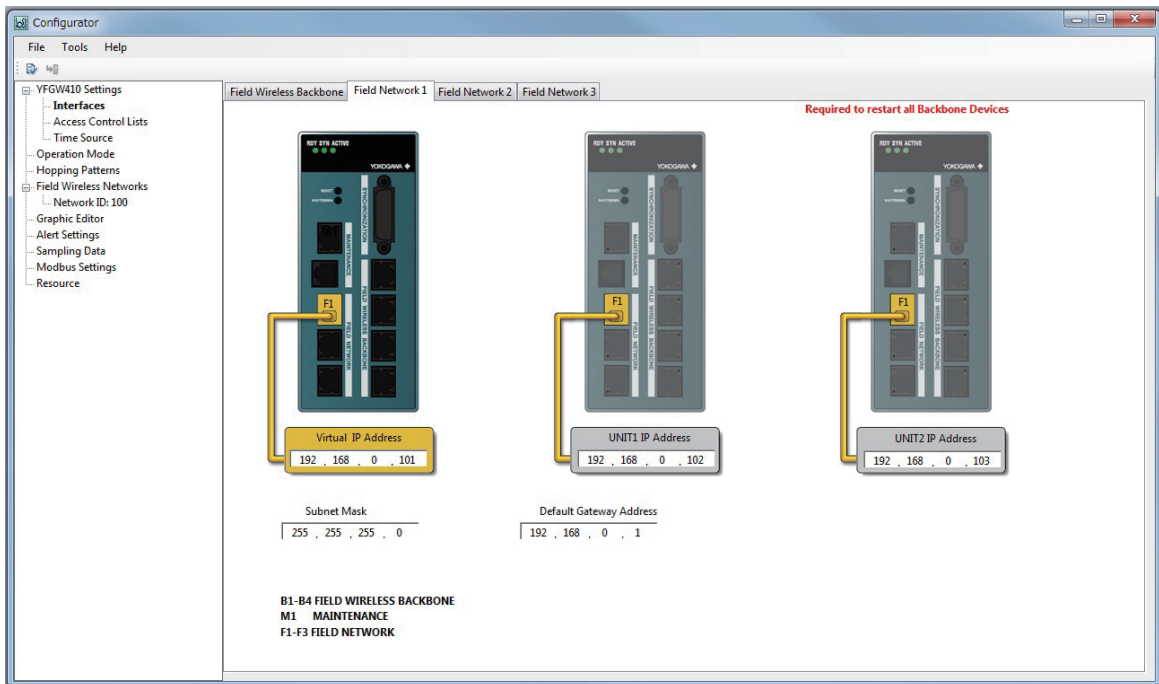


IMPORTANT

The following addresses are used internally by the YFGW410: UNIT1 IP Address +1 and UNIT2 IP Address +1. It is necessary to set IP Address settings such that there is no overlap with other devices.

● Field Network1

When the YFGW410 is set for redundant operation and the [Field Network1] tab is selected, the tab shown in Figure D4-6 appears at the main page.



FD0406.ai

Figure D4-6 Field Network1 Setting Tab (for Redundant Operation)

The IP address, subnet mask, default gateway address of Field Network1 are configured here. The [Default Gateway Address] specifies the IP address for routers when they are connected and connecting to systems on different network segment (Plant Resource Manager(PRM), etc.) When a router is not used, we recommend setting the same address as the [Virtual IP Address]. Default settings are shown below. Make changes as necessary.

Item	Description	Default setting
Virtual IP Address	Virtual IP address of Field Network 1 connecting from the host system	192.168.0.101
UNIT1 IP Address	The IP Address of Field Network1 of the YFGW410 connected to the UNIT1 connector of the cable for redundancy.	192.168.0.102
UNIT2 IP Address	The IP Address of Field Network1 of the YFGW410 connected to the UNIT2 connector of the cable for redundancy.	192.168.0.103
Subnet Mask	Subnet mask of Field Network1	255.255.255.0
Default Gateway Address	Default gateway address of Field Network1	192.168.0.1

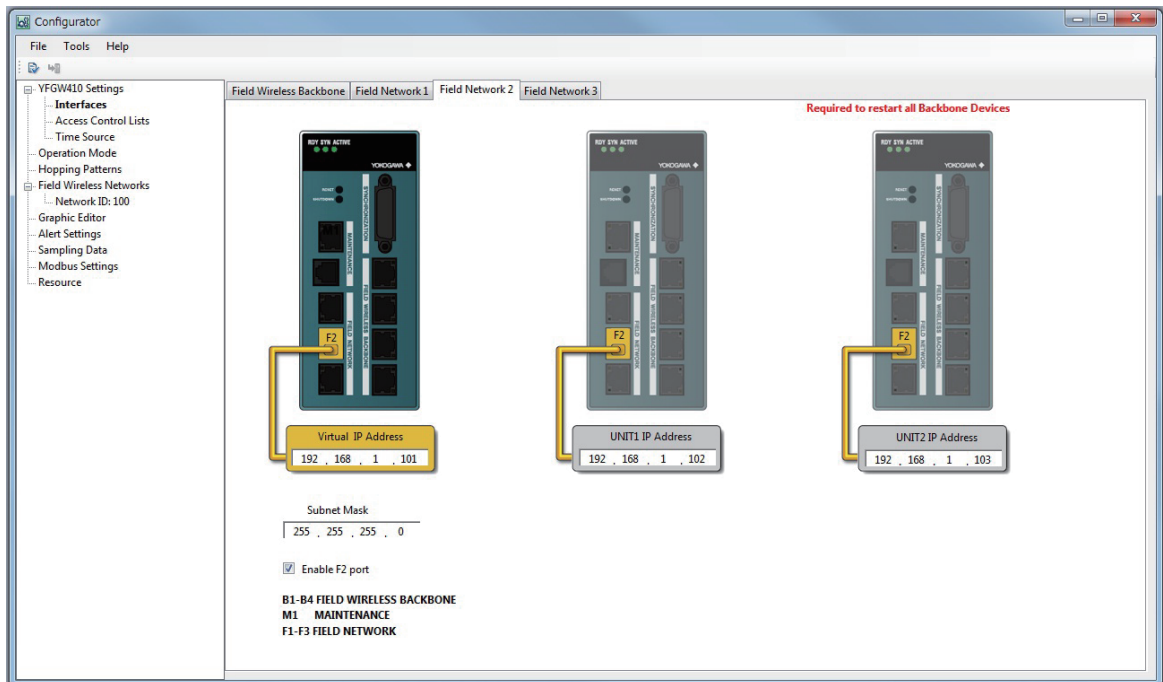


IMPORTANT

Always connect the host system to Field Network1.

● **Field Network2/3**

When the YFGW410 is set for redundant operation and the [Field Network2] tab is selected, the tab shown in Figure D4-7 appears at the main page.



FD0407.ai

Figure D4-7 Field Network2 Setting Tab (for Redundant Operation)

At this tab, configure the [Enable F2 Port], [IP Address] and [Subnet Mask] settings.

When the [Enable F2 Port] check box is selected, the [IP Address] and [Subnet Mask] items can be configured.

Default settings are shown below. Make changes as necessary.

Item	Description	Default setting
Enable F2 Port	Enable Field Network2	Check box cleared (disabled)
Virtual IP Address	Virtual IP address of Field Network 2 connecting from the host system	192.168.1.101
UNIT1 IP Address	The IP Address of Field Network2 of the YFGW410 connected to the UNIT1 connector of the cable for redundancy.	192.168.1.102 (Used internally)
UNIT2 IP Address	The IP Address of Field Network2 of the YFGW410 connected to the UNIT2 connector of the cable for redundancy.	192.168.1.103 (Used internally)
Subnet Mask	Subnet mask of Field Network2	255.255.255.0

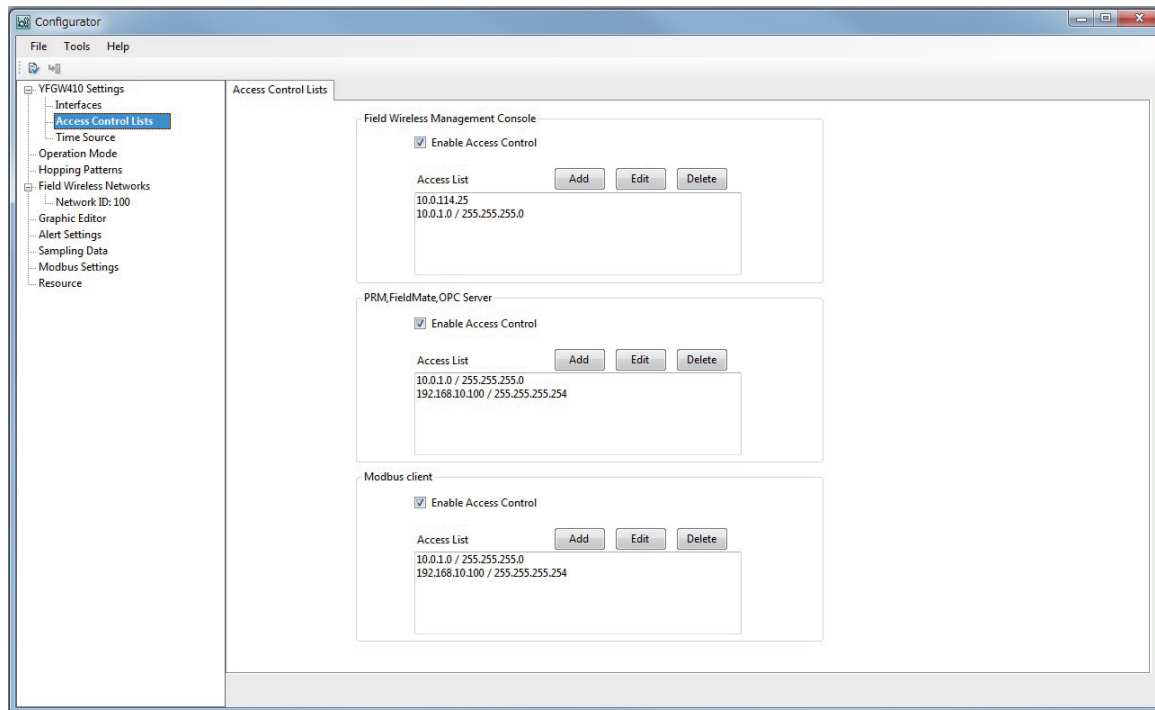
When the YFGW410 is set for redundant operation and the [Field Network3] tab is selected, a window similar to Figure D4-7 appears.

The settings are the same as those for Field Network2. Configure the settings as necessary. Default settings are shown below.

Item	Description	Default setting
Enable F3 Port	Enable Field Network3	Check box cleared (disabled)
Virtual IP Address	Virtual IP address of Field Network 3 connecting from the host system	192.168.2.101
UNIT1 IP Address	The IP Address of Field Network3 of the YFGW410 connected to the UNIT1 connector of the cable for redundancy.	192.168.2.102 (Used internally)
UNIT2 IP Address	The IP Address of Field Network3 of the YFGW410 connected to the UNIT2 connector of the cable for redundancy.	192.168.2.103 (Used internally)
Subnet Mask	Subnet mask of Field Network3	255.255.255.0

■ Access Control Lists

When [Access Control Lists] is clicked in the menu tree of the Configurator, the tab shown in Figure D4-8 opens in the main window.



FD0408.ai

Figure D4-8 Access Control List Tab

In the access control list, IP address and subnet mask information of host systems (PCs running applications, recording instruments, DCS I/O cards, etc.) that are permitted to access the YFGW410 can be registered and restrictions can be set for access to the YFGW410 by unregistered host systems or PCs.

In the [Field Wireless Management Console] section, register the information of PCs running the Field Wireless Management Console. In the [PRM,FieldMate,OPC Server] section, register host systems that transmit using the ISA100.11a protocol. In the [Modbus client] section, register host systems transmitting using the Modbus/TCP protocol.

Each section has 2 settings: the [Enable Access Control] check box to enable access control, and the [Access List] to register the addresses.

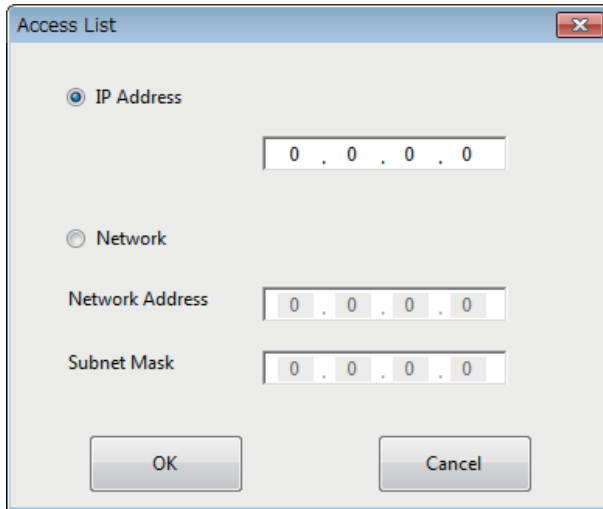
The access control list of Configurator will be explained as an example.

With the default settings, the [Enable Access Control] check box is cleared. When the check box is selected, the access control list function is enabled and the [Add], [Edit], and [Delete] buttons are available.

The access control list displays the information of registered hosts and other networks.

Button name	Function
Add	Add new items. The window shown in Figure D4-9 appears.
Edit	Edit the selected items. The window shown in Figure D4-9 appears.
Delete	Delete the selected items.

When the [Add] button is clicked, the window shown in Figure D4-9 appears.



FD0409.ai

Figure D4-9 Access Control List Registration Window

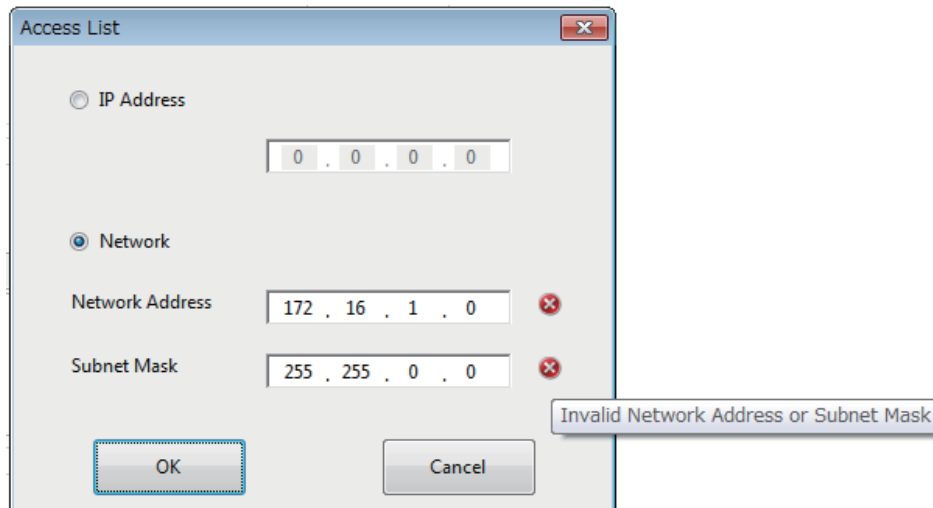
Two settings are available for the access control list setting: [IP Address] to configure the IP address, and [Network] to configure an individual network. In the window, select the button of the desired setting. The default setting is [IP Address].

When [IP Address] is selected, enter the IP address in the [IP Address] field.

When [Network] is selected, enter the network address in the [Network Address] field and enter the subnet mask in the [Subnet Mask] field.

The default setting for all items is [0.0.0.0].

Button name	Operation
OK	When there are no errors in the entered information, it is added to the access list in the window shown in Figure D4-8. If there is an input error, the location of the problem is indicated by an error icon and the content of the error is displayed to correct the problem. See Figure D4-10.
Cancel	No registration information is added and the window returns to the tab displayed in Figure D4-8.



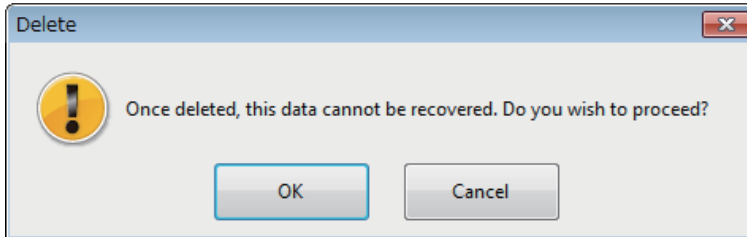
FD0410.ai

Figure D4-10 Error Display Window

When the [Edit] button is clicked, the information of the device selected in the access control list is displayed in the window shown in Figure D4-9. Make the necessary changes or corrections.

Button name	Operation
OK	If there are no errors in the information entered, the information in the access control list is changed. If there is an input error, the location of the problem is indicated by an error icon and the content of the error is displayed to correct the problem, as shown in Figure D4-10.
Cancel	The registration information is not changed and the window returns to the tab displayed in Figure D4-8.

When a setting to be deleted is selected in the access control list and the [Delete] button is clicked, the dialog shown in Figure D4-11 appears.



FD0411.ai

Figure D4-11 Deletion Confirmation Dialog

Button name	Operation
OK	The registration selected in the access control list is deleted.
Cancel	The registration information is not changed and the window returns to the tab displayed in Figure D4-8.

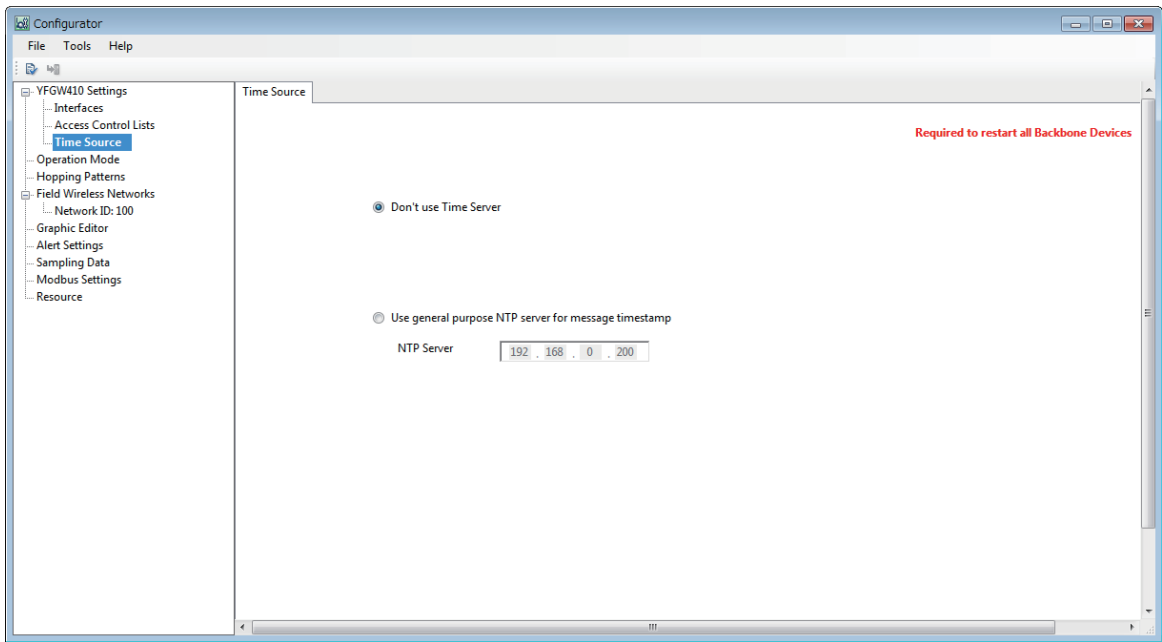
■ Time Source

Setting the time source that YFGW410 uses. Time Source is the time standard to notify the host system from the Field Wireless Management Console and YFGW410.

To synchronize the time of the YFGW410 and host system, acquire the time from a network time protocol (NTP) server that the host system uses. By synchronizing the time with the host system, you can handle data with time stamps.

Even if an NTP server is not used, the Field Wireless Network operates normally based on the time maintained by the YFGW410.

When [Time Source] is selected in the menu tree of the Configurator, the tab shown in Figure D4-12 appears in the main window.



FD0412.ai

Figure D4-12 Time Source Selection Tab

The default setting for the time source is [Don't Use Time Server]. To connect to an NTP server and synchronize time, select [Use general purpose NTP server for message timestamp]. When this option is selected, the IP address of the time server of the selected item can be entered manually. The default setting is the following address. IP Address: 192.168.0.200



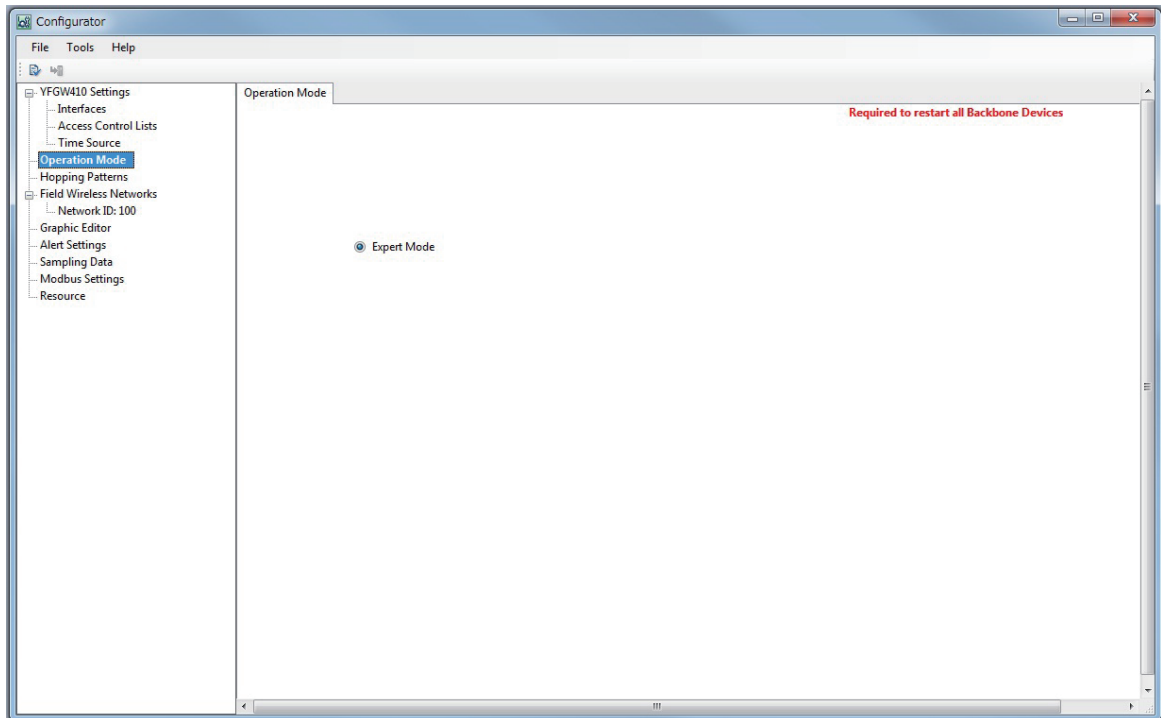
IMPORTANT

When the setting information of this tab is edited, YFGW410 must be restarted when the setting information is downloaded.

D4.2.2 Operation Mode

The Field Wireless System supports one operation mode (Expert Mode) only.

When [Operation Mode] is selected in the menu tree in the left pane of the Configurator, the tab shown in Figure D4-13 appears in the main window.



FD0413.ai

Figure D4-13 Operation Mode Tab

At this tab, [Expert Mode] is selected. No operations can be performed at this tab.

D4.2.3 Hopping Patterns

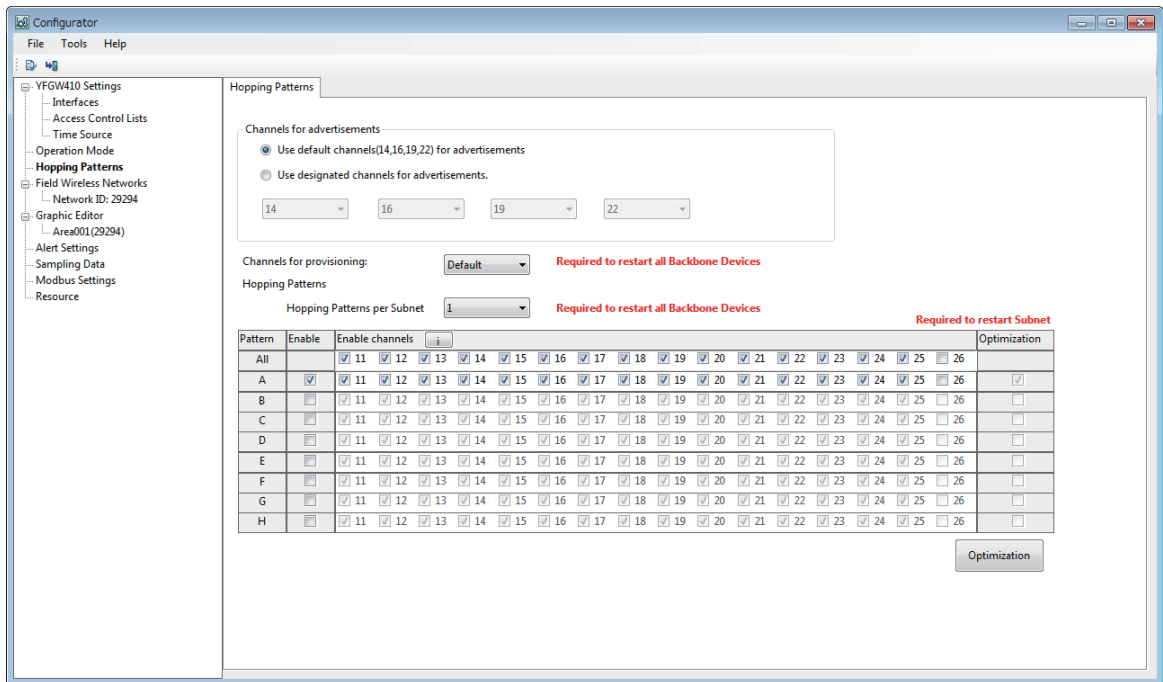
Field Wireless System uses the frequencies of 16 channels in the range of 2.4000 to 2.4835 GHz as prescribed by IEEE802.15.4.

In order to coexist with other types of wireless systems using the same 2.4 GHz band, field wireless devices change wireless channels according to a prescribed order while transmitting.

This wireless channel order is called a hopping pattern.

When a Field Wireless System is comprised of several field wireless subnet and the wireless frequencies overlap, changing the hopping pattern and preventing interference in the transmissions of field wireless subnets provides stable transmission.

When [Hopping Patterns] is selected in the menu tree in the left pane of the Configurator, the tab shown in Figure D4-14 appears in the main window.



FD0414.ai

Figure D4-14 Hopping Pattern Setting Tab

At the bottom of the main window, select the wireless channels to be used to automatically generate a hopping pattern. At the top of the main window, configure the [Channels for advertisements] setting.

Channels for advertisements are wireless channels to add the new wireless devices to the field wireless network.

Generally, the default channels do not need to be changed.

■ Channels for advertisements

Set the channels for advertising transmission. The default setting is [Use default channels (14, 16, 19, 22) for advertisements]. In most cases, use the default setting.

If it is necessary to change to other transmission channels, select [Use designated channels for advertisements], and then select the channels in the drop-down boxes below. Before making changes, consult our service or sales representative.

■ Channels for provisioning

Select the channel used for OTA provisioning from the following three values.

Value	Description
Default	Uses channel 15, 20 and 25 as the channels for provisioning. Those channels are also shared with the process data communication. (default)
15	Uses channel 15 as the dedicated channel for provisioning.
25	Uses channel 25 as the dedicated channel for provisioning.

■ Hopping Patterns

● Hopping Patterns per Subnet

Select how many Hopping Patterns are used in one field wireless subnet.

If many field wireless subnets are used and each subnet is a simple network, select 1. If a few field wireless subnets are used and each subnet is a complex network, select 4.

Configuration	Hopping Patterns	Field wireless subnets	Note
1	Max. 8	Max. 20	default
4	Max. 2	Max. 5	*1, *2

*1 If selecting 1 Hopping Pattern, more than 10 Enable Channels are required.

*2 If selecting 2 Hopping Patterns, more than 15 Enable Channels are required, and all Enable Channels should be same for each Hopping Pattern.



IMPORTANT

When the setting information of this tab is edited, YFGW410 must be restarted when the setting information is downloaded.

● Hopping Pattern Table Items

Pattern: Hopping pattern name

Enable: Select the check box to enable the respective pattern

Enable channels: Select the check boxes to enable the wireless channels used by the respective pattern

Optimization: Select when optimization recalculation is required due to editing at this tab. When the [Optimization] button below the chart is clicked and the optimization calculation is successful, these check boxes are cleared.

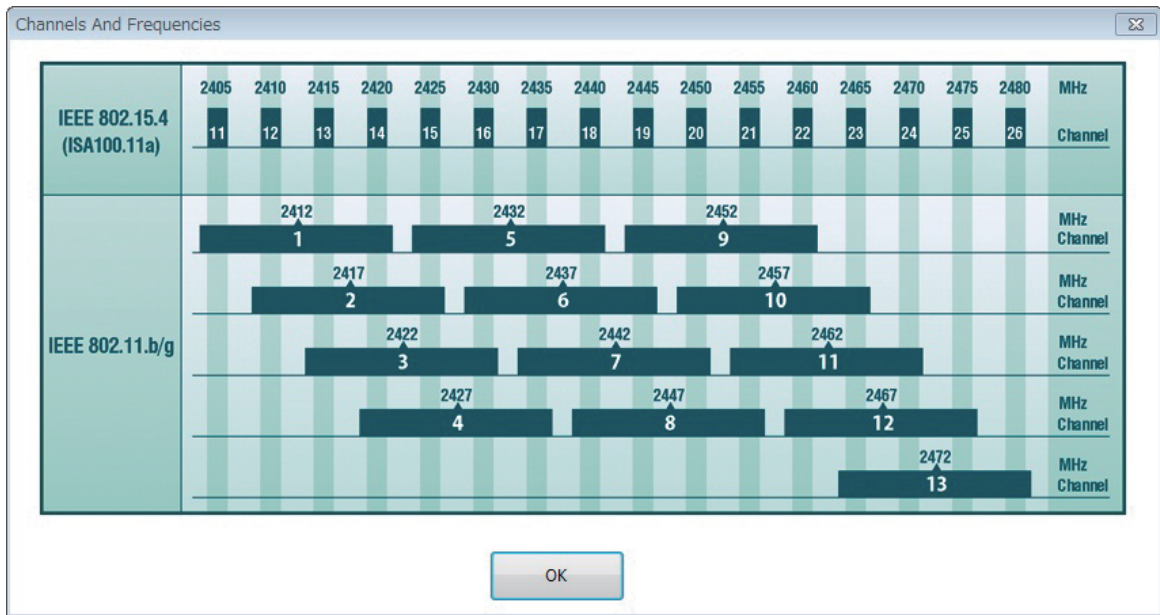


IMPORTANT

When an [Optimization] check box is selected, you cannot move away from this tab. Click the [Optimization] button to run the optimization calculation.

When the check boxes of wireless channels under [Enable channels] in the "All" pattern row are changed, the status of the wireless channel check boxes for A to H are changed in the same manner.

When the [i] button to the right of [Enable channels] is clicked, the image shown in Figure D4-15 appears. The image shows the relation of wireless LAN channels and frequencies with the highest possibility of interference with ISA100.11a field wireless.

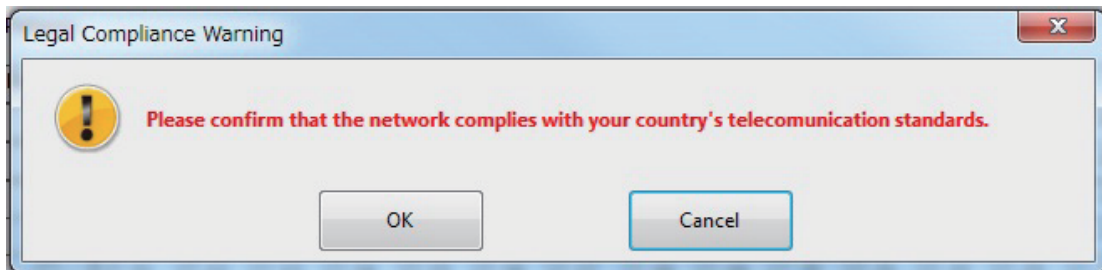


FD0415.ai

Figure D4-15 Field wireless channels and wireless LAN channels window

Usable wireless channels are regulated by national radio standards. With field wireless, 16 channels between 11 and 26 can be used. However, the default setting is FCC (US), which removes channel 26 because it cannot be used. The 15 channels between channel 11 and 25 that are permitted in most countries are selected. If there is a wireless channel that is not used because of additional national channel restrictions or the effects of interference with wireless LAN and other wireless transmissions cannot be tolerated, clear the check box of that channel.

After the hopping pattern settings have been configured and the [Optimization] button is clicked, a message appears asking the user to confirm that the frequencies used comply with local wireless standards.

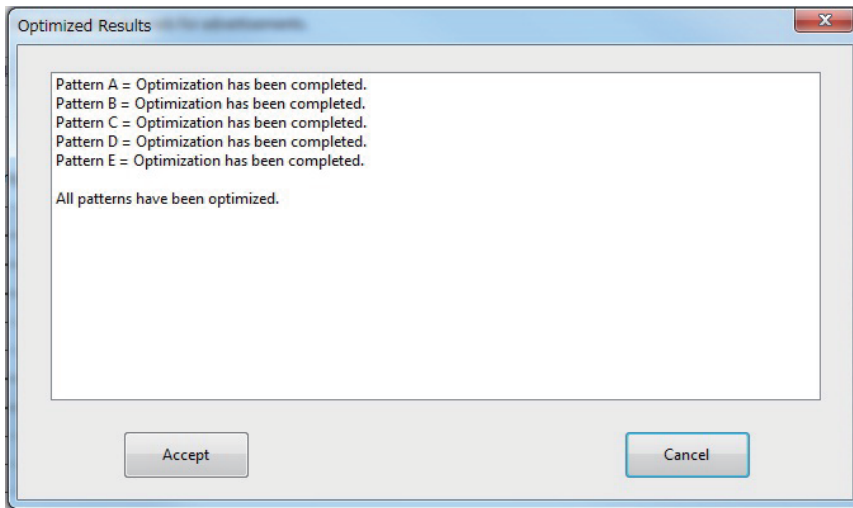


FD0416.ai

Figure D4-16 Frequency Use Confirmation Dialog

When the [OK] button is clicked, optimization calculation is performed for the hopping pattern. When the [Cancel] button is clicked, the window returns to the Hopping Pattern tab.

When the optimization calculation for the hopping pattern is complete, the window shown in Figure D4-17 appears.



FD0417.ai

Figure D4-17 Optimization Calculation Result Window

This window shows the results of optimization for each pattern and indicates whether all patterns were optimized successfully.

Button name	Operation
Accept	This button appears when all patterns were successfully optimized. When this button is clicked, the window switches from the Optimized results window to the Hopping Pattern tab, and the [Optimization] check boxes are cleared.
Cancel	When this button is clicked, the window switches from the Optimized results window to the Hopping Pattern tab.



IMPORTANT

When optimization has been completed and the patterns has been changed, a request to restart field wireless subnets using the changed hopping patterns is issued when setting information is downloaded.



IMPORTANT

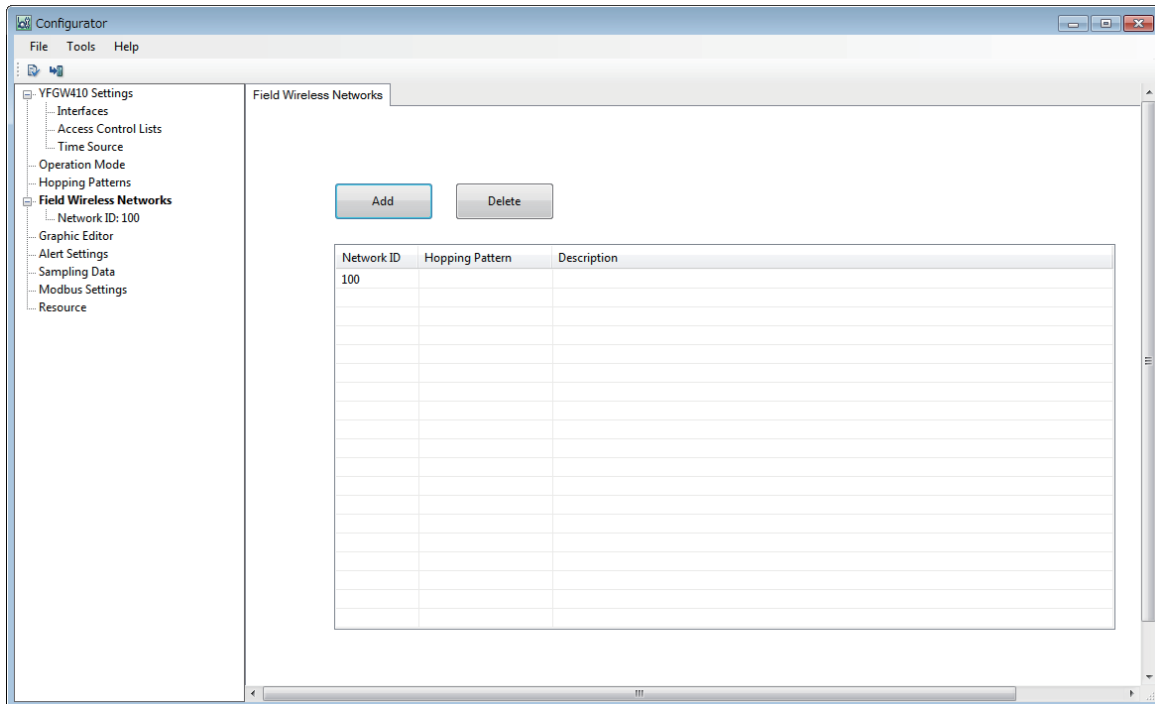
When an [Optimization] check box is selected, you cannot move away from this tab. Click the [Optimization] button to run the optimization calculation.

When optimization calculation was not successful, change the Hopping Pattern settings as follows.

- Decrease the types of hopping patterns.
- Select more [Enable channels] check boxes.

D4.2.4 Field Wireless Networks

When [Field Wireless Networks] is selected in the menu tree of the Configurator, the tab shown in Figure D4-18 appears in the main window.



FD0418.ai

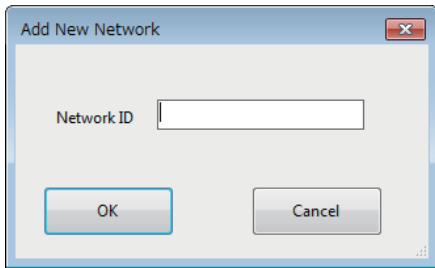
Figure D4-18 Field Wireless Network Setting Tab

At this tab, configure the settings of the field wireless subnets connected under the YFGW410. The default setting is to register a field wireless subnet with a Network ID of 100. When the network ID of the field wireless subnet is registered here, Network ID:100 (when the default setting is used) appears under [Field Wireless Networks] in the menu tree of the window.

Button name	Function
Add	When this button is clicked, the window shown in Figure D4-19 appears.
Delete	When a Network ID to be deleted is selected and this button is clicked, the dialog shown in Figure D4-20 appears.

- Add a field wireless subnet

When the [Add] button is clicked, the window shown in Figure D4-19 appears.



FD0419.ai

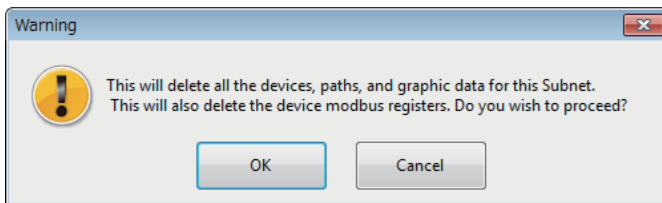
Figure D4-19 Add Field Wireless Subnet Window

When the [Network ID] field is entered and the [OK] button is clicked, it is added to the list in the main window and under [Field Wireless Networks] in the menu tree.

The Network ID setting range is a decimal number between 2 and 65535.

- Delete a field wireless subnet

When the [Delete] button in the main window is clicked, the dialog shown in Figure D4-20 appears.



FD0420.ai

Figure D4-20 Warning Dialog

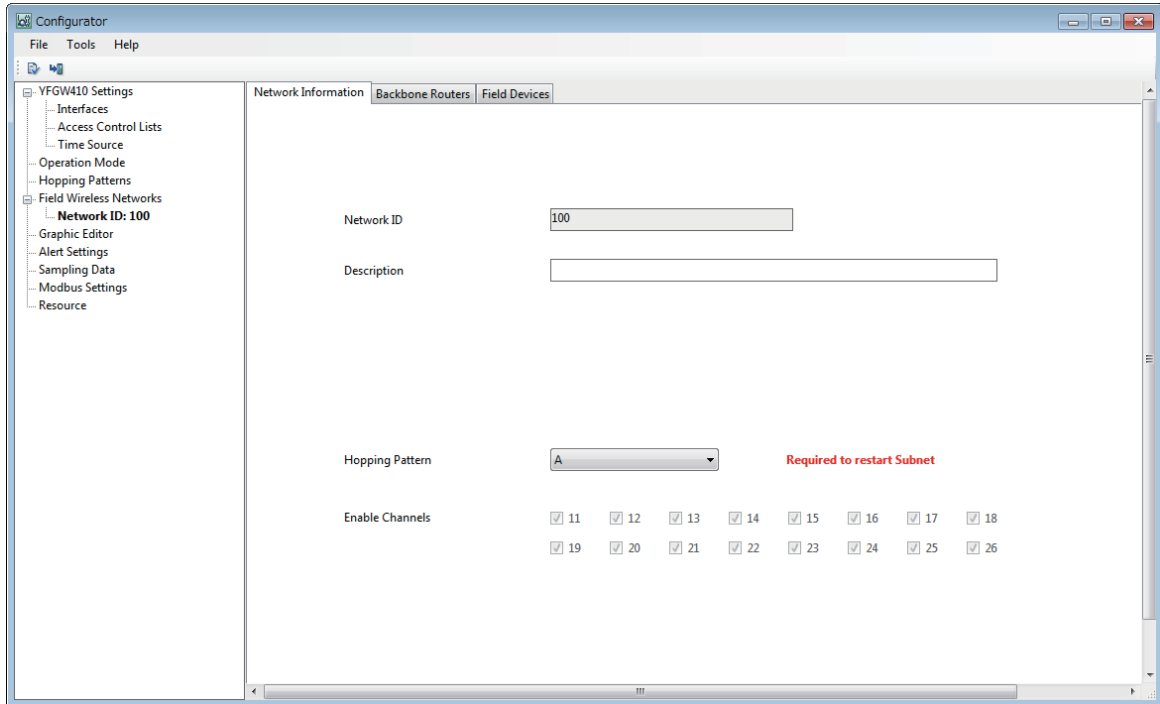
When the [OK] button in the dialog shown in Figure D4-20 is clicked, the respective network ID and all data related to this subnet are deleted.

■ Field Wireless Subnet Settings (Network ID:100)

When [Network ID:100] (when the default Network ID setting) is selected under [Field Wireless Networks] in the menu tree of the Configurator, the [Network Information], [Backbone Routers], and [Field Devices] tabs appear in the main window.

● Field Wireless Subnet Information (Network Information)

When the [Network Information] tab is selected, the tab shown in Figure D4-21 appears.



FD0421.ai

Figure D4-21 Network Information Tab

At this tab, select the hopping pattern for the Field Wireless Subnet and configure the network.

Item	Description	Default setting
Network ID	The ID of the field wireless subnet configured is automatically displayed.	Automatic setting
Description	Lists a description of the network.	Blank
Hopping Pattern	Select the hopping pattern appropriate for the respective field wireless subnet from the drop-down box. The drop-down box displays the names of optimized selectable hopping patterns.	Blank
Enable Channels	When a hopping pattern is selected, the wireless channels specified for this pattern are automatically displayed.	Blank

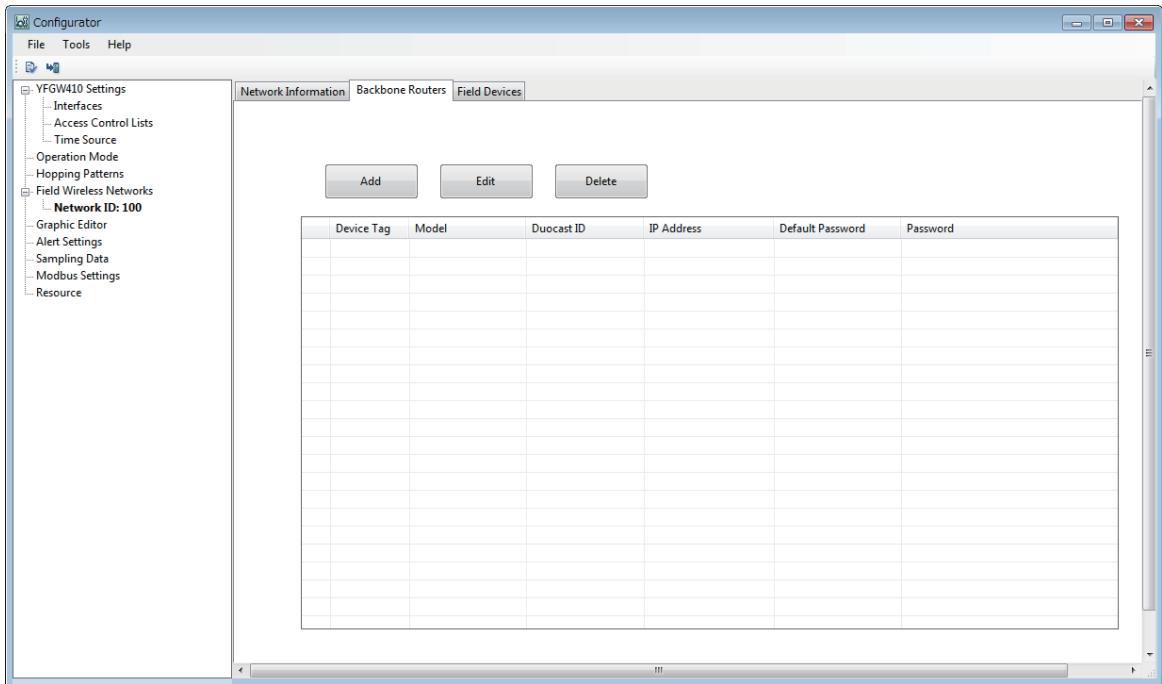


IMPORTANT

When the hopping pattern is selected or changed, a request to restart the respective field wireless subnet is issued when the setting information is downloaded.

● Backbone Routers

When the [Backbone Routers] tab is selected, the tab displayed in Figure D4-22 appears.



FD0422.ai

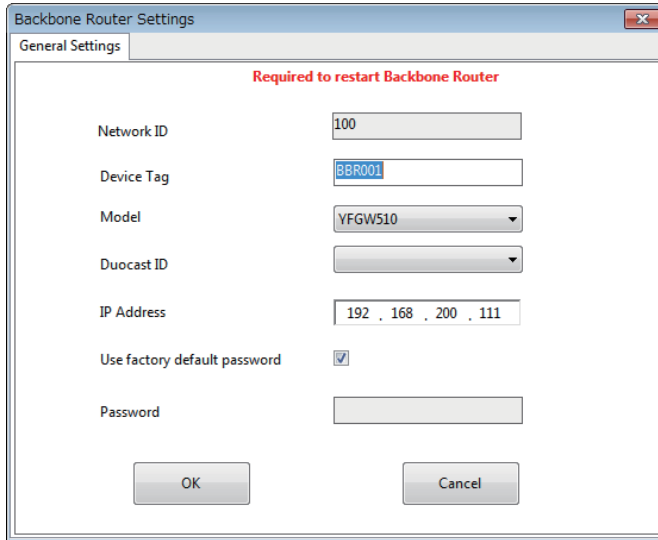
Figure D4-22 Backbone Router Tab (Initial Condition)

At this tab, register Field Wireless Access Point that comprise the field wireless subnet.

Button functions

Button name	Function
Add	Add YFGW510. The window shown in Figure D4-23 appears.
Edit	Edit registered information of selected YFGW510. The window shown in Figure D4-23 appears.
Delete	Delete selected YFGW510.

○ When the [Add] button is clicked, the window shown in Figure D4-23 appears.



FD0423.ai

Figure D4-23 Backbone Router Settings Window

Item	Description	Default setting
Network ID	Automatically displays the ID of the field wireless subnet.	Automatic setting
Device Tag	Enter the Device Tag configured by the field wireless access point setup tool. To change from an automatically allocated device tag, enter the information manually.	Allocated in ascending order from BBR001
Model	Select the model type of the Field Wireless Access Point. Currently, the only setting is YFGW510.	YFGW510
Duocast ID	When the Field Wireless Access Point is set for redundancy, and the field wireless device is connected by Duocast, select the same ID as the pairing Field Wireless Access Point. The following selections can be made: blank, A to H When the Duocast function is not used, leave this setting blank. When the Duocast ID has already been configured to a Field Wireless Access Point, the setting is displayed in the following format: Duocast ID:device tag. (Ex. A:BBR001). When the Duocast ID has already been configured to 2 Field Wireless Access Point, the setting is displayed in the following format: [Duocast ID]: Reserved. (Ex. A:Reserved)	Blank
IP Address	Enter the IP address of the Field Wireless Access Point. When automatic allocation of the IP address was selected using the setting at the [Field Wireless Backbone] window after selecting [YFGW410 Settings] and [Interfaces], the displayed IP address cannot be changed.	Automatically allocated in ascending order from 192.168.200.111
Use Factory Default Password	Configure whether to use the factory default password. It must be the same as that set by the field wireless access point setup tool. When this check box is selected, the default setting is used. The factory default for the Field Wireless Access Point setting is to have the check box selected.	Check box selected
Password	When the factory default password is not used, enter the password manually. It must be the same as that set by the field wireless access point setup tool. The following characters can be used: half-byte numbers and half-byte alphabetic characters from A to F (uppercase and lowercase characters are distinguished).	Blank

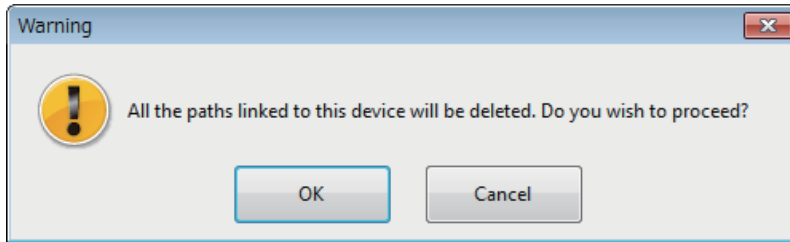
Duocast is a method for a field wireless device to transmit the same data to a paired Field Wireless Access Point to make the transmission path of a field wireless network including a Field Wireless Access Point redundant. When setting the path of the field wireless device, always set the Field Wireless Access Point with the same Duocast ID as the 2 paths.

After the settings and changes are complete and the [OK] button is clicked, the information of the Backbone Router Settings window is added to the setting chart of the main window. When the [Cancel] button is clicked, the information at the Backbone Router Settings window is discarded.

- When the row of the device at the backbone routers tab is selected and the [Edit] button is clicked, the registration information of the selected device appears on the window shown in Figure D4-24.

When the settings and changes are complete and the [OK] button is clicked, the information of the relevant Field Wireless Access Point is changed and the changes are reflected in the setting list chart of the main window. When the [Cancel] button is clicked, the changes are discarded and the setting information of the registered Field Wireless Access Point is not changed.

- When the row of the device at the backbone routers tab is selected and the [Delete] button is clicked, Figure D4-24 appears.



FD0424.ai

Figure D4-24 Deletion Confirmation dialog

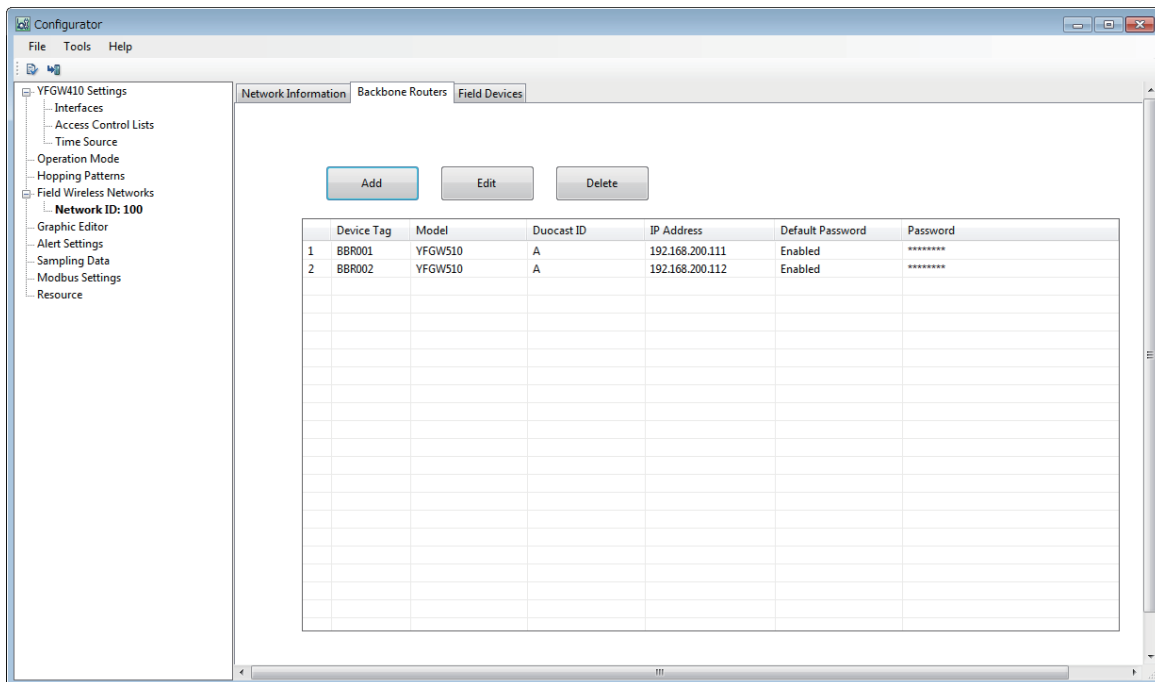
When the [OK] button is clicked, the all path information related to this device is deleted. When the [Cancel] button is clicked, no information is deleted and returns to the main window.



IMPORTANT

When a Field Wireless Access Point is added, changed, or deleted, a request to restart the relevant Field Wireless Access Point is issued when the setting information is downloaded.

In the example shown in Figure D4-25, 2 YFGW510s in the Network ID:100 field wireless subnet have a Duocast setting and are registered to use the default password.

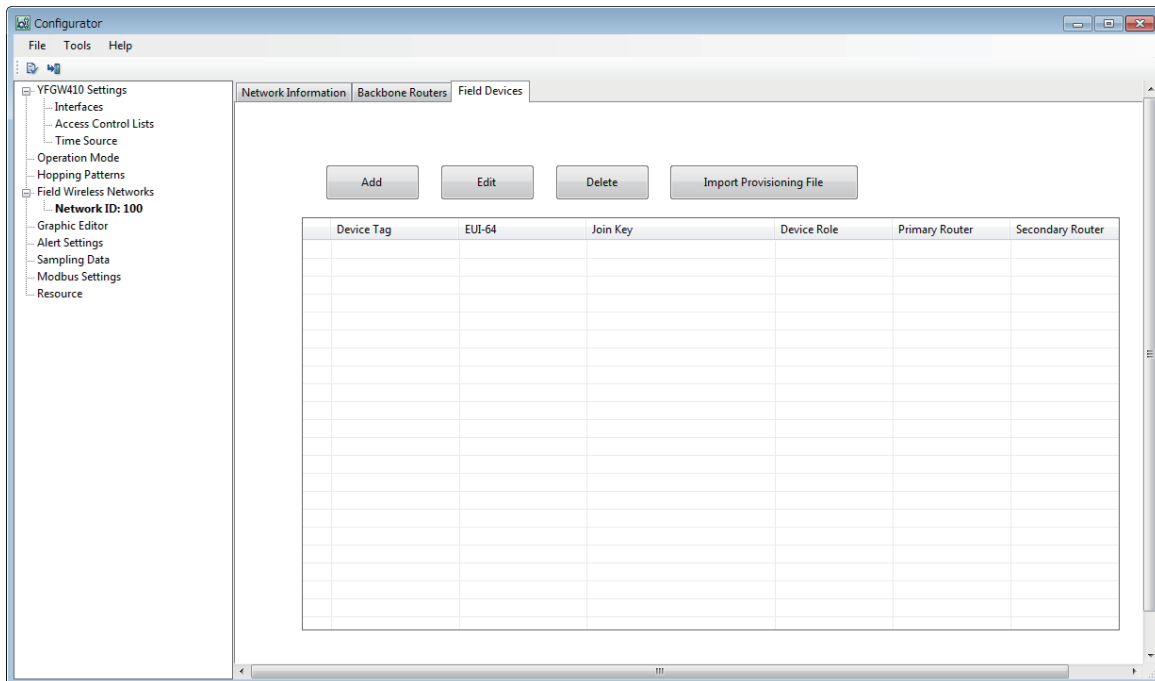


FD0425.ai

Figure D4-25 Backbone Routers Registration Example

● Field Devices

When the [Field Devices] tab is selected, the tab shown in Figure D4-26 appears. In the default status, the chart does not contain any registered items.



FD0426.ai

Figure D4-26 Field Devices Tab (Initial Condition)

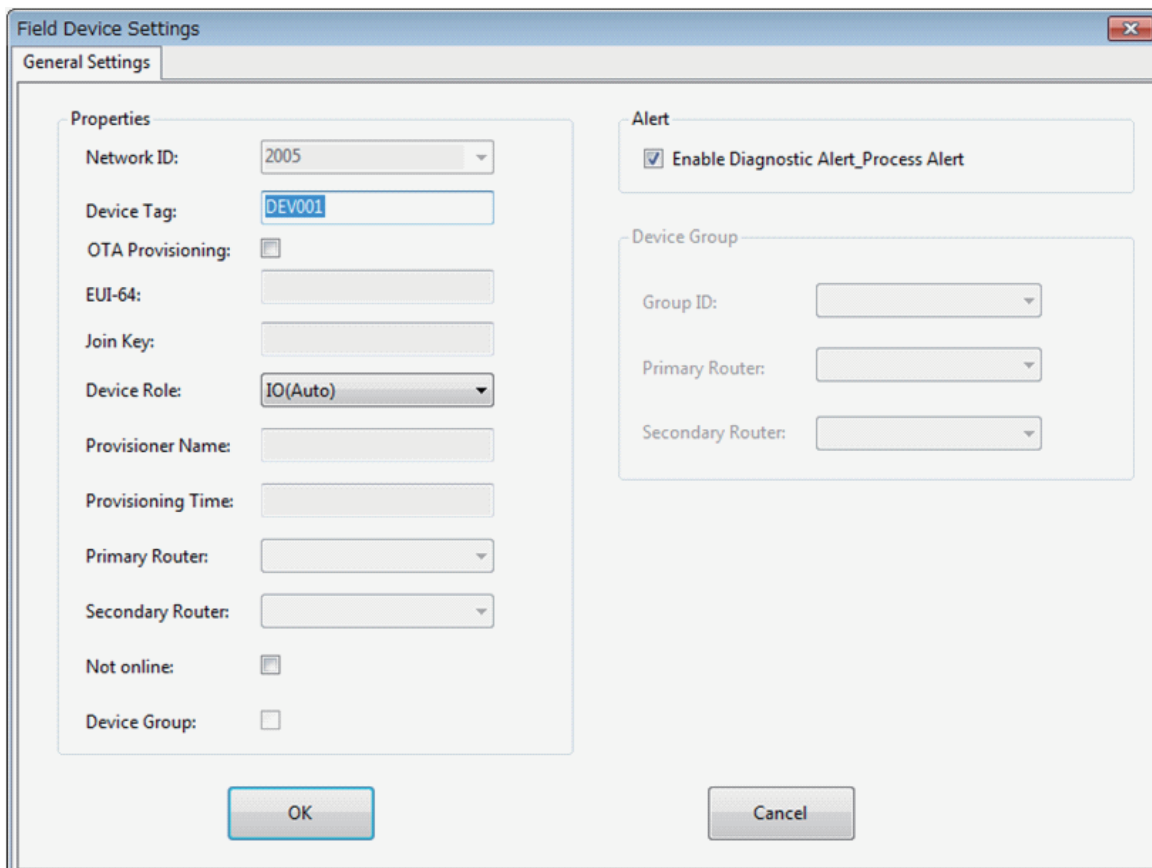
At this tab, register field wireless devices to be allocated under the field wireless backbone.

Button functions

Button name	Function
Add	When the device is provisioned by using OOB provisioning “Does not use a provisioning information file” or provisioned at the factory or provisioned via OTA provisioning, click this button to add the device.
Edit	When a field wireless device that requires additional or changed functions settings is selected and this button is clicked, the window shown in Figure D4-27 appears. Perform the necessary changes at this window. When the row of the selected device is double clicked, the same window appears.
Delete	When a registered field wireless device is selected and this button is clicked, the registration is deleted.
Import Provisioning file	When the device is provisioned by using OOB provisioning “Uses a provisioning information file”, click this button. Proceeds to the procedure to import the provisioning file created from the advance provisioning of devices as described in Chapter D1. Engineering Procedures to register field wireless devices.

○ Registering device information

When the [Add] button is clicked, the window shown in Figure D4-27 appears.



FD0427.ai

Figure D4-27 Field Device Registering Window

	Item	Description	Default setting
Properties	Network ID	Automatically display the ID of the field wireless subnet.	Automatic setting
	Device Tag	Display the device tag of the field wireless device set during provisioning.	DEV001
	OTA Provisioning	To let the device join to the field wireless network by using OTA provisioning, select the check box.	Check box cleared (Don't execute OTA provisioning)
	EUI-64	64-bit Extended Unique Identifier. Acquired during provisioning.	Blank
	Join Key	Transmission encryption key when joining a wireless network Automatically generated during provisioning.	Blank
	Device Role	Role of the field wireless device Select from (1) IO, (2) IO+Router, (3) Router, and (4) IO(Auto).	IO(Auto)
	Provisioner Name	Display the name of the Provisioner.	Blank
	Provisioning Time	Display the time of provisioning.	Blank
	Primary Router	The primary host device to connect to the device itself. Select from the candidate devices displayed in the drop-down box. When a YFGW510 is configured with a Duocast setting, the DuocastID is displayed in parentheses at the end of the device tag. Example) BBR001(A)	Blank
	Secondary Router	The secondary host device to connect to the device itself. Select from the candidate devices displayed in the drop-down box. The display when a YFGW510 is configured with a Duocast setting is the same as that of Primary Router.	Blank
	Not Online	Select whether to prevent the relevant device from joining (check box selected)	Check box cleared (Join)
Device Group	Group IO Devices that are planned to connect to the same host device (check box selected). When this check box is selected, the Device Group section on the right is available.	Check box cleared (Don't include in group)	
Alert	Enable alerts from the field wireless device (check box selected).	Check box selected (Send alerts)	
Device Group	Group ID	When the device is set to be included in a Device Group, select the group ID number from the drop-down box.	Blank
	Primary Router	When the device is set to be included in a Device Group, select the primary host device to connect to from the drop-down box. When another device is set with the same group ID, the host device is automatically entered.	Blank
	Secondary Router	When the device is set to be included in a Device Group, select the secondary host device to connect to from the drop-down box. When another device is set with the same group ID, the host device is automatically entered.	Blank

When the settings and changes are complete and the [OK] button is clicked, the information of the field device settings window is added to the setting list of the main window. When the [Cancel] button is clicked, the information of the setting window is discarded.

- Setting a role of the field wireless device

When it is necessary to set device roles and other functions from the setup plan, change the settings.

The types of field wireless devices are as follows.

- i. Field wireless device that only supports the routing function (parameter displayed as "Router")
- ii. Field wireless device that only supports the IO function (parameter displayed as "IO" or "IO(Auto)")
- iii. Field wireless device that supports both the routing and IO functions and is able to run either

**IMPORTANT**

A field wireless device that supports only the routing function is not available at the moment. Accordingly, when using the routing function, it is necessary to use a field wireless device in the category of iii. Yokogawa's FN, EJX, YTA510 and YTMX580 are field wireless devices in the category of iii. In some cases, third-party field wireless devices cannot be used as a routing device.

Devices that have IO, IO+Router, or Router roles are manually configured to connect host devices according to a wireless device allocation plan. The host type roles to which devices of each role can connect are IO+Router, Router, and Backbone Router (BBR).

In addition, devices with an IO(Auto) role are automatically set to the optimal connection destination at this time by the YFGW410 when joining the wireless network. Even in such cases, devices with a routing function (devices with a IO+Router or Router role) must have a host device manually selected and hopping limited to three times.

- Field Wireless Device Duocast Settings

When a field wireless device is configured with a Duocast setting, always set both paths of the field wireless device to a Field Wireless Access Point with the same DuocastID. If the Duocast IDs do not match, it does not operate.

Example) Correct Duocast setting

Primary Router: BBR001(A)

Secondary Router: BBR002(A)

Example) Incorrect Duocast setting

- a) The Duocast IDs of both paths do not match

Primary Router: BBR001(A)

Secondary Router: BBR002(B)

- b) A Duocast ID is not set for one of the paths

Primary Router: BBR001(A)

Secondary Router: BBR002

A field wireless device with an IO(Auto) role cannot connect to a Field Wireless Access Point configured with a Duocast setting. When using a field wireless device with an IO(Auto) role, always connect to a Field Wireless Access Point with a blank DuocastID field (there are no parentheses at the end of the device tag name)

**IMPORTANT**

Check the important points listed in G2. Field Wireless Networks before configuring the settings.

**IMPORTANT**

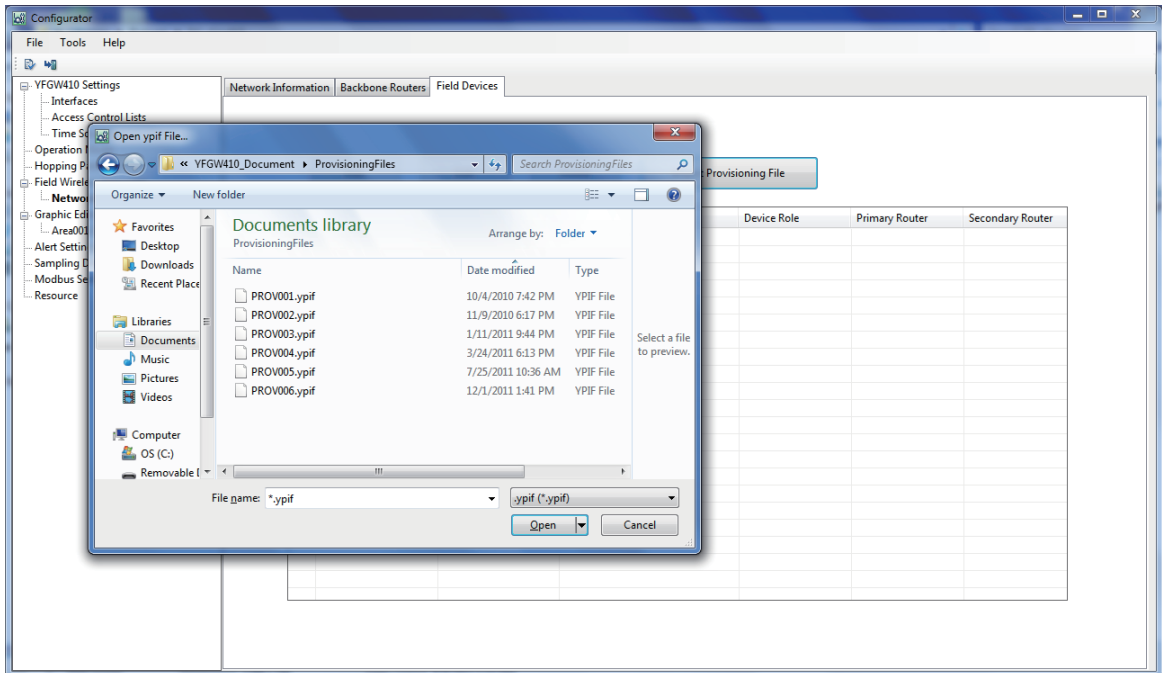
When the following setting information is changed, a request to restart field wireless devices is issued when settings are downloaded.

Device Tag, OTA Provisioning, EUI-64, Join Key, Provisioning Time, Provisioner Name, Device Role, Not online

Take sufficient care when changing settings after starting operation.

○ **Registering from a provisioning file**

When the [Import Provisioning File] button is clicked, the window shown in Figure D4-28 appears.



FD0428.ai

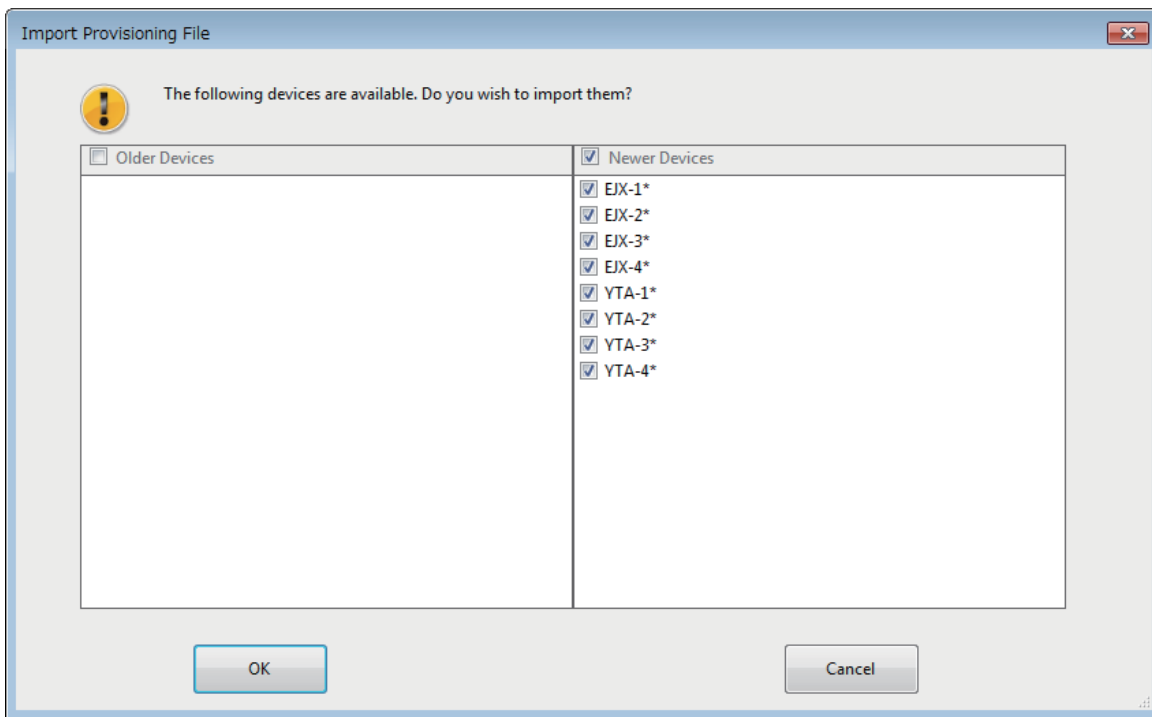
Figure D4-28 Open Provisioning File Window

In this window, select the provisioning file (the file extension is .ypif) that includes the information of field wireless devices to be registered to import it.

For file names, half-byte alphanumeric characters and non-alphabetic characters are recommended.

When a file is selected and the [OK] button is clicked, the window shown in Figure D4-29 appears.

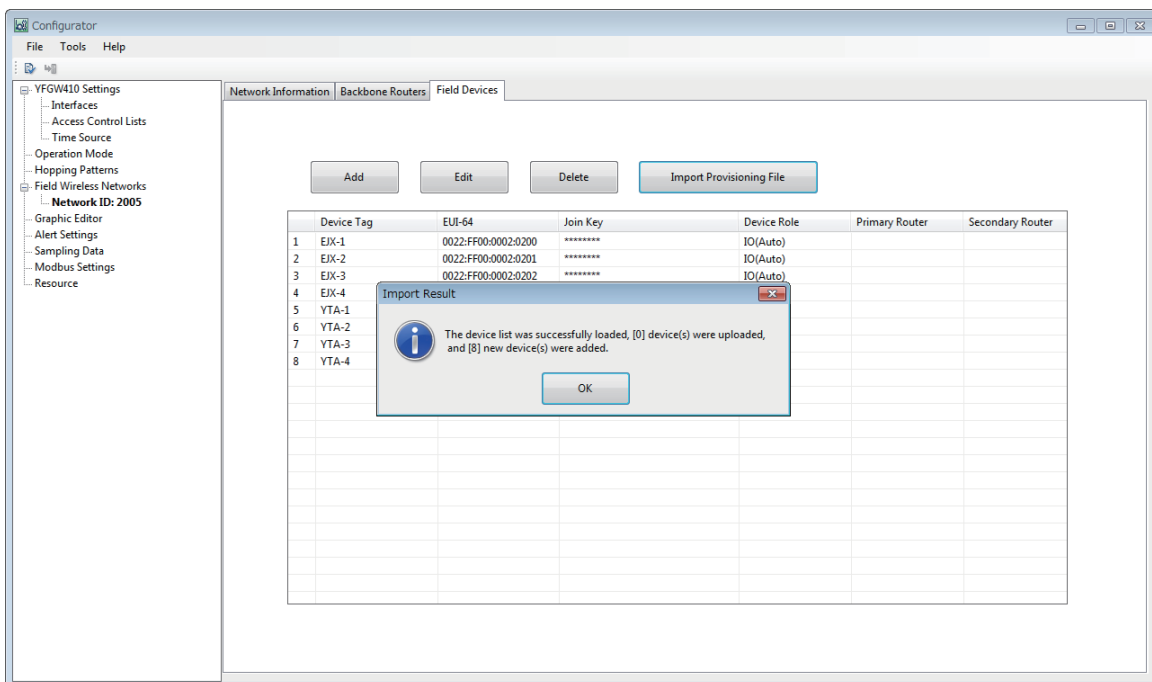
In this example, the file contains the information of 8 newly registered field wireless devices. Information is displayed in the [Newer Devices] column and the check boxes of all devices are selected.



FD0429.ai

Figure D4-29 Import Provisioning File Window

When the [OK] button is clicked, the information is added to the device registration list as shown in Figure D4-30. When the [Cancel] button is clicked, new devices are not registered and the confirmation window is closed.

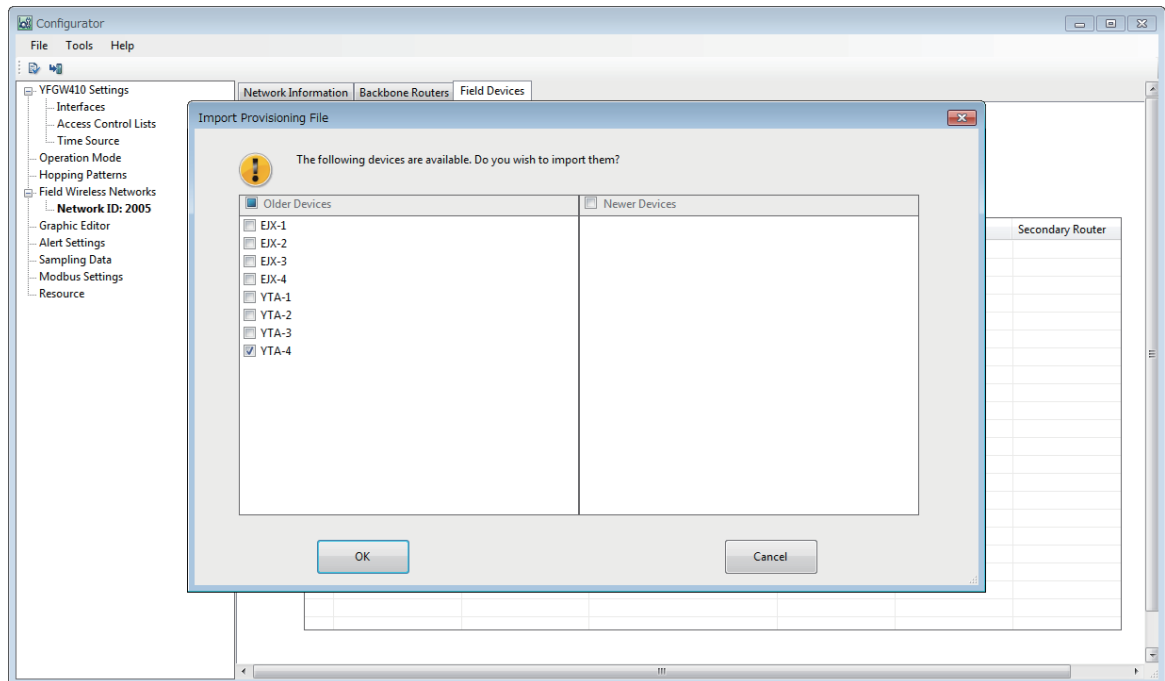


FD0430.ai

Figure D4-30 Field Devices Tab after Adding 8 New Devices

After the provisioning file has been imported, an <Import Result> appears that indicates that 8 new devices were successfully added. Click the [OK] button to close this dialog.

If the field wireless devices tab already contains information of registered devices when the provisioning file information is imported, a window shown in Figure D4-31 appears instead of Figure D4-29.

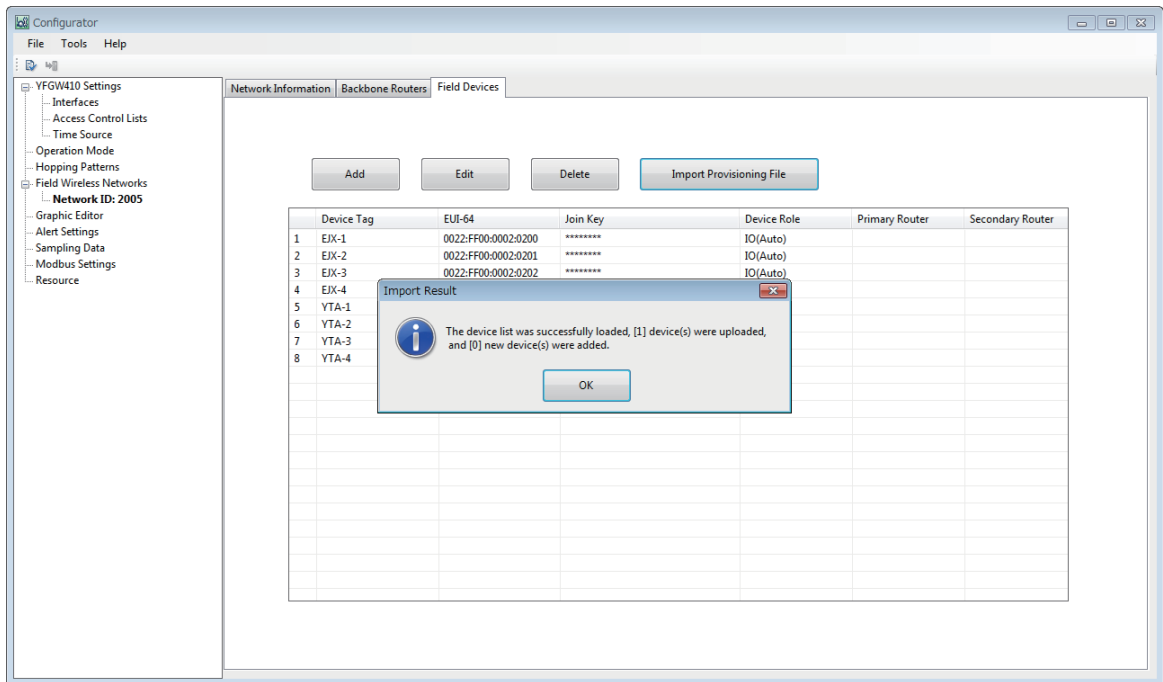


FD0431.ai

Figure D4-31 Import Provisioning File Window

The [Older Devices] column of the import provisioning file window displays the device tag that have already been registered to the field devices tab included in the provisioning file. Not all device check boxes are selected. Check boxes of devices to be updated by the provisioning information are selected. In this example, the window indicates that all 8 devices included in the provision file are already registered and the check box of YTA-4 is selected.

When the [OK] button is clicked, the registration information of devices with selected check boxes is updated. When the [Cancel] button is clicked, the information is not updated and the import provisioning file is closed.

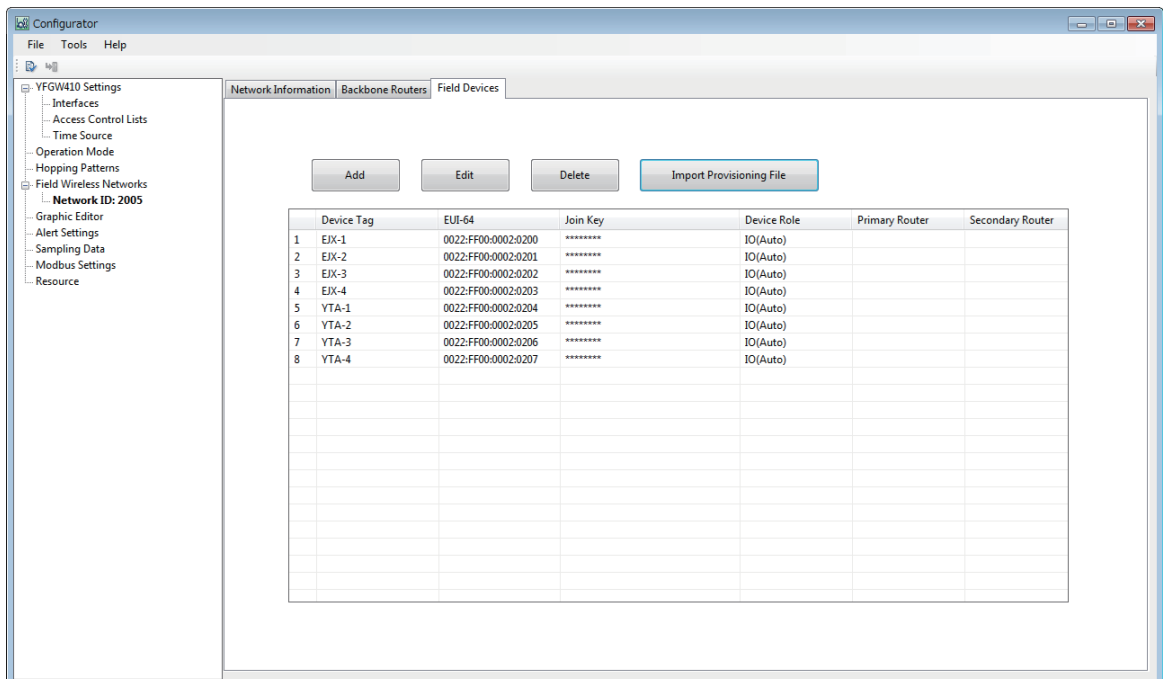


FD0432.ai

Figure D4-32 Import Result Dialog

After the information has been imported to the device registration list, the dialog shown in Figure D4-32 appears. Click the [OK] button to close this window. This window indicates that 1 field wireless device was updated in this example.

Figure D4-33 shows the results of importing the information of 8 field wireless devices from the provisioning file to the wireless device registration list.



FD0433.ai

Figure D4-33 Field Devices Tab after Registering from Provisioning File

Device registration list items

Item	Description	Default setting
Device Tag	Device tag of the field wireless device	Read from the provisioning file (*1)
EUI-64	64-bit Extended Unique Identifier	
Join Key	Encryption key when adding a field wireless device to the network	
Device Role	Role of the field wireless device	IO (Auto)
Primary Router	The routing device in the primary path is set by the device tag	Blank
Secondary Router	The routing device in the secondary path is set by the device tag	Blank

*1. In addition to the parameters above, Provisioner Name and Provisioning Time are also imported from the provisioning file.

The blank items in the device registration list and details of added setting items are described in the following “Editing device information”.

○ Editing device information

The window shown in Figure D4-27 appears when one of the following two actions is performed at the device registration list of the main window: the row of the device information to be added or edited is selected and the [Edit] button is clicked or the relevant row is double clicked. For the operation of this window, see “Registering device information” in this sub-section.

○ Deleting registered devices

When the row of the device to be deleted is selected in the Field wireless device registration list of the main window and the [Delete] button is clicked, the relevant device is deleted from the list.



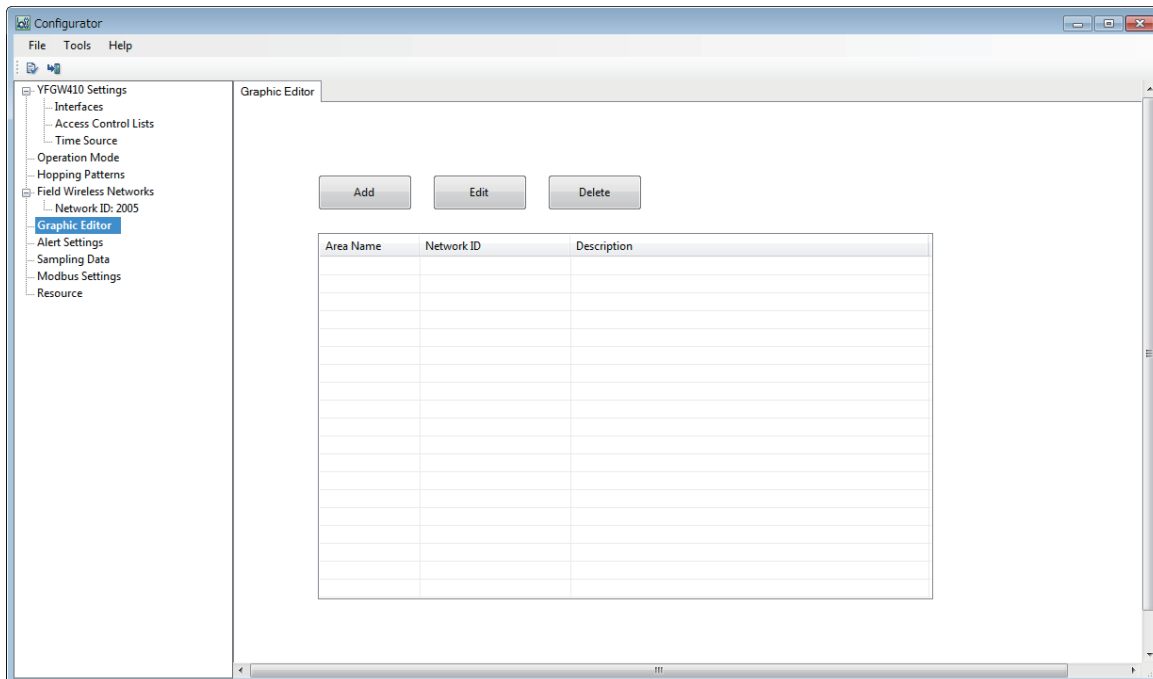
IMPORTANT

Be aware that when a routing device is deleted or a routing function is cleared, the transmission of field wireless devices downstream may be unstable.

D4.2.5 Graphic Editor

The graphic edit function allows you to position wireless devices on a map or floor plan of the installation area so that you can visually confirm transmission paths. You can also observe the connections status of YFGW510 and field wireless devices set in the image using the Monitor of the Field Wireless Management Console.

When [Graphic Editor] is selected in the menu tree of the Configurator, the tab shown in Figure D4-34 appears in the main window.



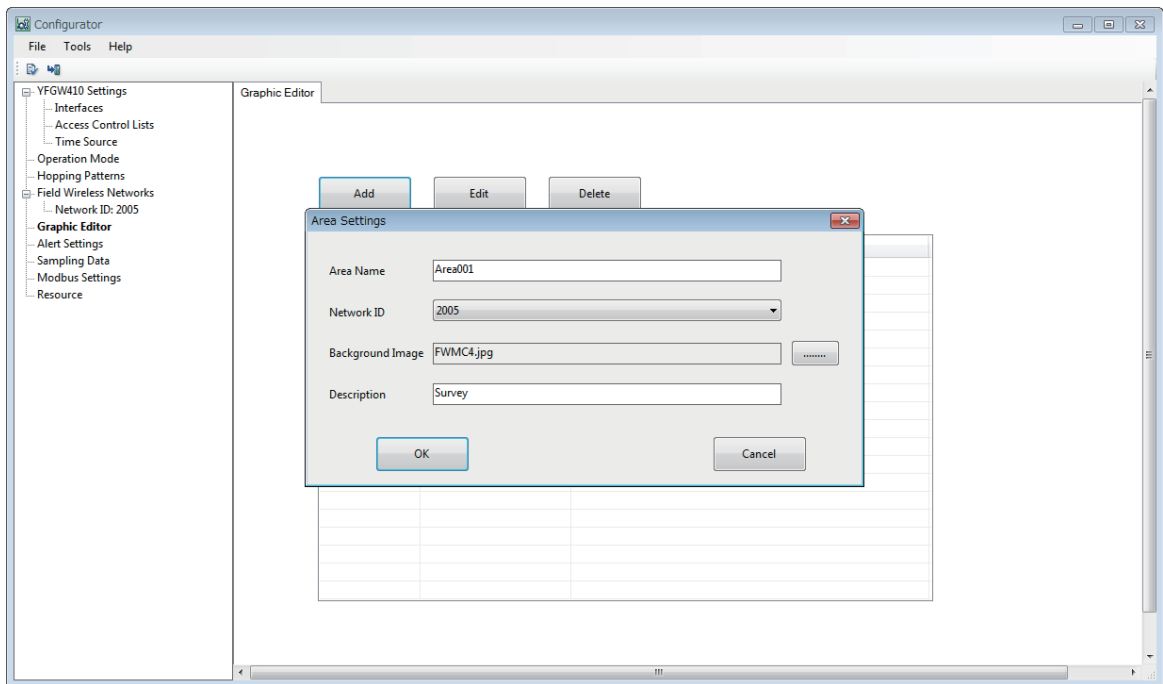
FD0434.ai

Figure D4-34 Graphic Editor Tab

Button name	Function
Add	Set the information of the area information to be newly registered.
Edit	Edit the information settings of the area information.
Delete	Delete a registered area information and its information.

○ Adding area information

When the [Add] button is clicked, the window shown in Figure D4-35 appears.



FD0435.ai

Figure D4-35 Area Settings Window

Item	Description	Default setting
Area Name	Set an area name. The default setting can be changed.	Allocated in ascending order from Area001
Network ID	Select this setting from the drop-down box, which displays wireless networks set at the <Field Wireless Networks>.	The smallest ID of the network IDs registered with the field wireless network
Background Image	Set a background image. Set an image such as a map or floor plan of the installation area.	Blank
Description	Enter description of the relevant area.	Blank

When the [OK] button is clicked, the settings are reflected in the graphic registration list of the main window. When the [Cancel] button is clicked, the setting information is discarded.

Multiple areas can be used for the same Field Wireless Subnet. In addition, the same device icons can be allocated to other areas. For details about device icons, see “Area settings” in this sub-section.



IMPORTANT

Background images must satisfy the following conditions to be imported.

Image size: 1000 x 450 pixels or less

File size: 1 MB or less

File format: jpeg, jpg, png

○ **Editing area information**

When the row of information to be updated is double clicked or the row is selected in the list and the [Edit] button is clicked, the shown in Figure D4-35 appears. Make the necessary corrections or revisions.

When the [OK] button is clicked, the changes are reflected in the registration list. When the [Cancel] button is clicked, the changes are discarded.

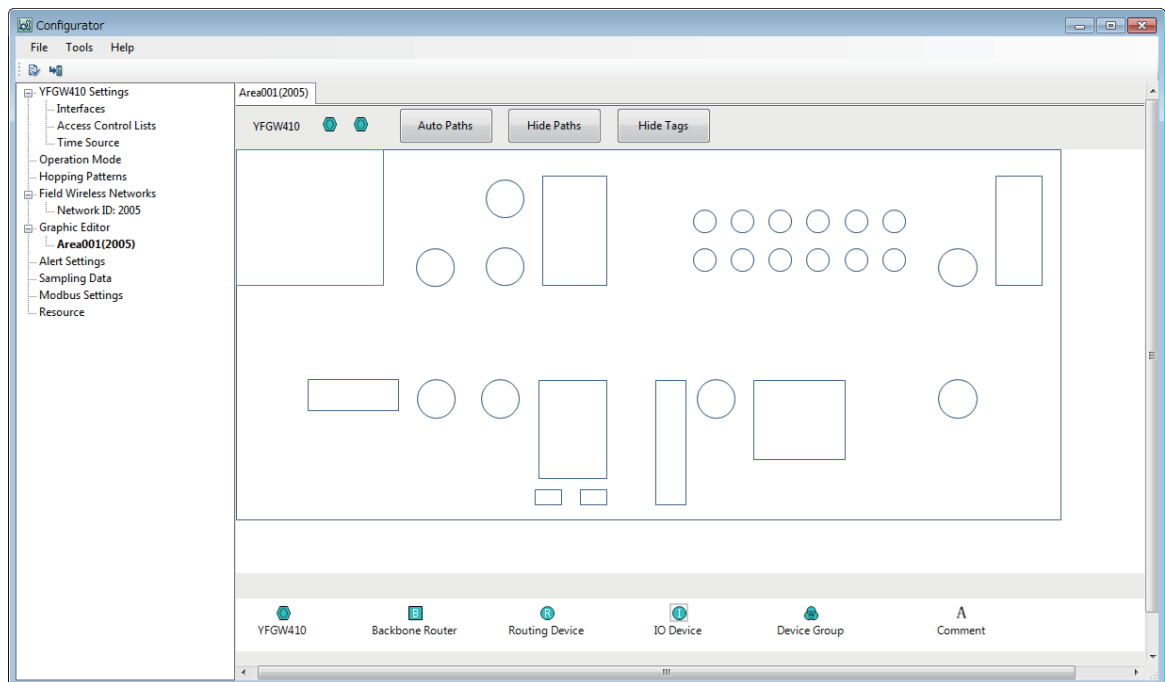
○ **Deleting area information**

When the row of information to be deleted is selected in the graphic registration list and the [Delete] button is clicked, all information of the relevant area is deleted.

■ **Area settings (Area001(2005))**

When graphics are registered with the list shown in the Figure D4-34, the specified area name is displayed in the menu tree under [Graphic Editor]. The name is displayed using the following format: "Area name (Network ID)".

When an area name (in this example, Area001(2005)) in the menu tree is clicked, the tab shown in Figure D4-36 appears.



FD0436.ai

Figure D4-36 Registered Area Setting Window

The picture of the map or floor plan registered in the area settings window is displayed on a main window.

On this window, allocate YFGW510 and field wireless devices to their positions in the installation plan.

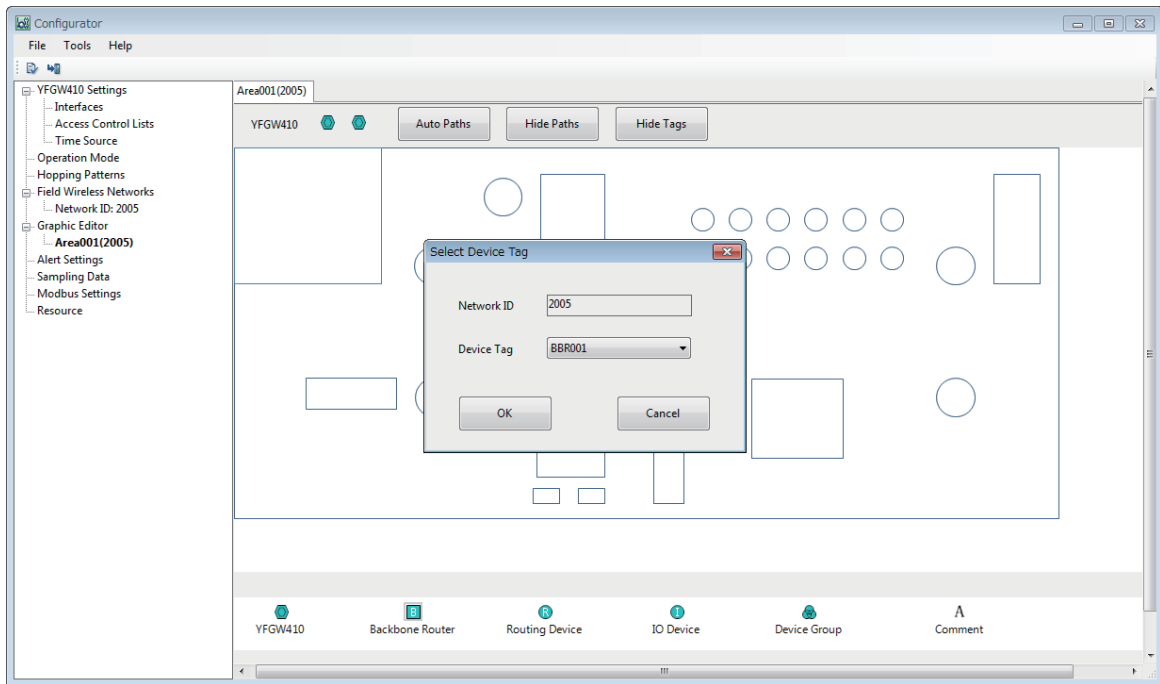
Six types of icons are displayed at the bottom of the main window.

Icons and operations scope

Icon	Name	Operation scope
	YFGW410	Indicates a YFGW410. It cannot be allocated in the background image area.
	Backbone Router	Indicates a Field Wireless Access Point with a backbone router role. Allocate registered devices on the background image area.
	Routing Device	Indicates devices with Router or IO+Router roles. Allocate registered devices on the background image area.
	IO Device	Indicates devices with IO or IO(Auto) roles only. Allocate registered devices on the background image area.
	Device Group	Indicates groups of IO devices with the same connection device on the host side. Allocate registered groups on the background image area.
A	Comment	Add a comment to the background image area.

○ Allocating Backbone Routers (BBR)

To allocate a backbone router, drag and drop the backbone router icon at the bottom of the main window to the allocation position on the background image area. The shown in Figure D4-37 appears. Select the device tag of the device to be allocated.

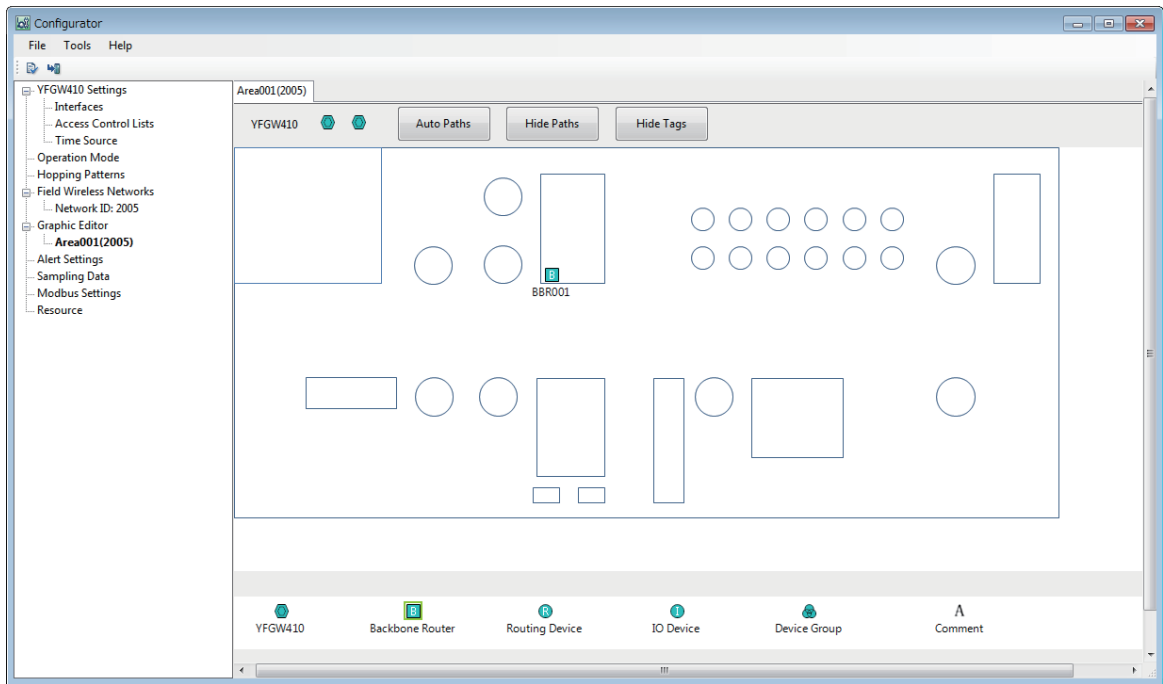


FD0437.ai

Figure D4-37 Select Device Tag Window

Item	Description	Default setting
Network ID	Automatically displays the network ID set for the area displayed.	Automatically displayed
Device Tag	The device tags of backbone devices registered with the relevant network ID are displayed in the drop-down box. Select the device tag of the wireless device to be allocated at the position.	Displays registered unallocated devices in ascending order

When the [OK] button is clicked, the icon of the device and the device tag appear in the specified position, as shown in Figure D4-38. When the [Cancel] button is clicked, the settings are discarded and nothing is added to the background image area.



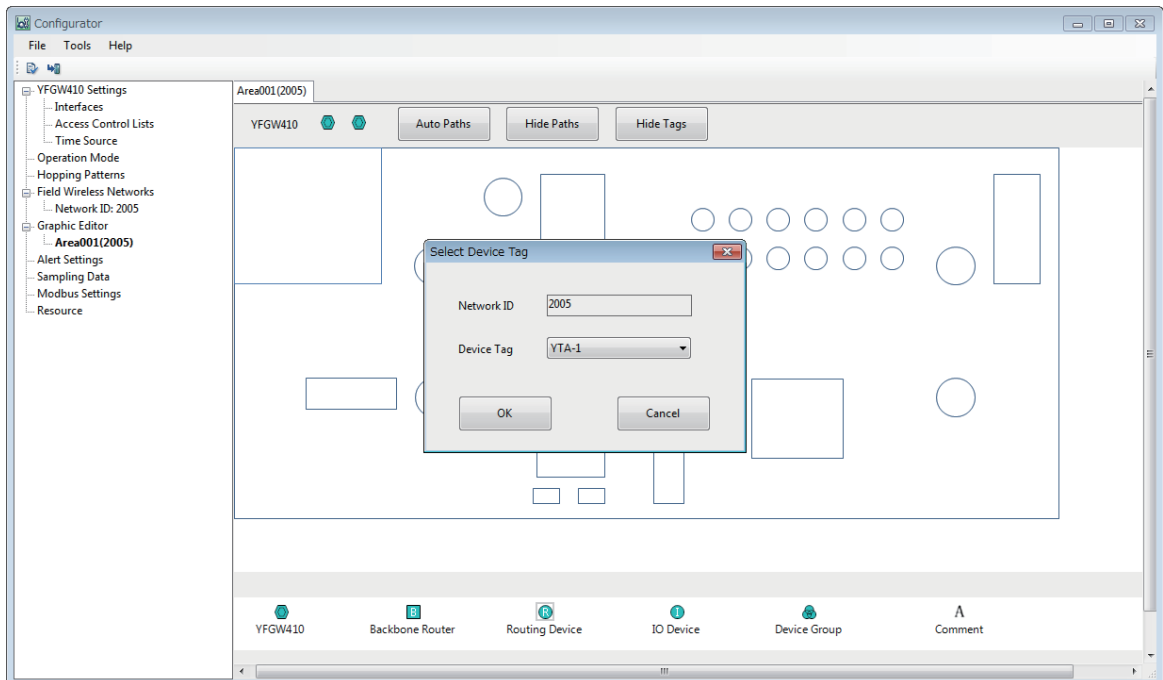
FD0438.ai

Figure D4-38 Backbone Router Allocation

○ Allocating Routing Devices

A routing device is a field wireless device with a Router or IO+Router role.

Drag and drop the routing device icon at the bottom of the main window to the installation position on the background image area. The shown in Figure D4-39 appears.

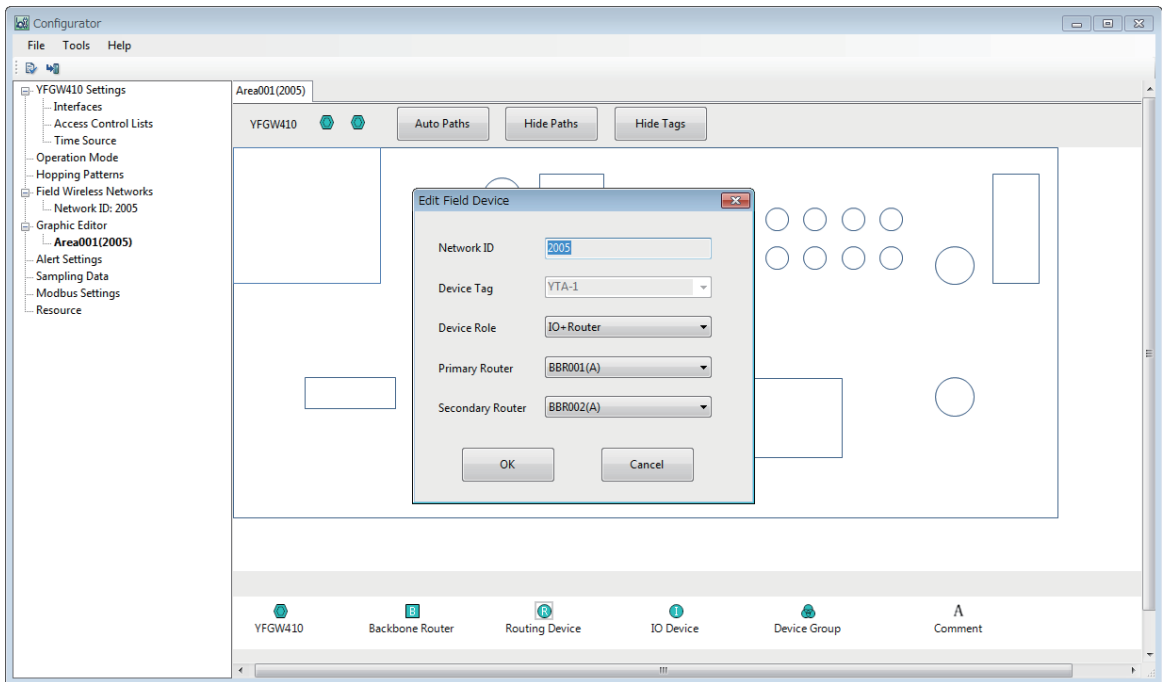


FD0439.ai

Figure D4-39 Select Device Tag Window

Item	Description	Default setting
Network ID	Automatically displays the network ID set for the area displayed.	Automatically displayed
Device Tag	The device tags of field wireless devices with routing function registered with the relevant network ID are displayed in the drop-down box. Select the device tag of the device to be allocated at the position.	Displays registered unallocated devices in ascending order

When the device tag of a device to be registered is selected and the [OK] button is clicked, the device icon and device tag appear in the specified location. A window appears to edit the wireless transmission paths and the device information configured when the wireless device was registered, as shown in Figure D4-40. When the [Cancel] button is clicked, the settings are discarded and nothing is added to the background image area.



FD0440.ai

Figure D4-40 Routing Device Allocation

When no changes to the device registration information are required, click the [OK] button. The wireless device is added in the condition displayed on the background image area.

If the information must be changed, edit the settings and click the [OK] button to update the information. If the transmission path settings are changed, the display of these paths is changed and added to the background image area. When the [Cancel] button is clicked, the settings are discarded and no wireless devices are added to the background image area.

○ Allocating IO Devices

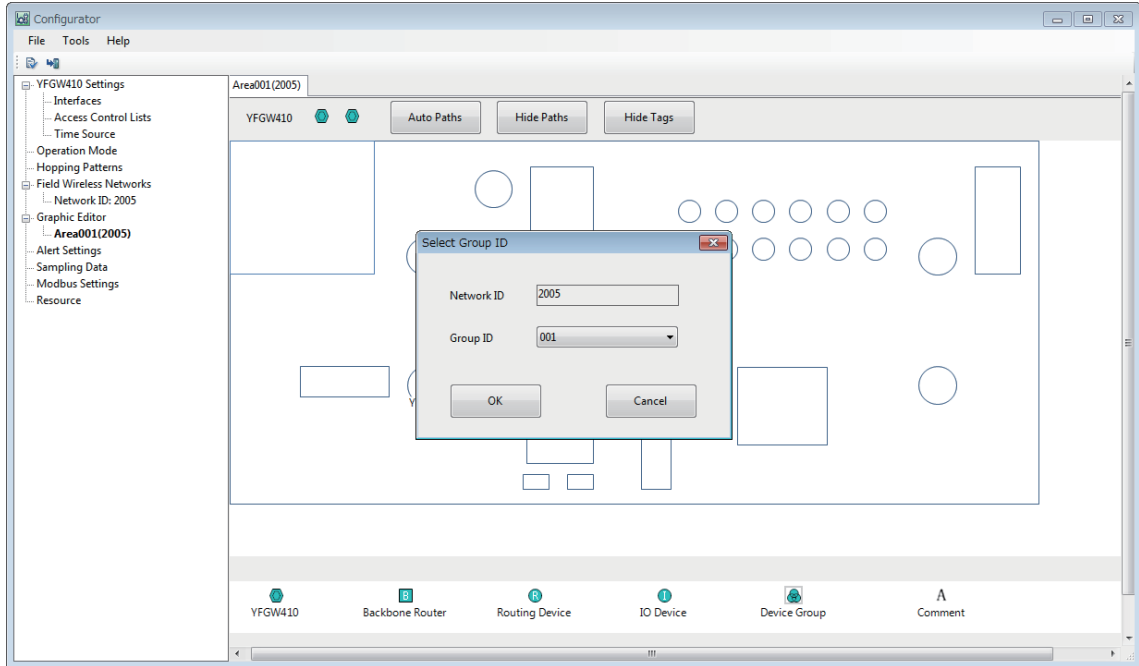
IO devices are field wireless devices with an IO or IO(Auto) role.

IO devices are added to the device installation position on the background image area using the same procedure as that for routing devices. See “Allocating Routing Devices” for details.

The paths of field wireless devices with IO(Auto) roles are determined after they join a field wireless network. So, the Configurator does not display their paths.

○ Allocating Device Groups

To add a device group, drag and drop the device group icon at the bottom of the main window to the installation position on the background image area. The window shown in Figure D4-41 appears.

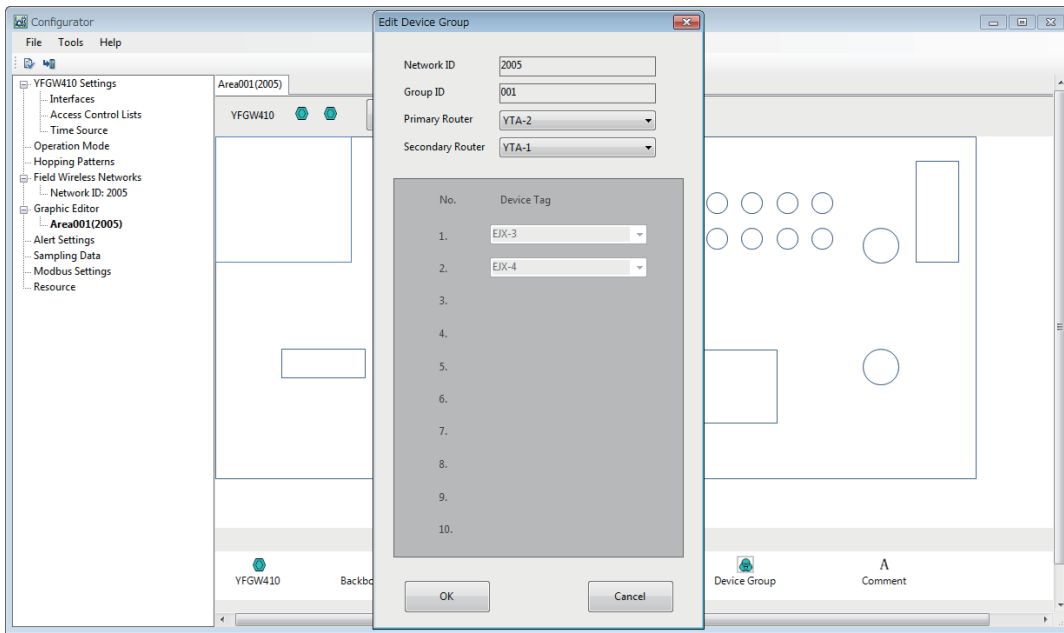


FD0441.ai

Figure D4-41 Select Group ID Window

Item	Description	Default setting
Network ID	Automatically displays the network ID set for the area displayed.	Automatically displayed
Group ID	The device Group IDs configured with the relevant network ID are displayed in the drop-down box. Select the group ID of the device to be allocated at the position.	Displays registered unallocated group IDs in ascending order

When a Group ID is selected and the [OK] button is clicked, the device group icon and group ID appear in the specified position. As shown in Figure D4-42, a window appears to display and update the wireless transmission paths and the information of the wireless devices associated with the relevant device group, which were configured when the field wireless devices were registered. When the [Cancel] button is clicked, the settings are discarded and nothing is added to the background image area.



FD0442.ai

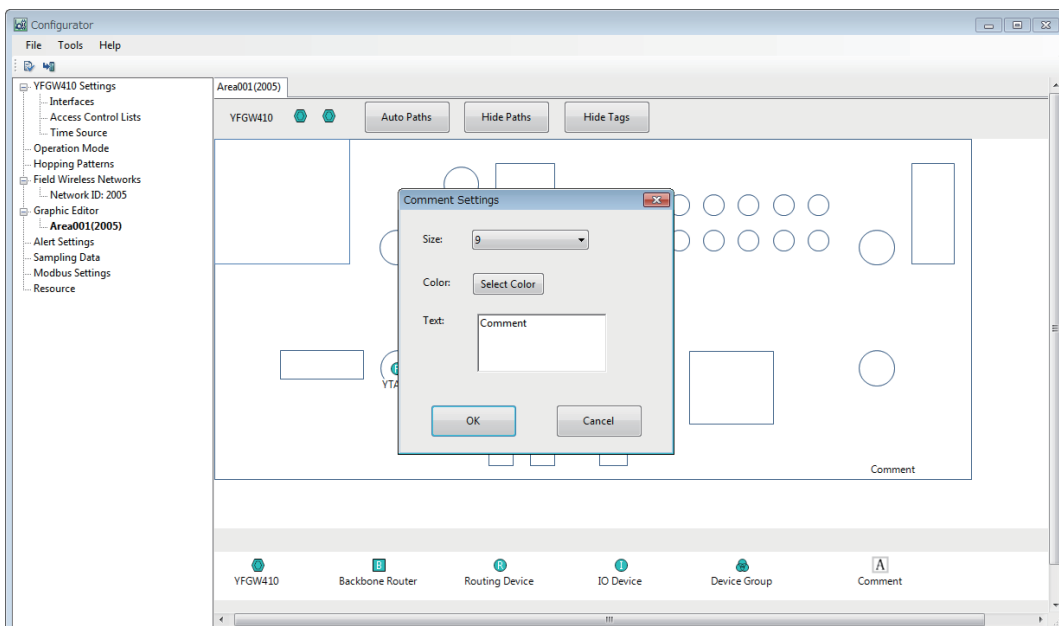
Figure D4-42 Edit Device Group Window

When the information does not need to be edited, click the [OK] button. The wireless device group is added in the condition displayed on the background image area.

If the transmission path host devices must be changed, edit the settings and click the [OK] button to update the information. If the transmission path settings are changed, the display of these paths is changed and added to the background image area. When the [Cancel] button is clicked, the settings are discarded and no wireless device groups are added to the background image area.

○ Adding comments

To add a comment to the background image area, drag and drop the comment icon at the bottom of the main window to the background image area. The window shown in Figure D4-43 appears.

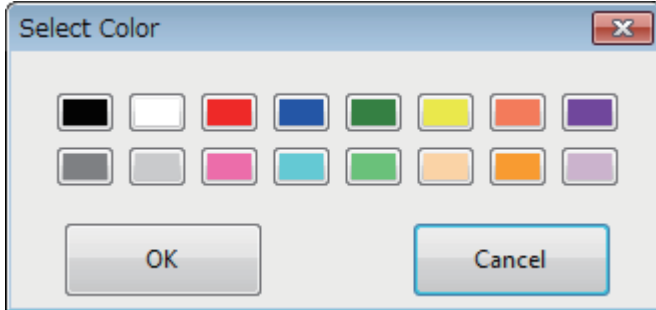


FD0443.ai

Figure D4-43 Comment Settings Window

Item	Description	Default setting
Size	Set the size of the comment characters (in points) Select the setting from the drop-down box.	9
Color	Set the character color.	Black
Text	Enter a comment. Up to 16 half-byte alphanumeric characters can be entered.	Comment

To select the character color, click the [Select Color] button. Figure D4-44 appears.



FD0444.ai

Figure D4-44 Select Color Window

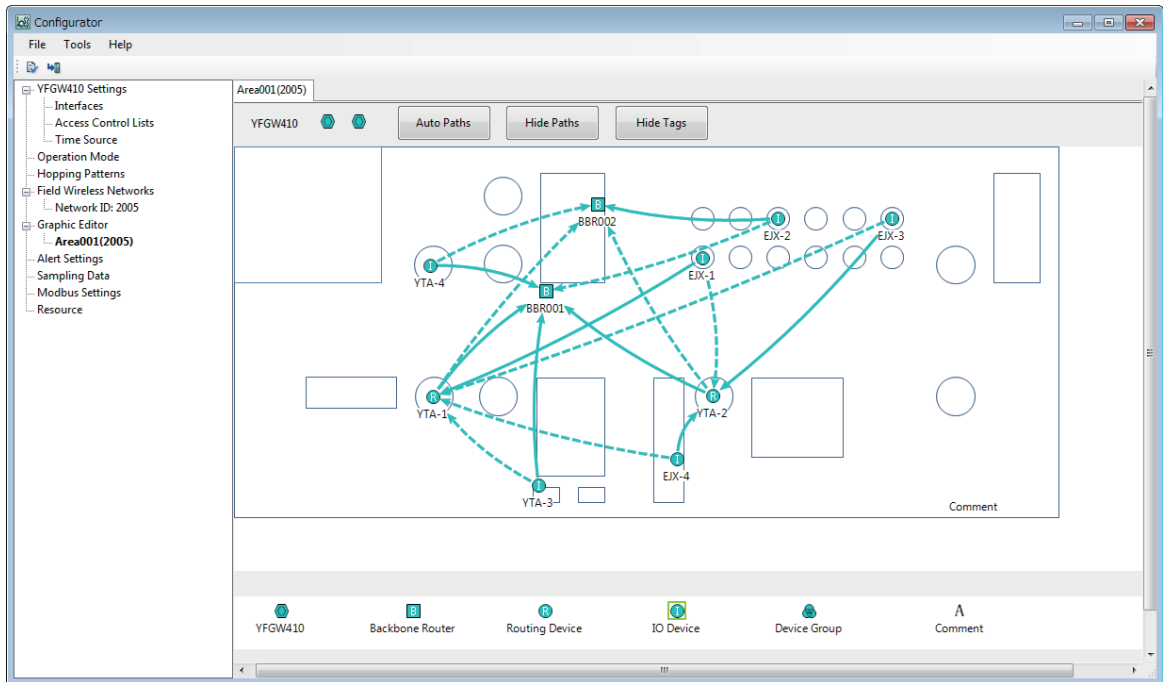
The following 16 colors are available.

Color name	Black	White	Red	Blue	Green	Yellow	Orange	Purple
Sample	■	□	■	■	■	■	■	■
Color name	50% grey	25% grey	Rose	Light blue	Light green	Beige	Light orange	Lavender
Sample	■	■	■	■	■	■	■	■

When a comment to be displayed on the background image area is entered in the Text column and the [OK] button is clicked, the comment is added to the background image area. Added comments can be right clicked on the background image area and moved to a location of your choosing on the background image area. When the [Cancel] button is clicked, no comment is added.

○ Manipulating and changing the background image area

Figure D4-45 shows the result of all examples of adding information to the eight wireless devices registered at Figure D4-32.



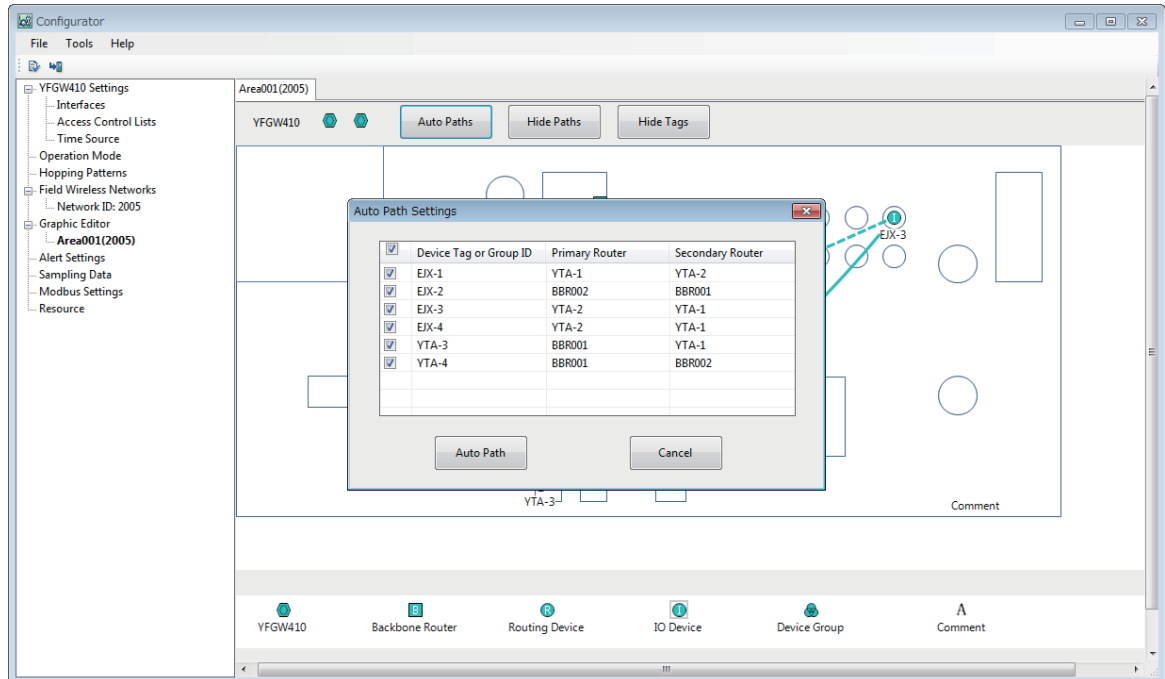
FD0445.ai

Figure D4-45 Area Registration Example

Buttons in the area setting tab and their functions

Button name	Function
Auto Paths	See below.
Hide Paths	Hide lines indicating the transmission paths on the displayed background image area. The button name switches then to [Show Paths]. Click the [Show Paths] button to display the lines again.
Hide Tags	Hide device tags of wireless devices on the displayed background image area. The button name then changes to [Show Tags]. Click the [Show Tags] to display the tags again.

When the [Auto Paths] button is clicked, the window shown in Figure D4-46 appears in the main window.



FD0446.ai

Figure D4-46 Auto Path Settings Window

The automatic path settings window appears. The transmission paths of IO field wireless devices with selected check boxes are automatically recalculated. Recalculation calculates that distance between the icons based on the positions of the device icons allocated on the background image area. The path to the closest routing device (Primary Router) and the path to the second closest routing device (Secondary Router) are set as the new transmission paths. Based on these results, the display of the paths on the background image area is revised and the Primary Router and Secondary Router of the field wireless device registered with the field wireless network are automatically changed and configured.

When the automatic path settings window appears, the check boxes of all devices are selected as default. Clear the check boxes of devices that do not require automatic calculation.

○ **Displaying and editing detailed information about devices and transmission paths**

After wireless devices are registered with the background image area, devices and transmission paths can be selected individually and their registration information displayed or deleted.

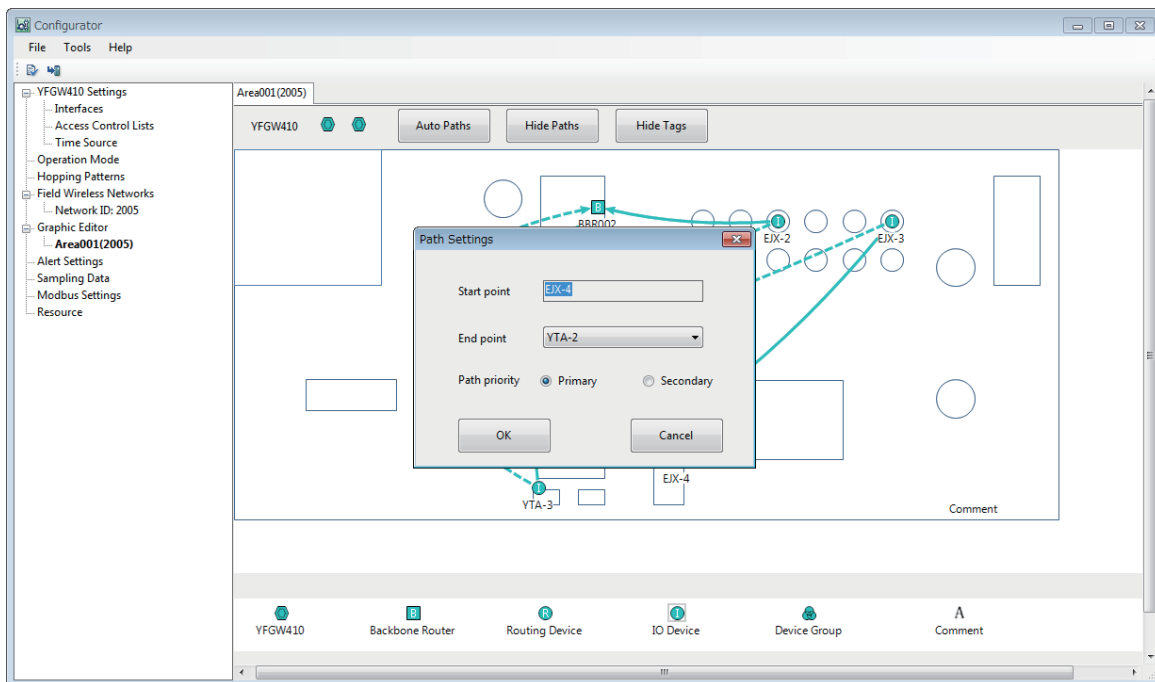
When right click over the icon of a wireless device allocated to the background image area, a menu to select the [Properties] and [Delete] options appears.

If the [Properties] option is selected, the window shown in Figure D4-27 appears. In the window that appears here, the information is simply displayed. It cannot be changed or corrected.

The [Delete] option is selected, the icon and transmission path of the relevant device are deleted from the background image area. However, the device registration information itself is retained.

When right click over the transmission path displayed on the background image area, a menu to select the [Properties] and [Delete] options appears.

If the [Properties] option is selected, the window shown in Figure D4-47 appears.



FD0447.ai

Figure D4-47 Path Settings Window

Item	Description	Default setting
Start Point	The start point device of the selected path. It cannot be edited.	Automatically displays the configured information of the selected transmission path
End Point	The end point device of the selected path. Select the setting from the drop-down box.	
Path Priority	Select the primary or secondary path. This setting can be changed.	

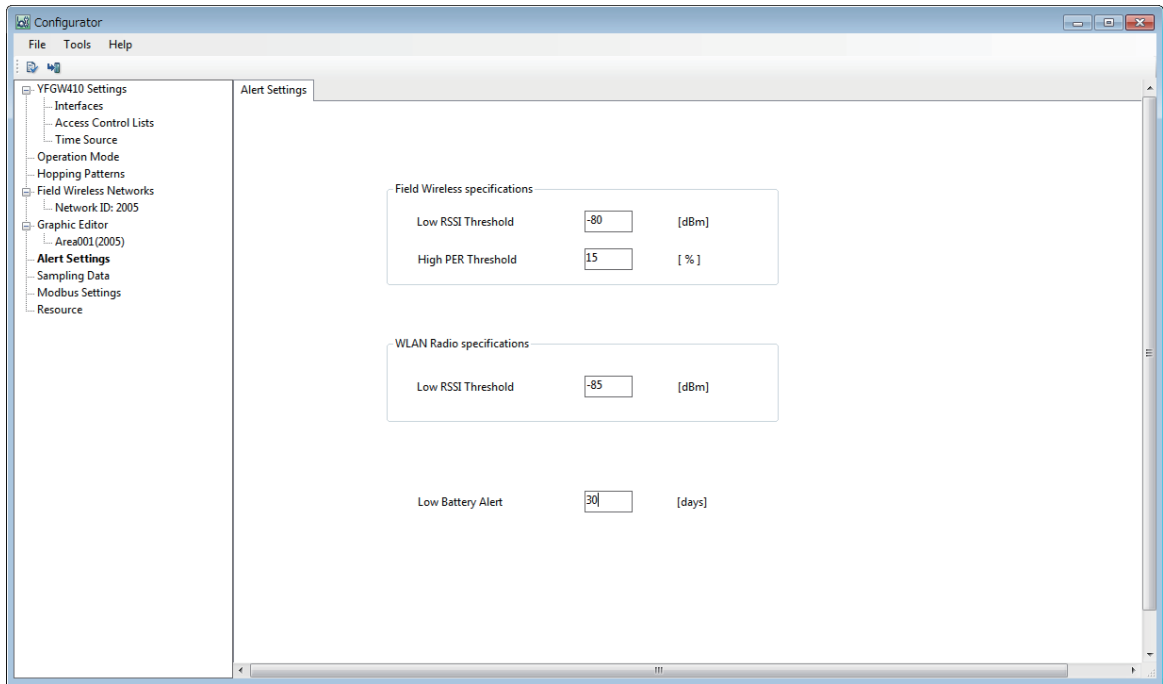
When the path priority is changed and the [OK] button is clicked, modification is reflected in background image area and an device list.

When the [Delete] option is selected after right clicking on transmission path on the background image area, the transmission path is deleted. Information related to the transmission path is also deleted from the registration information of the wireless device.

D4.2.6 Alert Settings

At this tab, set the tolerances for the warning operations used by the Monitor, which observes the operation status of the field wireless network.

When [Alert Settings] is selected in the menu tree of the Configurator, the tab shown in Figure D4-48 appears in the main window.



FD0448.ai

Figure D4-48 Alert Settings Tab

Setting items

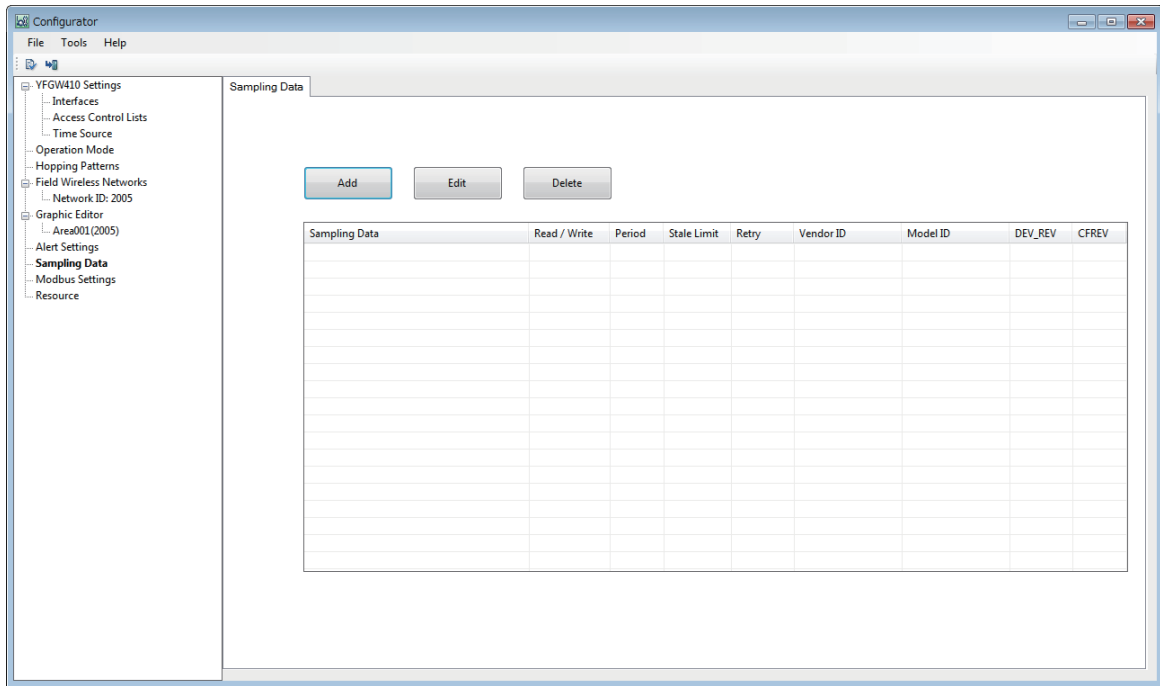
Item		Description	Default setting
Field Wireless Specifications	Low RSSI Threshold	This is the warning setting for the received signal strength indication (RSSI) between wireless devices on a field wireless network. When the value is equal to or lower than this setting, a warning status occurs.	-80dBm
	High PER Threshold	This is the warning setting for the packet error rate (PER) between wireless devices on a field wireless network. When the value is equal to or higher than the specified value, a warning status occurs.	15%
WLAN Radio Specification	Low RSSI Threshold	This is the warning setting for the received signal strength indication (RSSI) for wireless LAN transmission. When the value is equal to or lower than this setting, a warning status occurs.	-80dBm
Low Battery Alert		This is the warning setting for the battery life display which shows the estimated remaining operation time of the wireless device. When the value is equal to or lower than this setting, a warning status occurs.	30days

The Monitor changes the operation status indicator values and the colors of icons and marks according to the settings above to show the operation status.

D4.2.7 Sampling Data

At this tab, configure the publication of process values and diagnosis data from field wireless devices to host systems.

When [Sampling Data] is selected in the menu tree of the Configurator, the tab shown in Figure D4-49 appears.



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Figure D4-49 Sampling Data Tab

Information displayed in the sampling data list

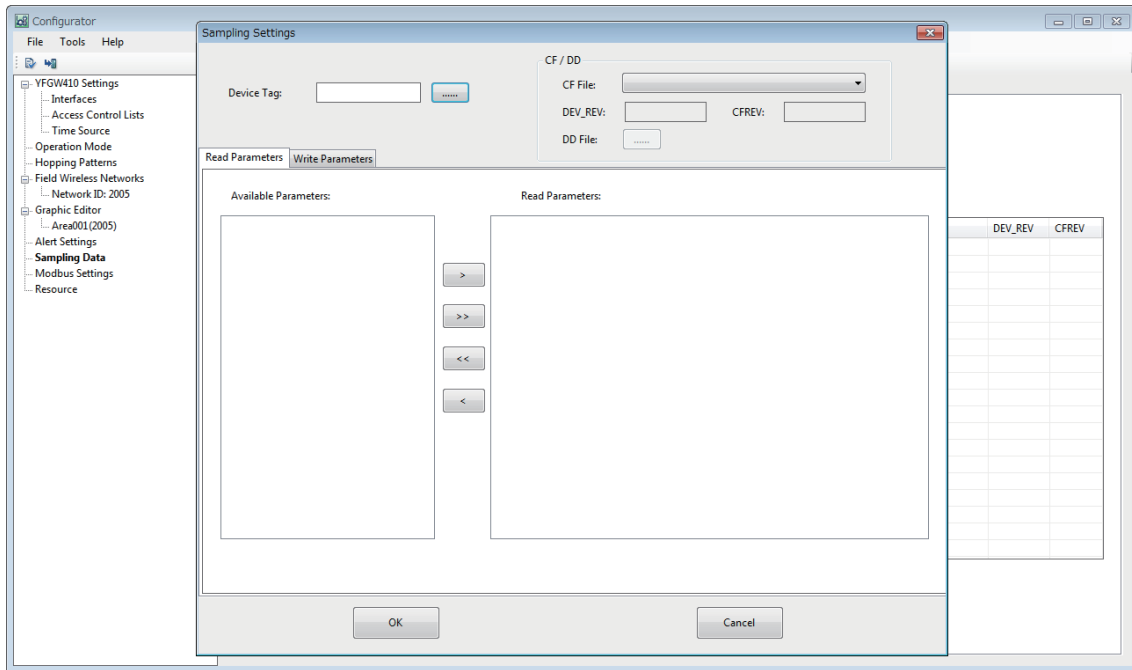
Item	Description	Default setting
Sampling Data	The name of the data exchanged with the host system. List rows are displayed in ascending order by data name.	Blank
Read/Write	Identify the data as read or write data.	
Period	This is the publication period.	
Stale Limit	This is the timeout interval when published data does not arrive normally. It is set in multiples of the Period setting.	
Retry	This is the retry mode when data does not arrive normally. x1: Normal mode; x2: Double the normal mode band; x4: Quadruple the normal mode band; x8: Octuple the normal mode band	
Vender ID	This is the vendor ID.	
Model ID	This is the model ID.	
DEV_REV	This is the device revision.	
CFREV	This is the capabilities file (CF) revision.	

Functions of the buttons of the sampling data setting window

Button name	Function
Add	Associate the CF file with registered field wireless devices, configure the sampling data exchanged with the host system, and add the transmission parameters.
Edit	Change the setting information of the registered sampling data.
Delete	Delete sampling data.

○ Adding sampling data

When the [Add] button in Figure D4-49 is clicked, the window shown in Figure D4-50 appears.



FD0450.ai

Figure D4-50 Sampling Settings Window

Item		Description	Initial settings
Device Tag		Device tag name of the device whose information is displayed in this window.	Blank when new items are added
CF/DD	CF File	Name of the CF file associated with the displayed device.	
	DEV_REV	This is the device revision.	
	CFREV	This is the CF file revision.	
	DD File	This function is not used.	

The Sampling Settings window has two tabs, which can be viewed by selecting the [Read Parameters] and [Write Parameters] tabs.

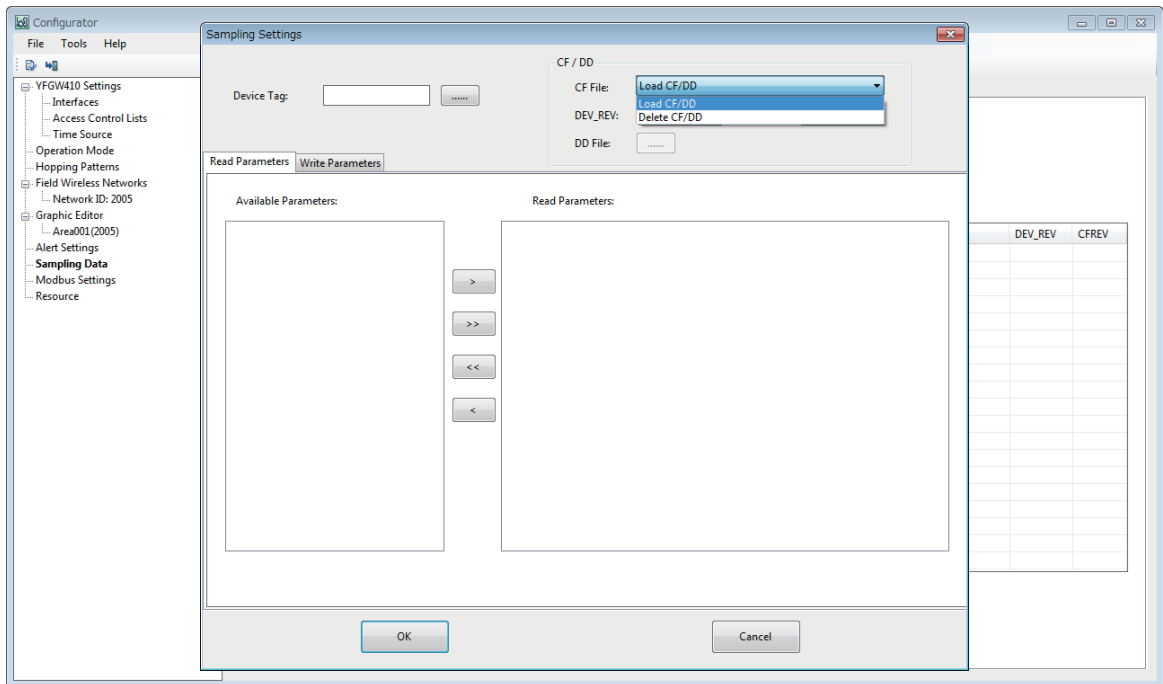
At the [Read Parameters] tab, configure the parameters to transmit data from the selected field wireless device to the host system. At the [Write Parameters] tab, configure the parameters to transmit data from the host system to the selected field wireless device.

• Registering and Deleting Capabilities Files

CF files contain the following data: vendor names, model names, revisions, embedded process data (flow rate, temperature, pressure, and other measurement values) and device self-diagnosis information. This information is provided by the device vender. Therefore, it is necessary to acquire the CF file for the relevant model before registration.

First, register the CF file of the model to register sampling data.

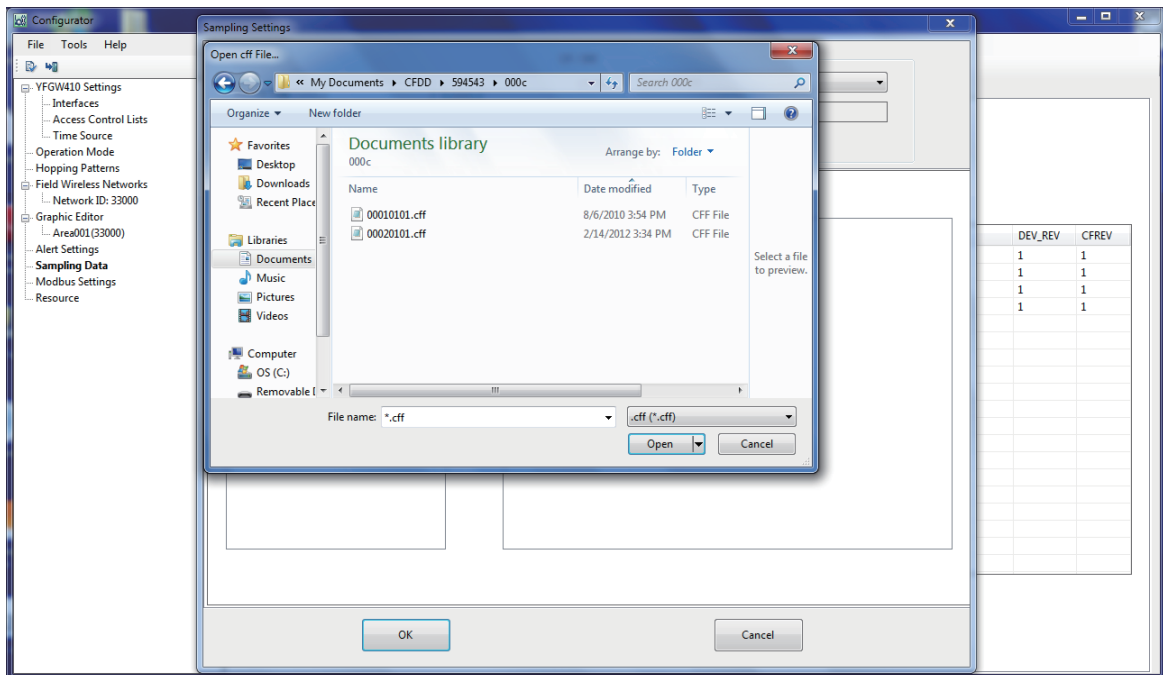
When the [CF File] drop-down box is clicked, the default drop-down box is displayed, as shown in Figure D4-51.



FD0451.ai

Figure D4-51 CF File Drop-down Box at Sampling Settings Window

The default condition of the drop-down box has two items: [Load CF/DD] and [Delete CF/DD]. To register on new CF file here, select [Load CF/DD], and then select the CF file of the model to be registered at the window shown in Figure D4-52.



FD0452.ai

Figure D4-52 Selection Window to Register CF Files

The folder and file names for CF files have the following format. Therefore, it is necessary to select a file that matches the revision of the model to be registered.

<Vendor ID>\<Model ID>¥<Device Revision><DD Revision><CF Revision>.cff

IDs of Yokogawa Field Wireless Devices

Item		Description
Vender ID		00594543
Model ID	EJX	000C
	YTA	0005
	YTMX	1802
	FN310 (HART Communication)	2000
	FN310 (SENCOM)	2001
	FN510 (AI, DIDO, PULSE)	2002

When the [OK] button is clicked, the window shown in Figure D4-53 appears. The name of added and registered CF files appear in the [CF File] drop-down box. In the same manner, register the CF files of all models to register sampling data.



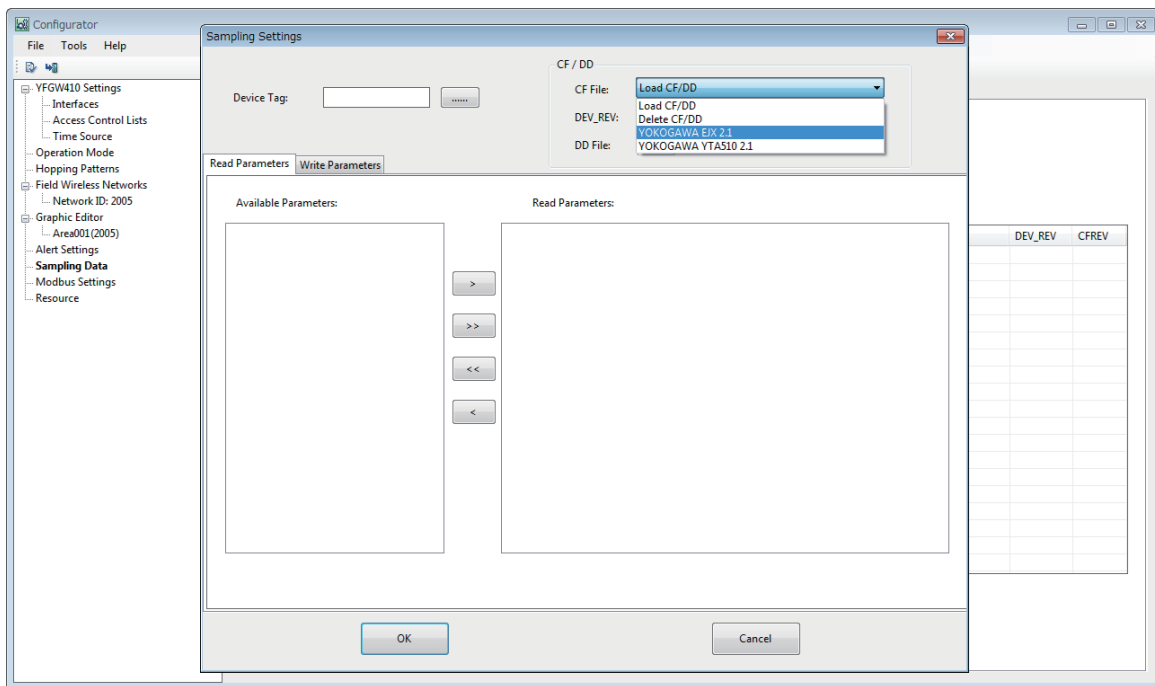
IMPORTANT

If a CF file unsuitable for the field wireless device is specified, it joins the field wireless network but published data may not be sent in some cases. If this occurs, check the <Vendor ID><Model ID><Device Revision><DD Revision><CF Revision> format. If data does not match, configure the correct information.



IMPORTANT

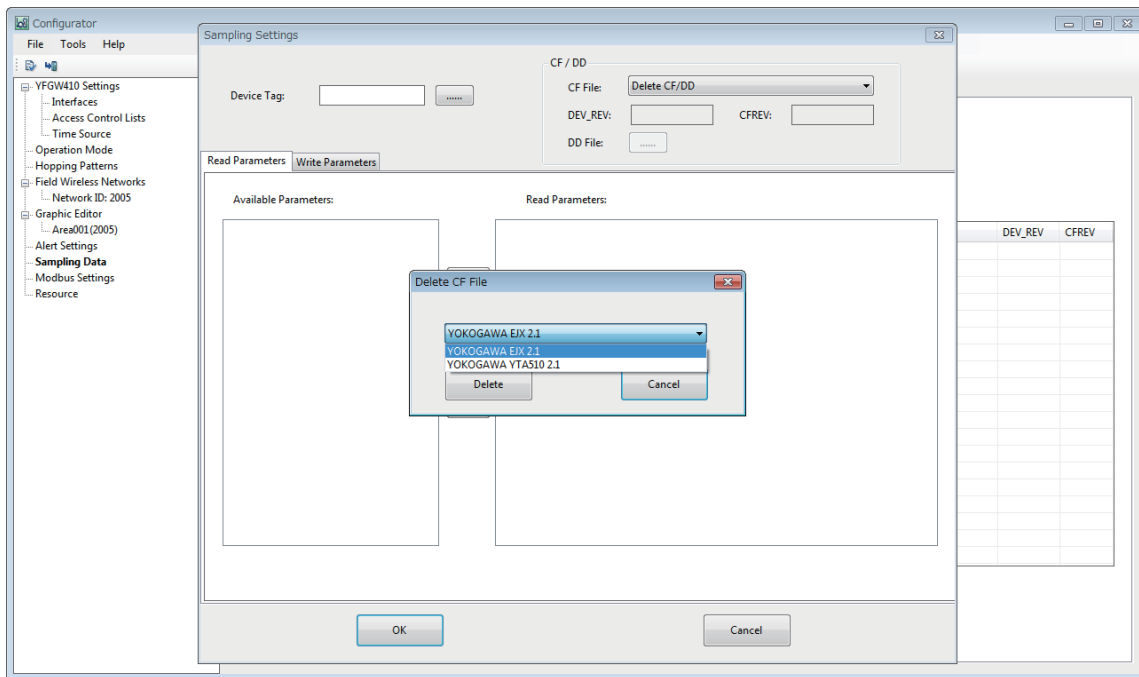
Always register the CF file, even if periodic publishing is not performed.



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Figure D4-53 Sampling Settings Window after Loading CF File

When [Delete CF/DD] is selected from the CF File drop-down box, the window shown in Figure D4-54 appears.



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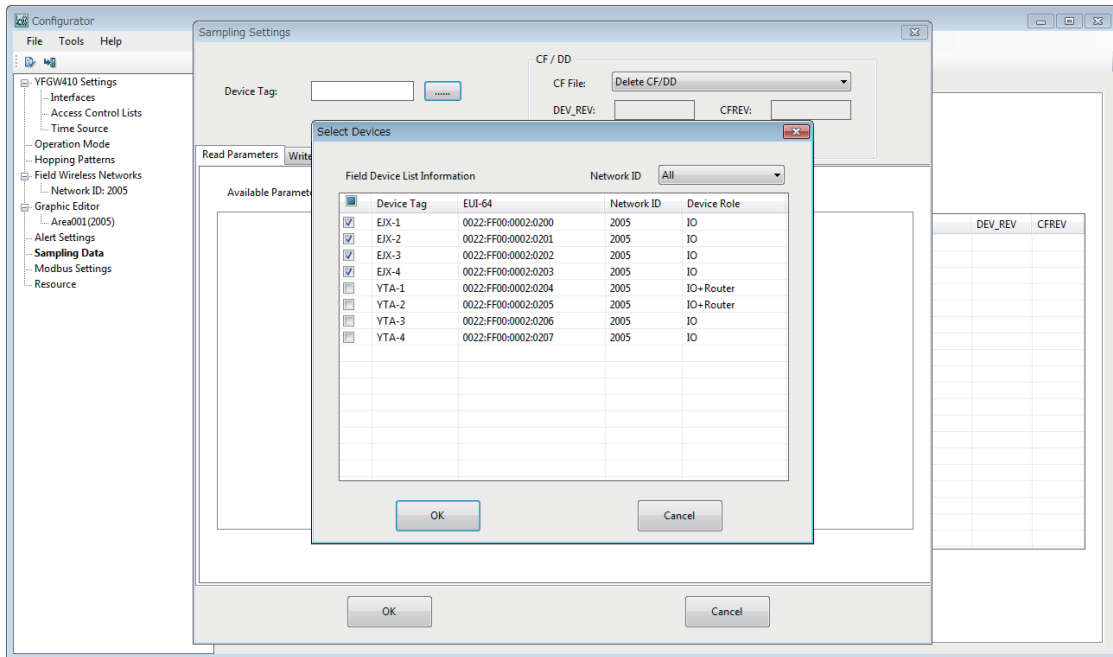
Figure D4-54 Delete CF File Window

When a CF file to be deleted is selected from the drop-down box and the [OK] button is clicked, the registration is deleted. When the [Cancel] button is clicked, the registration is not deleted and the window closes.

When a CF file is deleted, the sampling data and Modbus register mapping information of all field wireless devices using the CF file are deleted. For details about Modbus register mapping, see Sub-section D4.2.8 Modbus Settings.

- **Registering sampling data**

When the button to the right of the Device Tag field at the sampling settings window is clicked, the window shown in Figure D4-55 appears.



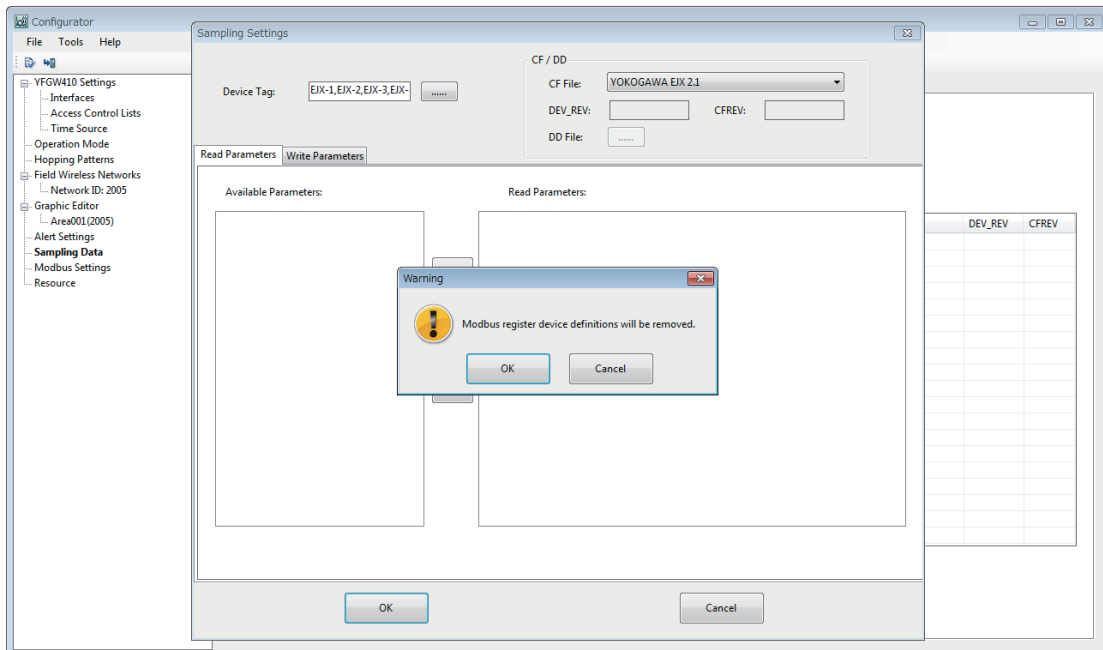
FD0455.ai

Figure D4-55 Select Devices Window

When selecting the [Network ID] in select devices window, field wireless devices can be registered into field device list information.

Devices to register sampling data have their check boxes selected to the left of the device tag. The same model can be registered at same time. Select the check box of the target device tag.

When the [OK] button is clicked, the dialog shown in Figure D4-56 appears.

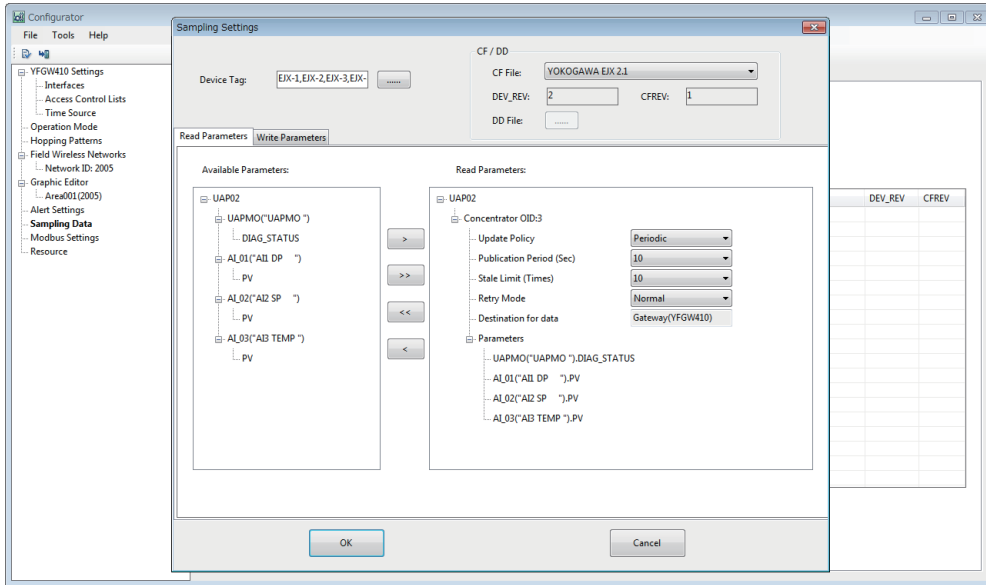


FD0456.ai

Figure D4-56 Device Registration Warning Dialog

When a new registration is made, no Modbus Settings are affected.

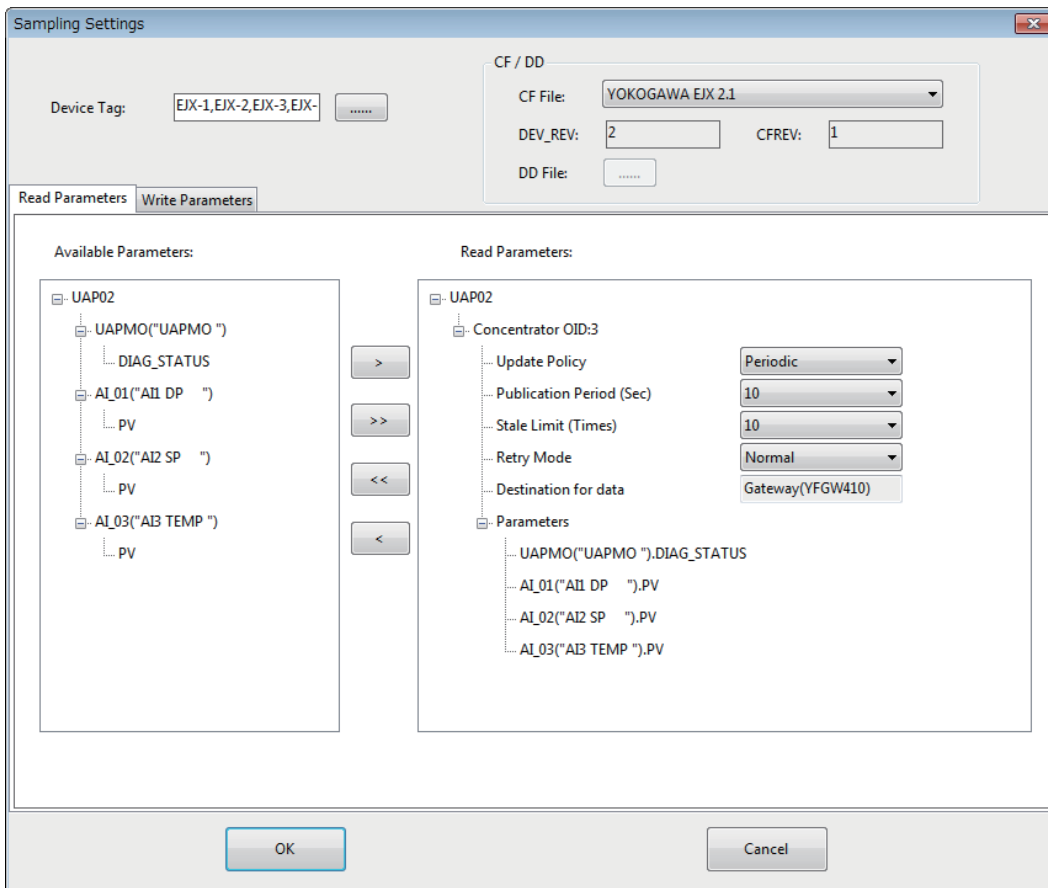
When the [OK] button of the warning dialog is clicked, the parameter information of devices registered to the [Read Parameters] tab and [Write Parameters] tab of the sampling settings window is registered.



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Figure D4-57 Sampling Settings Window (After Specifying CF File to Device)

Figure D4-58 is an enlarged image of the sampling settings window.



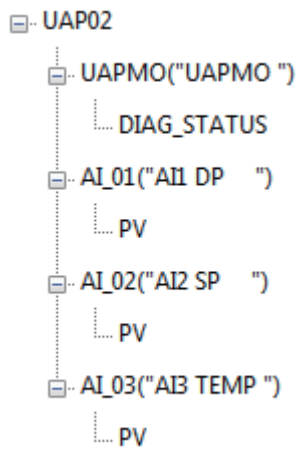
FD0458.ai

Figure D4-58 Sampling Settings Window

The [Read Parameters] tab is comprised of Available Parameters and Read Parameters sections.

When a new registration is made, all Available Parameters are registered under Parameters in the Read Parameters section, and mapping to the Modbus Register can be performed.

Content of the Available Parameters tree



First level: UAP ID

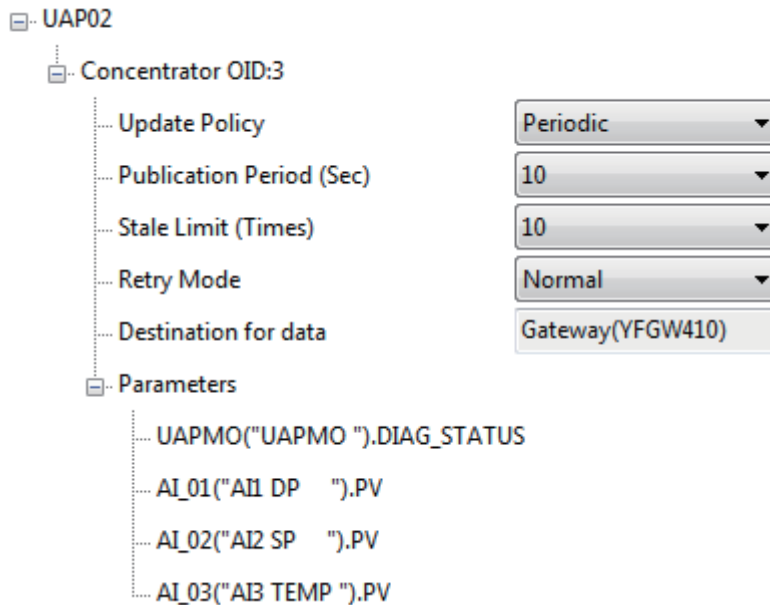
Second level: Object Name + Block Description

Third level: Attribute Name

The example for this model shows that three analog inputs (AI) (process value inputs) and one device self-diagnosis(DIAG_STATUS) can be published.

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Content of the Read Parameters tree



First level: UAP ID

Second level: Concentrator OID



Third level: For details, see the chart below.



Fourth level: Parameter

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Item	Description	Default setting
Update Policy	Select the method to update data from the following two methods. Periodic : Update periodically Change of state : Update with change of state	Periodic
Publication Period (Sec)	Select the update time to periodically publish data from the drop-down box. The setting range is from 0 to 3,600 seconds. When "0" is selected, there is no publication.	10 Sec
Stale Limit (Times)	Set the time for a YFGW410 to determine transmission error. Set a multiple of the Publication Period setting. Select a setting from 1 to 255 from the drop-down box.	10 Times
Retry Mode	Set the retry frequency when the published data is not correctly received. Select from Normal and x2 (two times Normal), x4 (four times Normal), x8 (eight times Normal)	Normal
Destination for data	Display the general name of the receiver of data For read parameters: Gateway(YFGW410) For write parameters: Selected Field Devices	

You can register and delete data in the Read Parameters area using the arrow buttons between the two sections.

To individually add parameters in the Available Parameters tree not registered under the [Read Parameters] tree, select the relevant parameter ([PV] or [DIAG_STATUS] in the tree), and then click the  button. To add all parameters under the UAP ID, select the UAP ID, and then click the  button.

Conversely, to individually delete parameters registered under the parameters in the Read Parameter tree, select the name of the parameter to be deleted, and then click the  button. When the  button is clicked, all of the parameter names below the parameter are deleted.

○ Publication Period and Stale Limit

- **Publication Period**

A publication period refers to a period at which data is transmitted and received between YFGW410 and the field wireless device.

Determine the publication period considering battery power consumption (which varies depending on the publication period) or other factors.

- **Stale Limit**

The check process of wireless communication, the operating environment of the system, deterioration of wireless quality, and communication path error and restoration may cause data loss, retransmission of the same data, or variations in the data update time.

When the state of not-updated-data or lost-data continues for the period specified in Stale Limit, YFGW410 considers that an error has occurred and notifies the control system of an error.

It is recommended to set a value 10 times as large as the publication period. However, determine the value considering the fact that the time from when the state of data-not-updated or data-lost occurs until the determination of an error varies depending on the system environment and user application.



IMPORTANT

When Publication Period is set to "0.5", Retry Mode should not be exceeding x2. When Publication Period is set to "1", Retry Mode should not be exceeding x4.



IMPORTANT

Always register the CF file, even when data is not published periodically. Alternatively, set Publication Period to "0".

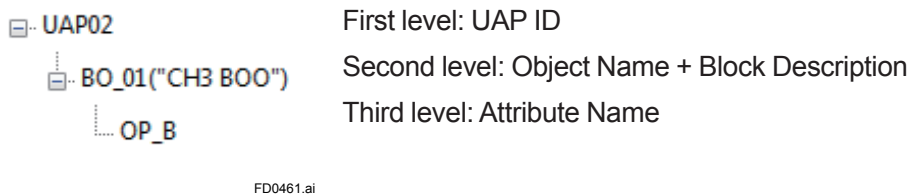


IMPORTANT

For periodic data publication, set an update time in the range that can be used by the field wireless device.

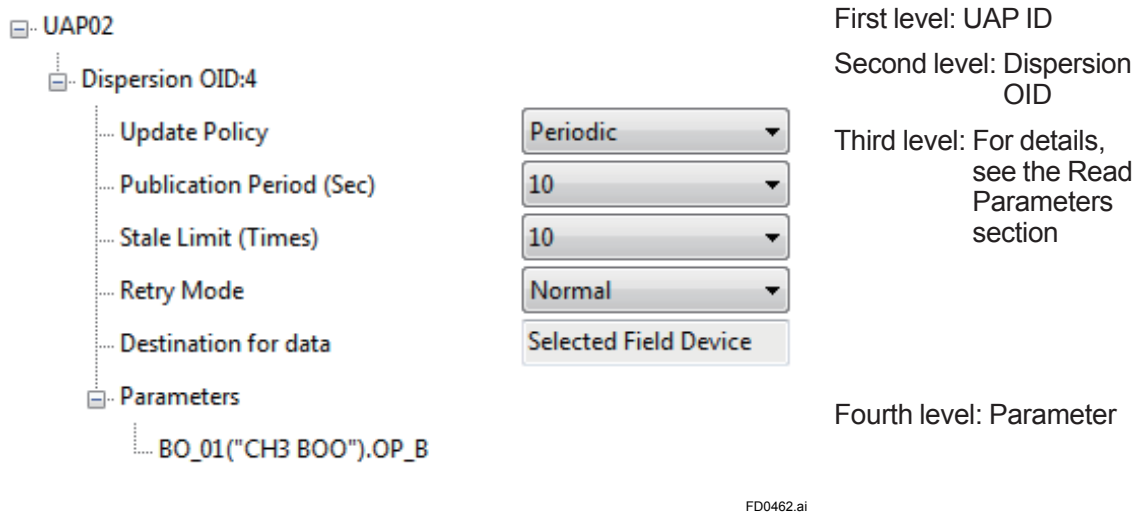
The composition of the [Write Parameters] tab is the same as that of the [Read Parameters] tab, excluding the items below.

Content of the Available Parameters tree



The example for this model shows that 1 binary output (BO) (process value output) can be published.

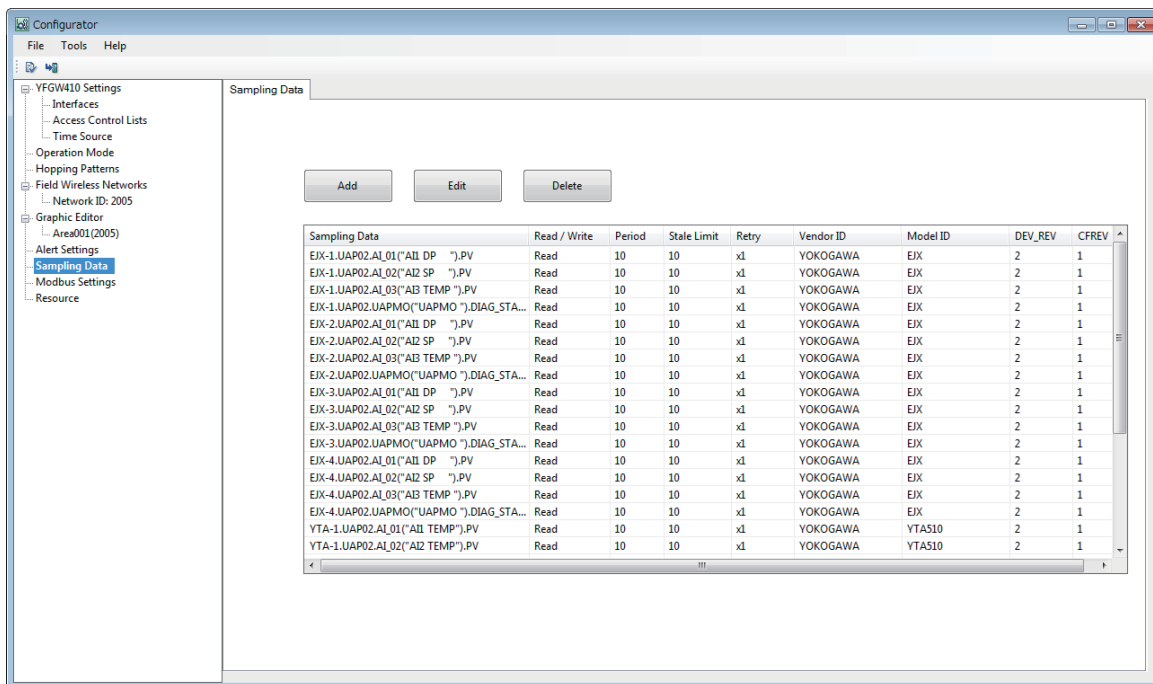
Content of the Read Parameters tree



When field wireless devices have no read parameters, "No Dispersion Object exist" is displayed under the UAP ID at the [Write Parameters] tab.

When the [OK] button is clicked after completing the sampling data settings, the information is added to the tab shown in Figure D4-59.

When the [Cancel] button is clicked, the information is discarded and nothing is added to the list.



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Figure D4-59 Example of Registration at the Sampling Setting Tab

○ **Updating sampling data**

When information registered in the list at the [Sampling Data] tab is selected and the [Edit] button is clicked, the sampling settings window appears and displays the information currently registered.

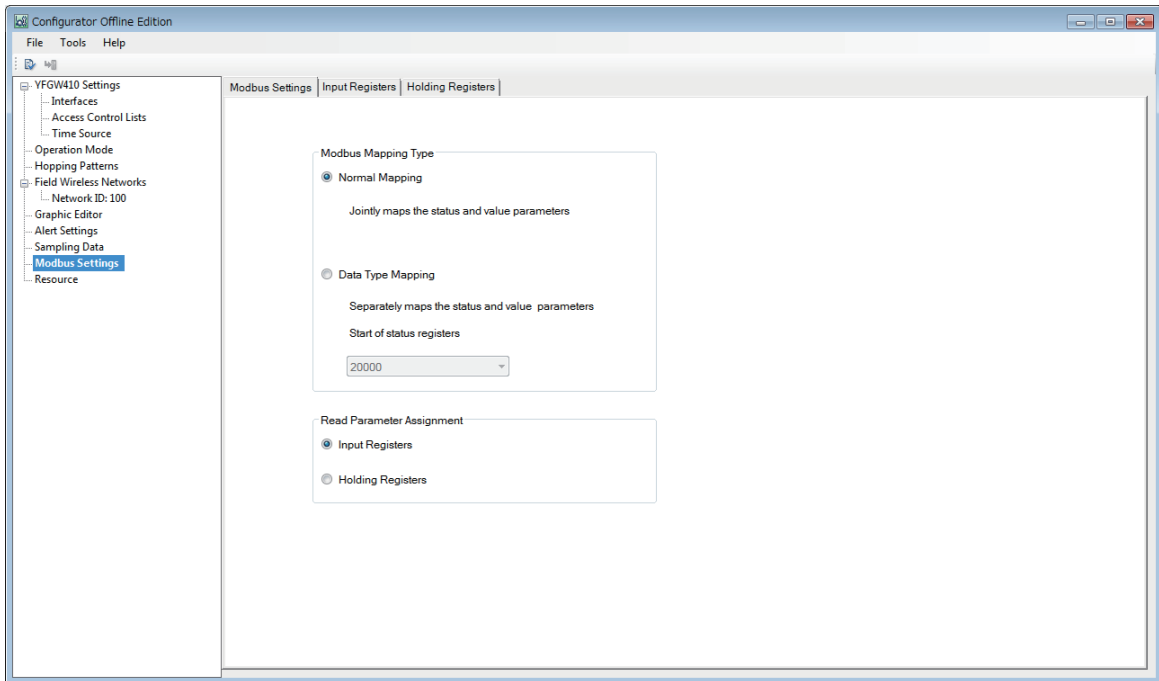
For the method to change or correct parameters, see “Adding sampling data” in this sub-section.

○ **Deleting sampling data**

When information registered in the list at the [Sampling Data] tab is selected and the [Delete] button is clicked, all sampling data setting information of the relevant device is deleted.

D4.2.8 Modbus Settings

When [Modbus Settings] is selected in the menu tree of the Configurator, the tab shown in Figure D4-60 appears.



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Figure D4-60 Modbus Settings Tab

The main window is comprised of three tabs: [Modbus Settings], [Input Registers], and [Holding Registers].

● Modbus Settings Tab

When the [Modbus Settings] tab is selected, the tab shown in Figure D4-60 appears.

At this tab, configure the Modbus mapping type and read parameter assignment.

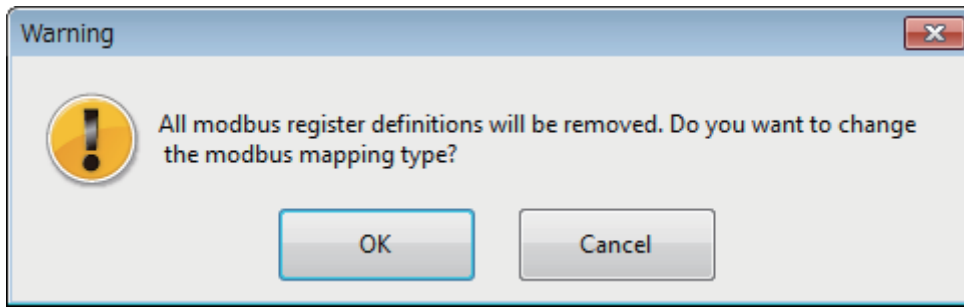
○ Modbus Mapping Type

There are two mapping types: Normal Mapping and Data Type Mapping.

Mapping Type	Description
Normal Mapping	The status and value of the parameters which send to a host system can be combined and mapped.
Data Type Mapping	The status and value of the parameters which send to a host system are separated and mapped to respective areas. <ul style="list-style-type: none"> For host systems with 10000 Modbus registers, status values are allocated from register number 5000. For host systems with 65536 Modbus registers, status values are allocated from register number 20000. The default setting for [Start of status registers] is 20000.

The default Modbus setting is [Normal Mapping].

To change the Modbus mapping type, select the relevant button. When the button selection is changed, the dialog shown in Figure D4-61 appears.



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Figure D4-61 Change Warning Dialog

When the [OK] button is clicked, the change is applied. All existing mapped settings are discarded at this time. When the [Cancel] button is clicked, no changes are made and the dialog is closed.

To change the [Start of status registers] setting when Data Type Mapping is selected, select "5000" or "20000" from the drop-down box. The dialog shown in Figure D4-61 appears at this time as well.

○ Read Parameter Assignment

Select Input Registers or Holding Registers where read parameters will be assigned to. Select Holding Registers only for when connecting the host system which does not support reading from Input Registers but supports reading from Holding Registers.

Selection	Description
Input Registers	Read parameter is assigned by using [Input Registers] tab. Write parameter is assigned by using [Holding Registers] tab.
Holding Registers	[Input Registers] tab is disabled. Both read parameter and write parameter are assigned by using [Holding Registers] tab.

● Input Registers Tab

The [Input Registers] tab is comprised of two sections: [Available Parameters] and [Input Registers].

Drag parameters in the [Available Parameters] section, such as GW_STATUS, BBR_STATUS, DEV_STATUS, UAPMO.DIAG_STATUS, and AI_01.PV, to the top number of the target register in the [Input Registers] section. To delete parameters, select the [Input Registers] section and press the [Delete] key on the keyboard.



IMPORTANT

When registers removed by the deletion from the [Input Registers] section are accessed, values other than "0" may be included.

Parameters can be allocated to Input Registers are as follows.

Parameter name	Description	Data size (word)	
		Data status	Data
GW_STATUS	Notification of YFGW410 status	1	8
BBR_STATUS	Notification of backbone router status	1	8
DEV_STATUS	Notification of field wireless device status	1	8
UAPMO.DIAG_STATUS	Notification of self-diagnosis information of the field wireless device	1	2
AI_xx("BLOCK_DESCRIPTION").PV	Notification of analog data	1	2
BI_xx("BLOCK_DESCRIPTION").PV_B	Notification of binary data	1	1
AO_xx("BLOCK_DESCRIPTION").READBACK	Readback of analog output data	1	2
BO_xx("BLOCK_DESCRIPTION").READBACK_B	Readback of binary output data	1	1

In an example of AI parameters, three consecutive words [status + value] are used Normal Mapping is used. Alternatively, when using Data Type Mapping, two words and one word are used for the value and status, respectively.

DEV_STATUS data configuration and content

Modbus address	Name	Data format	Details
n	Data status	Unsigned16	Usually 0x0080: Normal
n+1	DEV_STATUS	Unsigned16	Status of the field wireless device (0: connected, 1: not connected)
n+2		Integer16	Battery life (0>: days, <0: hours, 0x7FFF: external power source)
n+3 ~ n+8		Unsigned16	Usually 0 (Reserved bits)

Only (n+1) and (n+2) are used

For GW_STATUS, see Section F2.1 Status Information.

For BBR_STATUS, see the user's manual of YFGW510 (IM 01W02E01-01EN).

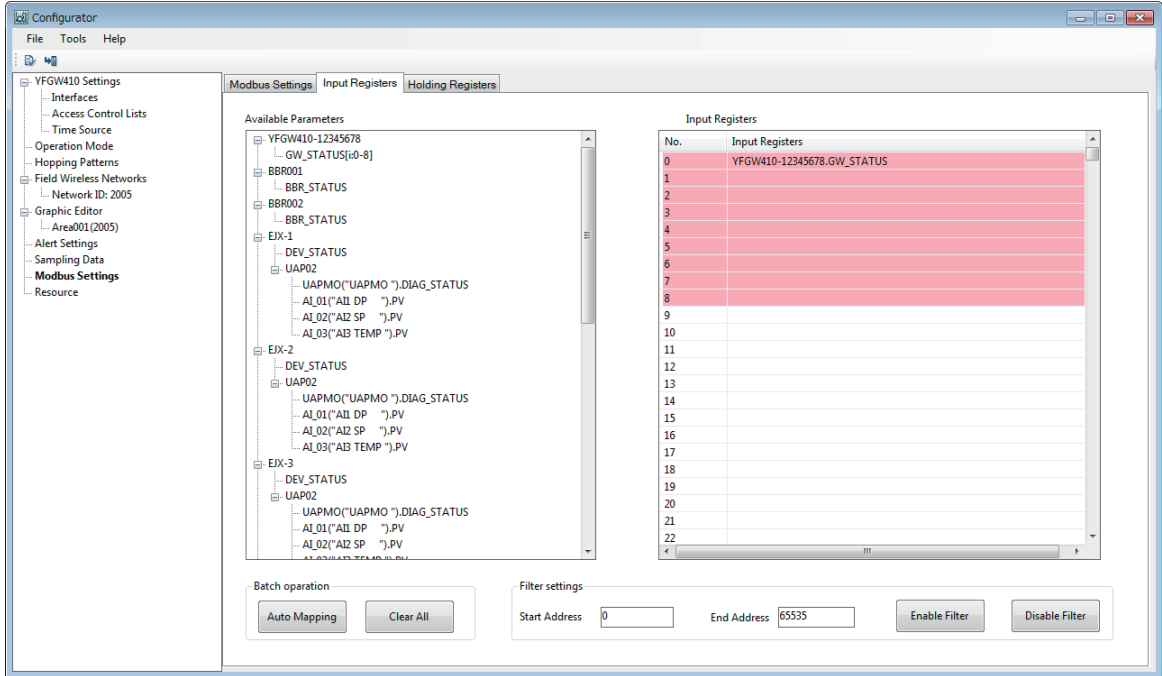
For details about other parameters, see the user manual of the relevant model.

For details about the data status of the abovementioned parameters, see Sub-Section F2.3 Data Status Specification.

○ For Normal Mapping

The status and value of the parameters which send to a host system can be combined and mapped. The first time the [Input Registers] tab is opened at the [Modbus Settings] tab, GW_STATUS is already positioned at the top (0 to 8). The allocation position of GW_STATUS can be changed by dragging it in the [Input Registers] list.

Figure D4-62 shows an example of parameters mapped to the input registers.

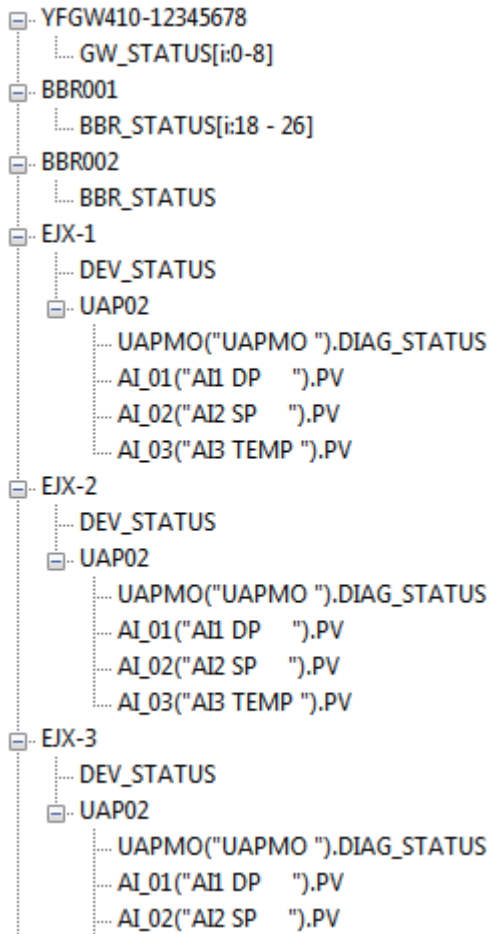


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Figure D4-62 Example of Input Registers Mapping

In this example, GW_STATUS is allocated to register numbers 0 through 8, and BBR_STATUS of BBR002 is allocated to register numbers 18 through 26.

In this case, the [Available Parameters] section of the [Input Registers] tab is configured as follows.



Items displayed in the tree

First level : Device tag name

Second level : Device status (GW_STATUS, BBR_STATUS, and DEV_STATUS)

Field wireless device UAP ID

Third level : Field wireless device parameter name

GW_STATUS and BBR_STATUS of BBR002 allocated in the [Input Registers] section have their input registers numbers (as a range) added to the right of the parameter name.

The format is as follows: [i:xxx-xxx].

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The [Input Registers] section is configured as follows.

No.	Input Registers
0	YFGW410-12345678.GW_STATUS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	BBR001.BBR_STATUS
19	
20	
21	
22	

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The list is comprised of a column of registers numbers starting from 0 and a column of parameter names.

Areas in which process values are allocated are light blue and areas in which statuses are allocated are light pink. The first row of the addresses contains the parameter name.

○ For Data Type Mapping

The status and value of the parameters which send to a host system are separated and mapped to respective areas.

When Data Type Mapping is selected at the [Modbus Settings] tab, parameter values are allocated to register numbers lower than the start status registers. The status of parameters are automatically arranged in accordance with the following rule after a start of status registers. The status of parameters are allocated in order which has arranged the value in the status allocation range for every value data size.

When [Start of status registers] is 20000 (devices with 65536 registers)

Value data size	Status allocation range
8 words	20000~29999
2 words	30000~39999
1 word	40000~59999

When [Start of status registers] is 5000 (devices with 10000 registers)

Value size	Status allocation range
8 words	5000~5999
2 words	6000~8999
1 word	9000~13999

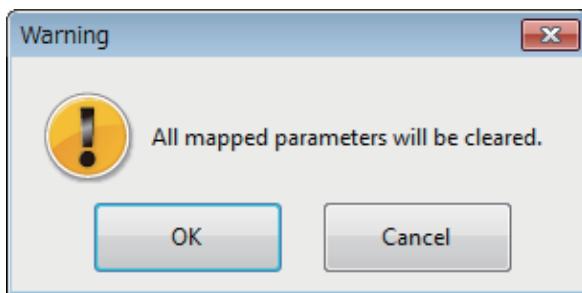
Example) When the data value is two words ([Start of status registers] is 5000)

Top number of value	Status allocation number
0	6000
2	6001
4	6002
...	...
500	6250
502	6251

○ Batch Operation

There is a [Batch Operation] button at the bottom of the [Input Registers] tab

When the [Auto Mapping] button is clicked, all parameters are automatically allocated. When data has been already allocated, all allocation information is discarded and allocation is performed again. The dialog shown in Figure D4-63 appears.



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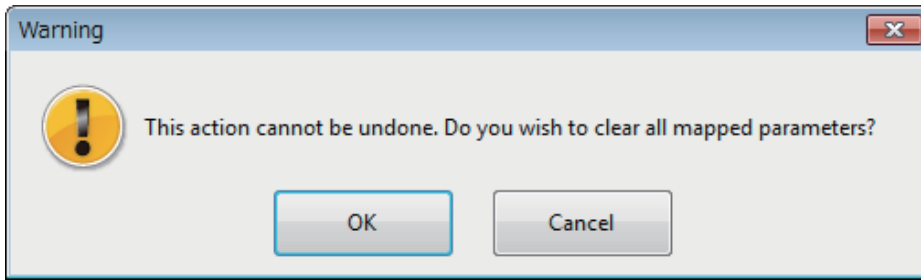
Figure D4-63 Warning Dialog

When the [OK] button is clicked, the automatic allocation is reflected in the Input Registers tab. When the [Cancel] button is clicked, the information is not changed and the dialog is closed.

The order of the auto mapping follows rules in the chart.

Parameter	Normal Mapping	Data Type Mapping
GW_STATUS (YFGW410)	0 to 8 (Reserve 9 to 29)	0 to 7 (Reserve 8 to 29)
BBR_STATUS	30 to 389 (Reserve 390 to 499)	30 to 349 (Reserve 350 to 499)
Publish data and DEV_STATUS	500 to 65535	500 to (Start of status setting -1)

All parameter allocation information can be deleted by clicking the [Clear All] button. When the [Clear All] button is clicked, the dialog shown in Figure D4-64 appears.



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Figure D4-64 Modbus Registers Settings Deletion Warning Dialog

When the [OK] button is clicked, the information is deleted. When the [Cancel] button is clicked, the information is not deleted and the dialog is closed.

○ Filter settings

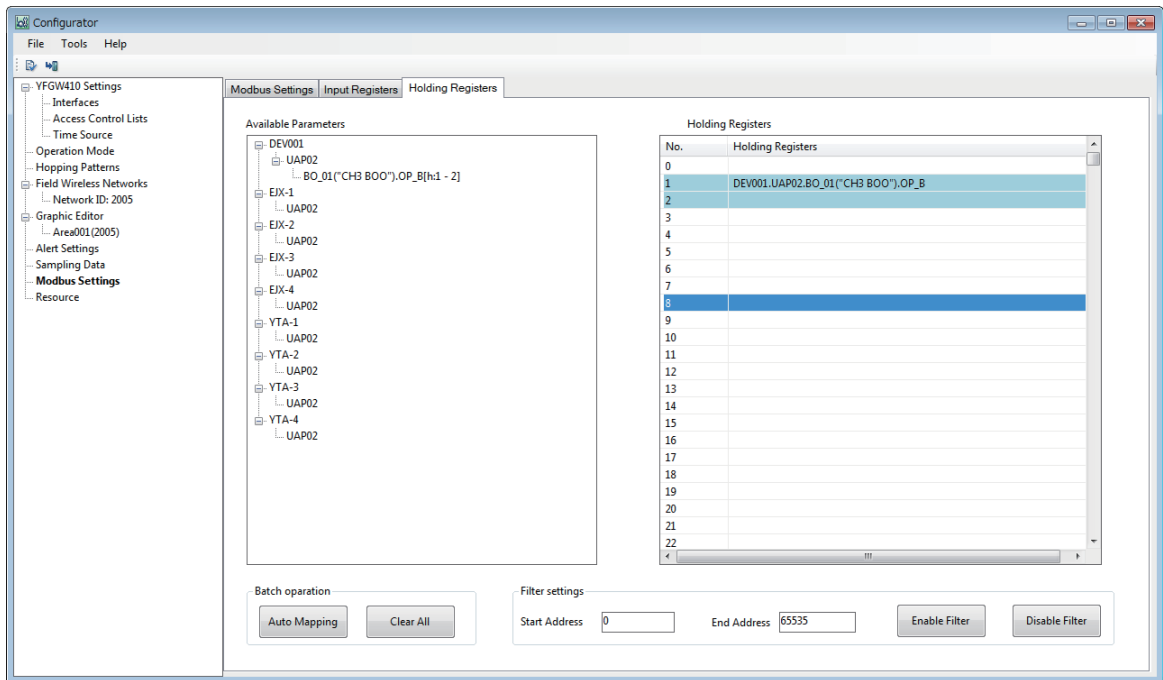
The display range of the [Input Registers] section can be limited by filter settings.

In the Start Address field, enter the register number from which to start display. In the End Address field, enter the register number from which to end display.

Clicking the [Enable Filter] button enables the filter settings and limits the register numbers that are displayed. Clicking the [Disable Filter] button disables the filter settings and all register numbers are displayed.

● Holding Registers Tab

When the [Holding Registers] tab is selected, the tab shown in Figure D4-65 appears.



FD0471.ai

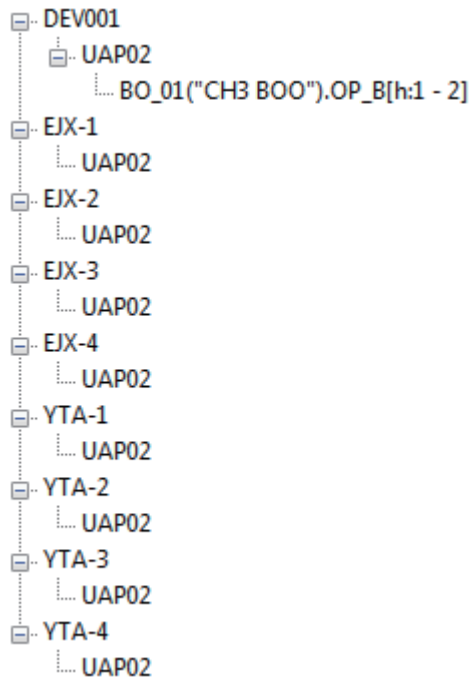
Figure D4-65 Holding Registers Tab

The [Holding Registers] tab is comprised of two sections: Available Parameters and Holding Registers.

Registered devices with write parameters that can be allocated to the holding registers are displayed in the [Available Parameters] section in the following format.

Contents of [Available Parameters] will be changed depending on the selection of [Read Parameter Assignment] in [Modbus Setting] tab.

When selecting Input Registers in [Read Parameter Assignment], registered devices with write parameters are displayed in the [Available Parameters] section in the following format.



- First level : Device tag name
- Second level : Field wireless device UAP ID
- Third level : Field wireless device parameter name

When the device does not have parameters that can be registered to the holding registers, no parameter is displayed in the third level.

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When selecting Holding Registers in [Read Parameter Assignment], not only the registered devices with write parameters but also the registered devices with read parameters will be displayed in the [Available Parameters] section.

Parameters can be allocated to Holding Registers are as follows.

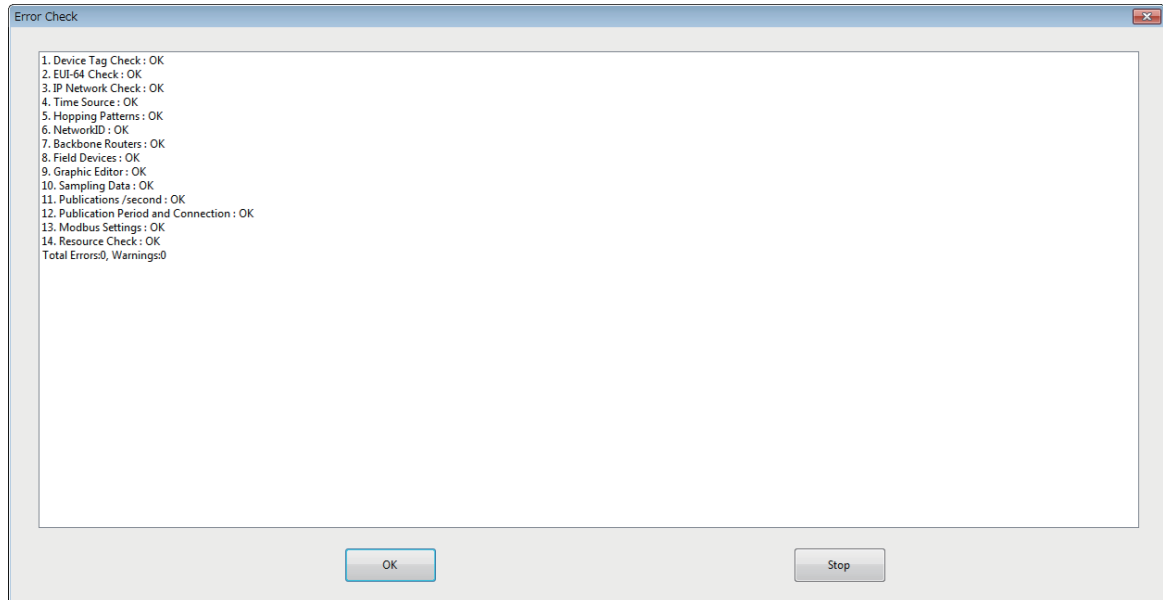
○ When selecting Input Registers in [Read Parameter Assignment]

Parameter name	Description	Data size (word)	
		Data status	Data
AO_xx("BLOCK_DESCRIPTION").OP	Output of analog data	1	2
BO_xx("BLOCK_DESCRIPTION").OP_B	Output of binary data	1	1

The network ID of the field wireless network and the resource usage rate (%) of that field wireless subnets are displayed in the resource tab. Devices can be added as long as the usage rate does not exceed 100%.

After configuring new settings or changing settings of the Configurator, perform an error check of the wireless network before selecting [Resource].

To perform an error check, click [Tools] and then click [Error Check]. When the check is complete, the window shown in Figure D4-67 appears.



FD0474.ai

Figure D4-67 Error Check Window

This window displays the results of the error check. Make corrections in the relevant locations until the number of errors and warnings shown in the last line of the window reaches "0".

After confirming there are no errors, click the [OK] button to close the window. Click the [Stop] button to stop an error check while it is running.

D4.2.10 Downloading Wireless Network Settings

Please check configuration before downloading that it meets the setting rules.

● Error Check

To check the compatibility of the setting information with the setting rules, click [Tools], and then click [Error Check] in the menu bar of the Configurator. Alternatively, click the download icon [📄] in the command bar.

After the check is complete, the window shown in Figure D4-67 appears. If there are errors or warnings in the results, click the [OK] button. The error check window closes and returns to main window. Correct the relevant items.

● Download

○ When downloading from the default setting condition

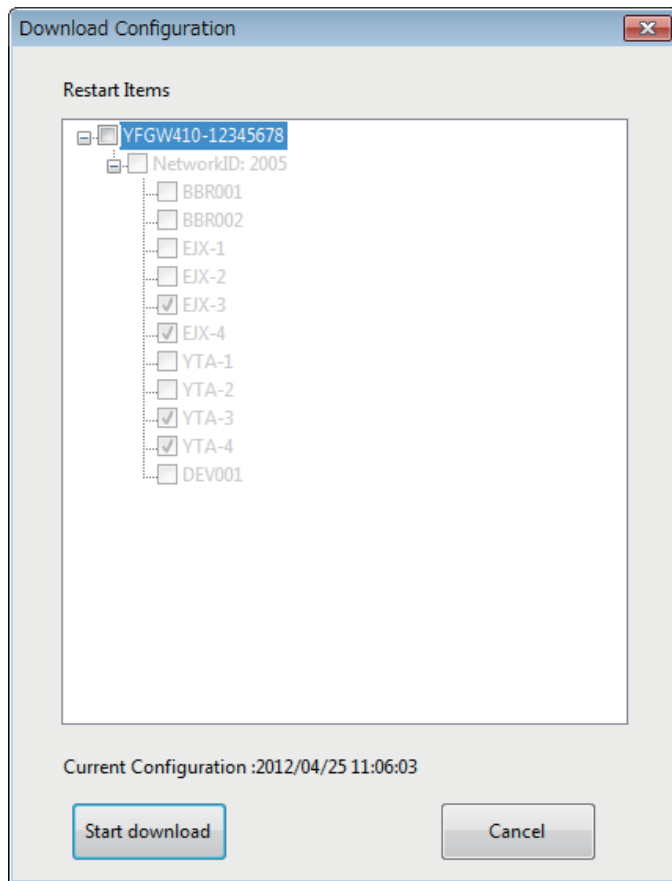
After using the Configurator to configure the field wireless network, download the setting information to the YFGW410.

All information of the YFGW410, YFGW510, and field wireless devices is downloaded, but the YFGW510 and field wireless devices do not need to be running. When the YFGW510 and field wireless devices are running, the setting information is automatically downloaded from the YFGW410.

To check the compatibility of the setting information with the setting rules, click [Tools], and then click [Download] in the menu bar of the Configurator. Alternatively, click the download icon [📄] in the command bar.

After the check is complete, the results are displayed in Figure D4-67. If there are no errors or warnings in results, click the [OK] button. The error check window closes and Figure D4-68 appears.

If there are items that require correction, click the [OK] button. The error check window closes and returns to main window. Correct all the relevant items. Next, either perform the error check mentioned later or perform the download procedure again.

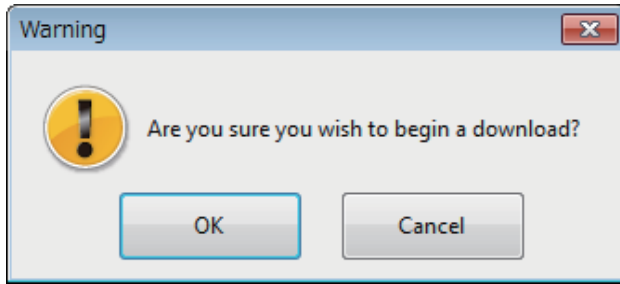


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Figure D4-68 Download Configuration Window

In the download configuration window, devices that require a restart after downloading due to new or changed settings have their check box selected. Check boxes can be cleared by clicking them. To add models that are restarted manually, select the check box of the relevant devices. Devices positioned below checked items have their check boxes selected automatically.

When the [Start Download] button is clicked, the dialog shown in Figure D4-69 appears. When the [Cancel] button is clicked, nothing is downloaded and the dialog is closed.

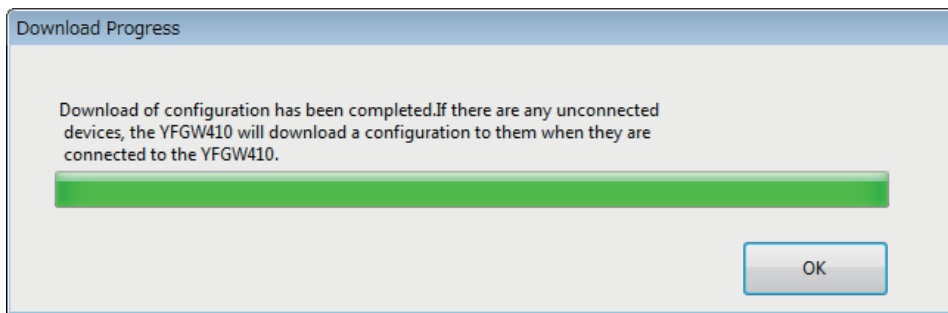


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Figure D4-69 Start Download Warning Dialog

When the [OK] button is clicked, downloading to the YFGW410 starts. When the [Cancel] button is clicked, the warning dialog is closed.

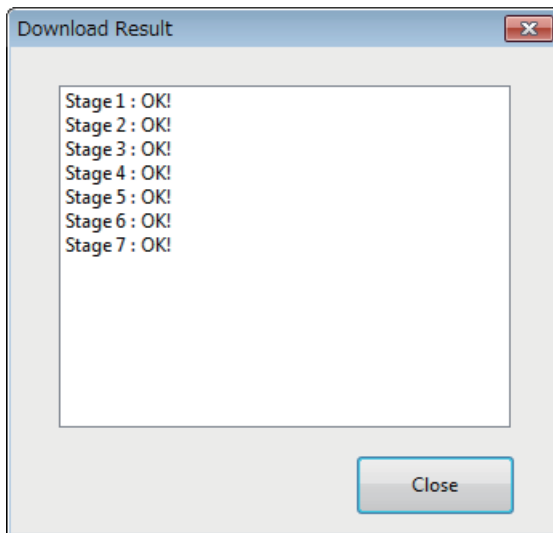
When the download is complete, the window shown in Figure D4-70 appears.



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Figure D4-70 Download Progress Window

When the [OK] button of the confirmation window is clicked, the window is closed and the window shown in Figure D4-71 appears.



FD0478.ai

Figure D4-71 Download Result Window

Confirm that the results of all download processes are OK, and then click the [Close] button to close this window.

○ When changing settings and downloading in an operational state

Be aware of the following points when changing and downloading settings after starting operation of the field wireless network.

- While YFGW410 communicates to set a publish configuration to field wireless devices, the configuration download may be failed. To avoid this, confirm that the status of the target field wireless devices that are changed configuration are Published, then execute the configuration download.
- When deleting a routing device or changing a role from router, devices which is connected under target routing device will leave from the network. If IO (Auto) device is used, confirm before deleting that IO (Auto) device is not connected under target routing device.
- When changing configuration of field wireless network in an operational state, field wireless network resource will increase temporally. Even if the resource usage rate is less than 100%, changing route may be failed. To change configuration of field wireless network (e.g., adopting field wireless device or changing route) in an operational state, the network resource is less than 50%, is recommended. Regarding field wireless network resource, see D4.2.9 Resource.
- Changing CF file of field wireless device requires restart target devices. If not restart device, changing CF file will not be applied. The operation status is Session time-out, indicates that CF file doesn't match to the device.

Depending on the configuration changes of the field wireless network, there are cases that field wireless subnets must be restarted when the setting information is downloaded. Note the following points to avoid restarting field wireless subnets.

- Download the setting information every time performing each single operation of the followings to avoid restarting the respective field wireless subnet:
 - Route change
 - Device role change
 - Duocast setting change
- If multiple operations as listed above to a field wireless device or adding/removing the field wireless device with the above operation are performed, a request to restart the respective field wireless subnet is issued when the setting information is downloaded.
- When the hopping pattern is selected or changed, a request to restart the respective field wireless subnet is issued when the setting information is downloaded.
 - In the download configuration window, field wireless subnets that require a restart after downloading have their check box selected. If check boxes are selected, the subnet will be restarted.
 - If the lack of network resource is anticipated during configuration changes, YFGW410 will judge the restarting of the respective field wireless subnet.



IMPORTANT

Do not perform this operation at the same time as conflicting operations at the Configurator and Monitor. Always confirm that conflicting processes are completed before carrying out this operation. For details about conflicting operations at the Configurator and Monitor, see Sub-section D2.2.2. Launching the tool.



IMPORTANT

If the Monitor is running when settings are downloaded, the Monitor may close. If the Monitor closes, restart it.

D4.2.11 Other Setting Operations

The menu bar of the Configurator has three items: [File], [Tools], and [Help].

● File Menu

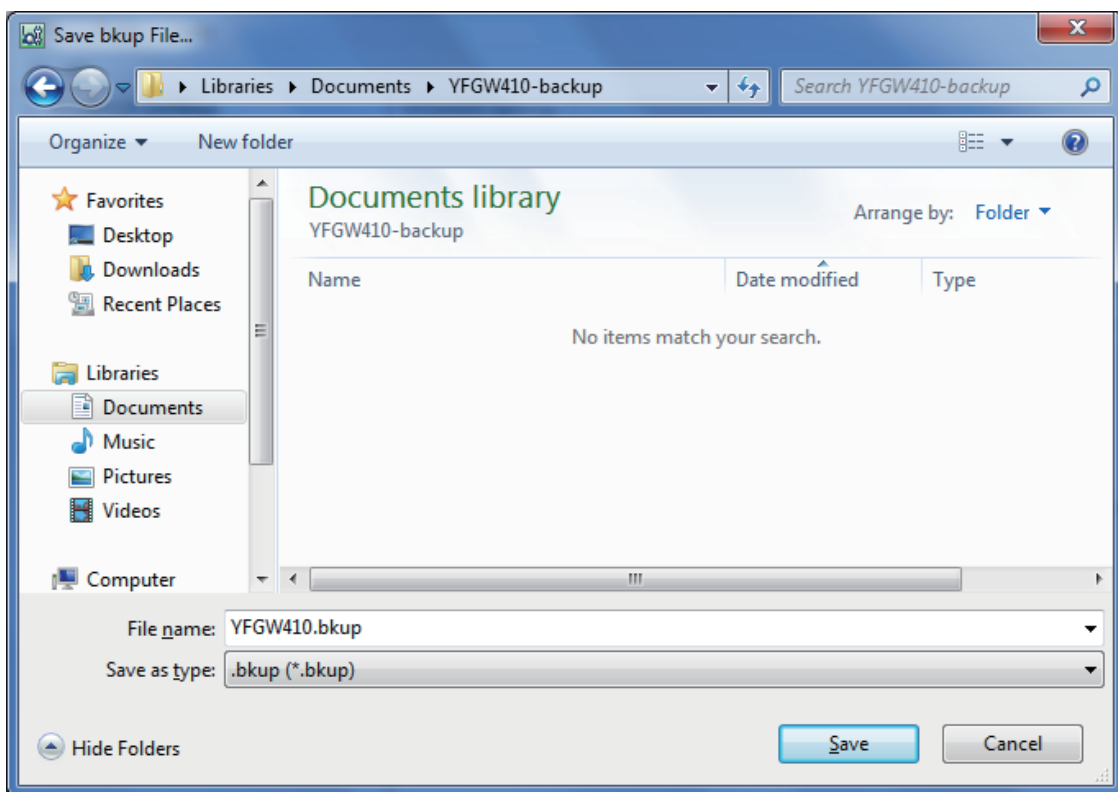
The File menu has the following six items.

[Backup], [Restore], [Export Configuration Data], [Export Modbus Registers], [Import Modbus Registers], and [Exit]

○ Backup

This function backs up the wireless network setting information created by the Configurator of the YFGW410 to a file.

When [File] and then [Backup] are clicked, the window shown in Figure D4-72 appears.



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Figure D4-72 Save Backup File Window

When the file name and storage location are specified and the [Save] button is clicked, the window shown in Figure D4-73 appears. When the [Cancel] button is clicked, the save backup file window is closed.



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Figure D4-73 Backup Window

At this window, encryption and a password can be added to the backup file.

The default setting is [Only Encryption]. When [Encryption with Password] is selected, the password fields become available. Enter a password into the File password and the Retype password fields.

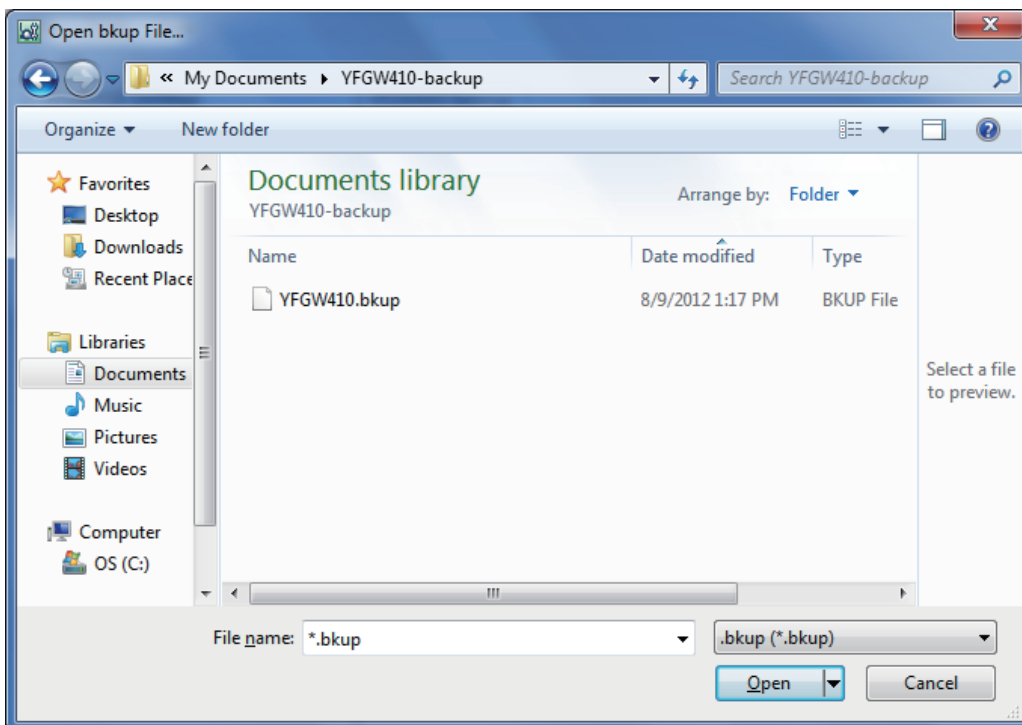
Up to 16 half-byte alphanumeric characters and symbols can be entered.

When the [OK] button is clicked, a file of the field wireless network settings is saved. When the [Cancel] button is clicked, the window is closed.

○ Restore

This function restores saved backup file into the Configurator.

When [File] and then [Restore] are clicked, the window shown in Figure D4-74 appears.

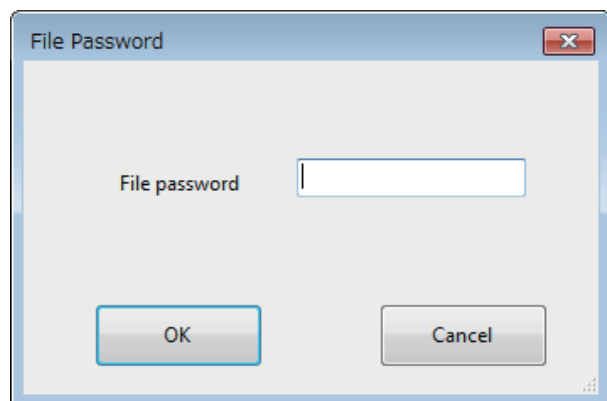


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Figure D4-74 Restore the Backup File Window

Select a file with the extension [.bkup] and then click the [Open] button. The configuration data is imported into the Configurator. When the [Cancel] button is clicked, the window is closed.

If the backup file has a password, the window shown in Figure D4-75 appears when the [Open] button is clicked.



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Figure D4-75 File Password Window

Enter the password specified when the configuration data was backed up, and then click the [OK] button. The configuration data is imported. When the [Cancel] button is clicked, the window is closed and the backup file is not imported.

Click the [Restore] button after confirming that all items are checked. Selecting restore items is for the use of service personnel and is not required for ordinary inspection and management.

○ Export Configuration Data

This function outputs a part of the configuration data as an XML format text file.

When [File] and then [Export Configuration Data] are clicked, the output window for the data appears. Select the file directory and file name, and then output the file.

○ Export Modbus Registers

This function outputs process value and status data information allocated in the Modbus registers as a CSV-formatted text file.

When [File] and then [Export Modbus Registers] are clicked, the output window for the Modbus register settings appears. Select the file directory and file name, and then output the file.

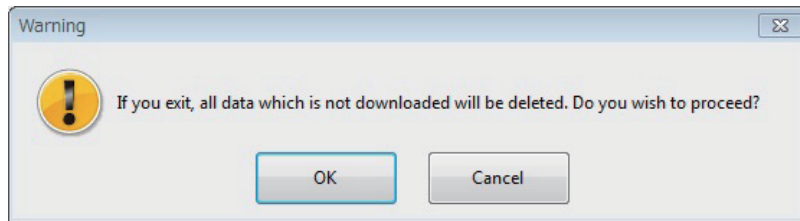
○ Import Modbus Registers

This function imports a CSV-formatted text file with process value and status data information to be exported to the Modbus registers.

When [File] and then [Import Modbus Registers] are clicked, a window to select the CSV file to be imported appears. Import the required file. Imported setting information is reflected in the [Input Registers] section of the [Input Registers] tab and the [Holding Registers] section of the [Holding Registers] tab of the Modbus settings.

○ **Exit**

When [File] and then [Exit] are clicked, the dialog shown in Figure D4-76 appears. When is necessary to save the configuration data to a file, back up the settings ahead of time.



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Figure D4-76 Warning Dialog

When the [OK] button is clicked, the Configurator closes.

● **Tools**

The Tools menu has the following five items.

[Error Check], [Download], [Change Password], [User Account Manager], and [Time Setting]

○ **Error check**

Check the errors in the setting information.

To perform an error check, click [Tools] and then click [Error Check].

For details, see Sub-section D4.2.10. Downloading Wireless Network Settings

○ **Download**

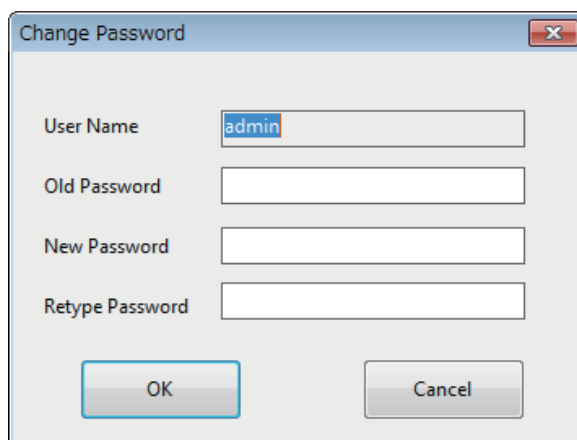
Download field wireless network settings to the YFGW410, YFGW510, and field wireless devices.

For details, see Sub-section D4.2.10 Downloading Wireless Network Settings.

○ **Change password**

The password of the user currently logged into the Configurator can be changed.

When [Tools] and then [Change Password] are clicked, the window shown in Figure D4-77 appears.



FD0484.ai

Figure D4-77 Change Password Window

The User Name field displays the name of the user logged into the Configurator. Enter the current login password in the Old Password field. Enter at the new password in the New Password and Retype Password fields. For privacy, characters entered into the password fields are displayed as asterisks [*].

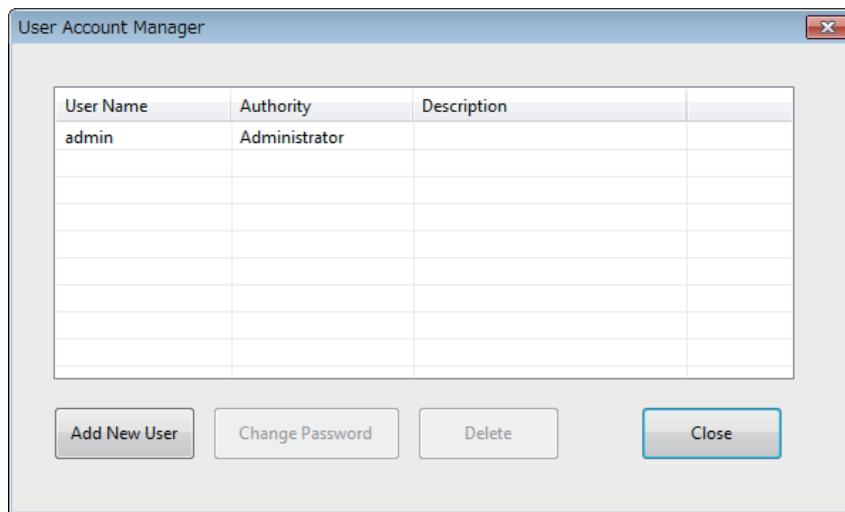
Up to 16 half-byte alphanumeric and non-alphanumeric characters (Ex. !,\$,#,%) can be entered.

When the [OK] button is clicked, the password is changed and the window closes. When the [Cancel] button is clicked, the password is not changed.

○ User Account Manager

Use the User Account Manager to register, delete, and restrict user accounts and manage passwords.

When [Tools] and then [User Account Manager] are clicked, the window shown in Figure D4-78 appears.



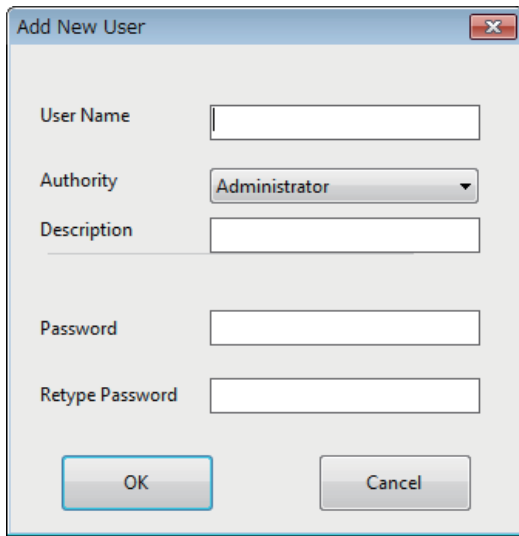
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Figure D4-78 User Account Manager Window

Item	Description		Default registered user
User Name	Login username		admin
Authority	Operation authority	Administrator	Administrator
		PowerUser	
		RegularUser	
Description	Add a description		

Button name	Function
Add New User	Register a new login user.
Change Password	Select a registered user and change their password.
Delete	Select and delete a registered user.
Close	Close the User Account Manager window

- Add New User
When the [Add New User] button is clicked in the window shown in Figure D4-78, the window shown in Figure D4-79 appears.

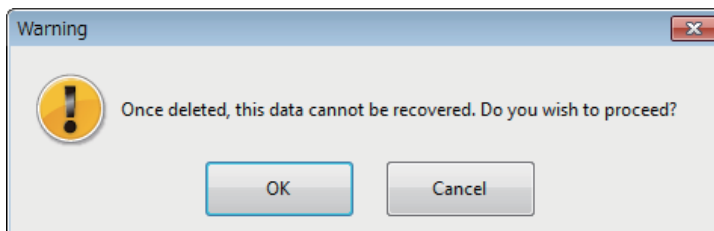


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Figure D4-79 Add New User Window

Fill in the [User Name], [Authority], [Password], and [Retype Password] fields and then click [OK]. The new user is registered and the window closes. When the [Cancel] button is clicked, the user is not added.

- Change Password
When the [Change Password] button is clicked in the window shown in Figure D4-78, the window shown in Figure D4-77 appears. For details about changing passwords, see “Change password” in this sub-section.
- Delete
In the window shown in Figure D4-78, select the user to be deleted from the registered users shown in the user account list. When the [Delete] button is clicked in this state, the dialog shown in Figure D4-80 appears.



FD0487.ai

Figure D4-80 Warning Dialog

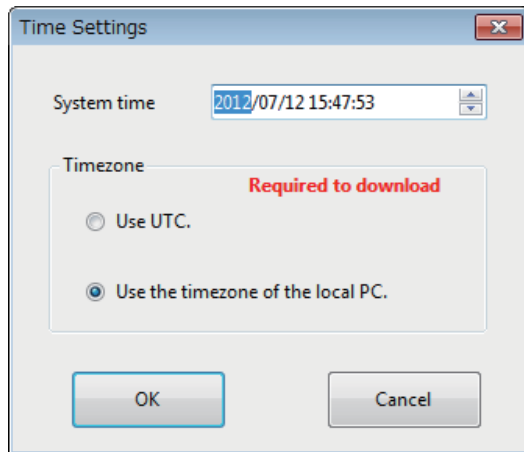
When the [OK] button is clicked, the selected user account is deleted. When the [Cancel] button is clicked, the user is not deleted and the dialog is closed.

- Close
When the [Close] button is clicked in the window shown in Figure D4-78, the user account manager window closes.

○ **Time settings**

Set the system time and time zone for the YFGW410.

When [Tools] and then [Time Settings] are clicked, the window shown in Figure D4-81 appears.



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Figure D4-81 Time Settings Window

Item	Description		Initial setting
System Time	System time of YFGW410		System time when the window is displayed
Timezone	Time zone	Use UTC	Use UTC
		Use the time-zone of the local PC	Use the time zone of the PC running the Field Wireless Management Console.
			Time zone of PC

When the system time and time zone are set and the [OK] button is clicked, the settings are changed.

The system time is changed when the [OK] button is clicked.

The time zone is changed when the wireless network settings are downloaded.

When the [Cancel] button is clicked, no changes are made and the window is closed.



IMPORTANT

After the system time is changed, manually restart the YFGW410.



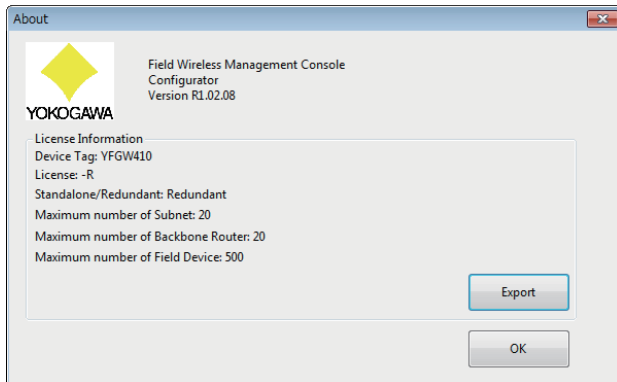
IMPORTANT

When [Use the timezone of the local PC] is selected for the time zone and the time zone of the client PC is changed, it is necessary to restart the Configurator and Monitor.

● Help

The Help menu contains the [About] item.

When [Help] and then [About] are clicked, a window shown in Figure D4-82 appears. This window shows the application version number and license usage status.



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Figure D4-82 Version and License Information Window

[Export] button is for the use of service personnel, and is not required for ordinary inspection and management.

D5. Starting up the Field Wireless System

This chapter describes how to start up the Field Wireless System and check the communications quality.

The Monitor from the Field Wireless Management Console, which is contained in the YFGW410, shows the communications quality. For instructions on how to start up the application, see Sub-section D2.2.2 Launching the tool.

D5.1 Procedure for System Start-up

After following the connection instructions in part C, start up the Field Wireless System in the following sequence.

- 1 Host system
- 2 YFGW410
- 3 Field Wireless Access Point YFGW510
- 4 Field wireless device (devices with routing function)
- 5 Field wireless device (devices with only IO function)

For 4 and 5, start devices physically closer to YFGW510 first.

Power on YFGW410, and wait approximately 1 minute after the RDY LED has lighted up green, then start the Monitor of the Field Wireless Management Console. The Monitor will show the status of wireless communications.



IMPORTANT

When enabling F1-F3 ports of YFGW410, power on the connected devices before starting YFGW410. A link down state for F1-F3 ports is handled as an error.

In redundant configuration, enabled F1-F3 ports shall be a link up state.

Next, turn on YFGW510 and use the Monitor to confirm connection (Full Join) to the network. Instructions on how to check this with the Monitor are described below.

Next, start up the field wireless devices that have routing function (Router or IO+Router setting), from a number of small hops. The method of starting up the devices depends on the status of the devices. If the device is in deep sleep mode, remove the battery once and plug it back in again. If the device is in radio silence mode, it will automatically start up and start connecting to the target network within an hour. If it fails to connect within the specified time frame, it will attempt connection every hour. For detailed instructions on start up, refer to the user's manual of each device.

Using the Monitor, check that all field wireless devices that have routing function have connected (Full Join) to the network. Instructions on how to check this with the Monitor are described below.

Finally, start up field wireless devices with IO functions only, starting with devices that are physically closer to YFGW510.

The method of starting operation for IO devices is the same as for devices with routing functions. Using the Monitor, confirm that all field wireless devices have connected (Full Join) to the network. Instructions on how to check this with the Monitor are described below.

After confirming that all field wireless devices have connected (Full Join) to the network, when 3 to 6 hours have elapsed, use the Monitor to check the radio communications path, communications quality and status of the field wireless devices. If there is any problem with communication quality or paths, reconsider the positions of the field wireless devices and/or antennas and adjust them.

For details of how to check communications quality with the Monitor and use device management functions see Section D5.2 Wireless Network Management.



IMPORTANT

Within the same field wireless subnet, while a field wireless device is trying to join through an existing the Field Wireless Access Point, a new Field Wireless Access Point is not available immediately. Once the field wireless device has successfully joined, the new Field Wireless Access Point will be available.

D5.2 Wireless Network Management

Check that the field wireless network is up and all communications are stable, then the system will be a normal operation.

Since the quality of wireless communications is affected by the environment of the communications paths. Even after checking that communications are stable,

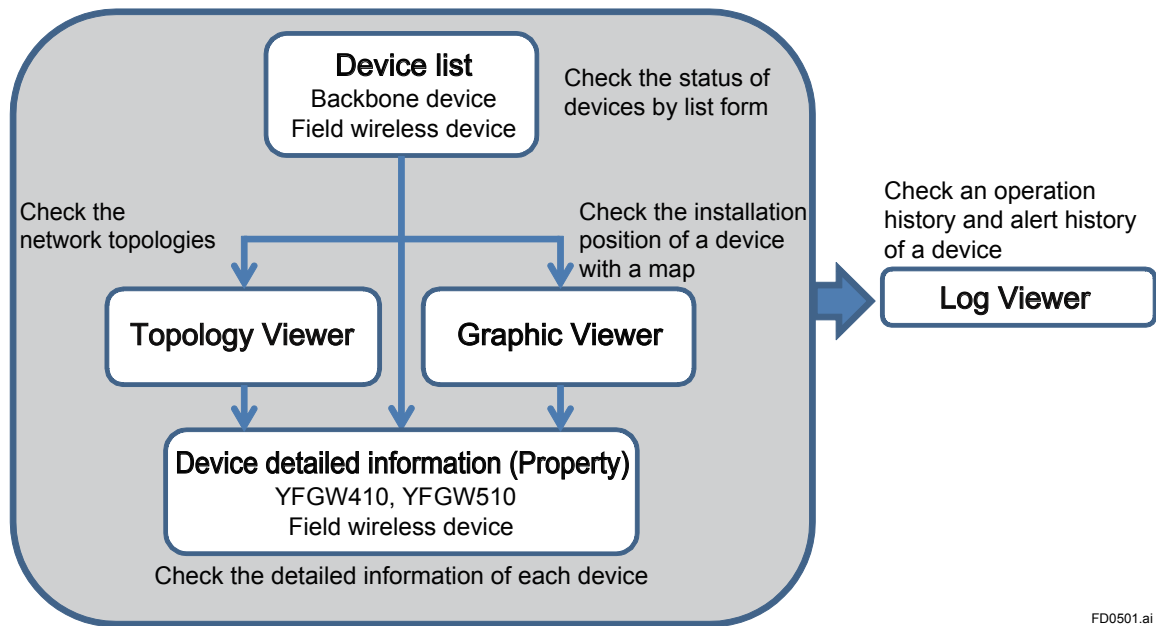
Various causes (installation of structures or machines, arrival of a large vehicle, temporary construction installations, or new installation of wireless networks using the same frequency on a different wireless LAN) may lead to deterioration. To keep a stable field wireless network, requires regular status monitoring and maintenance of the wireless network.

The Monitor in the Field Wireless Management Console built into YFGW410 is used for monitoring status and management of the wireless network and devices.

D5.2.1 Monitor Functions

The Monitor provides functions to show the wireless network topology, backbone device status (YFGW410 and YFGW510), and field wireless device status, functions for logging operations and warning or fault messages, and functions for updating the firmware of the devices.

These functions are related as follows.



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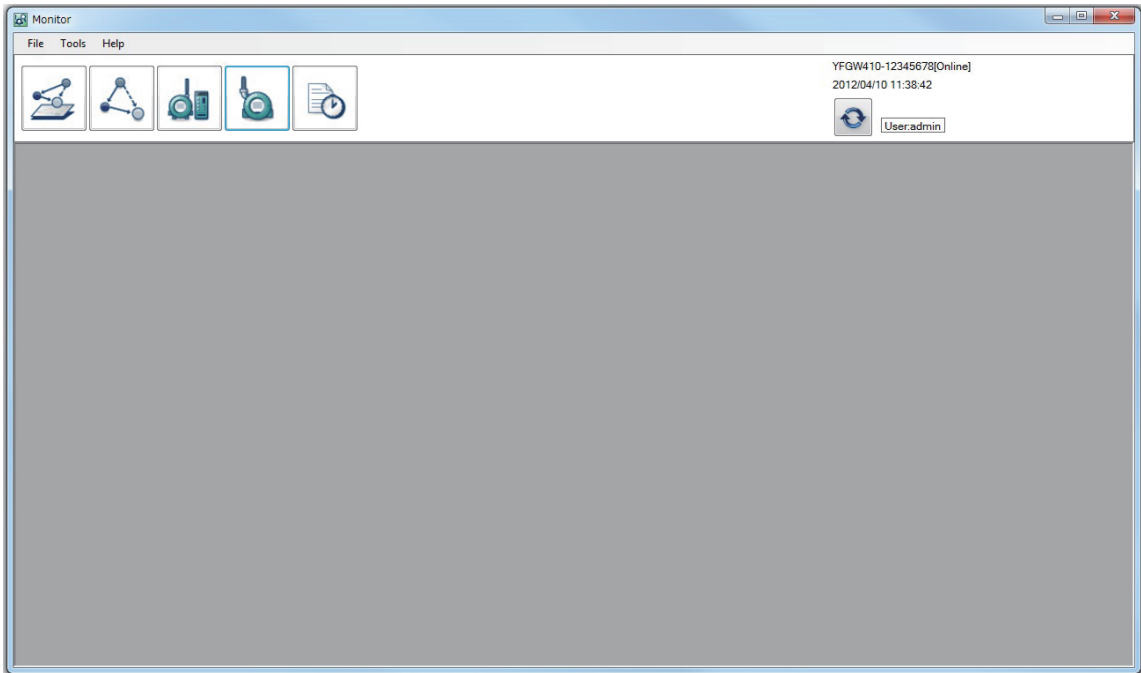
Figure D5-1 Relations among Monitor Functions

A procedure of monitoring the field wireless network is following.

- Check the status of devices by the Device List.
For details, see Sub-section D5.2.5 Backbone Device List and Sub-section D5.2.6 Field Device List.
- Check the field wireless network topology with the Topology Viewer.
For details, see Sub-section D5.2.4 Topology Viewer.
- Check the device installation locations and network topology by the Graphic Viewer.
For details, see Sub-section D5.2.3 Graphic Viewer.
- When the Monitor shows warnings or errors, check the status of each device and/or communications path by the Property panel.
For details, see Sub-section D5.2.3 Graphic Viewer.
- Check the operation history and device warning and fault occurrence history in the Log Viewer, to aid in problem analysis.
For details, see Sub-section D5.2.7 Log Viewer.

D5.2.2 The Monitor Start up Window

Figure D5-2 shows the start up window of the Monitor.









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Figure D5-2 Monitor Start up Window

At first when the start up window has opened, there is nothing displayed in the lower pane.

There are three menus, [File], [Tools], and [Help] in the menu bar. There are six icons that execute the viewers in the tool bar. The information will be appeared in the lower pane by selecting an icon.

The icons in the tool bar have the following functions.

Icon	Name	Function
	Graphic Viewer	Display locations of wireless devices on a plan or map, and show communications paths between devices. Click on a device icon or communications path to show details.
	Topology Viewer	Display the wireless network communications paths (topology). Click on a device icon or communications path to show details.
	Backbone Device List	Display the status of the field wireless backbone devices (YFGW410, YFGW510). Click on the row for a particular device to show details.
	Field Device List	Display the status of the field wireless devices. Click on the row for a particular device to show details.
	Log Viewer	Display a log of monitor operations and device warnings and fault occurrences.
	Refresh	Refresh the information by manual.

The information is automatically refreshed every minute.

Device details are only automatically refreshed for field wireless devices. For details of device detail display, see Sub-section D5.2.3 Graphic Viewer.



IMPORTANT

Depending on the information refresh timing, status of devices and/or communications paths may be an intermediate status. It does not indicate an operational or other problem. From the next refresh the display will be complete.

The information on the right side of the tool bar shows the following information.

Line 1: Connected YFGW410 device tag. The connection status or operating mode of YFGW410

Line 2: YFGW410 time

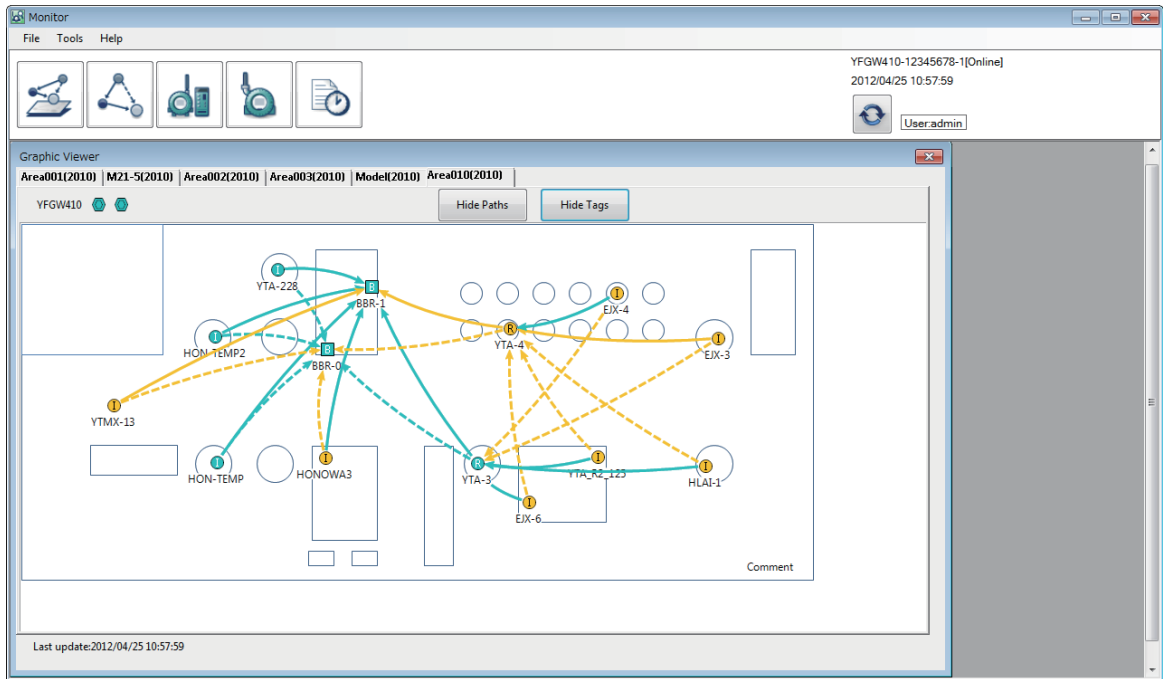
Line 3: Refresh button and user name

Item	Description
Connected YFGW410 device tag	Device tag of YFGW410. In redundant operation, the device tag of the operating YFGW410 appears. In UNIT1 YFGW410 case, the device tag has "-1" appended. In UNIT2 YFGW410 case, the device tag has "-2" appended. The UNIT number is determined by the cable of redundancy.
Connection status or operating mode of YFGW410	When the Monitor is connected to YFGW410, <Online> appears, otherwise <Offline> appears.
YFGW410 time	The time of the latest refresh appears. The time zone of this and time is set by the Configurator. See Sub-section D4.2.11 Other Setting Operations.
User name	Shows the logged in user name.

D5.2.3 Graphic Viewer

The Graphic Viewer displays the communications paths on user specified image (e.g., a plan, a map or an aerial photograph). It also shows the selected individual devices and the status of their communications paths.

Start the Monitor, and click the [Graphic Viewer] icon to open the window shown in Figure D5-3.



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Figure D5-3 Graphic Viewer Window

The following icons appear on the background, depending on the function and status of the devices.

Device status	YFGW410	YFGW510	Device with router function	Device with IO function	Device group	Icon color
Normal						Cyan
Warning						Yellow
Fault						Red
Joining						Pale green

The communications paths are shown as follows.

Path status	Primary path	Secondary path	Description
Normal status			Communications path is normal quality.
Warning status			Communications path has a problem.



IMPORTANT

If both paths for a device have a communications fault status, the communications paths are not shown. Depending on the Monitor refresh timing, an intermediate status in which the icon does not indicate a fault even though the communications path is absent. It is correctly displayed at the time of the next refresh.



IMPORTANT

The device group paths are not shown if all devices have not joined the field wireless network. The device group communications paths and icons shown the worst case values for field wireless devices within the group.

The device status is determined as follows. This is common to all the Monitor windows.

○ YFGW410/YFGW510

Device Status	Conditions	Note
Normal	All status are normal.	
Warning	Device communications are operating, but any of the following problems have occurred: <ul style="list-style-type: none"> • Any of the F1 to F3 port in operation causes link-down. • The communication from YFGW510 to YFGW410 is interrupted • The received signal strength indication (RSSI) of wireless LAN is worse than the threshold value. 	Each threshold value is set by the Configurator.
Fault	A fault has occurred on a device, or there is a disconnection from the network.	Conditions are depended on the device type. (*1)
Joining	A wireless device is in the process of joining to the network.	Excluding YFGW410.

(*1) For details, see Sub-section D5.2.5 Backbone Device List.

○ Field Wireless Device

Device Status	Conditions	Note
Normal	All status are normal.	
Warning	Device communications are operating, but any of the following problems have occurred: <ul style="list-style-type: none"> • The packet error rate (PER) is worse than the threshold value. • The received signal strength indication (RSSI) is worse than the threshold value. • The battery level of a field wireless device has fallen below the threshold value. 	Each threshold value is set by the Configurator.
Fault	There is a disconnection from the network.	
Joining	A wireless device is in the process of joining to the network.	

The device tag appears under the icon indicating a device.

Pressing [Hide Paths] button, regardless of the device or communications path status, the communications paths disappear. Pressing the button again to redisplay the paths.

Pressing [Hide Tags] button, the device tags disappear. Pressing the button again to redisplay the device tags.

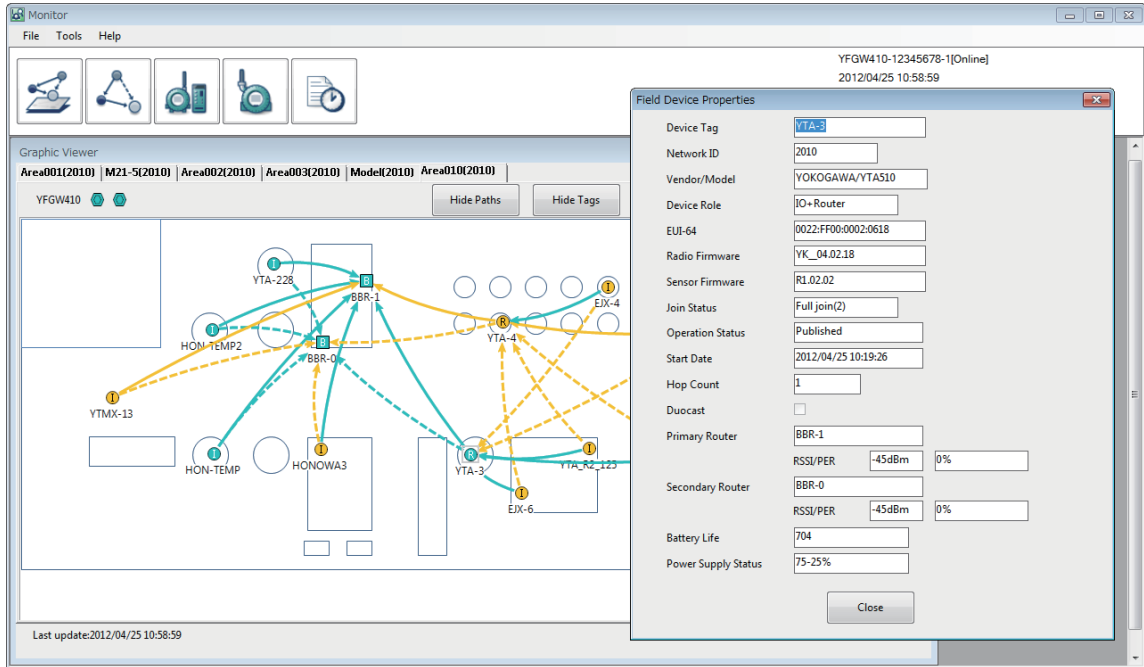
The lower left corner of the Graphic Viewer window shows the date and time of the most recent refresh.

● **Device properties**

The information is different for YFGW410, YFGW510, or a field wireless device, so Each information is described separately.

○ **Field wireless device**

Double click the field wireless device icon on the window to display the information shown in Figure D5-4.



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Figure D5-4 Field Wireless Device Properties Window

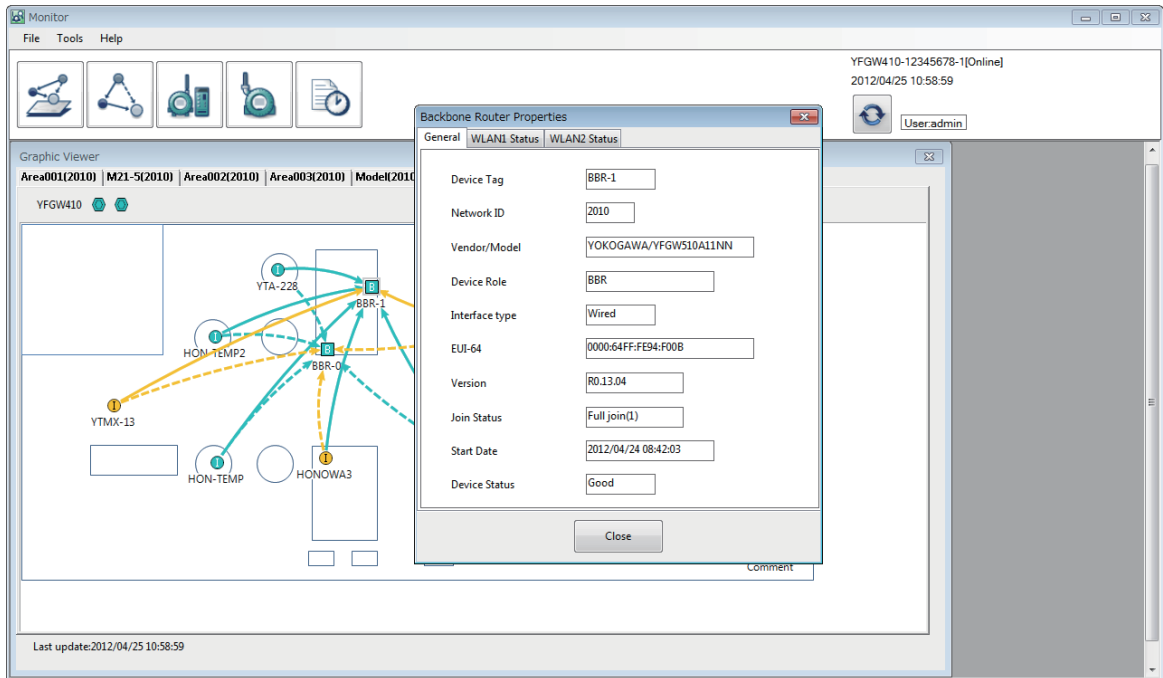
Following table shows each item of the field wireless device information. These items are displayed only and cannot be changed.

Item	Description
Device Tag	Device tag
Network ID	Network ID
Vendor/Model	Vendor/Model
Device Role	Device role
EUI-64	64-bit Extended Unique Identifier
Radio Firmware	Wireless module firmware version
Sensor Firmware	Sensor module firmware version
Join Status	Join status (number of joins shown in parenthesis)
Operation Status	Data publication status
Start Date	Date and time of sending join request to upper device
Hop Count	Number of hops to the field wireless access point
Duocast	Duocast operation setting status. When checked, Duocast operation is activated.
Primary Router	Device tag of a primary router
RSSI/PER	Received Signal Strength Indication (dBm) / Packet Error Rate (%)
Secondary Router	Device tag of a secondary router
Battery Life	Calculated battery operating life (days)
Power Supply Status	Battery capacity status

To close the properties window, click the [Close] button.

○ **Field Wireless Access Point**

Double click the backbone router icon on the window to display the information shown in Figure D5-5.



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Figure D5-5 Backbone Device Properties Window

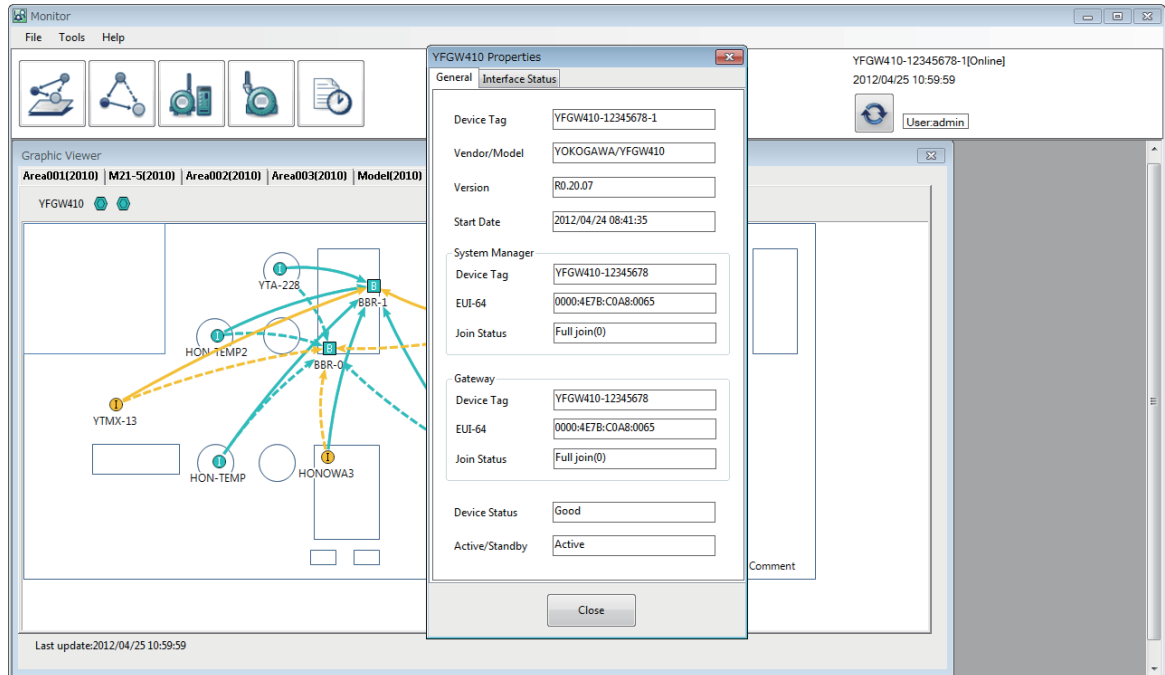
Following table shows each item of the field wireless access point information. These items are displayed only and cannot be changed.

Item	Description
Device Tag	Device tag
Network ID	Network ID
Vendor/Model	Vendor/Model
Device Role	Device role
Interface Type	Interface type of field wireless backbone
EUI-64	64-bit Extended Unique Identifier
Version	Device firmware version
Join Status	Join status (number of joins shown in parenthesis)
Start Date	Date and time of sending join request to upper device
Device Status	Device status

To close the properties window, click the [Close] button.

○ YFGW410

Double click the YFGW410 icon on the window to display the information shown in Figure D5-6. The window includes two tabs: the [General] tab and the [Interface Status] tab. Select the [General] tab to display the window shown in Figure D5-6.



FD0506.ai

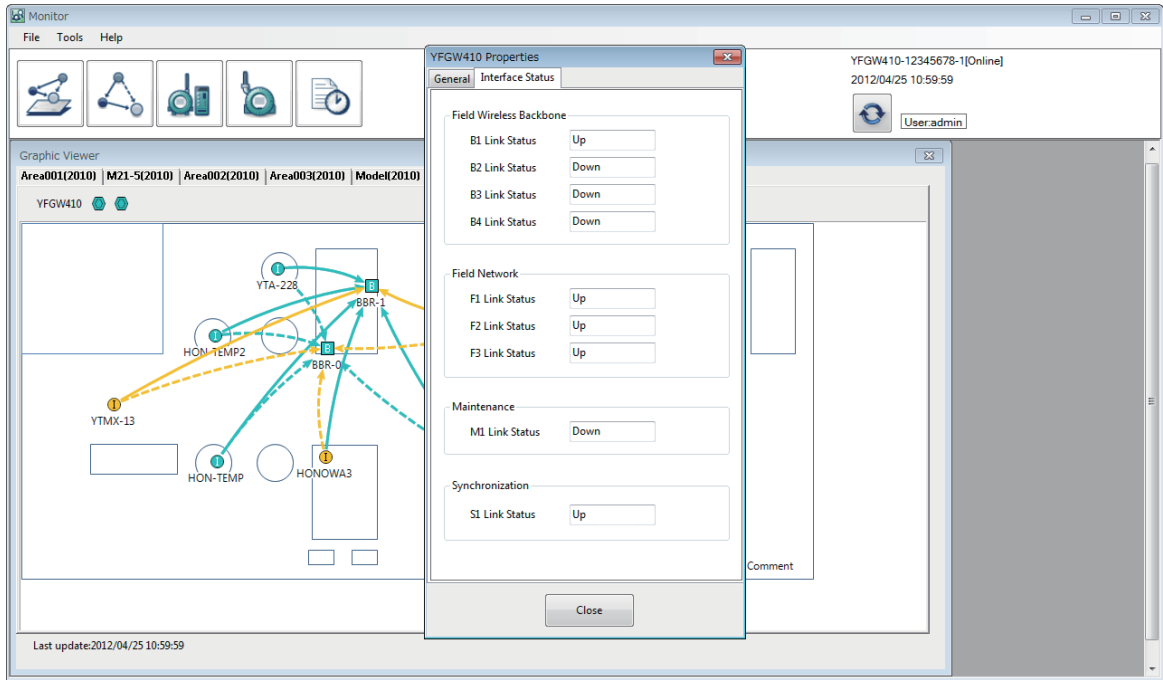
Figure D5-6 YFGW410 Properties Window (General tab)

The items on the [General] tab are as follows. These items are displayed only and cannot be changed.

Item	Description	
Device Tag	Device tag of YFGW410. In redundant operation, the device tag of the operating YFGW410 appears. In UNIT1 YFGW410 case, the device tag has "-1" appended. In UNIT2 YFGW410 case, the device tag has "-2" appended. The UNIT number is determined by the cable of redundancy.	
Vendor/Model	Vendor/Model	
Version	Firmware version	
Start Date	Date when device was started	
System Manager	Device Tag	System manager device tag
	EUI-64	System manager 64-bit Extended Unique Identifier
	Join Status	System manager join status (number of joins shown in parenthesis)
Gateway	Device Tag	Gateway device tag
	EUI-64	Gateway 64-bit Extended Unique Identifier
	Join Status	Gateway join status (number of joins shown in parenthesis)
Device Status	Device status	
Active/Standby	Active/Standby status indication	

To close the properties window, click the [Close] button.

Select the [Interface Status] tab to display the window shown in Figure D5-7.



FD0507.ai

Figure D5-7 YFGW410 Properties Window (Interface Status)

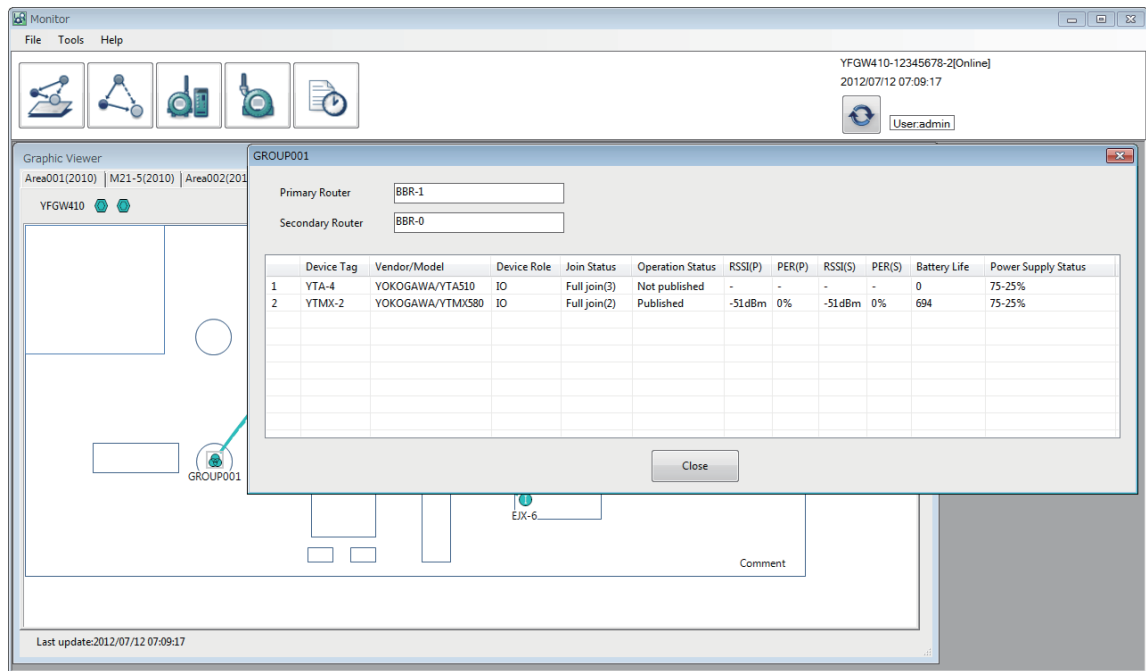
The items displayed on the [Interface Status] tab are as follows. These items are displayed only and cannot be changed.

Item		Description
Field Wireless Backbone	B1 Link Status	Field wireless backbone B1 port link status
	B2 Link Status	Field wireless backbone B2 port link status
	B3 Link Status	Field wireless backbone B3 port link status
	B4 Link Status	Field wireless backbone B4 port link status
Field Network	F1 Link Status	Field network F1 port link status
	F2 Link Status	Field network F2 port link status
	F3 Link Status	Field network F3 port link status
Maintenance	M1 Link Status	Maintenance interface M1 port link status
Synchronization	S1 Link Status	Redundancy synchronization S1 port link status

To close the properties window, click the [Close] button.

○ Device group

Double click the device group icon on the window to display the information shown in Figure D5-8.



FD0508.ai

Figure D5-8 Device Group Window

The device group ID is shown on the title of the window.

At the upper part of the window, the device group connection information appear. These items are displayed only and cannot be changed.

Item	Description
Primary Router	Devive tag of a primary router
Secondary Router	Device tag of a secondary router

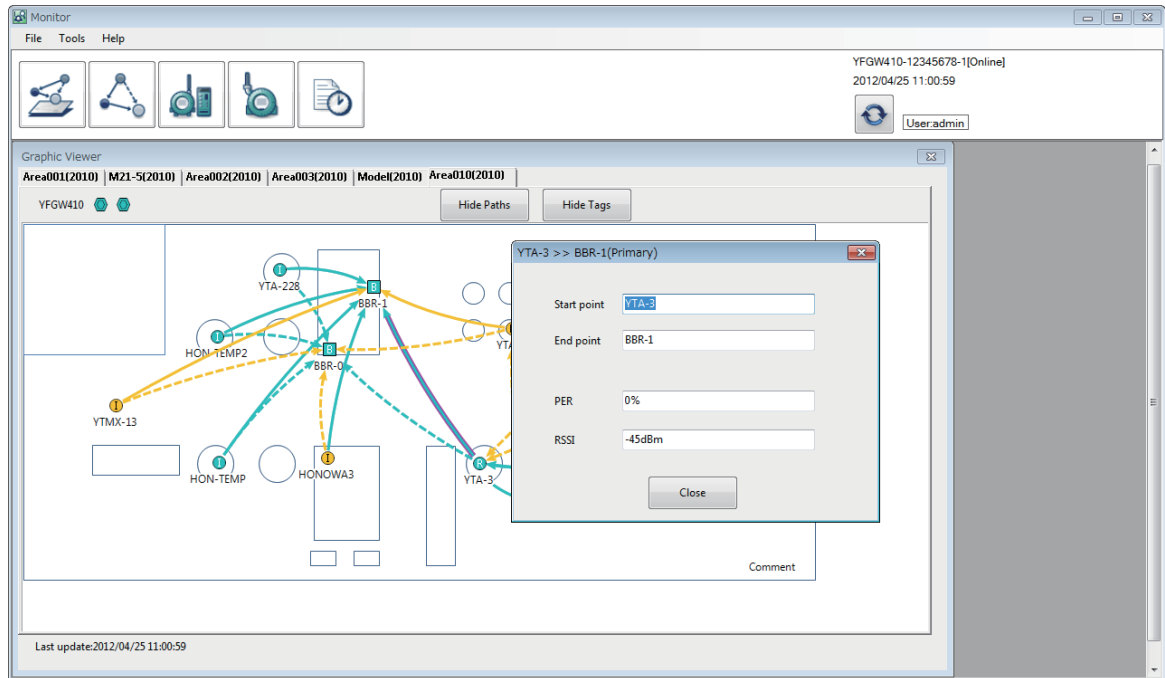
The lower part of the window shows the following list items. These items are displayed only and cannot be changed.

Item	Description
Device Tag	Device tag of field wireless device belonging this group.
Vendor/Model	Vendor/Model
Device Role	Device role
Join Status	Join status (number of joins shown in parenthesis)
Operation Status	Data publication status
RSSI(P)	Received Signal Strength Indication (dBm) for primary path
PER(P)	Packet Error Rate (%) for primary path
RSSI(S)	Received Signal Strength Indication (dBm) for secondary path
PER(S)	Packet Error Rate (%) for secondary path
Battery Life	Calculated battery operating life (days)
Power Supply Status	Battery capacity status

To close the properties window, click the [Close] button.

○ **Communications paths**

Double click the communications path on the window to display the information shown in Figure D5-9. This window shows the path properties.



FD0509.ai

Figure D5-9 Communication Path Properties Window

The title of window shows summary of the communications path like [Lower device tag] >> [Upper device tag] [Path priority (Primary/Secondary)].

The items are as follows. These items are displayed only and cannot be changed.

Item	Description
Start point	Device tag of lower device sending packets
End point	Device tag of upper device receiving packets
PER	Communications Packet Error Rate (%)
RSSI	Received Signal Strength Indication (dBm)

To close the properties window, click the [Close] button.

● Other functions

In addition to displaying the properties of the devices, by right-clicking a device icon usual functions for regular management and maintenance can be executed: showing an information of neighbor devices, restarting a device and reading out of the device parameters.

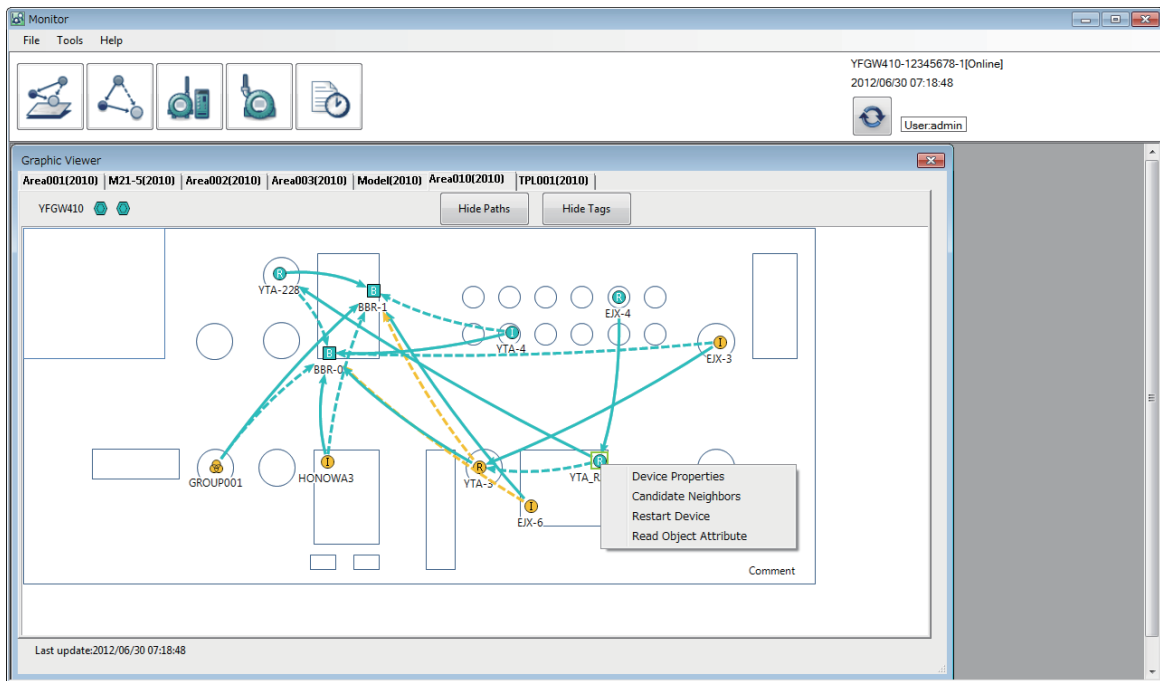
These functions can be called either from the Topology Viewer, the Backbone Device List or the Field Device List.

The functions that can be used depend on the device type as follows.

Function	Summary	Field wireless device	Backbone devices	
			YFGW510	YFGW410
Device Properties	Display device detail information	✓	✓	✓
Candidate Neighbors	Display neighbor devices	✓	✓	
Restart Device	Restart device	✓	✓	✓
Read Object Attribute	Read out device parameters	✓		
Change Active/ Standby Status	Display device active/standby status and switch the status			✓

This sub-section describes the procedure of executing functions from the Graphic Viewer as an example.

Opening the pop-up menu by right-clicking a device icon as shown in Figure D5-10.



FD0510.ai

Figure D5-10 Function Selection Pop-up Menu (e.g., field wireless device)

Select a function in the pop-up menu to start it. The pop-up menu closes when the window is refreshed (every minute).

○ **Displaying device properties**

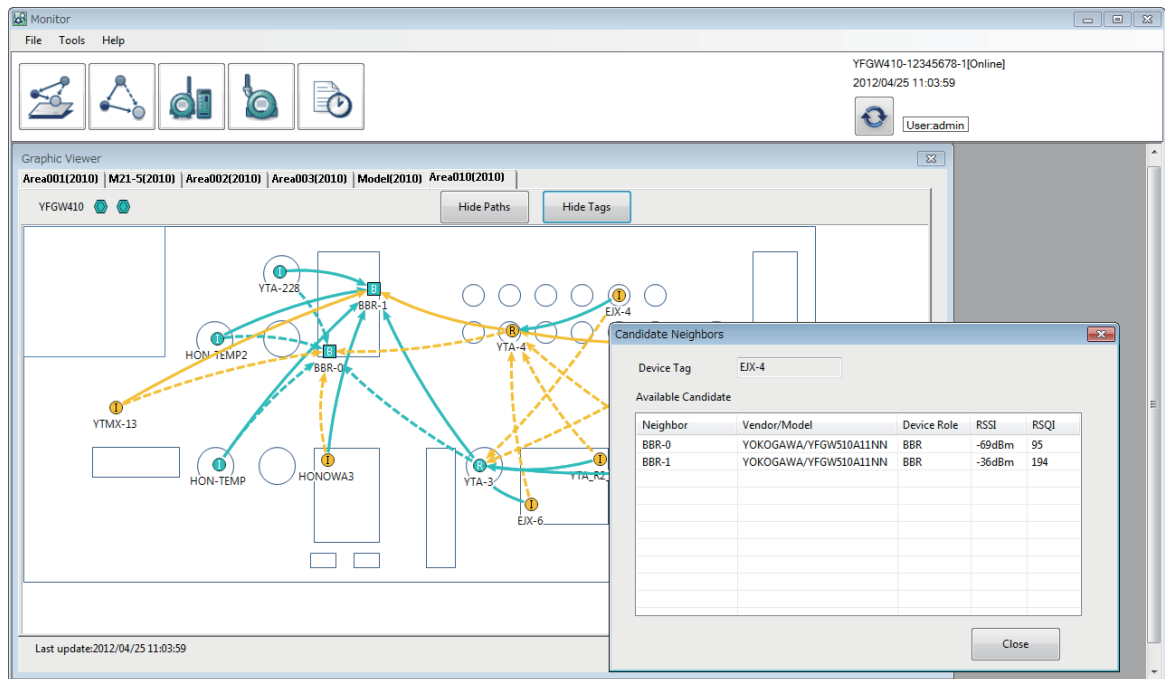
Select [Device Properties] in the pop-up menu to open the window.

For detail information, see “Device Properties” in this sub-section.

○ **Displaying candidate neighbors**

This function displays devices located in the vicinity which are not being used as primary or secondary path devices, but which are path candidate devices for which the received signal strength indication is at least at a usable level.

Select [Candidate Neighbors] in the pop-up menu to open the window shown in Figure D5-11.



FD0511.ai

Figure D5-11 Candidate Neighbors Window

The [Device Tag] field of upper part of this window indicates the device tag of the device initiating this function.

The items in the Available Candidate table are as follows.

Item	Description
Neighbor	Device tag of candidate device
Vender/Model	Device vendor/model
Device Role	Device role
RSSI	Received Signal Strength Indication (dBm)
RSQI	Received Signal Quality Indication

○ Restart device

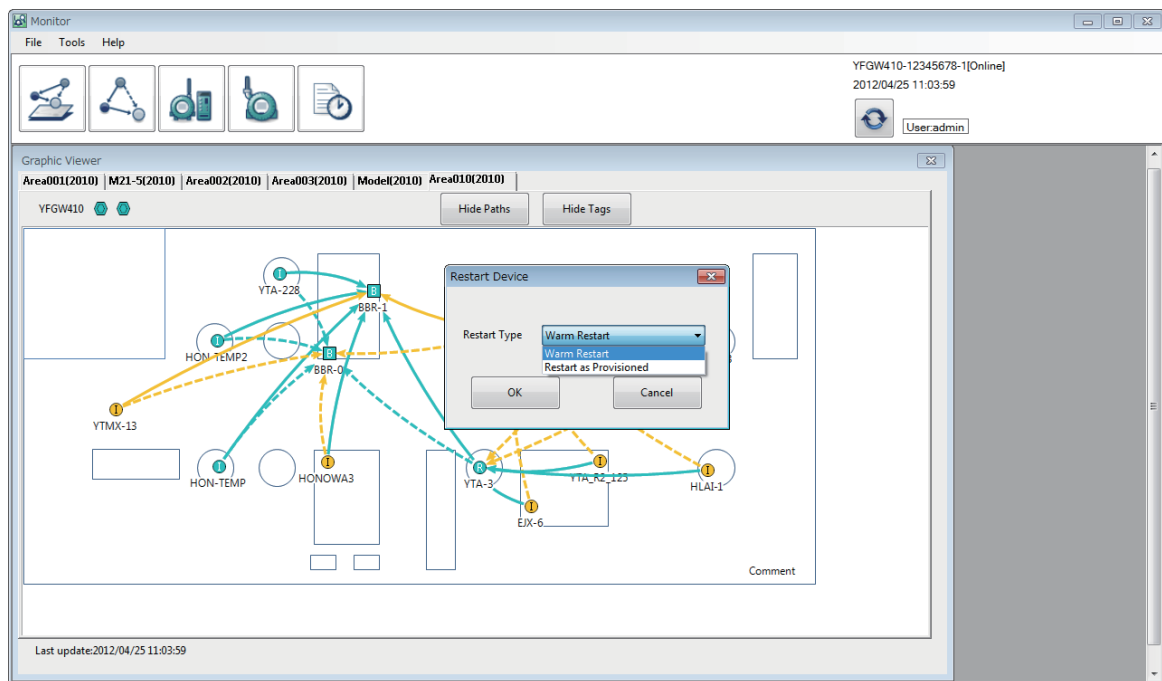
This function provides to restart devices within the network forcibly. When there is an operation fault or problem in a device or communications path, this function may correct it. Before executing this function, must consider impacts on other devices and/or the host system. Especially in a router device case, impacts for lower devices should be cared.



IMPORTANT

Do not execute this function while other the Configurator or the Monitor operations are running. Check all operation is completed before execute this function. For detail of the Configurator and the Monitor operation conflicts, see Sub-section D2.2.2 Launching the tool.

For a field wireless device, select [Restart Device] in the pop-up menu to open the window shown in Figure D5-12.



FD0512.ai

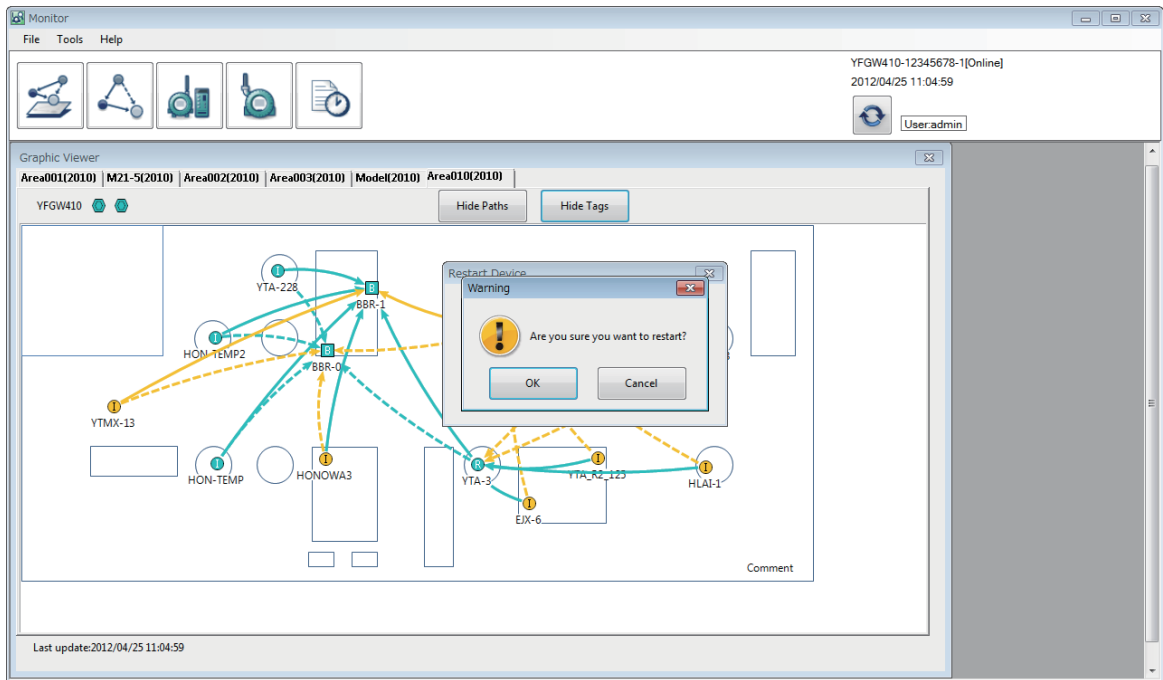
Figure D5-12 Device Restart Window (in a field wireless device case)

In the window drop-down box select the restart type.

In a field wireless device case, there are two restart types, as follows.

Restart type	Description
Warm Restart	Restart the wireless communications module.
Restart as Provisioned	Restart both wireless communications and sensor module.

After selecting the restart type, click the [OK] button to display the dialog shown in Figure D5-13.



FD0513.ai

Figure D5-13 Restart Confirmation Dialog

Click the [OK] button to restart. Click the [Cancel] button to cancel the restart and close the confirmation dialog.

In a backbone device case, there is no restart type selection. The confirmation dialog is shown by selecting [Restart Device] in the pop-up menu (same as Figure D5-13).



IMPORTANT

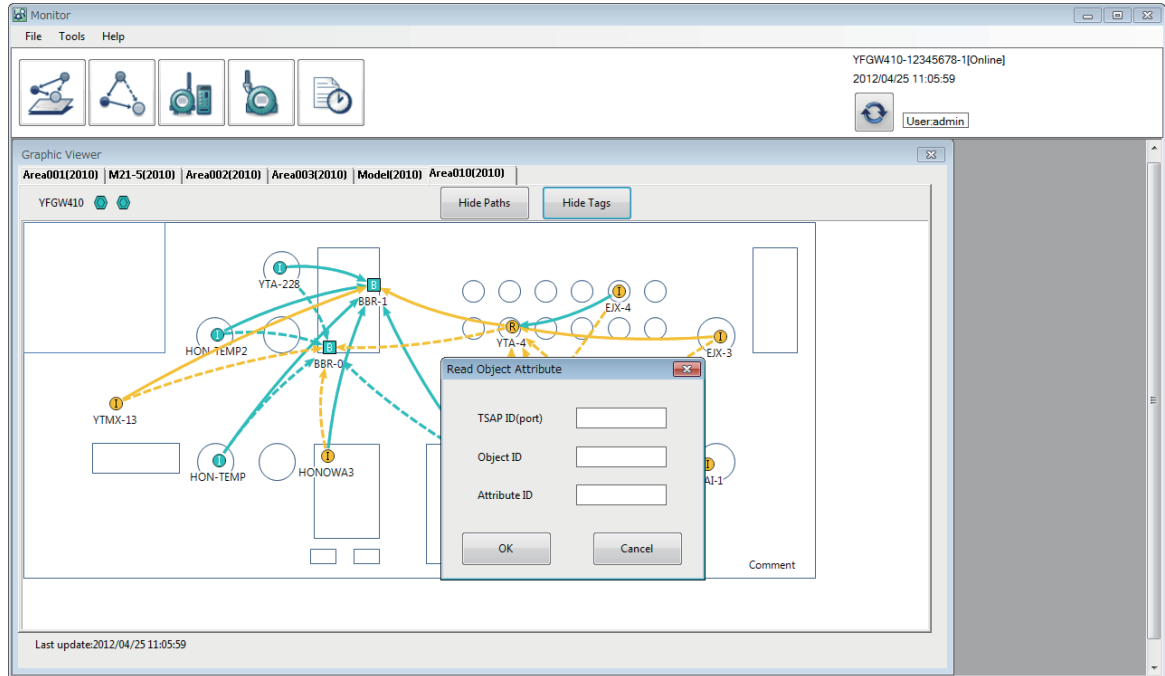
In a redundant configuration, do not restart YFGW410 during SYN LED is blinking. The system will be stop and YFGW410 will generate a fault status. To recover, it is necessary to power off the YFGW410 then power on again, so the operating status of the YFGW410 should be checked before restarting.

○ **Reading out device parameters (Read Object Attribute)**

This function provides to read a device parameter specified ISA100.11a standard or device vendor by manual. It requires three IDs to read: TSAP, Object and Attribute.

For the IDs to read out parameters, refer to the user’s manual for the field wireless device.

Select [Read Object Attribute] in the pop-up menu to open the window shown in Figure D5-14.



FD0514.ai

Figure D5-14 Read Object Attribute Window

Enter the TSAP ID, Object ID, and Attribute ID for the parameter to be read, and click the [OK] button to reading the parameter. Clicking the [Cancel] button closes the window.

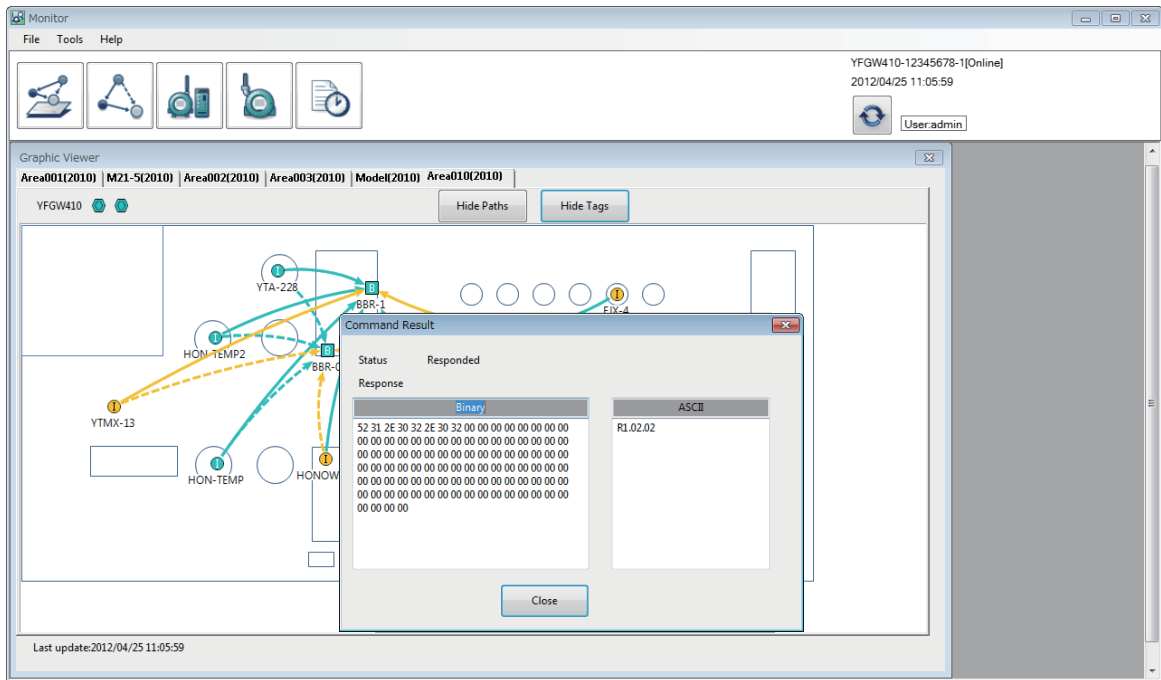
Check the TSAP ID, Object ID, and Attribute ID in the user's manual for the field wireless device.



IMPORTANT

Do not execute this function while other the Configurator or the Monitor operations are running. Check all operation is completed before execute this function. For detail of the Configurator and the Monitor operation conflicts, see Sub-section D2.2.2 Launching the tool.

As the result, the window shown in Figure D5-15 appears.



FD0515.ai

Figure D5-15 Read Object Attribute Results Window

The results of reading out are shown both in binary and ASCII formats. The figure shows the sensor firmware version as an example.

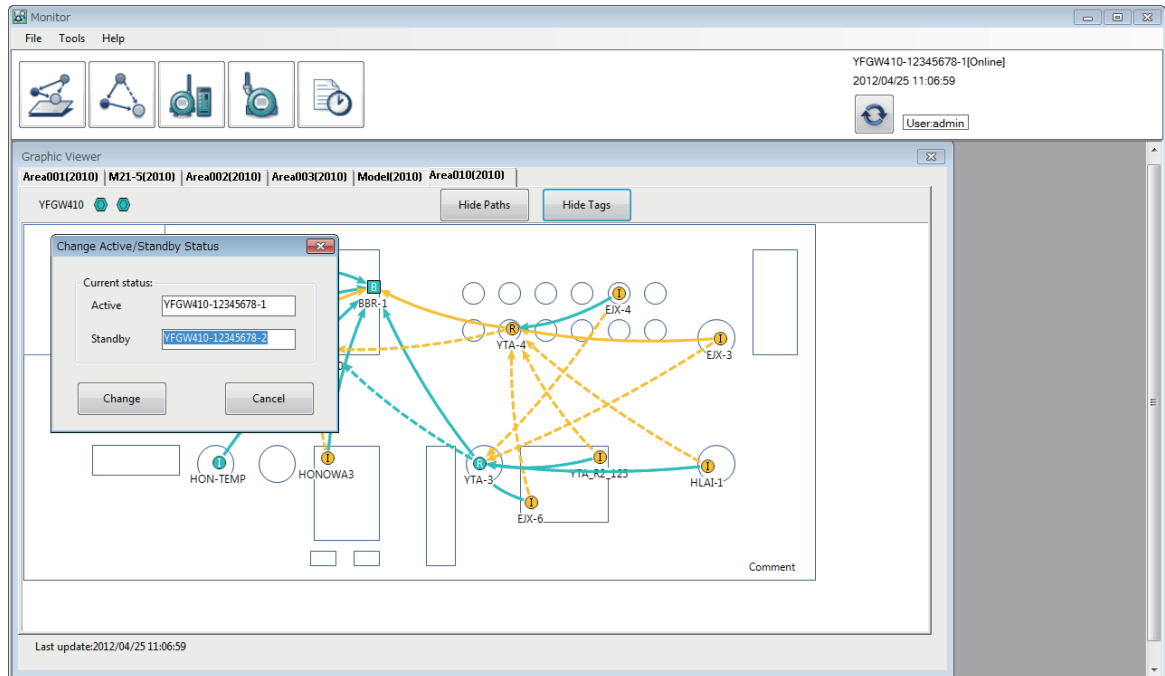
Click the [Close] button to close the window.

If the parameter reading fails, a dialog appears: "Communication error: Failed to access database." Click the [OK] button to close the dialog.

○ Change Active/Standby status

This function provide to switch Active/Standby status of redundant YFGW410s. This function is available while both YFGW410s are normal. In a single configuration case, or in the Standby YFGW410 is stopped or has a fault status in a redundant configuration case, this function is not valid.

Select [Change Active/Standby Status] in the pop-up menu to open the window shown in Figure D5-16.



FD0516.ai

Figure D5-16 Change Active/Standby Status Window

This window shows the Active device tag to [Active] field, and the Standby device tag to [Standby] field.

Click the [Change] button to switch the active and standby devices. Click the [Cancel] button to cancel the operation and close the window. After switching Active/Standby status, communications between the Monitor and YFGW410 may be closed, and a dialog appears with message “Communication Error: Failed to send or receive data”, and the connection status is changed to [Offline]. After a short wait the Monitor will reconnect at the next refresh timing.

If the Active YFGW410 and the Standby YFGW410 have different firmware versions, the Monitor will be closed by switching Active/Standby status. In this case, restart the Field Wireless Management Console



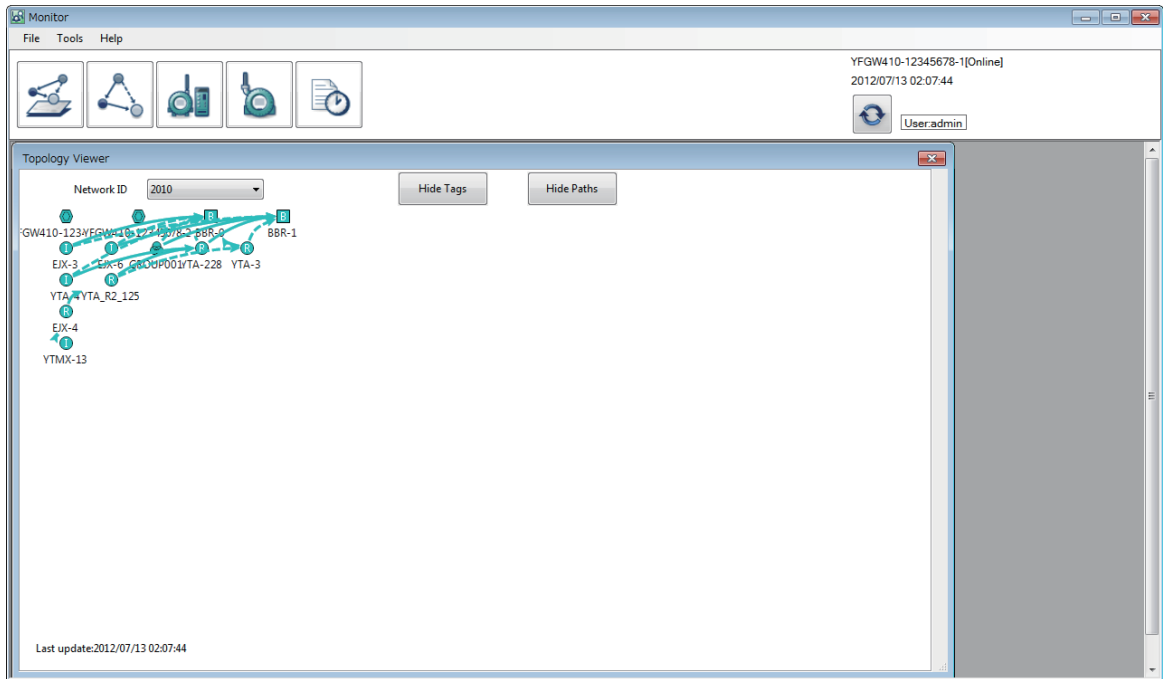
IMPORTANT

Do not execute this function while other the Configurator or the Monitor operations are running. Check all operation is connection before execute this function. For detail of the Configurator and the Monitor operation conflicts, see Sub-section D2.2.2 Launching the tool.

D5.2.4 Topology Viewer

The Topology Viewer shows the field wireless network topology for each field wireless subnet. The properties window is shown from the Topology Viewer by selecting device or communications path.

Click [Topology Viewer] icon to open the window shown in Figure D5-17.



FD0517.ai

Figure D5-17 Topology Viewer Window

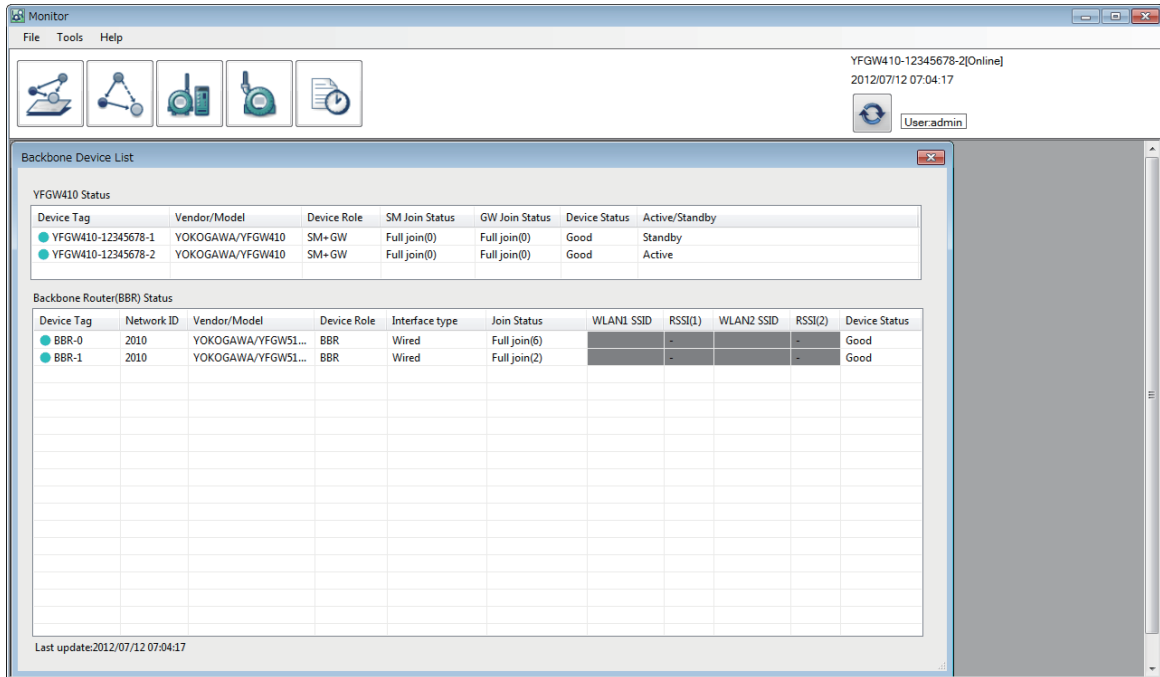
The meaning of colors of device icons and communications path, and functions of the Topology Viewer are same as the Graphic Viewer. For details, see Sub-section D5.2.3 Graphic Viewer.

D5.2.5 Backbone Device List

The Backbone Device List shows a YFGW410 status list and backbone router status list.

A backbone device includes YFGW410 and YFGW510.

Click [Backbone Device List] icon to open the window shown in Figure D5-18.



FD0518.ai




Figure D5-18 Backbone Device List Window

The YFGW410 status list shows the following items.

Item	Description
Device Tag	Device tag of YFGW410. In redundant operation, the device tag of the operating YFGW410 appears. In UNIT1 YFGW410 case, the device tag has "-1" appended. In UNIT2 YFGW410 case, the device tag has "-2" appended. The UNIT number is determined by the cable of redundancy.
Vender/Model	Vendor/model
Device Role	Device role, SM+GW (constant)
SM Join Status	System manager (SM) join status, Full Join / Disconnected
GW Join Status	Gateway (GW) join status, Full Join / Disconnected
Device Status	Device status, Good/Bad/Warning
Active/Standby	Redundant status, Active/Standby

A round mark of a left side of each device tag shows a summary of the device status.

The following are the device status indications.

Mark	Status	Condition
	Normal	Normal status.
	Warning	Device communications are operating, but the following problem has occurred. Maintenance is required to recover to normal status. <ul style="list-style-type: none"> Any of the F1~F3 port in operation causes link-down. Make sure the network cable correctly connected to the host system.
	Fault	The device has a fault status. If the fault status persists after the following checks, it is necessary to replace the device. <ul style="list-style-type: none"> Is the network cable correctly connected to the host system? Is power being supplied normally? If the above two items are normal, power off and on again to restart





The backbone router status list shows the following items.

Item	Description
Device Tag	Device tag name
Network ID	Network ID
Vender/Model	Vendor/model
Device Role	Device role, BBR (constant)
Interface Type	Type of a communication interface “Wired” if wired LAN (copper or optic fiber), and “Wireless” if wireless LAN
Join Status	Join status Full Join / Now Connecting / Disconnected
WLAN1 SSID	Service Set Identifier for Wireless LAN1
RSSI 1	Received Signal Strength Indication for Wireless LAN1 (dBm)
WLAN2 SSID	Service Set Identifier for Wireless LAN2
RSSI 2	Received Signal Strength Indication for Wireless LAN2 (dBm)
Device Status	Device status, Good/Bad

Appears for wireless LAN client model

A round mark of a left side of each device tag shows a summary of the device status. YFGW510 updates its status every 10 minutes.

The following are the device overall status indications and appropriate responses.

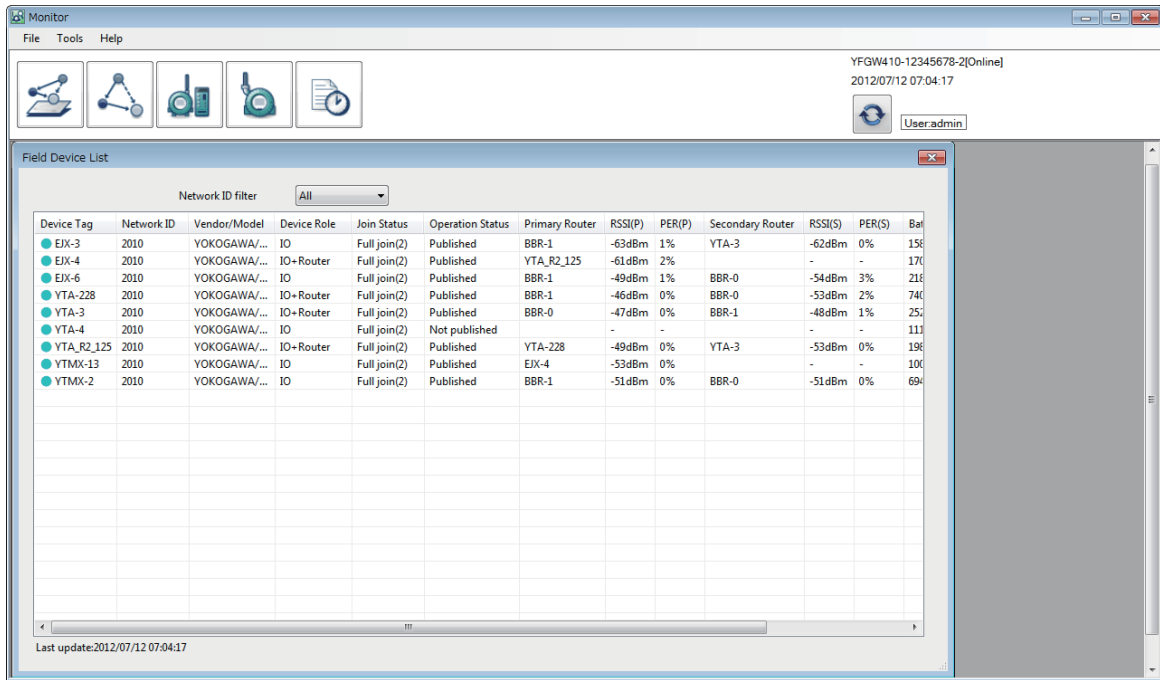
Mark	Status	Condition
	Normal	Normal status.
	Warning	Device communications are operating, but the following problem has occurred. Maintenance is required to recover to normal status. <ul style="list-style-type: none"> The communication from YFGW510 to YFGW410 is interrupted. Make sure the network cable correctly connected to the backbone network The received signal strength indication (RSSI) between YFGW510 and wireless LAN AP is worse than the threshold value. Optimize the device (antenna) position to solve the problem.
	Fault	The device has a fault status. If the fault status persists after the following checks, it is necessary to replace the device. <ul style="list-style-type: none"> Is the network cable correctly connected to the backbone network ? Is the wireless LAN configuration or wireless LAN connection correct ? Is power being supplied normally? If the above two items are normal, power off and on again to restart
	Joining	The device is joining to the network. Wait until completing the join.

Opening the device properties and executing functions are available on the Backbone Device List window. For details, see Sub-section D5.2.3 Graphic Viewer.

D5.2.6 Field Device List

The Field Device List shows a status list of field wireless devices.

Click [Field Device List] icon to open the window shown in Figure D5-19.



FD0519.ai

Figure D5-19 Field Device List Window





The field device list shows the following items.

Item	Description
Device Tag	Device tag name
Network ID	Network ID
Vender/Model	Vendor/model
Device Role	Device role, IO / IO+Router / Router For devices having IO (Auto) set in the Configurator, this is shown as IO.
Join Status	Join status, Full Join / Now Connecting / Disconnected
Operation Status	Data publication status, Published / Not Published / Session time-out When CF file doesn't match to this device, this status is shown as Session time-out.
Primary Router	Device tag of a primary router
RSSI (P)	Received Signal Strength Indication for a primary path (dBm)
PER (P)	Packet Error Rate for a primary path (%)
Secondary Router	Device tag of a secondary router
RSSI (S)	Recieved Signal Strength Indication for a secondary path (dBm)
PER (S)	Packet Error Rate for a secondary path (%)
Battery Life	Remaining battery operating life (days)
Power Supply Status	Power supply status Battery driven devices: 100-75% / 75-25% / 25-0% External power supply devices: Line powered

A round mark of a left side of each device tag shows a summary of the device status.

The RSSI and PER are shown as 30 minutes moving average, and refreshed every minute. In Duocast configuration case, the refresh interval is 30 minutes.

The following are the device status indications.

Mark	Status	Condition
	Normal	Normal status.
	Warning	The device is still operating, but the following problems have occurred. Maintenance is required to recover to normal status. <ul style="list-style-type: none"> • PER or RSSI is worse than the threshold value Optimize the device (antenna) position, or add a router to solve the problem. • The remaining battery capacity is below the threshold value Replace the battery.
	Fault	The following are likely causes. <ul style="list-style-type: none"> • Left from the field wireless network • Battery exhausted Check the above items and take appropriate action; if this does not recover it is necessary to replace the device.
	Joining	The device is joining to the network. Wait until completing the join.

Opening the device properties and executing functions are available on the Field Device List window. For details, see D5.2.3 Graphic Viewer.

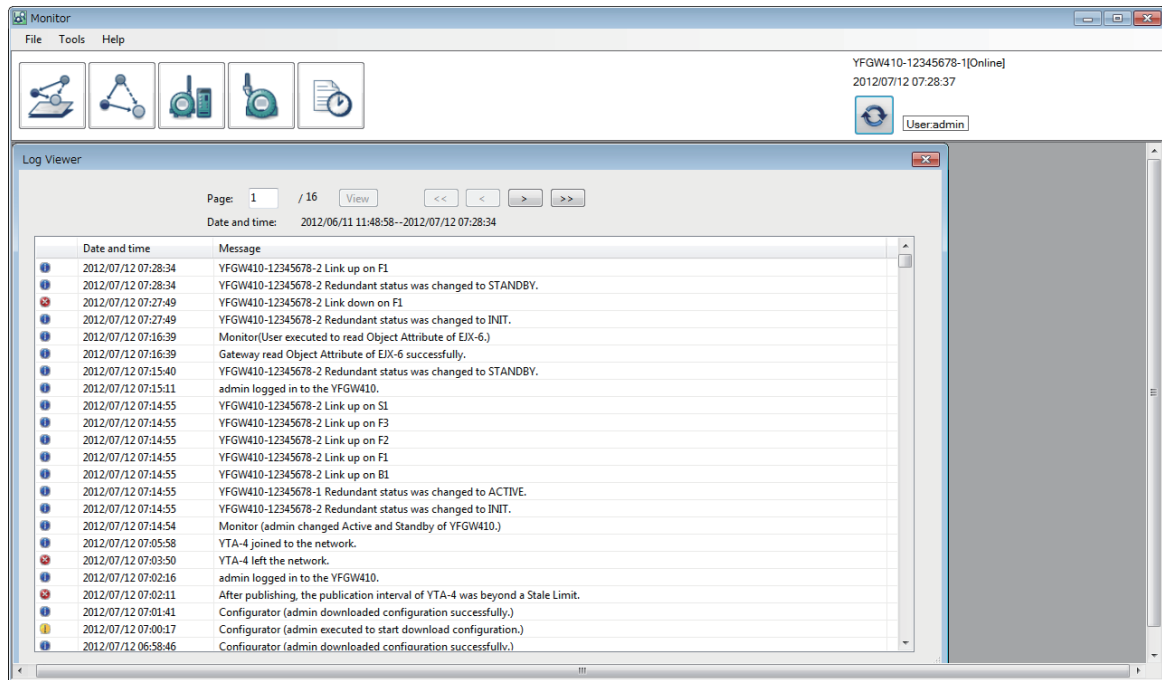
D5.2.7 Log Viewer

The Monitor stores the following information.

- Operation of important the Configurator and the Monitor functions
- Changes in the status of field wireless devices
- Occurrence of device warning status or fault status
- Changes in the YFGW410 redundant status

The Log Viewer shows 1000 records per page, and can hold 65 pages. When this capacity is exceeded, log records are replaced from the oldest first.

Click [Log Viewer] to open the window shown in Figure D5-20.



FD0520.ai




Figure D5-20 Log Viewer Window

The Log Viewer shows a current page number in Page field. A page is moved to next or previous by clicking the arrow buttons, and is moved to the latest or oldest by clicking the double-arrow buttons.

The Date and time field shows a period in which displayed log messages were issued.

Each log messages is shown with the log level and a time stamp. The log level is expressed by an icon.

The log levels are as follows.

Icon	Log Level	Example
	Error	Device leaving the wireless system A Configurator or Monitor operation did not complete normally Device failure
	Warning	Remaining battery capacity is below the warning threshold value
	Information	Device joining the wireless system A Configurator or Monitor operation completed normally Login or logout operation for a tool

The following table shows the messages list.

In the messages, {0} is replaced with device tag name, login name, etc.

Message	Log Level
{0} joined to the network.	Information
{0} left the network.	Error
The security manager rejected {0} joining to the network.	Information
{0} Battery Life was below the pre-configured threshold.	Warning
{0} PER was beyond the pre-configured threshold.	Warning
{0} RSSI was below the pre-configured threshold.	Warning
{0} YFGW510 Status Error.	Error
{0} YFGW510 Status Error recovered.	Information
Duplicated device tag was found: {0}	Error
A downloaded new Radio Firmware for {0} was canceled.	Information
Downloading a new Radio Firmware to {0} was successfully finished.	Information
Downloading a new Radio Firmware to {0} was failed.	Error
User prohibited field wireless radio of Network ID {0}.	Warning
User allowed field wireless radio of Network ID {0}.	Warning
Radio transmission of Network ID {0} could not be prohibited.	Error
Radio transmission of Network ID {0} could not be allowed.	Error
OTA provisioning to {0} was successfully finished.	Information
OTA provisioning to {0} was failed.	Error
Provisioning information on {0} was reset.	Information
Update join key command to {0} was rejected.	Warning
Duplicated EUI-64 was found: {0}	Error
User sent the update join key command to {0}.	Information
The communication from {0} was stopped temporarily.	Warning
The communication from {0} was recovered.	Information
After publishing, the publication interval of {0} was beyond a Stale Limit.	Error
Sending the publication to {0} started.	Information
Sending the publication to {0} stopped.	Information
A downloaded new Sensor Firmware for {0} was canceled.	Information
Downloading a new Sensor Firmware to {0} was successfully finished.	Information
Downloading a new Sensor Firmware to {0} was failed.	Error
Gateway read Object Attribute of {0} successfully.	Information
Gateway failed to read Object Attribute of {0}.	Error
Gateway could not configure Field Device(s).	Error
Monitor ({0} changed Active and Standby of YFGW410.)	Information
Monitor ({0} activated Maintenance Mode.)	Warning
Monitor ({0} activated Normal Mode.)	Information
Monitor (Downloading a new Radio Firmware to {0} was started.)	Warning
Monitor (Downloading a new Sensor Firmware to {0} was started.)	Warning
Monitor (Downloading a new Backbone Device Firmware to {0} was started.)	Warning
Monitor (User executed to apply a new Radio Firmware to {0}.)	Warning
Monitor (User executed to apply a new Sensor Firmware to {0}.)	Warning
Monitor (User executed to apply a new Backbone Device Firmware to {0}.)	Warning
User sent the warm restart command to {0}.	Information
User sent the restart as provisioned command to {0}.	Information
User Control ({0} changed User Password.)	Information
Configurator(System time was changed to {0}.)	Information

Message	Log Level
Monitor ({0} uploaded Technical Information.)	Information
Configurator ({0} executed to start download configuration.)	Warning
Configurator ({0} downloaded configuration successfully.)	Information
Configurator ({0} failed to download configuration.)	Error
User Control ({0} added new user account.)	Information
User Control ({0} deleted user account.)	Information
GUI was shut down by firmware version difference of YFGW410.	Information
Monitor(User executed to read Object Attribute of {0}.)	Information
{0} logged in to the YFGW410.	Information
{0} logged out of the YFGW410.	Information
User sent the restart command to {0}.	Information
User enabled the OTA provisioning network on Network ID:{0}.	Warning
User disabled the OTA provisioning network on Network ID:{0}.	Information
{0} Temperature was beyond a higher threshold.	Warning
{0} Temperature was below a lower threshold.	Warning
{0} Voltage was beyond a higher threshold.	Warning
{0} Voltage was below a lower threshold.	Warning
{0} Link up on B1	Information
{0} Link up on B2	Information
{0} Link up on B3	Information
{0} Link up on B4	Information
{0} Link up on F1	Information
{0} Link up on F2	Information
{0} Link up on F3	Information
{0} Link up on M1	Information
{0} Link up on S1	Information
{0} Link down on B1	Information
{0} Link down on B2	Information
{0} Link down on B3	Information
{0} Link down on B4	Information
{0} Link down on F1	Information
{0} Link down on F2	Information
{0} Link down on F3	Information
{0} Link down on F1	Warning
{0} Link down on F2	Warning
{0} Link down on F3	Warning
{0} Link down on M1	Information
{0} Link down on S1	Information
{0} Redundant status was changed to INIT.	Information
{0} Redundant status was changed to SYNC.	Information
{0} Redundant status was changed to STANDBY.	Information
{0} Redundant status was changed to ACTIVE.	Information
{0} HW Error: Internal interface was down	Error
{0} HW Error: PTP Module	Error
{0} The connection of SYNCHRONIZATION port was changed.	Warning
{0} Time Synchronization Error	Error
A downloaded new Backbone Device Firmware for {0} was canceled.	Information
Downloading of a new Backbone Device Firmware to {0} was successfully finished.	Information
Downloading of a new Backbone Device Firmware to {0} was failed.	Error



IMPORTANT

Error messages may require recovery process to solve errors. Refer to the maintenance information in the user's manual for the device for the required action.

D5.2.8 Functions Called from the Menu Bar

The menu bar includes the [File], [Tools], and [Help] menus.

This sub-section describes details of each menu.

● File menu

The file menu contains the [Export Device List] and [Exit] menu items.

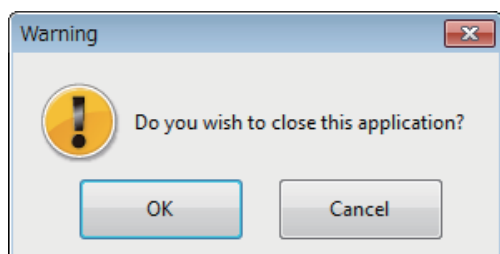
○ Export Device List

This function exports all items shown in the Backbone Device List, the Field Device List and the Device properties to CSV file.

Select [File] ⇒ [Export Device List] to open the Save CSV File Window.

○ Exit

Select [File] ⇒ [Exit] to open the dialog shown in Figure D5-21.



FD0521.ai

Figure D5-21 Exit Dialog

Click the [OK] button to quit the Monitor.

● Tools menu

The Tools menu includes seven menu items.

[Change Password], [User Account Manager], [Select Restart Devices], [OTA Provisioning Manager], [Prohibit Radio Transmission], [Firmware Download Manager], [Maintenance Mode] and [Upload Technical Information]

○ Change Password

This function changes the password of the user currently logged in to the Monitor.

This function is common to the Monitor and the Configurator. In other words, changing the password in the Monitor also changes it in the Configurator. For details see "Change password" in Sub-section D4.2.11 Other Setting Operations.

○ User Account Manager

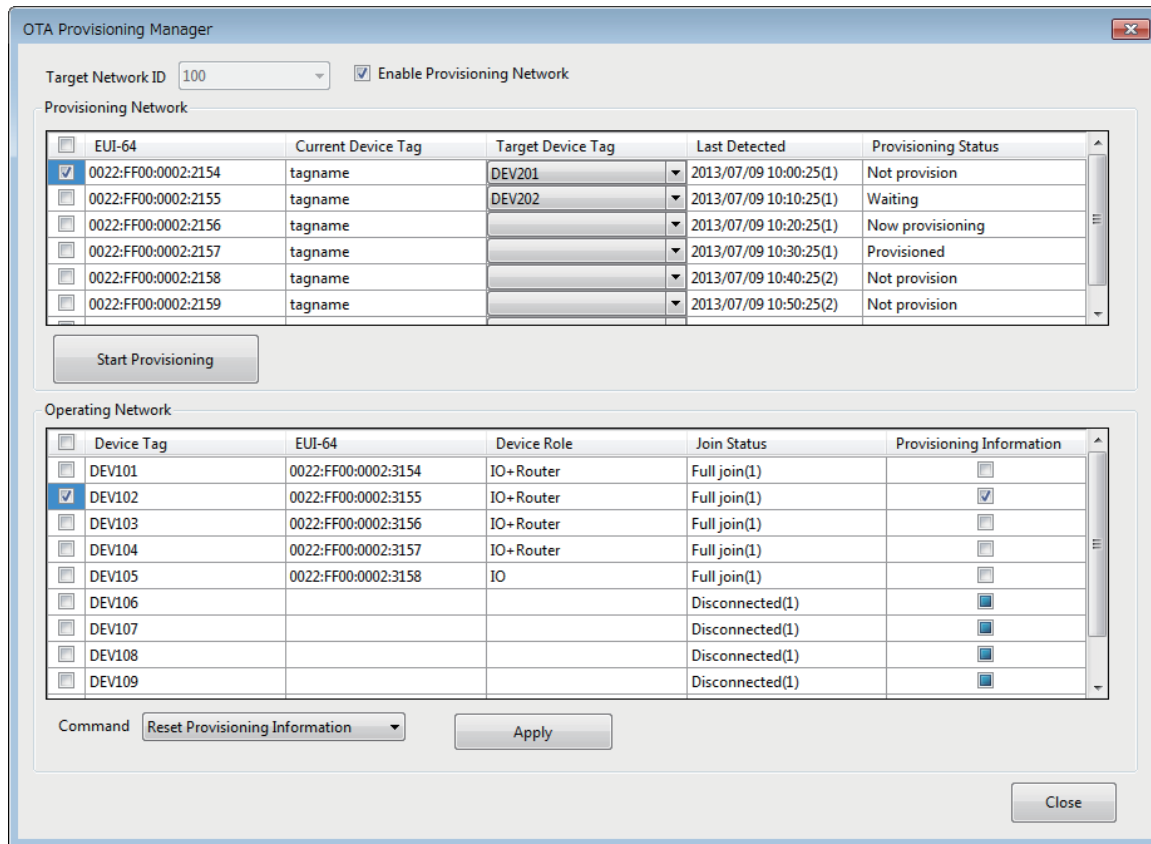
This function creates and deletes user accounts, and manage privileges and passwords.

This function is common to the Monitor and the Configurator. For details see "User Account Manager" in Sub-section D4.2.11 Other Setting Operations.

○ OTA Provisioning Manager

You can perform the provisioning to the field wireless device by using Monitor.

When the [Tools] menu and then the [OTA Provisioning Manager] are clicked, the window shown in Figure D5-22 appears.



FD0522.ai

Figure D5-22 OTA Provisioning Manager Window

Item	Description
Target Network ID	From this drop-down box, select the network ID of field wireless subnet where OTA provisioning is enabled. By selecting the [Enable Provisioning Network] check box, OTA provisioning is enabled. After OTA provisioning is finished, the selected network ID is set to the device.
Provisioning Network	When OTA provisioning is enabled, the provisioning target field wireless device is detected and the following information are displayed: <ul style="list-style-type: none"> • EUI-64 • Device tag currently set to the device via Configurator (Current Device Tag) • The candidates of the device tag (Target Device Tag) • The last detected time and the number of detection (Last Detected) • The status of provisioning (Provisioning Status)
Start Provisioning	This button is enabled by selecting the check box of the provisioning target device and selecting the device tag of the device from the [Target Device Tag]. By clicking the [Start Provisioning] button, OTA provisioning to the device is performed.
Operating Network	The following information of the field wireless device in the field wireless subnet specified by the [Target Network ID] drop-down box is listed. After provisioning to the device in the field wireless subnet specified by the [Target Network ID] is finished and the device joined the subnet, the value of [Join Status] will be set to "Full Join". <ul style="list-style-type: none"> • Device Tag • EUI-64 • Device Role • Join Status • Provisioning Information The [Provisioning Information] check box is checked when the correspondent field wireless device is provisioned via OOB provisioning "Uses a provisioning information file" or OTA provisioning. When the [Update Join Key] described below is selectable, this check box is cleared.
Command	By this drop-down box, the following operation to the provisioning information of the field wireless device is performed: <ul style="list-style-type: none"> • Reset Provisioning Information Reset the provisioning information of the selected device. • Update Join Key Reprovision the field wireless device provisioned via OOB provisioning "Does not use a provisioning information file" or provisioned at the factory. When the [Command] is selected and the [Apply] button clicked, the operation is performed to the selected device in the [Operating Network].

The following table shows the values displayed at the [Provisioning Status] and their meaning.

Item	Description
Not provision	Provisioning has not been performed yet.
Waiting	Communicating with YFGW410 or finding the provisioning target device
Now provisioning	Provisioning is in progress.
Provisioned	Provisioning has finished.
Failed to provision	Provisioning has failed.

The procedure of OTA provisioning is as follows:

- 1) From the [Target Network ID] drop-down box, select the field wireless subnet where OTA provisioning is enabled.
- 2) When the [Enable Provisioning Network] check box is selected, OTA provisioning is enabled and detected device is displayed in the [Provisioning Network].
- 3) Select the check box of the provisioning target device and select the device tag of the device from the [Target Device Tag].
- 4) When the [Start Provisioning] button is clicked, provisioning is started. You can confirm the status of provisioning at the [Provisioning Status] in the [Provisioning Network]. After the device is provisioned successfully and the device joins to the subnet specified by the [Target Network ID] drop-down box, the device will be disappeared from the [Provisioning Network]. The status of the device can be confirmed by the [Join Status] of the [Operating Network].
- 5) When the [Join Status] of the all target devices in [Operating Network] becomes "Full join", provisioning to the devices are finished. Then, clear the [Enable Provisioning Network] check box.



IMPORTANT

When the provisioning information is updated, it is necessary to restart the Configurator. Without restarting the Configurator, it is not possible to download any settings.



IMPORTANT

Do not perform this operation at the same time as conflicting operations at the Configurator and Monitor. Always confirm that conflicting processes are completed before carrying out this operation. After finishing this operation, always deselect the [Enable Provisioning Network] check box before closing the OTA Provisioning Manager window. For details about conflicting operations at the Configurator and Monitor, see Sub-section D2.2.2 Launching the tool.



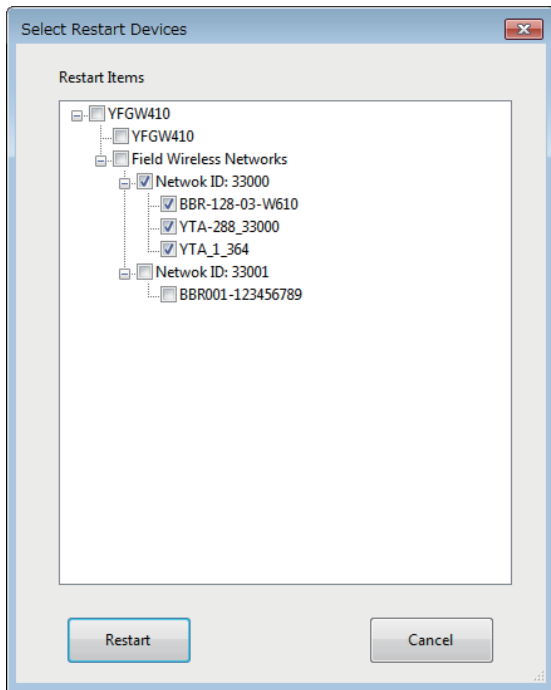
IMPORTANT

- YFGW410 takes longer time to detect the OTA provisioning target device depending on the surrounding environment such as radio condition.
 - The OTA provisioning target device takes longer time to complete the joining to the network compared with the device performed OOB provisioning.
 - Do not perform the operation which interrupts OTA provisioning process such as restarting YFGW410, YFGW510 and field wireless devices. In case of OTA provisioning is interrupted, it is required to reset the provisioning information of the device.
-

○ **Select Restart Devices**

Restarting specified devices.

Select [Tools] ⇒ [Select Restart Devices] to open the window shown in Figure D5-23.

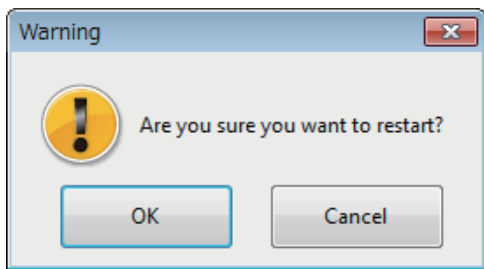


FD0523.ai

Figure D5-23 Restart Devices Selection Window

Mark devices to be restarted. If marked items have lower hierarchy items, they will be marked automatically.

Click the [OK] button to open the dialog shown in Figure D5-24. Clicking the [Cancel] button cancels the operation and closes the window.



FD0524.ai

Figure D5-24 Restart Confirmation Dialog

Click the [OK] button to restart the selected devices. Click the [Cancel] button to cancel the operation and close the dialog.



IMPORTANT

Do not execute this function while other instance of the Configurator or the Monitor operations are running. Check all operation is completed before execute this function. For detail of the Configurator and the Monitor operation conflicts, see Sub-section D.2.2.2 Launching the tool.

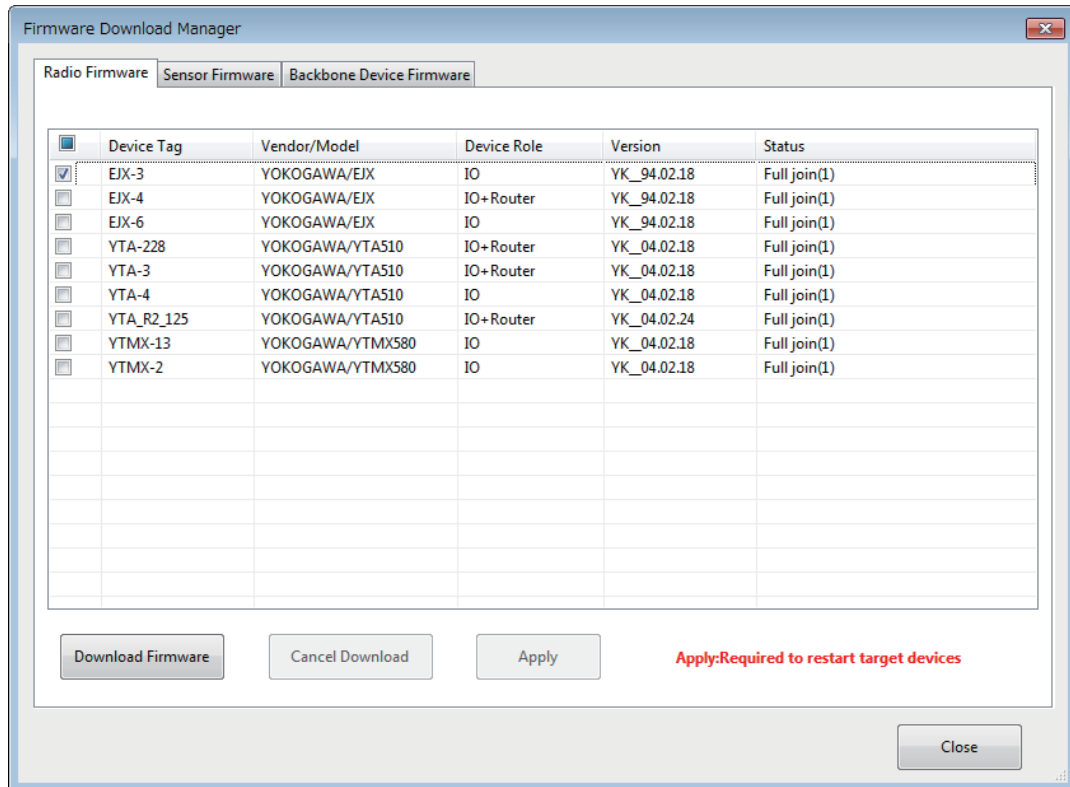
○ **Prohibit Radio Transmission**

This function is for the use of service personnel and is not required for ordinary inspection and management.

○ **Firmware Download Manager**

Updating the firmware for backbone devices and field wireless devices.

Select [Tools] ⇒ [Firmware Download Manager] to open the window shown in Figure D5-25.



FD0525.ai

Figure D5-25 Firmware Download Manager Window (Radio Firmware)

This window includes the [Radio Firmware] tab, the [Sensor Firmware] tab, and the [Backbone Device Firmware] tab.

Figure D5-25 shows the [Radio Firmware] tab is selected.

The items shown in the list of the Radio Firmware Window are as follows.

Item	Description
<input type="checkbox"/>	Check box for a device to be updated. Selecting the check box in the heading row selects the check boxes for all device.
Device Tag	Device tag name
Vender/Model	Vendor/Model
Device Role	Device role
Version	Current firmware version of the module
Status	Shows firmware update status or device status. If firmware update is running, a progress is shown, otherwise a join status is shown.

The functions of buttons are as follows.

Button	Function
Download Firmware	Start downloading firmware for the device.
Cancel Download	Cancel the download.
Apply	Restart the device to apply the downloaded firmware to the device. The [Apply] button is valid after the download completes normally.

If devices of a different model or status are selected simultaneously, to prevent misoperation the above buttons are disabled.

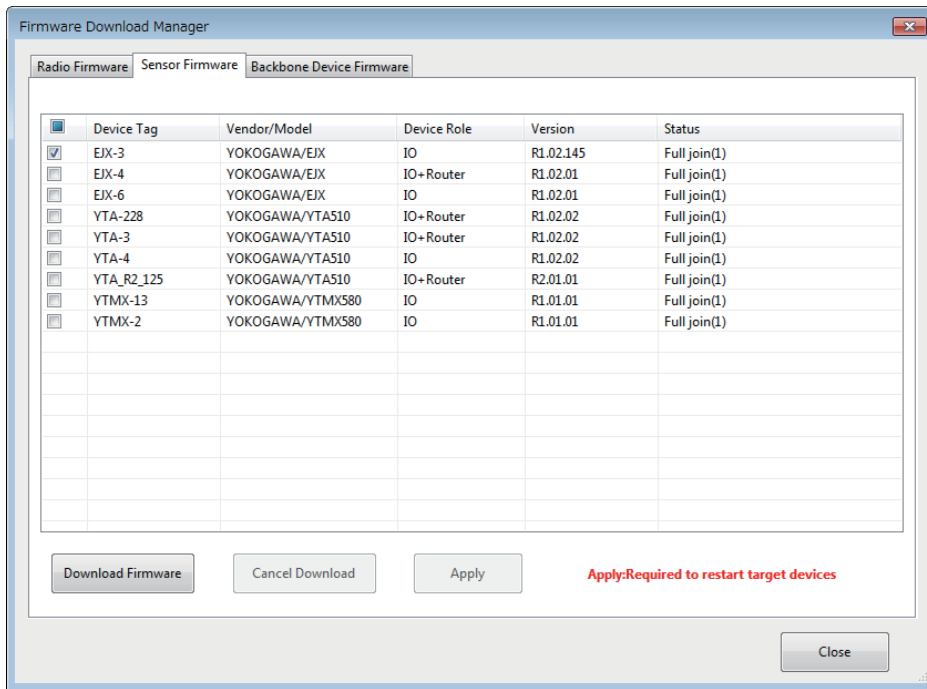


IMPORTANT

Do not execute this function while other the Configurator or the Monitor operations are running. Check all operation is completed before execute this function. For detail of the Configurator and the Monitor operation conflicts, see Sub-section D2.2.2 Launching the tool.

Even if the Firmware Download Manager is closed, the firmware update process is running in background. However if the Monitor is closed, all status of firmware update will be cleared. So do not close the Monitor before completing firmware update process.

Figure D5-26 shows the [Sensor Firmware] tab is selected.

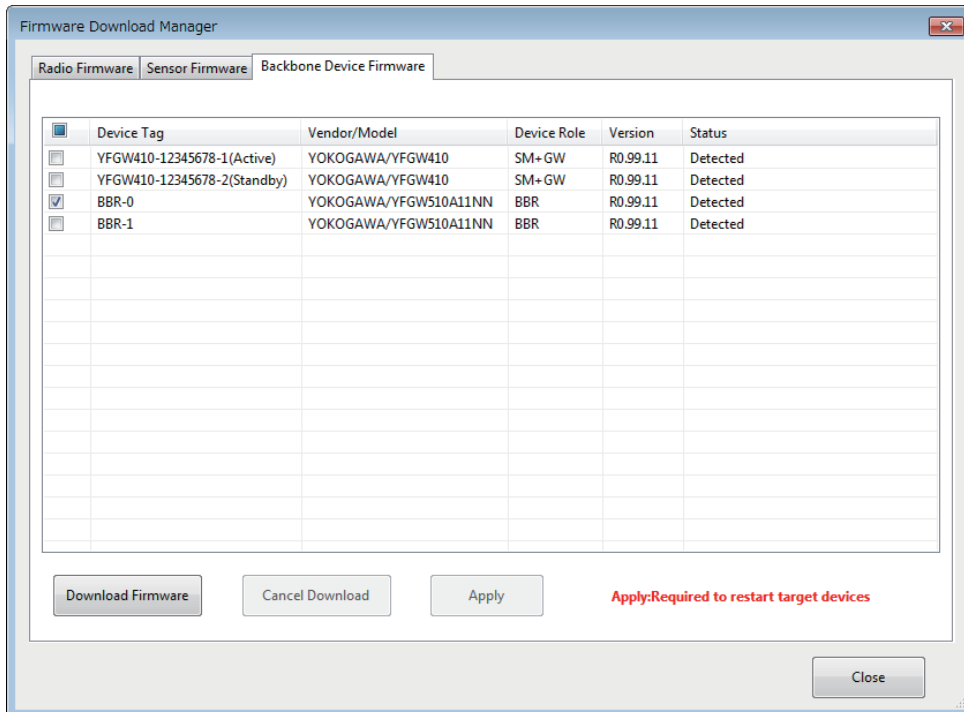


FD0526.ai

Figure D5-26 Firmware Download Manager Window (Sensor Firmware)

Each item, button and notification are same as Radio Firmware. For details see a description of the Radio Firmware part.

Figure D5-27 shows the [Backbone Device Firmware] tab is selected.



FD0527.ai

Figure D5-27 Firmware Download Manager Window (Backbone Device Firmware)

Each item except the status field is same as Radio Firmware. The status field shows that if firmware update is running, a progress is shown, otherwise “Detected” is shown.

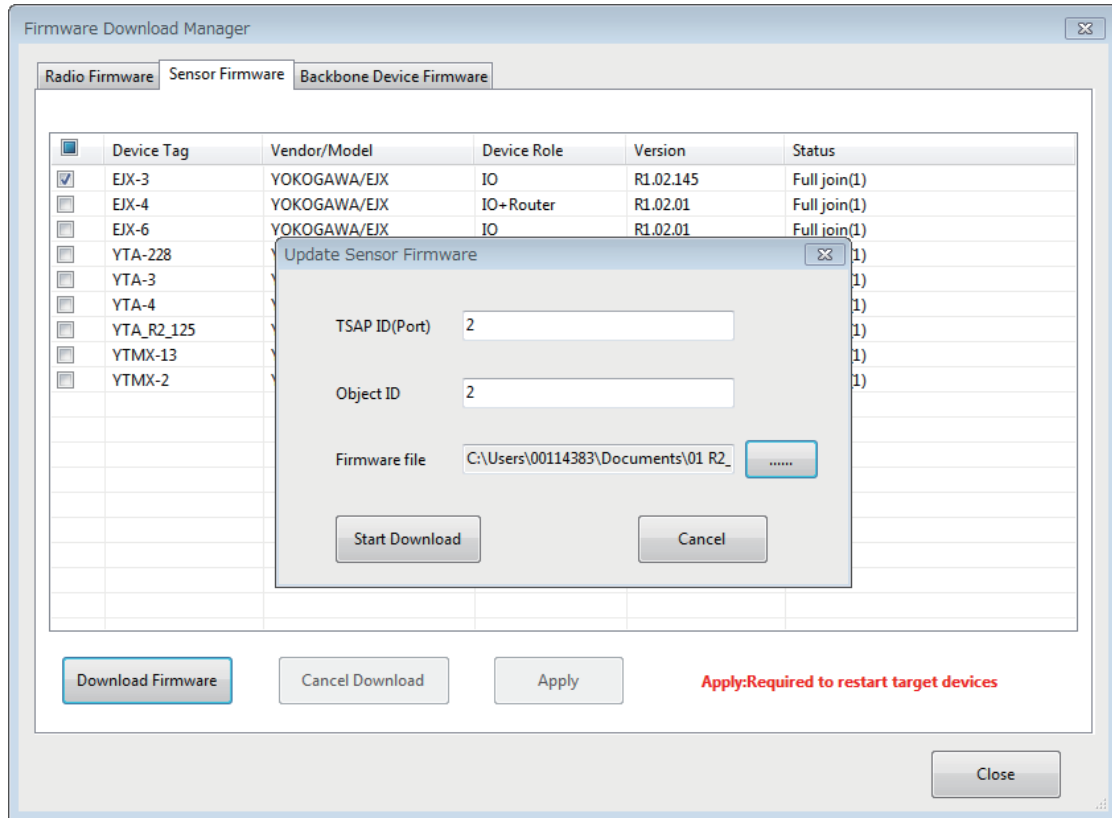
Each button and notification are same as Radio Firmware. For details see a description of the Radio Firmware part.

- **Firmware update procedure**

This sub-section describes a procedure of updating firmware as an example updating sensor firmware.

In the [Sensor Firmware] tab shown in Figure D5-26, select the device to be updated. Click the [Download Firmware] button to open the window shown in Figure D5-28.

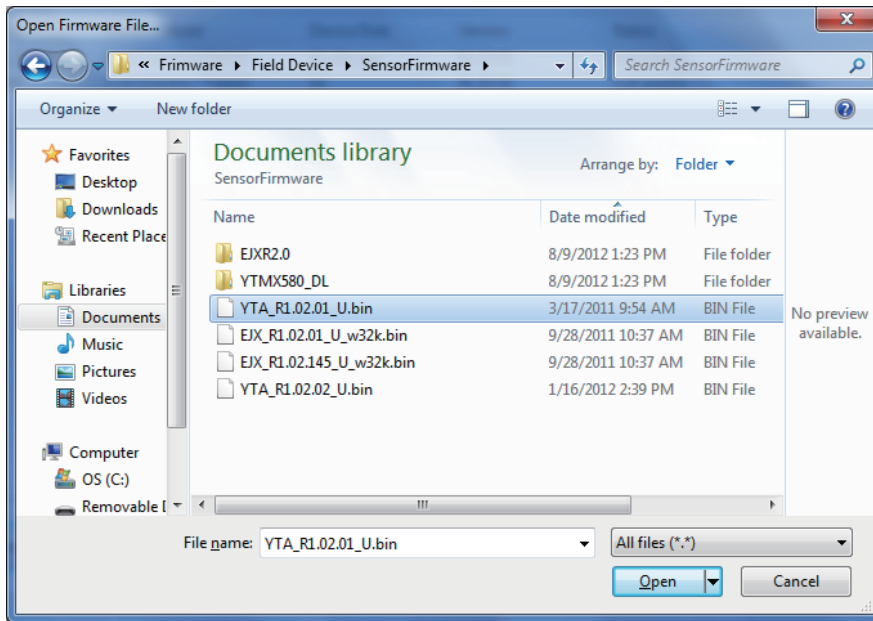
For radio firmware and backbone device firmware downloads, this dialog does not appear.



FD0528.ai

Figure D5-28 Update Sensor Firmware Window

The TSAP ID and Object ID are already filled; do not change these. To select the firmware file for the update, click right side the button of Firmware file field to open the Open Firmware File dialog shown in Figure D5-29 for selecting the new firmware. In radio firmware and backbone device firmware case, the Open Firmware File window is opened by clicking [Download Firmware] button.

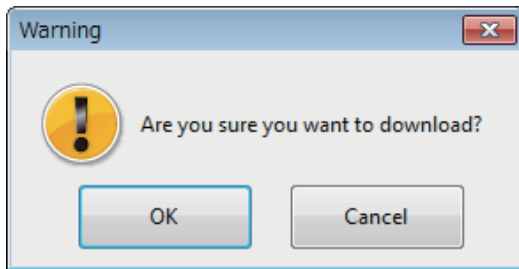


FD0529.ai

Figure D5-29 Open Firmware File Window

The Firmware file field is filled by selecting the new firmware in the Open Firmware File window. Click the [Cancel] button to close this window without specifying the file.

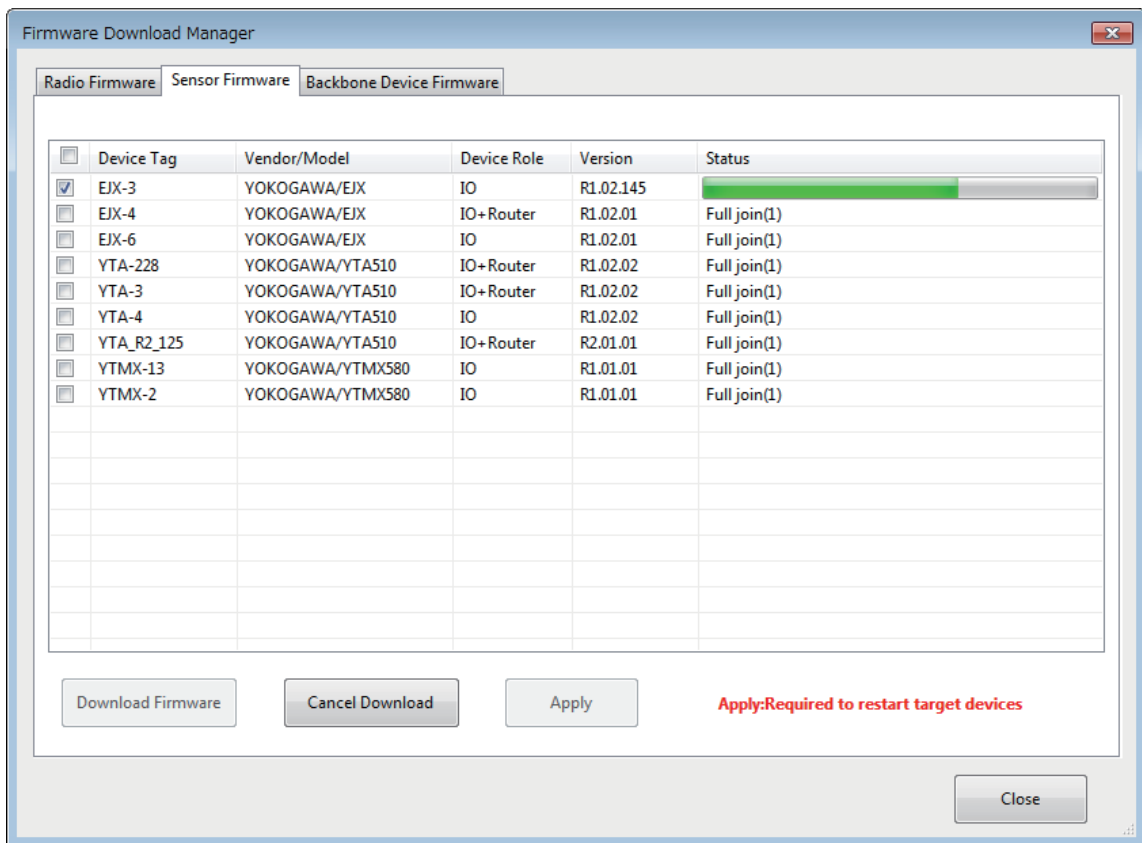
Click the [Start Download] button in this window shown in Figure D5-28 to open the dialog shown in Figure D5-30. Click the [Cancel] button to close the window of Figure D5-28.



FD0530.ai

Figure D5-30 Download Confirmation Dialog

Click the [OK] button to start the download, and update download status as shown in Figure D5-31. Click the [Cancel] button to cancel the operation and close the confirmation dialog.



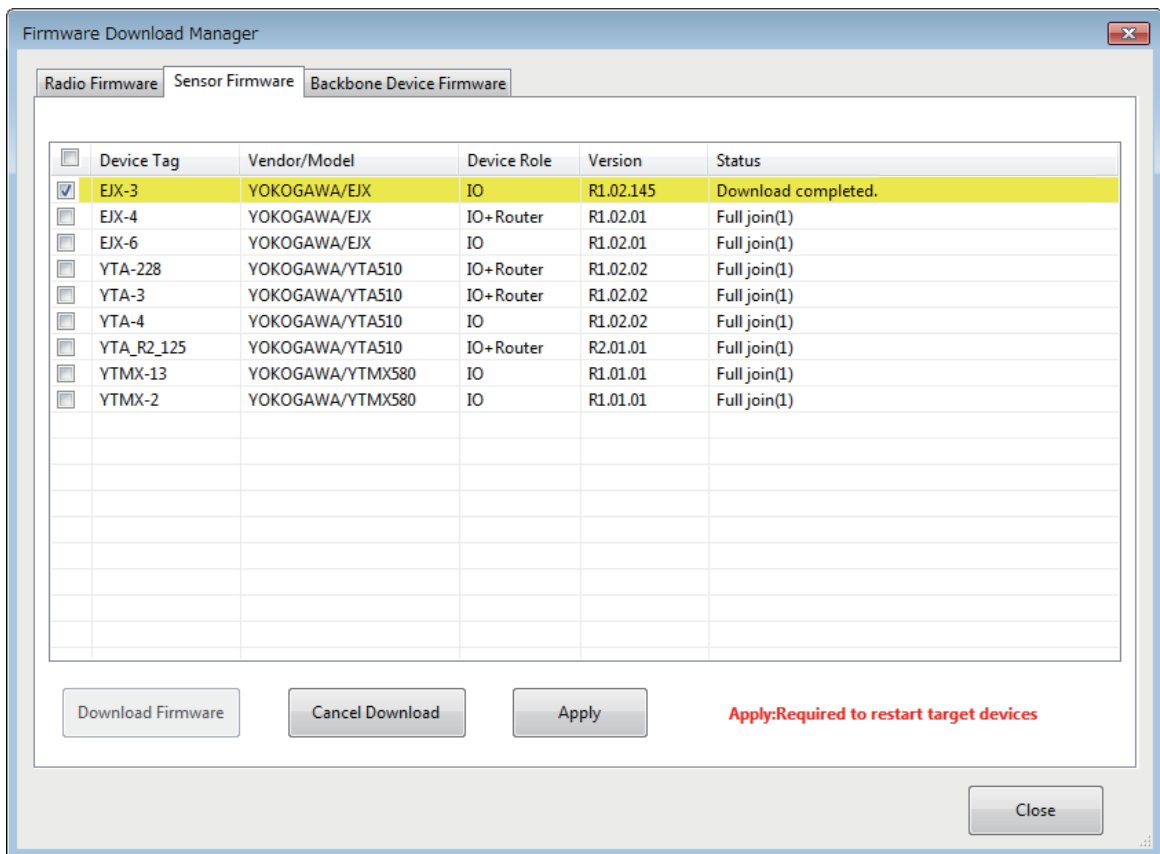
FD0531.ai

Figure D5-31 Firmware Download Manager Window (download in progress)

When the firmware download is started, "Waiting for download to complete" message is shown in the Status column. After that a green progress bar appears as shown in Figure D5-31.

A download process can be canceled by clicking [Cancel Download] button. During a cancel process, "Waiting" message is shown in the Status column. After finishing a cancel process, a join status is shown.

When download process is finished, color of row is changed as shown in Figure D5-32.



FD0532.ai

Figure D5-32 Firmware Download Manager Window (firmware download completed)

[Apply] button of the Firmware Download Manager window becomes available, and “Download completed.” message is shown in the Status column.

Applying process is started by clicking [Apply] button, and the Status column shows “Waiting” message, and devices try to apply a new firmware. When devices start to apply firmware, the Status column shows “Apply command was sent.” message, and devices will be restart automatically.

During the period from starting the restart until it is completed, the Status column shows the progress as: “Disconnected”→“Now connecting”→“Apply command was sent.” To see whether the firmware application was successful or not, check the version information. The version information is updated when devices rejoin the field wireless network after applying the firmware. The message “Apply command was sent.” continues to appear until the next firmware download.

Firmware downloads for a backbone device involve a different procedure from those for radio firmware and sensor firmware.

**IMPORTANT**

After upgrade firmware of YFGW410 or YFGW510, check the all field wireless devices which belong to the target device are joined to the network by the Monitor. Then carry out the download firmware and apply to next backbone devices.

**IMPORTANT**

When upgrade YFGW510 firmware, carry out the download firmware and apply by model.

- (1) The file size of YFGW410 firmware is larger than that of a field wireless device, and therefore there is an upload progress indication for transferring the file to the YFGW410.
- (2) After a YFGW410 firmware update, if the Field Wireless Management Console version is different, when the Monitor and the Configurator have accessed to the YFGW410, a closing confirmation dialog appears.
- (3) There are two ways to update YFGW410s or YFGW510s in a redundant configuration. During downloading firmware, the PC which executes FWMC should be able to communicate through field network with both of YFGW410s via the Layer2 switch. The procedure is described as follows:
 - i. Upgrading firmware to one by one device
 1. Check Active/Standby status of the YFGW410.

This explanation assumes that an initial status of “device A” is Active and “device B” is Standby.
 2. Carry out the firmware download for device B (Standby), and apply.
 3. With the Change Active/Standby function, switch device A (Active) into the Standby.

Since device A and device B have different versions, when reconnecting the application shows a closing confirmation message.
 4. Carry out the firmware download for device A which was Standby, and apply.
 5. Carry out the firmware download for YFGW510s, and apply.

To keep communications, select secondary YFGW510s at first. Several YFGW510s can be carried out the firmware download and applying at the same time.
 6. Carry out the firmware download for primary YFGW510s and apply.
 - ii. Upgrading firmware to YFGW410s or YFGW510s simultaneously
 1. Select both of Active and Standby YFGW410s, and carry out the firmware download and apply simultaneously.

In this case, all devices will be restarted.
 2. Select all YFGW510s which is same model, and carry out the firmware download and apply simultaneously.
- (4) Carry out the firmware download and applying for backbone devices consecutively. The download status is cleared by Applying process. If the download status is cleared, execute download process again.
- (5) For backbone devices, the downloads complete faster than for field wireless devices, and therefore during the download there is no valid [Cancel Download] button. Once the download completes cancel operation is available.

The time required for update depends on the device type. Target values for time taken are as follows.

Firmware		Time required for downloading (min.) *1	Assumptions
YFGW410		8 min./device	
YFGW510		3 min./device	
Field wireless device	Radio	15 min./device	For EJX-B series, YTA510, and YTMX580.
		60 min./30 devices	
	Sensor	360 min./device	For EJX-B series, YTA510, and YTMX580.
		360 min./25 devices	

*1 Not including the time taken from firmware application to restart



IMPORTANT

During radio firmware download, the publish data may be interrupted.



IMPORTANT

It is not possible to update radio firmware, sensor firmware, and backbone device firmware simultaneously. Carry out the download and apply for each firmware.

When applying a new firmware, refer the procedure in the each firmware release note.



IMPORTANT

Firmware downloads for field wireless devices can be carried out for a maximum of 100 devices simultaneously.



IMPORTANT

By Applying a firmware, devices will restart automatically. Care should be taken because restarting a device having a relay function within the field wireless network may affect all connected devices below this device in the hierarchy.

There are ISA100.11a field wireless devices provided by other manufacturers which do not automatically restart after applying a firmware. In this case, restart devices manually. For the method of manually restarting, see "Select Restart Devices" in this sub-section.



IMPORTANT

Even if the Firmware Download Manager is closed, the firmware update process is running in background. However if the Monitor is closed, all status of firmware update will be cleared. So do not close the Monitor before not completing firmware update process. A firmware download may take a considerable time, so it requires to care when closing the window during a firmware download to carry out another operation, until the firmware update process is completed.

○ **Maintenance Mode**

This function is for the use of service personnel, and is not required for ordinary inspection and management.

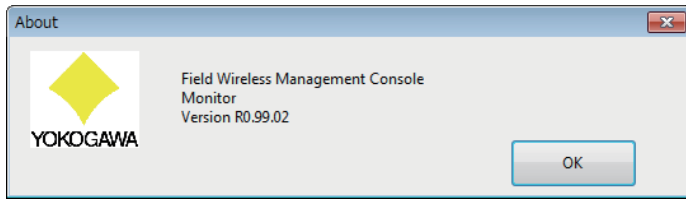
○ **Upload Technical Information**

This function is for the use of service personnel, and is not required for ordinary inspection and management.

● **Help menu**

The Help menu includes an About menu.

Select [Help] ⇒ [About] to open the window shown in Figure D5-33. This window shows a version information of the Monitor.



FD0533.ai

Figure D5-33 About Window

Part E Operation and Maintenance

This part describes how to carry out check tasks during daily operations of the field wireless system, carry out maintenance when a warning or error occurs, and add and replace components of the field wireless system.

E1. Routine Maintenance

For the field wireless network, it is important to monitor the degree of stability communications after the setup task was completed and the system started normal operations. A wireless communication may become unstable due to the influence of obstacles on radio waves on the communication path. Particular care is required to extend a new building or equipment, temporarily install a metallic structure for construction or maintenance work, or use construction equipments.

E1.1 Routine Maintenance

E1.1.1 Operation Status of Wireless System

For routine maintenance, start the Monitor on the Field Wireless Management Console through a PC connected to the YFGW410 in order to monitor the status of the wireless system.

When placing a PC for starting the Monitor near the YFGW410 to take tasks, connect it to the maintenance interface of the YFGW410. When working in secured room or other place in which host applications are running, connect the PC registered in the access control list to the field network interface.

For routine maintenance, check by the Monitor that the status information of YFGW410, YFGW510 and field wireless devices are normal.

For details on how to check the status of the wireless system on the Monitor, see Chapter D5 Starting up the Field Wireless System.

E1.1.2 YFGW410 Maintenance

For YFGW410 maintenance, check the device installation status as well as the operation status of wireless system components.

Check device installation, power supply cable, cable connection and stain condition.

If the YFGW410 becomes dirty or dusty, wipe with a soft cloth moistened with water or mild soap.



IMPORTANT

The housing has an open ventilation hole for heat radiation. When wiping out, be sure not to allow any foreign matter or water to get inside.



IMPORTANT

For details on how to check YFGW510, field wireless device, and other components, see the user's manual of the relevant devices.

E1.2 Handling a Device in the Abnormal Status

Check the status of a device by an abnormal status notification from a host application, and give an emergency treatment for a device of which the status is abnormal.

While referring to the detailed device information displayed on the Monitor, judge whether there is a problem in the communication path between devices or the power supply, or the device itself or whether the sensor is defective. Then, take the appropriate action.

For details on how to handle an abnormal device, see the user's manual of the relevant device. Methods it handle problems on the YFGW410 are explained in this user's manual.

E1.3 Handling a Device in the Warning Status

If there is a device that is judged to be subject to the warning status by an abnormal status notification received from a host application or by a daily monitor check, a communication error may occur if the situation deteriorates even if the process value or a status communication is continued.

The Monitor is supervising the wireless communication quality (PER, RSSI) of the field wireless device, remaining battery power level of the battery-powered device, and YFGW510 wireless LAN communication quality (RSSI) of the wireless LAN option specification. If these conditions become worse than the threshold specified by the Configurator, the target device is judged to be subject to the warning status, and a warning message appears on the Monitor.

If a warning message appears due to the low remaining battery power level of the field wireless device, immediately replace the battery pack regardless of the displayed number of days. For details on the replacement procedure, see the user's manual of the relevant device.

If a warning message appears due to a problem related to the wireless communication quality, check if a wireless communication error occurs on the communication path. Furthermore, check if a new structure or construction equipments is found on the route or around the device, and if the use of a new wireless communication is started in the same frequency band such as wireless LAN in a nearby area. For a short period of time, monitor the device for which a warning message is displayed due to a problem related to the communication quality. If there are no symptoms to return to the normal status by itself, adjust the device arrangement, especially the antenna installation position, or take into account the addition of a device with the router function. If a wireless device operated by the IO function is found on the communication path, change it to the IO + Router function, or add a new wireless device with the router function to an appropriate position to recover the communication path to the normal status.

If a warning message appears due to a problem related to the quality of a wireless LAN communication of YFGW510, to recover the status, eliminate the cause of an obstacle on the communication path, or appropriately change the installation position, considering a field wireless communication.

For details on how to check the threshold specified by the Configurator, see Sub-section D4.2.6 Alert Settings. For details on how to check the status of the wireless system on the Monitor and operate the Monitor, see Section D5.2 Wireless Network Management.

E2. Adding and Replacing a Device

This section describes how to add a component for the extension of the wireless system and replace a defective device.

E2.1 Field Wireless Device

This sub-section describes the procedure for adding and removing a field wireless device. The procedure varies depending on the provisioning method performed to the device.

To add a new field wireless device to the wireless network, perform the same procedure as for configuring a field wireless system explained in Chapter D4 Constructing a Field Wireless System.

- **OOB provisioning “Uses a provisioning information file”**

1. In FieldMate, perform provisioning, export the provisioning information file and configure parameters for the sensor module of the device.
2. Install the field wireless device at the site.
3. Register the device in the configuration data of the Configurator by importing the provisioning information file. Configure the interval of publish data to be sent to a host system, and place the device in the Modbus register. After registering the required items in the configuration data, download the configuration data in YFGW410 or target device.
4. On the Monitor, check that the added device is connected to the network and that all the detailed information such as the communication quality is normal.

- **OOB provisioning “Does not use a provisioning information file”**

1. In FieldMate, perform provisioning and configure parameters for the sensor module of the device.
2. Install the field wireless device at the site.
3. Register the device in the configuration data of the Configurator by specifying the device tag, etc. Configure the interval of publish data to be sent to a host system, and place the device in the Modbus register. After registering the required items in the configuration data, download the configuration data in YFGW410 or target device.
4. On the Monitor, check that the added device is connected to the network and that all the detailed information such as the communication quality is normal.

- **OTA provisioning**

1. Install the field wireless device at the site.
2. Register the device in the configuration data of the Configurator by specifying the device tag, etc. Configure the interval of publish data to be sent to a host system, and place the device in the Modbus register. After registering the required items in the configuration data, download the configuration data in YFGW410 or target device.
3. On the Monitor, enable the provisioning network and perform OTA provisioning to the device.
4. On the Monitor, check that the added device is connected to the network and that all the detailed information such as the communication quality is normal.

When replacing a device that is judged to be defective by the host system warning function or the Monitor analysis result, replace the device with a new one.

- **OOB provisioning “Uses a provisioning information file”**

1. In FieldMate, perform provisioning, export the provisioning information file and configure parameters for the sensor module of the device (recommended).
2. Replace the defective field wireless device at the site with a new one.
3. Register the device in the configuration data of the Configurator by importing the provisioning information file. After registering the required items in the configuration data, download the configuration data in YFGW410 or target device.
4. On the Monitor, check that the added device is connected to the network and that all the detailed information such as the communication quality is normal.

- **OOB provisioning “Does not use a provisioning information file”**

1. In FieldMate, perform provisioning and configure parameters for the sensor module of the device (recommended).
On the Monitor, enable the provisioning network and reset the provisioning information of the device.
2. Replace the defected field wireless device at the site with a new one.
3. On the Monitor, check that the added device is connected to the network and that all the detailed information such as the communication quality is normal.

- **OTA provisioning**

1. In FieldMate, configure parameters for the sensor module of the device (recommended).
On the Monitor, enable the provisioning network and reset the provisioning information of the device.
2. Replace the defected field wireless device at the site with a new one.
3. On the Monitor, enable the provisioning network and perform OTA provisioning to the device.
4. On the Monitor, check that the added device is connected to the network and that all the detailed information such as the communication quality is normal.

When a defective device is replaced with the same model (with the same CF file), the role of the device to be configured with the Configurator, communication path, publication setting such as the publication interval, and information for placing published data in the Modbus register are inherited to a new device.

E2.2 Field Wireless Access Point (YFGW510)

There is a case to add a new YFGW510 when adding a new field wireless subnet to the YFGW410, or making the YFGW510 redundant to enable the Duocast function (see Sub-section D4.2.4 Field Wireless Networks) of the field wireless device and make the field wireless route redundant. The addition procedure is as follows.

1. Configure the device tag name of YFGW510 using the field wireless access point setup tool.
2. For YFGW510 (wireless LAN client model), configure parameters for the wireless LAN access point using the field wireless access point setup tool.
3. Install the device at the site, and conduct wiring.
4. Add the target YFGW510 to wireless network configuration data using the Configurator, and correct information of the related field wireless device.
5. Power on added YFGW510, and download configuration data from the Configurator to the YFGW410 and related devices.
6. On the Monitor, check that all the devices, including the added device, and communication paths are normal.

When replacing the YFGW510 that is judged to be defective by the host system warning function or the Monitor's analysis result, perform the following procedure.

1. Set the same device tag name as for the defective device to the YFGW510 to be replaced using the field wireless access point setup tool.
2. Install the device at the site and conduct wiring. Then, turn the power on.
3. On the Monitor, check that all the devices, including the replaced device, are normal.

If wireless network configuration data is configured correctly, the required information is automatically downloaded when the YFGW410 recognizes the start of YFGW510. After this, YFGW510 starts running.

For details on the YFGW510, see the YFGW510 user's manual (IM 01W02E01-01EN).

E2.3 Field Wireless Management Station (YFGW410)

There is a case to add YFGW410 in order to make the YFGW410 redundant in a system in which the field wireless network is managed with a single YFGW410. The outline of the addition procedure is as follows.

1. Stop the existing system.
2. Initialize the database of the YFGW410 to be added.
3. Install the YFGW410, and conduct wiring.

The Rapid Spanning Tree Protocol and IEEE1588v2-compatible model is required to use the L2SW in the field wireless backbone.

Connect the cable for redundancy of the UNIT1 connector to the existing YFGW410 and the UNIT2 connector to the added YFGW410.

4. Turn YFGW410 and YFGW510 on.
5. After all devices have been started, start the Configurator with the IP address that was used to start the Field Wireless Management Console in the single-YFGW410 system. Then, select "YFGW410 Settings" - "Interfaces" setting window to change the required IP address from the default to the IP address based on the current environment.

6. Download the changed configuration data from the Configurator to the YFGW410.
7. On the Monitor, check that all the devices, including the added device, and communication paths are normal.

When replacing the YFGW410 that is judged to be defective by the host system warning function or the Monitor's analysis result, perform the following procedure.

● Single system

If the YFGW410 is judged to be defective, immediately replace it with the spare device to make a recovery.

1. If the YFGW410 to be replaced is a used product, initialize the database.
2. Install the new device and conduct wiring instead of the defective product at the site.
3. Connect the PC to the maintenance interface, and start the Configurator of the Field Wireless Management Console using the factory default IP address.
4. After the system has been set up or if any change has been made for maintenance, import the backup file of the last saved wireless network configuration data to the Configurator.
5. Check the configurations, and download it to the YFGW410.
6. On the Monitor, check that all the devices, including the replaced device, and communication paths are normal.

● Redundant system

In the YFGW410-redundant system, if one YFGW410 becomes abnormal, another one continues operations instead. As a precaution, replace the defective device at an early date to recover the system.

1. If the YFGW410 to be replaced is a used product, initialize the database.
2. Replace the defective device with a new one, and conduct the installation and wiring.
3. Turn the power on.
4. On the Monitor, check that all the devices, including the replaced device, and communication paths are normal.



IMPORTANT

For details of initializing the database, see B3.6 Reset Switch.



IMPORTANT

To use Field Wireless Management Console during an operational state, it should be executed on the PC which can access to YFGW410 through field network interfaces.

E3. YFGW410 Maintenance in Hazardous Area



IMPORTANT

Please be sure to read “YFGW410 Field Wireless Management Station Read Me First (IM 01W02D01-11EN)” for the precautions including maintenance and repair of the explosion-proof type product.

To carry out maintenance, check the power supply cable, grounding cable, and network cable for looseness.

If an access is required via YFGW410 maintenance interface in the hazardous area for maintenance and repair tasks, PC and devices to be used for access must match the requirements of the hazardous area. For details, contact us.

Explosion-proof instruments must retain their intended properties before and after maintenance.

Otherwise, hazardous conditions can arise. Be sure to consult with Yokogawa Electric Corporation for any repair and alteration.

For other wireless network components, see the user’s manual of the relevant device.

E4. Parts with Defined Life Spans

YFGW410 does not include any parts with defined life spans, which need to be replaced.

Read the following descriptions of parts with defined life spans.



IMPORTANT

Notes regarding parts with defined life spans

- The term “Parts with Defined Life Spans” refers to parts that are expected to wear out or break down within 10 years from the initial use under normal use and storage. Therefore, parts with expected life spans of 10 or more years are excluded here.
 - The recommended replacement cycle is the cycle indicated for preventive maintenance. It provides no guarantee against the accidental failures.
 - The recommended replacement cycle is merely a guideline. The actual replacement cycle depends on the usage status (ambient temperature, ambient atmosphere).
 - The recommended replacement cycle is subject to change according to the actual results in the field and other factors.
-



IMPORTANT

For YFGW510, field wireless device, and other wireless network components, see the user’s manual of the relevant device.

Part F Troubleshooting

This part briefly describes the troubleshooting procedure when a field wireless system error or warning has occurred in a host system.

The host system refers to a DCS (Yokogawa CENTUM VP and other system), SCADA system, Modbus/TCP-compatible monitor systems, or device management system (Yokogawa PRM and other system).

The CENTUM VP not only imports the process values of devices composing the field wireless system but also analyzes error information based on the health status of the process value or status information of each device to display the analysis result on the operator window (HIS). For details, see the Communication with Subsystems Using FIO user's manual (IM 33K03L20-50E).

In other DCS, SCADA system, or Modbus/TCP-compatible monitor systems, you need to create and operate an application to import the health status of the process value or status information of each device as Modbus data like the process value and convert them to the error or warning status in a host system and display the conversion result on the window.

In PRM, the status of the field wireless device can be monitored and displayed using the device patrol function. For the setting and operation procedure, see the Plant Resource Manager Reference (IM 33Y05Q10-11E).

F1. Field Wireless System

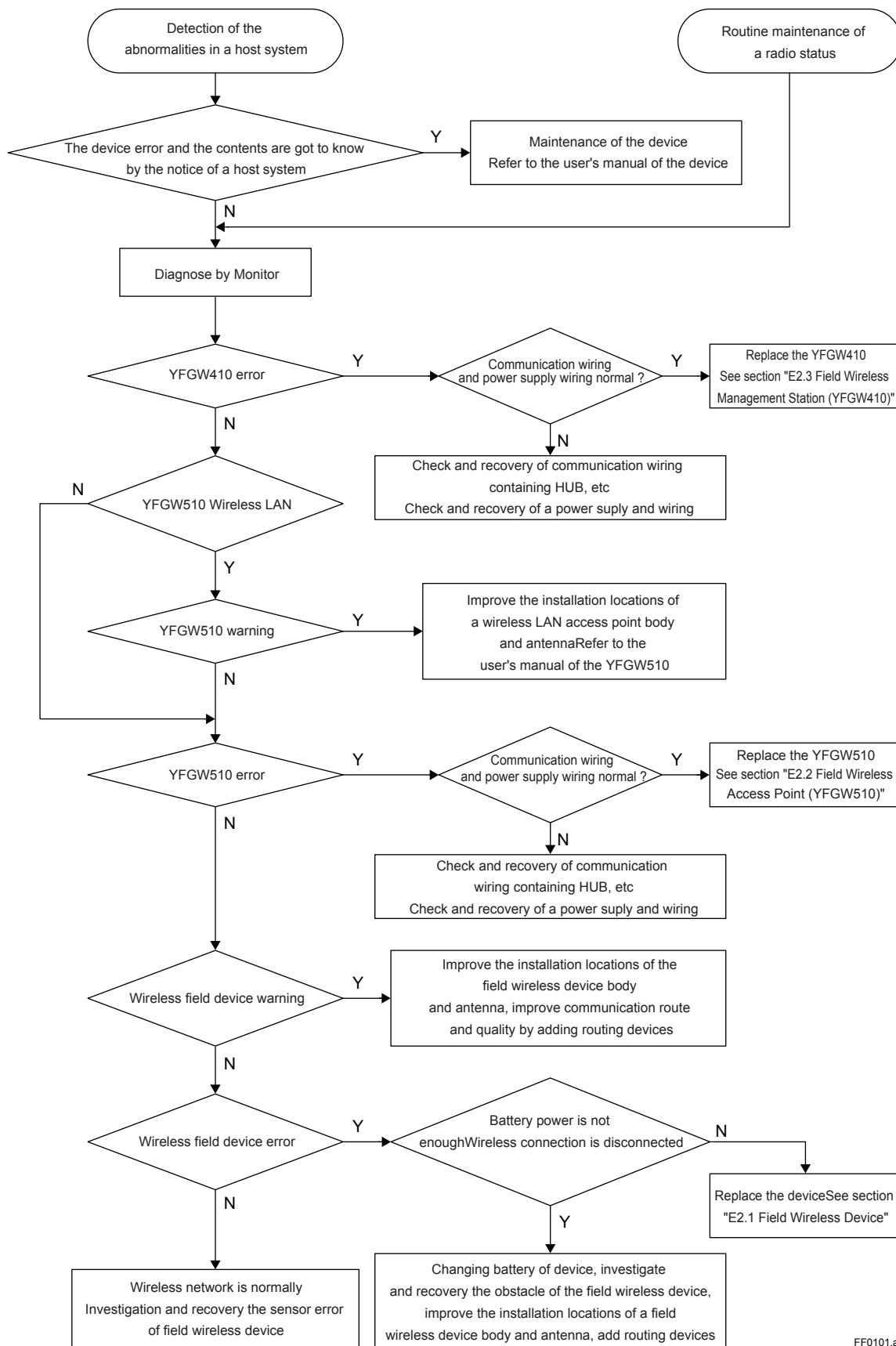
This chapter shows the troubleshooting flow when a field wireless system error or warning was detected in a host system or on the Monitor of the Field Wireless Management Console.

If such as an error or warning is explicitly isolated as a problem (input over-range, sensor failure, disconnection, etc.) in the measurement section of the field wireless device using the display of a host system, take the appropriate action, seeing the troubleshooting in the user's manual of the relevant device.

In the CENTUM VP, a wireless communication error, field wireless backbone communication error, or device error is notified by the IOP of the system alarm. The error code includes a communication-related comment, which allows you to identify a location at which an error was detected in the communication path or device. For details, see the Communication with Subsystems Using FIO user's manual (IM 33K03L20-50E).

In other host systems, perform system engineering to embed the error detection mechanism using Device Status of each wireless system component, Process Data Status, and self-diagnosis status (DIAG_STATUS) of the field wireless device; an error location can be identified in the same way as for the above.

The following shows the troubleshooting flow of the field wireless system.



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F2. YFGW410

This Chapter describes the details of the YFGW410 status information and the troubleshooting procedure.

F2.1 Status Information

YFGW410 operating status information is notified with the gateway status (GW_STATUS) on the Modbus register.

The data structure and the contents of status information are as follows.

Table F2-1 Gateway Status (GW_STATUS)

Modbus Address	Name	Data Type	Contents
n	Data status	Unsigned16	Always 0x0080: Normal
n+1	Gateway status	Unsigned16	GW0/1 system error (0: No error, 1: Error detected) GW1 in redundant system, GW0 in single system
n+2		Unsigned16	GW2 system error (0: No error, 1: Error detected, 0xFFFF: Not used)
n+3		Unsigned16	GW0/1 system status (0: Ready, 1: Active, 2: Standby) GW1 in redundant system, GW0 in single system
n+4		Unsigned16	GW2 system status (0: Ready, 1: Active, 2: Standby, 0xFFFF: Not used)
n+5		Unsigned16	Status of field wireless device 0: No error (Join for all field wireless devices) 1: Error detected. (Leave for one or more field wireless devices)
n+6		Unsigned16	Access counter (Number of access times by Modbus clients) 0 to 65535
n+7 to n+8		Unsigned16	Always 0 (Reserved bits)

Whether YFGW410 is normal or abnormal is notified with status information of (n+1) and (n+2). If the YFGW410 is normal, the device operating status is notified with status information of (n+3) and (n+4).

Whether field wireless devices registered in YFGW410 are normally connected is notified with status information of (n+5).

This status information is imported as data via Modbus into the host system and used on the application that displays the status of each device.

For details on how to import information with a host system and create an application, see the user's manual of the relevant system.

F2.2 Status Indicators and Actions

The YFGW410 provides three status indicator LEDs, “RDY”, “SYN”, and “ACTIVE”, on the front side.

- **Single system**

When a single YFGW410 manages the system, only “RDY” is available.

The “SYN” and “ACTIVE” indicator LEDs are always turned off.

Table F2-2 Status Indicator LED List (Single System)

LED Status	Device Status
Turned off	Powered off
ORANGE	Powered on, active
RED blink	Not connected to the synchronization connector, or failure
GREEN	Normal running
ORANGE blink	Any of the F1 to F3 port causes link-down
RED	Error occurrence

When the LED blinks red, it is assumed that the synchronization connector is not connected. If the correct terminator is installed, it is assumed there is a loose connection or that an internal error of the connector has occurred.

When any LED blinks orange, check the cables and hubs connected to the field network port for the host system. If an error is detected, recover it. If the F1 port causes link-down, the “RDY” indicator LED blinks orange.

When LED lights red, check if wiring is correct. If no error is detected in wiring and an error is indicated in gateway status information described in Section F2.1 Status Information, or an error is indicated in device information on the Monitor, it is assumed that a failure occurs in the YFGW410. For details on how to replace a YFGW410 device, see Section E2.3 Field Wireless Management Station (YFGW410).

● **Redundant system**

To manage the system in the YFGW410 redundant configuration, the device status is indicated using three LEDs.

Table F2-3 Status Indicator LED List (Redundant System)

LED Status			Device Status
RDY	SYN	ACTIVE	
OFF	OFF	OFF	Powered off
ORANGE	OFF	OFF	Powered on, active
RED	OFF	OFF	An error occurred during operation, or an inconsistency was detected in the setting or version.
RED blink	OFF	OFF	The cable for redundancy is not connected to the synchronization port.
GREEN	OFF	GREEN	One side is normally running (ACTIVE) in the YFGW410 redundant configuration.
N/A	GREEN blink	GREEN or OFF	YFGW410 is in process of synchronization.
GREEN	RED	OFF	Synchronization failure
GREEN	GREEN	GREEN	Synchronization completion (ACTIVE), normal running
GREEN	GREEN	OFF	Synchronization completion (STANDBY), normal running
ORANGE blink	GREEN	GREEN	Any of the F1 to F3 port causes link-down (ACTIVE)
ORANGE blink	GREEN	OFF	Any of the F1 to F3 port causes link-down (STANDBY)
RED	GREEN	GREEN	YFGW410 error (ACTIVE)
RED	GREEN	OFF	YFGW410 error (STANDBY)

If the “RDY” indicator LED lights red to indicate that an error occurred when the YFGW410 was started by turning the power on, it is assumed that an inconsistency is detected in the device setting or version.

If the “RDY” indicator LED blinks red to indicate that an error occurred at start-up of the YFGW410, it is assumed that the cable for redundancy is not connected normally. Check it, and restart the YFGW410 for recovery.

If the “RDY” indicator LED lights green or the “SYN” indicator LED lights red to indicate a synchronization failure, restart the YFGW410. If the same phenomenon recurs, it is assumed that a device failure occurs.

If an error is detected in the standby YFGW410 while the redundant system is active, the “RDY” indicator LED lights red and the “SYN” indicator LED lights green to indicate an error in the standby YFGW410. If an error is detected in the active YFGW410, the control is transferred to the standby side, and the database is synchronized. After the synchronization has been completed, three indicator LEDs light green in a new active side to indicate the normal state. In the standby side with a persisting failure, the “RDY” indicator LED lights red and the “SYN” indicator LED lights green to indicate the abnormal state of the standby side YFGW410. After this, if an error is recovered, the “RDY” indicator LED lights green and the standby side returns to the normal state.

If an error occurs in the active side before an error is recovered in the standby side, the “RDY” indicator LED lights red and the “SYN” and “ACTIVE” indicator LEDs light green to indicate an error in the active side.

When the “RDY” indicator LED blinks in orange check the cables and hubs connected to the field network port for the host system. If an error is detected, recover it. When the “RDY” indicator LED lights red, check if wiring is correct. If no error is detected in wiring relation, an error is indicated in gateway status information described in Section F2.1 Status Information, or an error is indicated in device information on the Monitor, it is assumed that a failure occurs in the YFGW410. For details on how to replace a YFGW410 device, see Section E2.3 Field Wireless Management Station (YFGW410).

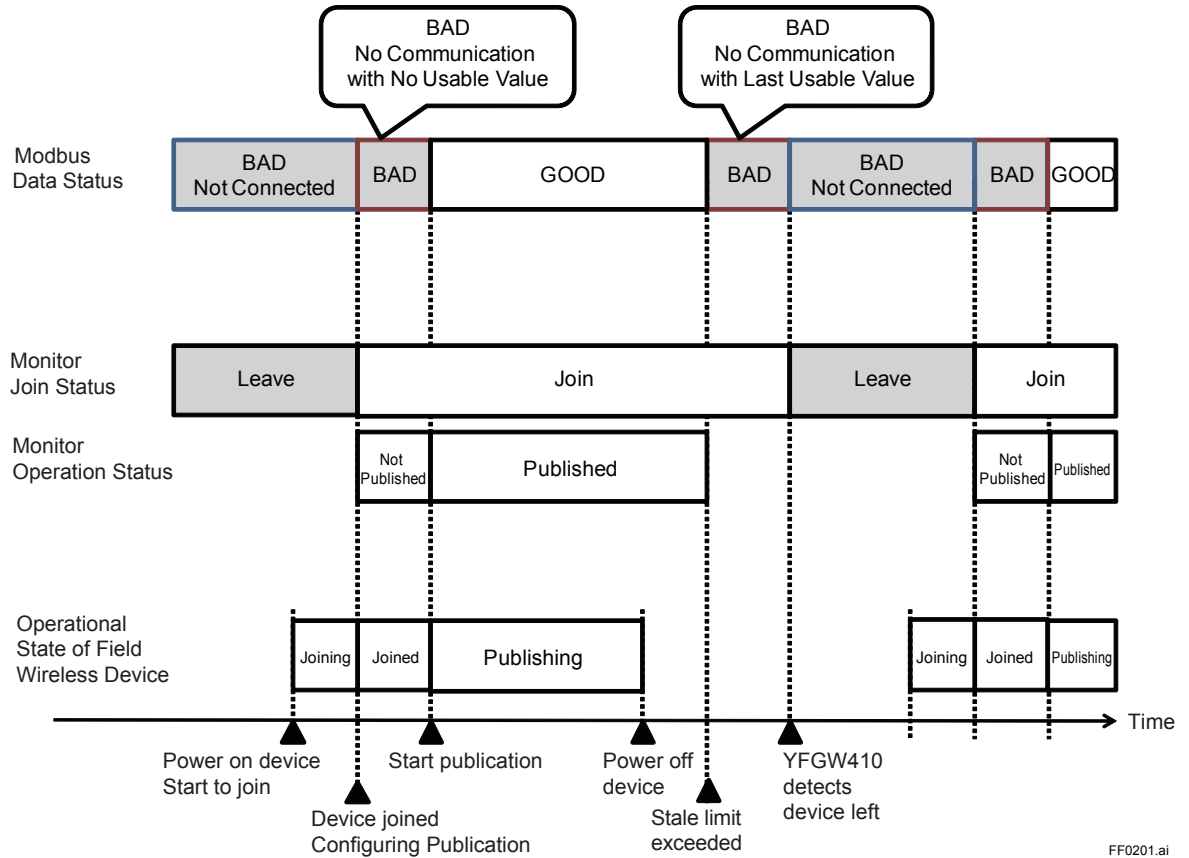
F2.3 Data Status Specification

The following table shows the specification of data status of the parameters in the YFGW410 Modbus registers.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Quality		Reserved	Quality dependent sub-status			Limit condition	
0=Bad	This bit should always be set to zero		0=Non-specific 1=Configuration error 2=Not Connected (*1) 3=Device failure 4=Sensor failure 5=No Communication with Last Usable Value (*2) 6=No Communication with No Usable Value (*3) 7=Out of service (value is not computed) All other values are reserved			0=Not limited 1=Low limit 2=High limit 3=Constant (both high and low limited)	
1=Uncertain			0=Non-specific 2=Substituted or manual entry 4=Sensor conversion inaccurate 5=range limit exceeded All other values are reserved				
2=Good			0=No special condition exist All other values are reserved.				
3=Reserved			All values are reserved.				

- *1 This value indicates that the field wireless device does not join to the field wireless network. The error may be caused by engineering mistakes in YFGW410, absence of the field device, inactivated field device, field device abnormal or YFGW510 abnormal.
- *2 This value indicates that the field device joined to the field wireless network, the data of the field wireless device has been published so far but the data cannot be updated. The error may be caused by network error, field device abnormal or YFGW510 abnormal.
- *3 This value indicates that the field device joined to the field wireless network, but the data of the field wireless device has never been published. The error may be caused by instability of the field wireless network which is normally occurs right after starting the field wireless devices or by the engineering mistakes in YFGW410.

Figure F2-1 shows an example of the relation among the data status of a parameter, the status display of Monitor and the operational status of the field wireless device.



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Figure F2-1 Example of the relation between Modbus Data, Monitor and Device Status

Part G Specifications

G1. YFGW410

G1.1 Standard Specification

■ Communication Interface

Item		Field Network Specifications		Field Wireless Backbone Specifications	Maintenance/Diagnostic Network Specifications	
Communication Interface	Standard	100BASE-TX *2	RS-485	100BASE-TX *2	100BASE-TX *4	RS-232C *4*5
	Transmission Speed	100Mbps	38.4Kbps	100Mbps	100Mbps	115.2kbps
	Connector	RJ-45	Proprietary	RJ-45	RJ-45	RJ-11
	Cable Type	Category 5	AWG24~12	Category 5	Category 5	Proprietary
	Maximum Length	100m	1200m	100m	100m	15m
	Number of Ports	3 ports	1 port	4 ports	1 port	1 port
	Port Name	F1, F2, F3	–	B1, B2, B3, B4	M1	–
	Protection	Surge	Isolated, Surge	Surge	–	–
Communication Protocol	Modbus	Modbus/TCP	Modbus/RTU	–	–	–
	OPC *1	Proprietary *3	–	–	–	–
	Management, configuration, etc.	HTTP NTP/SNTP Proprietary *3	–	HTTP IEEE1588PTP v2 Proprietary *3	HTTP Proprietary *3	–

- *1: OPC interface connection is available by Field Wireless Device OPC Server (SSS7100). For details of this product, see related products General Specifications.
- *2: In outdoor wiring to Field Network or 100BASE-TX of Field Wireless Backbone, use optical fiber cables with a nonmetallic tension member, combining with YFGW610.
- *3: TCP based custom protocol used for communication between this product, "Field Wireless OPC Server", "FieldMate Versatile Device Management Wizard", "Plant Resource Manager (PRM)", and YFGW510. For details of each product, see related products General Specifications.
- *4: Maintenance/Diagnostic Network (100BASE-TX, RS-232C) are not available for outdoor wiring.
- *5: These are the serial ports for a maintenance which only our company use.

■ OPTIONAL SPECIFICATIONS (For Explosion Protected Types)

For explosion proof certifications, see "General Specifications (GS 01W02D01-01EN)".

■ Installation Environment

Temperature Range:

Operating: -40 to +65°C (altitude : up to 2000m)
-40 to +55°C (altitude : more than
2000m, up to 3000m)

Storage: -40 to +85°C

Humidity Range:

Operating: 5 to 95 %RH (non-condensation)
Storage: 5 to 95 %RH (non-condensation)

Temperature Gradient:

Operating: $\pm 10^\circ\text{C/h}$ or less
Storage: $\pm 20^\circ\text{C/h}$ or less

Power Supply:

Voltage Range : 10.8~26.4 V DC
Rated Power Supply : 24 V DC
Momentary Power Failure : Instant
Disconnection
DC Power Supply Ripple Ratio : 1%_{p-p} or less

Power Consumption:

Max. 10 W

Degrees of Protection:

IP20

Vibration Resistance:

0.15 mm P-P (5~58 Hz) , 1 G (58~150 Hz)

Shock Resistance:

15 G 11 ms

Noise Resistance:

Electric Field : 3 V/m or less (80MHz~1GHz)
Electrostatic Discharges: 4 kV or less (contact
discharge), 8 kV or less (aerial discharge)

Grounding:

Class-D grounding (no sharing ground with
others)

Cooling:

Natural Air Cooling

■ Regulatory Compliance Statements

EMC Conformity Standards:

EN61326-1 Class A, Table 2,
EN55011 Class A group1, EN61000-6-2

Safety Requirements:

CSA C22.2 No. 61010-1
Indoor use only

Explosion-Proof Types:

ATEX Type n declaration
FM, CSA, IECEx (approvals under pending)

■ Physical Specifications

Housing Material:

Aluminum alloy plate with polyester, mint-green
paint (Munsell 5.6BG 3.3/2.9 or its equivalent)

External Dimension:

150 x 60 x 140 mm (not include projection)

Weight:

Approx. 1.0 kg

Mounting:

DIN RAIL Mounting

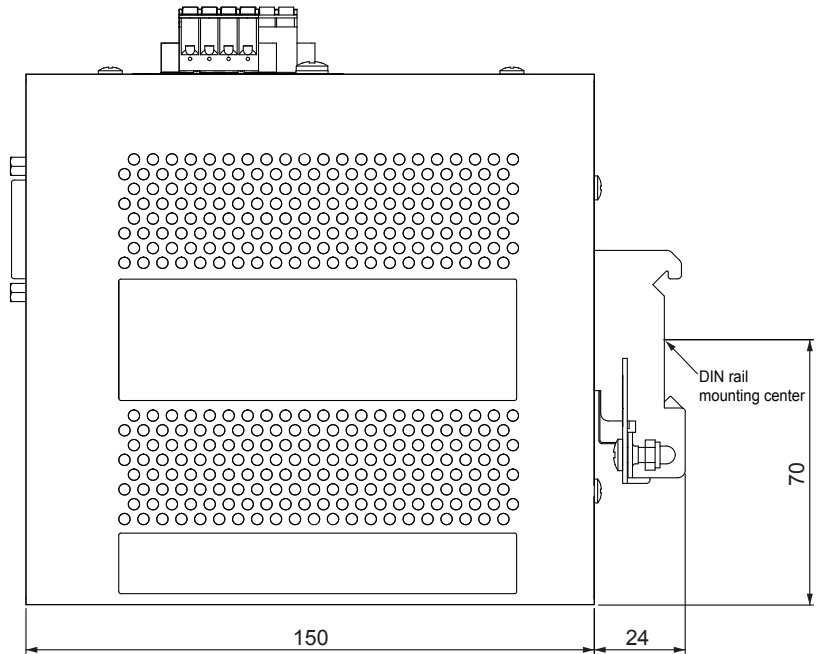
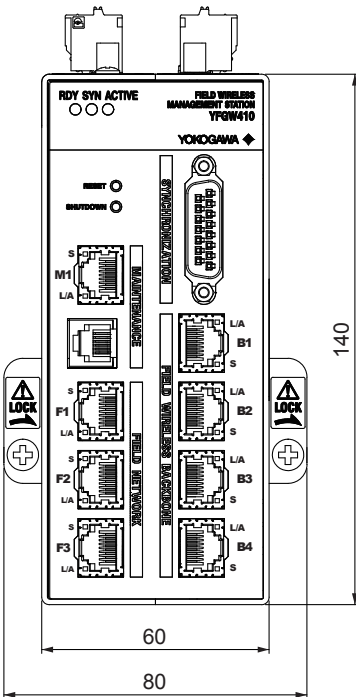
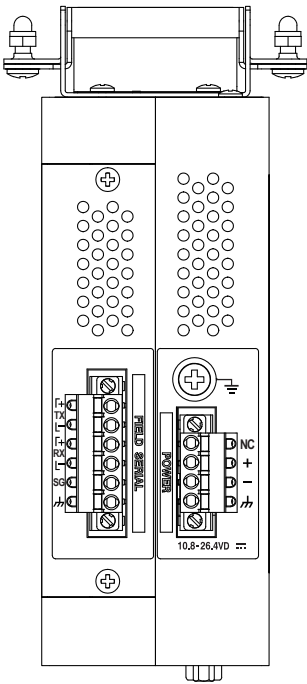
G1.2 Model and Suffix Codes

Model	Suffix Code		Descriptions
YFGW410		Field Wireless Management Station
General Specifications	Output signal	-A.....	Always A
	License	-B.....	Single License (10 Field wireless devices connectable) *1
		-C.....	Single License (100 Field wireless devices connectable) *2
		-S.....	Single License (500 Field wireless devices connectable)
		-R.....	Redundant License (500 Field wireless devices connectable)
	Manual Language	0	Japanese
		1	English
	Software Media	0	Provided with DVD-ROM
		1	None
	Mounting Bracket	D.....	DIN RAIL Mounting
	Sync Connector Termination	0	With Terminator *3
		1	With Cable for Redundancy *4
	---	A.....	Always A
---	A.....	Always A	
Option Codes			<input type="checkbox"/> Optional Specifications

- *1: One YFGW510 and one field wireless subnet are connectable.
- *2: Two YFGW510s and one field wireless subnet are connectable.
- *3: In case of single behavior, terminate the Sync Connector by the terminator.
- *4: In case of redundant behavior, connect the cable for Redundancy between two YFGW410s.

G1.3 External Dimensions

Unit: mm



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G2. Field Wireless Network

G2.1 Field Wireless Network Specification

Item	Specifications	
Network Form (Topology)	Star, Mesh	
Number of route hops	Fixed (Max. 4 hops) Auto (Max. 4 hops) ^{*1}	
Maximum number of hopping patterns	8 patterns ^{*2}	
Maximum number of connectable field wireless devices / YFGW410	200 devices (at 1 s update) ^{*3} 500 devices (at 5 s update) ^{*3}	
Maximum number of field wireless subnets / YFGW410	20 subnets	
Maximum number of YFGW510 devices/YFGW410	20 devices	
Maximum number of YFGW510 devices / field wireless subnet	8 devices (In wireless LAN connection, 1 device)	
Maximum number of routing devices / field wireless subnet	20 devices	
Maximum number of connectable field wireless devices / field wireless subnet	20 devices (at 1 s update) ^{*4*5} 100 devices (at 5 s update) ^{*4*5}	
Maximum number of directly connectable child devices / routing device ^{*7}	Routing device	4 devices
	I/O device	15 devices
Alarm at occurrence of failure in wireless communications	Supported (Displayed on FWMC)	
Battery life of routing device	5 or more years for 5 child devices at update in 30 s cycle ^{*6}	
Direct communication between wireless devices	Not supported	

- *1 Only an Auto I/O device is possible for an automatic setup of a route. An I/O device and a routing device need to fix a route.
- *2 Configuring the channel black list decreases the number of available hopping patterns.
- *3 Including a routing device
- *4 Maximum number of connectable field wireless devices when using periodic communication (Publish) and Modbus read access. The number of connectable field wireless devices decrease if the Modbus Write communication is used together.
- *5 The number of connectable devices depends the number of hops. If many field wireless devices are connected to a place with many hops, the number of simultaneously connectable devices decreases.
- *6 It is battery-life prediction when YTA510 (DEVREV1) is used as routing device and sets up the updating cycle of 3,600 seconds.
- *7 Number of field wireless devices that can be connected as the next hop of a single routing device

If there is a firewall between YFGW410 and YFGW510 or YFGW410 and the host system, following services should be allowed on the firewall.

Service	Port number	Interface of YFGW410	Destination
NTP/SNTP	[UDP] 123	<ul style="list-style-type: none"> • Field network • Field wireless backbone 	<ul style="list-style-type: none"> • NTP/SNTP server
IEEE1588	[UDP] 319, 320	<ul style="list-style-type: none"> • Field wireless backbone 	<ul style="list-style-type: none"> • YFGW510
Modbus/TCP	[TCP] 502	<ul style="list-style-type: none"> • Field network 	<ul style="list-style-type: none"> • CENTUM VP • STARDOM • FAST/TOOLS • Other companies' implementation of DCS/SCADA
YOKOGAWA dedicated communication service	[TCP] 4901, 4902	<ul style="list-style-type: none"> • Field network 	<ul style="list-style-type: none"> • Field wireless OPC server • PRM • FieldMate
HTTP	[TCP] 8080	<ul style="list-style-type: none"> • Field network • Field wireless backbone 	<ul style="list-style-type: none"> • PC which executes FWMC
Field wireless backbone service	[UDP] 34423 [TCP] 34423	<ul style="list-style-type: none"> • Field wireless backbone 	<ul style="list-style-type: none"> • YFGW510

Service	Port number	Interface of YFGW410	Destination
YFGW510 management service	[UDP] 34425, 34429, 34440, 44944 [TCP] 34429	• Field wireless backbone	• YFGW510
FWMC communication service	[TCP] 34424, 34428	• Field network • Field wireless backbone	• PC which executes FWMC
YFGW410 monitoring service	[UDP] 34427	• Field network • Field wireless backbone	• YFGW410

G2.2 Network Form (Topology)

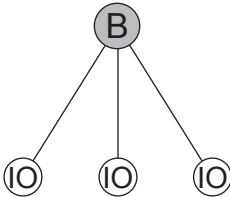
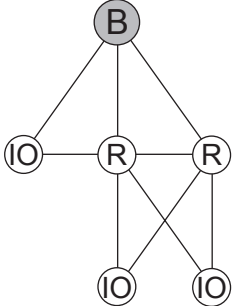
This field wireless system supports two network forms; the star topology and mesh topology.

G2.2.1 Star Topology

This topology will keep the installed communication paths. The delay time is minimized and high reliability is ensured. In order to establish a star network, YFGW510 must be arranged appropriately so that all field wireless devices can communicate directly with any YFGW510.

G2.2.2 Mesh Topology

If the data delay time will not cause any specific problem, routing devices can be used for wireless relay. A system with routing devices allows the range of wireless access to be expanded easily. However, the mesh network has the disadvantages of increased delay time and shortened battery life of relaying wireless devices.

Network form	Star	Mesh
Routes		
Hardware components	YFGW510 (B) IO device (IO)	YFGW510 (B) Routing device (R) IO device (IO)
Redundant route	Not applicable	Applicable
Number of devices /YFGW510	A maximum of 100 devices / YFGW510	
Update time	0.5 s or more	1 s or more
Battery life	Long Not route-sensitive	Short Route-sensitive
Expansion of the range of wireless access	Add YFGW510	Add routing devices

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G2.3 Precautions on Configuring a Wireless Network

G2.3.1 Route Specification

In the field wireless system constituted from YFGW410 the user can manually configure a wireless route for field wireless network. If an error occurs in the communication quality of the specified route, an alarm message appears on the Field Wireless Management Console.

G2.3.2 Redundancy of Wireless Route

In the field wireless system constituted from YFGW410 the user can configure wireless routes the user made redundant in advance. If wireless routes are made redundant, even when an error occurs in either route, a communication is continued via another redundant route, enhancing the communication reliability.

G2.3.3 Support of Large-Scale Wireless System

In the field wireless system constituted from YFGW410 the user can simultaneously manage up to 500 field wireless devices and up to 20 field wireless subnets for YFGW410 device (a pair of the YFGW410 devices in the YFGW410 redundant configuration). A field wireless subnet is assigned to one of up to 8 hopping patterns to perform operations. No interference occurs in wireless communications between field wireless subnets with a different hopping pattern. Therefore, many devices can be arranged in a narrow area by assigning a different hopping pattern to multiple field wireless subnets.

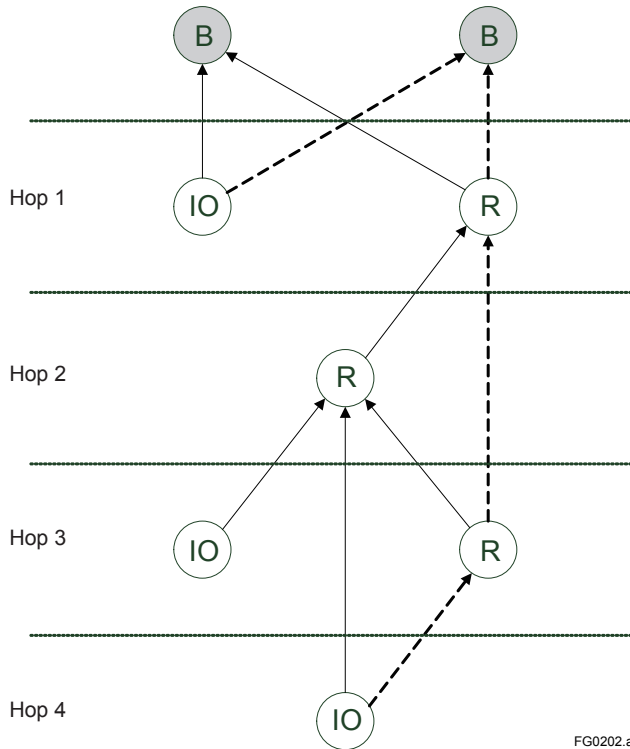
G2.3.4 Hopping Pattern

A field wireless communication is continued while up to 16 channels are hopped in the specified cycle. In which sequence channels are to be hopped (hopping pattern) is determined by the System Manager. A hopping pattern is determined by the setting for each field wireless subnet to perform operations. If the radio wave accessible ranges of the field wireless subnets assigned to the same hopping pattern overlap physically, an interference occurs between wireless communications. When operating multiple field wireless subnets in a place in which the radio wave accessible range overlaps each other, assign a different hopping pattern to each subnet to prevent an interference between radio waves.

The field wireless system uses the same frequency band as for wireless LAN. When simultaneously using wireless LAN in the area in which a field wireless subnet is to be installed, the user can use the channel black list to disable any channels in the field wireless subnet side to prevent an interference between radio waves. However, if the number of available channels decreases, the maximum number of available hopping patterns may decrease.

G2.3.5 Number of Hops

The field wireless system constituted from YFGW410 supports a wireless communication with up to 4 hops. The number of hops is defined depending on the number of field wireless devices in a route that reaches YFGW510 as shown below. Up to 4 hops are supported, taking into account the worst case. For a route to YFGW510, including redundant routes, a field wireless device with 1 hop is defined as a field wireless device directly connected to the backbone router. The field wireless device directly connected to the backbone router supports the 0.5 seconds update cycle at the earliest. Other field wireless devices support the 1 second update cycle at the earliest.



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G2.3.6 Communication between Devices

The field wireless system constituted from YFGW410 does not support field wireless device to field wireless device communication field wireless devices. It supports only a communication via YFGW410.

G2.4 Duocast (ISA100.11a Standard)

The field wireless system constituted from YFGW410 supports Duocast. Duocast is a function that makes a YFGW510 redundant by sending packets from the field wireless device directly connected to the backbone router to 2 YFGW510. The Duocast function is enabled by configuring the same Duocast ID to 2 YFGW510. The field wireless device enhances the reliability of wireless communications by simultaneously sending data to 2 YFGW510.

G2.5 Standard Battery Life

The Update time of a field wireless device and the battery life in a standard specification environment is shown below.

The battery life of an IO device is constant irrespective of the network form or the route configuration. However, the battery life of a routing device varies greatly according to the route connection. The larger the number of directly connected low-level devices, the shorter the battery life. In addition, the battery life greatly changes depending on temperature conditions. Note that the battery life may become shorter than the following data depending on device use conditions.

Update Time	Expected battery life when the IO device is set to Routing Device
10 seconds	x 0.1 - 0.4
30 seconds	x 0.1 - 0.5
60 seconds	x 0.1 - 0.6

G2.6 Restrictions

G2.6.1 Restrictions on Number of Connectable Devices by Network Resources

● Maximum number of connectable output devices

There are two type of field wireless devices; input devices which has function to read values from sensors, and output devices which has function to write values to objects to be controled.

Input devices have following process parameters;

for analog input data: PV

for digital input data : PV_B

The host system can read above parameters through YFGW410. Up to 500 input devices can be connected to YFGW410.

Output devices have following process parameters;

for analog input data: Readback (Actual value of the OP)

for analog output data: OP

for digital input data: Readback_B (Actual value of the OP_B)

for digital output data: OP_B

The host system can read and/or write above parameters through YFGW410. If the host system accesses to each output device with data tracking, up to 250 output devices can be connected to YFGW410.

● Maximum number of field wireless devices connectable to field wireless subnet

Up to 100 field wireless devices can be connected to each field wireless subnet. However, network resources to be used are different between routing device and IO device; therefore, the number of devices connectable to each field wireless subnet is restricted based on the following formula.

$$\text{Number of IO devices} + \text{Number of routing devices} \times 3 \leq 100$$

For example, if there are 4 routing devices, up to 88 IO devices can be connected.

● Maximum number of devices connectable to routing device

Up to 4 routing devices and up to 15 IO devices can be connected to the low-level side of routing device. However, network resources to be used are different between routing device and IO device, and the topology of up to 4 hops is supported. Therefore, the number of devices connectable to each routing device is determined based on the following formula.

$$\text{Number of IO devices} + \text{Number of routing devices} \times 3 \leq 30$$

For example, if there are 4 routing devices, up to 15 IO devices can be connected.

G2.6.2 Maximum Number of Host Systems

YFGW410 supports 240 accesses per second on sum of three field network interfaces. A number of access from the host systems should be configured within 240 accesses per second. When a number of accesses from the host system exceeds this, communication between YFGW410 and the host system may be delayed or unstable. In this case, it requires restarting YFGW410.

A guide line of accessing;

For 1 to 3 Modbus/TCP clients:

Up to 50 accesses per second for each client.

For 4 to 8 Modbus/TCP clients:

Up to 30 accesses per second for each client.

For Modbus/RTU client:

Up to 10 accesses per second.

For field wireless OPC server (SSS7100):

A number of accesses is depended on amount of field wireless devices and publish messages.

For details, consult our service or sales representative.

G2.6.3 Duocast and Auto I/O Device

The Duocast-specified backbone router cannot be connected to the Auto I/O device in the same field wireless subnet.

G2.7 Recommended Device List

The recommended devices used for the network between YFGW410 and YFGW510 with operations confirmed are as follows.

Function	Recommended and Performance-Based Device
L2SW	Cisco IE-3000-4TC
	Moxa EDS-616-T + CM-600-4TX-PTP
Wireless LAN access point	Cisco AIR-LAP1522AG-P-K9 (Antenna: AIR-ANT2450V-N)
	Hirschmann BAT54-F

To use the L2SW, enable the loop detection function such as RSTP and enable IEEE1588 v2. IEEE1588 v2 must be operated in E2E 2-step TC mode. To use the L2SW in the IEEE1588-compatible mode by extending a board, prepare an IEEE1588-compatible port.

For details on the recommended devices, contact the relevant manufacturer.

G3. Glossary of Terms and Abbreviations

Terms	Definition
Access Control List (ACL)	This is the list of the registered information of the IP address and the device connection was allowed. It limits the access from any other than a registered apparatus.
Backbone Router (BBR)	This is a routing device connected to the backbone network that provided in ISA100.11a. This device can be transported ISA100.11a protocol to different network standards such as Ethernet.
Black List	This list defines the items that will be an issue, and used to disable or block an applicable matter. In wireless communication, the communication patterns and frequencies that are registered in the list is not output from the device.
Device Role	This is the functional classification of the field wireless device that provided in ISA100.11a. There are two types of the routing device and the IO device in the functional classification.
Duocast	This is the unique function of the wireless communication that provided in ISA100.11a. Duocast provides support for high reliability communication with backbone routers. Duocast transaction uses two links for backbone router at the same time.
Ethernet	This is the networking standard that provided in IEEE 802.3. The physical specifications and communication speed, there are multiple types; 10BASE-T/TX, 100BASE-TX and others.
Extended Unique Identifier 64 (EUI-64)	This is a 64bit length ID specified in the IEEE.
Field Network	This is part of the plant network that provided in ISA100.11a. This is the network between the host system and YFGW410.
Field Wireless Backbone Network	This is a backbone network that provided in ISA100.11a. This is the network between YFGW510 and YFGW410.
Field Wireless Subnet	This is the unit of field wireless network that provided in ISA100.11a. This unit is identified by the network ID (2 ~ 65535 decimal).
Gateway	This is the protocol transform function that provided in ISA100.11a. To convert the process data and parameter data between the host system and the field wireless network.
Hopping Pattern	This is a transition rule of the radio channel that provided in ISA100.11a. The wireless communication is performed by change the radio channel according to a predetermined rule.
IEEE1588v2	The precision time protocol for synchronizing the time between the devices connected via a network such as Ethernet. The E2E 2-step TC is one of the mode of operation that is provided in IEEE1588v2.
Join Key	This is the encryption key that provided in ISA100.11a. This is mandatory encryption key to be used when the wireless field device joins to the field wireless network.
Layer 2 Switch (L2SW)	This is a device that relays the network. This determines the destination using the data of the data link layer included in the packet.
Layer 3 Switch (L3SW)	This is a device that relays the network. This determines the destination in the network layer data contained in the packet.
Modbus	This is the protocol that is used to communicate with the host system to read and write the process data. To read the data, use the input register, and to write the data, use the holding register. Modbus/TCP uses TCP/IP communication, and Modbus/RTU uses RS-232/485 communication.
Network Time Protocol (NTP)	This is the time synchronization protocol that provided in RFC1305. To synchronize the time using the network between a devices.
Packet Error Rate (PER)	The percentage of the communication error is indicated by "total number of failures / total number of communication".
Provisioning	This is work to set the security and network information to enable the field wireless device to be connected to the field wireless network.

Terms	Definition
OOB (Out-of-band) Provisioning	This is a provisioning method that provided in ISA100.11a. This uses infrared communication that provided in WCI (ISA100 Wireless Compliance Institute).
OTA (Over-the-air) Provisioning	This is a provisioning method that provided in ISA100.11a. This uses ISA100.11a wireless communication.
Rapid Spanning Tree Protocol (RSTP)	This is a network protocol that provided in IEEE802.1w. This prevents an infinite loop of packets flowing on the network.
Received Signal Strength Indicator (RSSI)	The values present the strength of the signal received by the field wireless device in dBm. The high value indicates high quality signal, that can be received stably.
Security Manager	This is the management function of the encryption key that provided in ISA100.11a. To manage multiple encryption keys, used by the field wireless devices.
Service Set Identifier (SSID)	This is the identification code of the wireless LAN. Identify the wireless network using this ID to communicate with the wireless LAN access point.
System Manager	This is the management function of the field wireless network that provided in ISA100.11a. To manage the wireless communication of the field wireless devices.
Topology	This is a form of network connection. There is two types of topology, star topology and mesh topology.
Wireless LAN (WLAN)	This is the wireless standard that provided in IEEE802.11. This network uses 5GHz and 2.4GHz frequency band.