Wireless Data Acquisition System
TYPE: **WDT-5LR-Z2**
TYPE: **WDT-6LR-Z2**
TYPE: **WDR-LE-Z2**

Instruction Manual
[Web version]

■ Notice to Customer

Thank for your purchasing our PATLITE products.
The WDT-5LR-Z2 and WDT-6LR-Z2 products are used exclusively with LR5/LR6 signal towers.

- ・ Request the installation and wiring be performed by a professional contractor if construction work is involved.
- ・ Prior to installation, read this manual thoroughly before using this product to ensure correct use.
- ・ Re-read this manual before conducting maintenance, inspections, repairs, and so on. If you have any questions about this product, please contact your PATLITE sales representative listed on the back of this manual.

■ To the Contractor

- ・ Prior to installation, read this manual thoroughly to ensure it is installed correctly.
- ・ Return this manual to the customer.

■ Table of Contents

1. Before you begin

1.1 About Safety Symbols

To prevent injuries to the user and other personnel, as well as to prevent damage to assets, note the following:

◆ The following symbols classify warnings and cautions, and describe the level of harm and damage that will occur when the corresponding instructions are ignored.

⚠ WARNING	This symbol indicates, "Failure to follow the instructions may lead to death or serious injury."
⚠ CAUTION	This symbol indicates, "Failure to follow the instructions may lead to injury or property damage."

◆ The following symbols classify and describe the content of associated messages.

🚫 Prohibited	This symbol identifies "Prohibited" operations that should never be carried out.
❶ Mandatory	This symbol identifies "Mandatory" instructions that should always be carried out.
⚠	This symbol identifies general "Caution" related information.

1.2 Safety Precautions

	⚠ WARNING
🚫 Prohibited	◆ This Wireless Data Acquisition System (hereafter referred to as "this product") is an attachment for existing machinery and equipment that work with LR series signal towers (LR5 and LR6). This product sends changes in the operation status of signal towers via a wireless transmitter to a receiver that collects the data. Do not use this product for any other purpose. ◆ Do not use this product in the vicinity of implanted cardiac pacemakers and other medical equipment, as this product's radio waves may affect the performance of these devices. ◆ Do not use or install the receiver (WDR-LE-Z2) in locations where liquids such as water is present, oil will splatter, or locations that are humid or dusty. Failure to follow these instructions could result in fire, electric shock or product failure. ◆ To prevent accidents, do not use this product other than for its intended purpose and do not run operations or maintenance other than those described in this manual. ◆ This product is not intended for use where high reliability is required and where human life is involved, such as medical equipment, atomic energy equipment and machinery, aviation and aerospace, transportation, and control of other equipment. If this product is used for these applications, we cannot be held responsible in the event of injury or property damage. ◆ Do not modify or disassemble this product. Failure to follow these instructions could result in fire or electric shock. ◆ Do not use this product when there is condensation. Failure to follow these instructions could result in fire or electric shock. ◆ Do not allow liquids to enter the receiver (WDR-LE-Z2), and do not allow it to have contact with metallic objects. Failure to follow these instructions could result in fire or electric shock.
❗ Mandatory	◆ Request the installation and wiring be performed by a professional contractor if construction work is involved. Failure to follow this instruction could result in fire, electric shock or falls. ◆ Turn off the power before performing any electric wiring or product installation. Failure to follow this instruction could result in electric shock. ◆ Always use a power supply within the operating voltage range. Failure to follow this instruction could result in fire or product failure. ◆ In places such as aircraft and hospitals, turn off this product where usage of wireless devices is prohibited and where its radio waves affect surrounding equipment. ◆ We cannot foresee all circumstances concerning the handling and dangers associated with this product. Therefore, not every possible danger is indicated in this instruction manual. To prevent accidents when operating or maintaining this product, in addition to the safety guidelines identified in the instructions of this manual, follow all general safety guidelines. ◆ In the unlikely event that there is an abnormal situation such as smoke or odors emitting from the product, immediately cut the power supplied to the product. Continued use of the product in this condition could result in fire or electric shock.

⚠ CAUTION	
🚫 Prohibited	◆ Do not install this product near other electrical appliances. If you install this product near a facsimile, personal computer, television, microwave oven, or equipment using a motor, this product may not operate properly. ◆ Do not use this product with the O-ring removed. Waterproofing will be affected, and potentially cause equipment failure. ◆ Do not use this product in applications that require a high-degree of reliability or real-time performance. If there are communication problems, this product cannot retrieve accurate data. ◆ Do not use this product near fire, in hot or humid environments, or where corrosive or flammable gas is present. Failure to follow this instruction could cause a malfunction and the product may not operate properly. ◆ Do not use or store this product in the following locations. Failure to follow this instruction could result in a malfunction or product failure. ・ Environments with poor breathability and ventilation ・ Near equipment that generate strong electrical or strong magnetic fields ・ Places exposed to direct sunlight ・ Locations subject to shock and vibration ・ Near heating appliances ・ Environments where there is dust, iron powder, and so on ・ Places near fire or environments with high temperatures and humidity ・ Locations where the product may experience a drop ・ Locations exposed to salty sea air
❗ Mandatory	◆ Operate this product only after thorough testing in the customer environment. ◆ Pay close attention to the polarity of the power supply before connection. Connecting the power supply incorrectly may cause equipment failure. ◆ To clean this product, wipe with a soft cloth dampened with water. Do not wipe with cleaners containing thinners, benzene, gasoline, or oil.
⚠	◆ Although this product has a high level of security, there is the potential for third-parties to intercept communications as this product uses radio waves. ◆ When using this product, pay close attention to the following: ・ Due to the nature of radio waves, communication can be disabled even over insignificant distances as a result of noise or other environmental factors. ・ Do not use this product near chemicals. This product could melt or become deformed if any chemicals adhere to it. ・ To prevent static electricity, discharge the static electrical charge in your body before starting work. (You can discharge static electricity by touching your hand on grounded metal objects.)

⚠ CAUTION

⚠

◆ Operation under the following conditions could cause the wireless communication distance to become shorter than specified, and increase reaction times:

・ Metal obstructions, such as steel doors or reinforced concrete, are between the transmitter and receiver.

・ Transmitter or receiver is mounted on a metal surface.

・ When used near powerful radio waves, such as those emitted by broadcasting stations.

・ When used near power lines or other high-voltage lines.

◆ About the Operating Environment

・ We have tested the product with out of the box computers in a normal operating environment. However, depending on your operating environment, which includes the computer main unit, peripheral devices and applications in use, there may be cases where this product will not run properly.

◆ The software copyrights are held by our company.
Do not use this software in other products, or duplicate or modify a portion or all the software without prior written permission.

◆ Disposing this product

・ When disposing of this product, follow the rules and regulations on how to handle recyclable materials as outlined in your community.

◆ About this manual

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

・ Images in this manual are for illustration purposes only, and may differ from the actual product. Additionally, the illustration may hide parts of the product for ease of explanation.

・ This manual is copyrighted. No part of the manual, including drawings or technical information, can be copied or duplicated in any manner, without prior consent.

・ When transferring ownership of this product, include the instruction manual (digest version).

・ If you have any questions or need further information, contact your nearest PATLITE sales representative.

We cannot warrant against breakdowns caused by disassembling this product, natural disasters, or handling of this product that is contrary to any warnings or precautions.
Avoid using this product in ways other than those described in this manual.
We cannot be held responsible for damages and injuries caused by failing to pay attention, or failing to follow precautions, when operating or running maintenance on this product.

KC	인증받은자의 상호: PATLITE CORPORATION 제품명/모델명:특정소출력무선기기(무선데이타통신시스템용무선기기)/WDR-LE-Z2 제조자 및 제조국가: PATLITE CORPORATION / JAPAN 제조년월:2017-8 인증번호: MSIP-CRM-PAt-WDRZ2 ◆ 해당 무선설비는 전파혼신 가능 성이 있으므로 인명안전과 관련된 서비스는 할 수 없음
KC	인증받은자의 상호: PATLITE CORPORATION 제품명/모델명:특정소출력무선기기(무선데이타통신시스템용무선기기)/ WDT-6LR-Z2/WDT-5LR-Z2 제조자 및 제조국가: PATLITE CORPORATION / JAPAN 제조년월:2017-8 인증번호: MSIP-CRM-PAt-WDTZ2 해당 무선설비는 전파혼신 가능 성이 있으므로 인명안전과 관련된 서비스는 할 수 없음

2. Contents

2.1 About the Contents

(1)   WDT-5LR-Z2/WDT-6LR-Z2
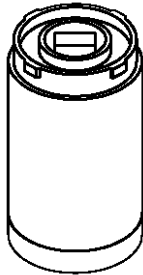
Product: 1 unit   Instruction Manual (digest version): 1 copy
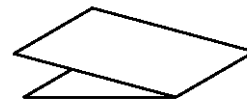
(2)   WDR-LE-Z2

Product: 1 unit
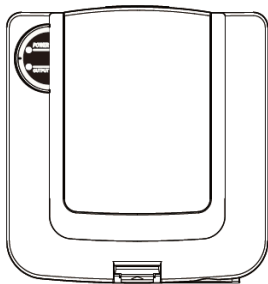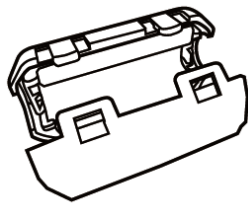
Ferrite core: 1   Instruction Manual (digest version): 1 copy
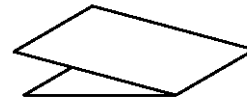
3. Models

3.1 About Models

(1)　WDT (transmitter)

　　Model

　　　WDT-5LR-Z2 (Compatible LR Series Signal Tower size: Φ50)
　　　WDT-6LR-Z2 (Compatible LR Series Signal Tower size: Φ60)

　　① LR Signal Tower Models

This product	Compatible LR Series Signal Tower		
Model	Model	Size	Rated Voltage
WDT-5LR-Z2	LR5-□-01	Φ50	12 VDC
	LR5-□-02		24 VDC
WDT-6LR-Z2	LR6-□-02	Φ60	24 VDC
	LR6-□-M2		100 to 240 VAC

(2)　WDR (receiver)

　　Model

　　　WDR-LE-Z2　　　(LE: LAN/USB connector model for overseas only)

4. Part Names and Dimensions

4.1 About Part Names and Dimensions

(1)   WDT (transmitter)

① Part Names

| Front View | Rear View | Bottom View |

② Part Dimensions

WDT-5LR-Z2   : D=φ50
WDT-6LR-Z2   : D=φ60

Front View (units: mm)
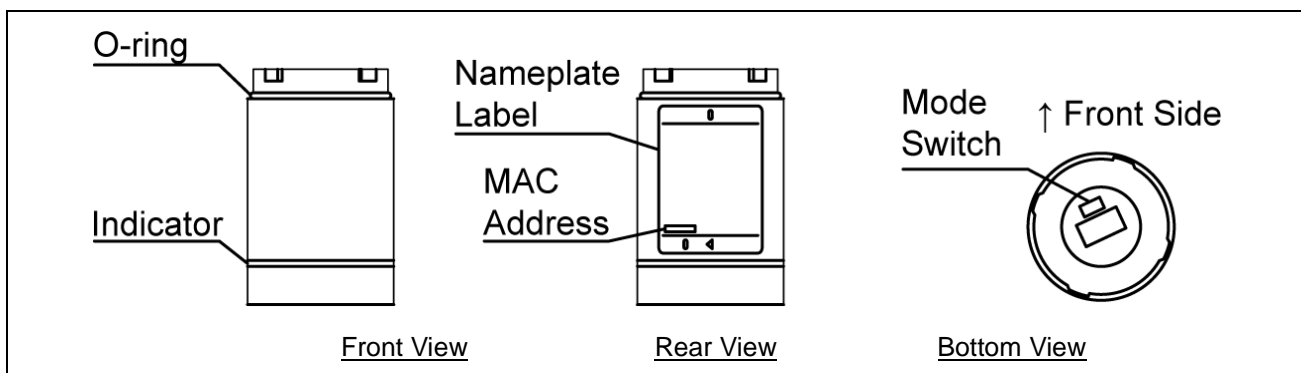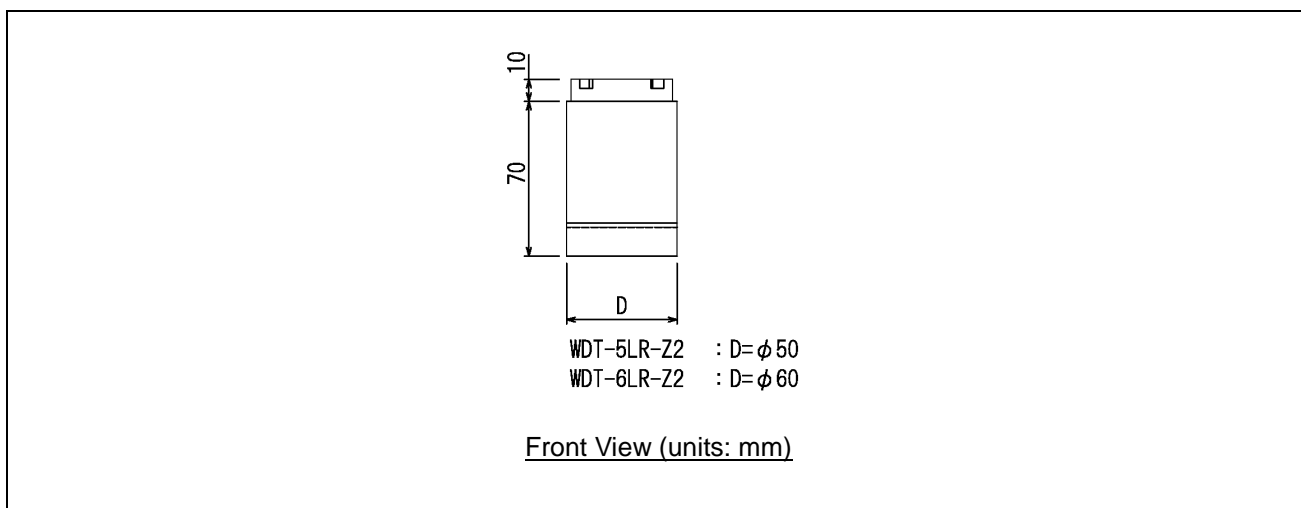
(2)   WDR (receiver)

① Part Names (main unit)

Front View   Bottom View
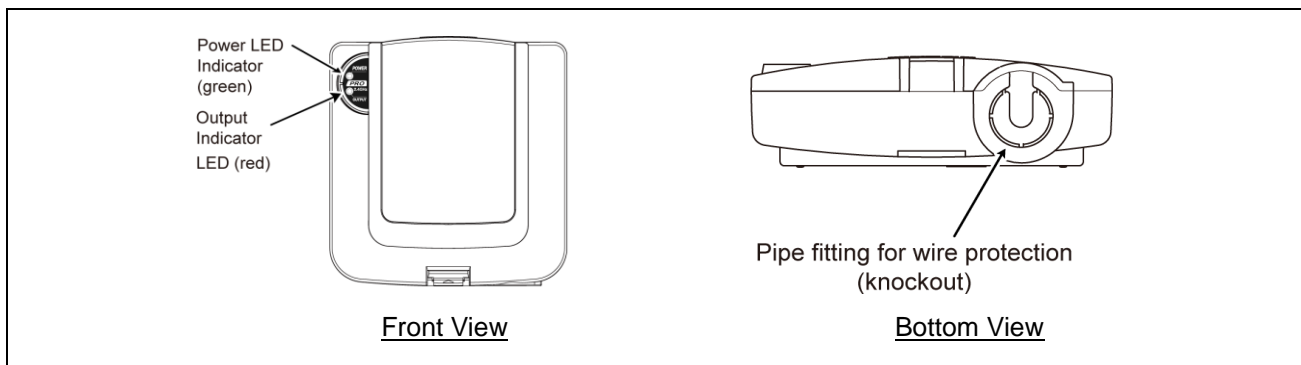
② Part Names (inside the main unit)

LAN Connector (RJ45)
For LAN communication

USB-B Connector (receptacle)
For USB communication

Power Terminal (24 VDC Input)

DC Power Jack
Use only the supplied AC adaptor
(Japan only)

Contact Terminal Block

Wiring Access (wall)

DIP Switches

Wiring Access (Bottom)

Reset Button

Front View (inside the main unit)

③ Part Dimensions

125 mm

131.8 mm

Front View

15 mm

39.5 mm

Front View (inside the main unit)

31.5 mm

38.8 mm

Bottom View
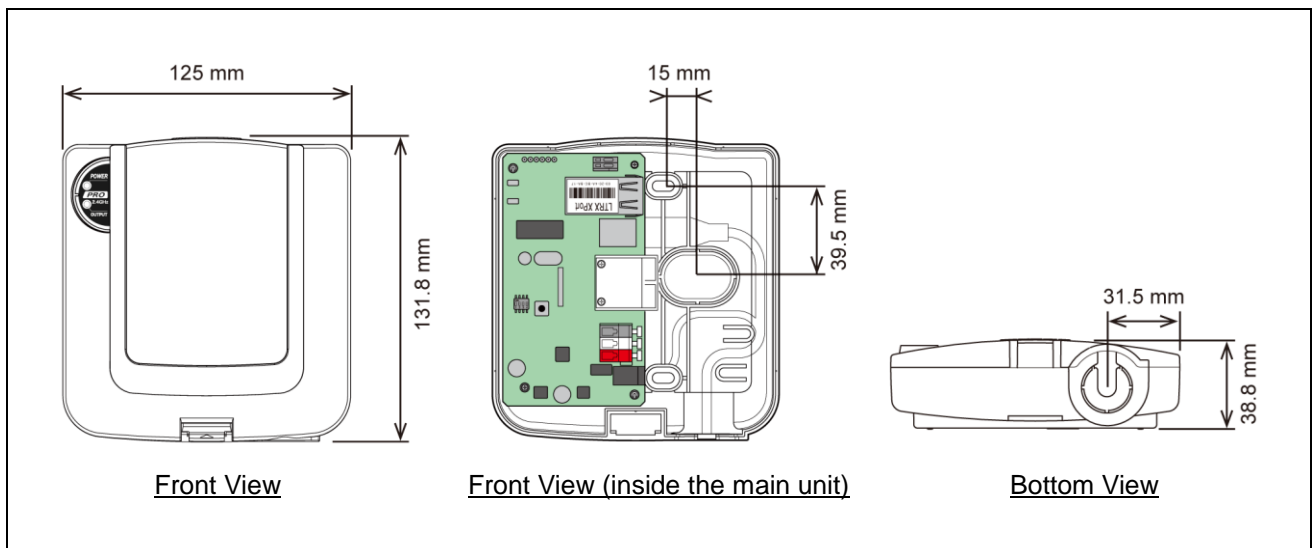
5. Operation Overview

5.1 About the WD System

To collect data available on equipment in your facility, the WD system transmits associated information (such as equipment operation data) to a host computer over the WD wireless network. By using visualization application software, you can use collected information to: a) accurately view utilization of capacity b) trigger improvement activities, and c) optimize operations. This application is not limited to production facilities and can be applied to other areas.

5.2 System Configuration

(1)   Glossary

| Term	Description
WD system	Generic name to identify the whole system. Includes multiple WD wireless networks and the host PC.
WD wireless network	The part of the wireless network that consists of one WDR and multiple WDT (up to 30 units).
Signal Tower information	Status of the signal tower from which the WD system collects data.
WDT	Transmitter on a WD wireless network. The WDT collects signal tower information from a signal tower and transmits the information wirelessly to a WDR.
WDR	Receiver on a WD wireless network. The WDR receives signal tower information from multiple WDT and transmits the information to the host PC.
Host PC	Personal computer for operation of the WD system.
WDS	Application software for WDT and WDR settings, and for collecting signal tower information in the WD system as CSV log data.
Visualization application software	Application software installed on the host PC. Use this application to display information collected by the WD system in a Gantt chart or graph. Must be provided by the customer.*
Maintenance PC	At maintenance, personal computer for setting up the WDT and WDR.

*   For information on visualization application software, refer to ☞ "5.4 About Visualization Application Software".

(2)　System Configuration

①　Run Time System Configuration

・Diagram
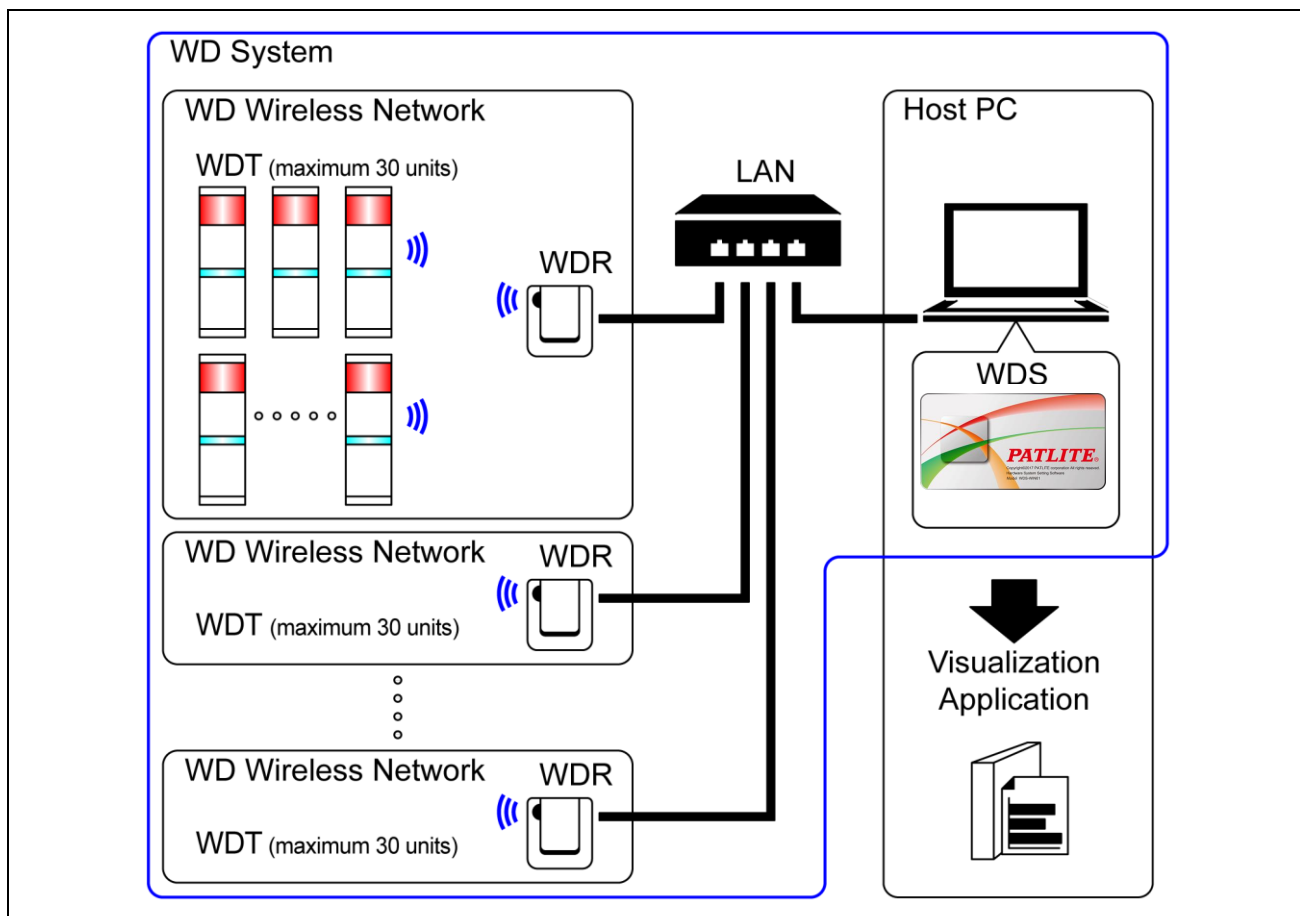
・Configuration

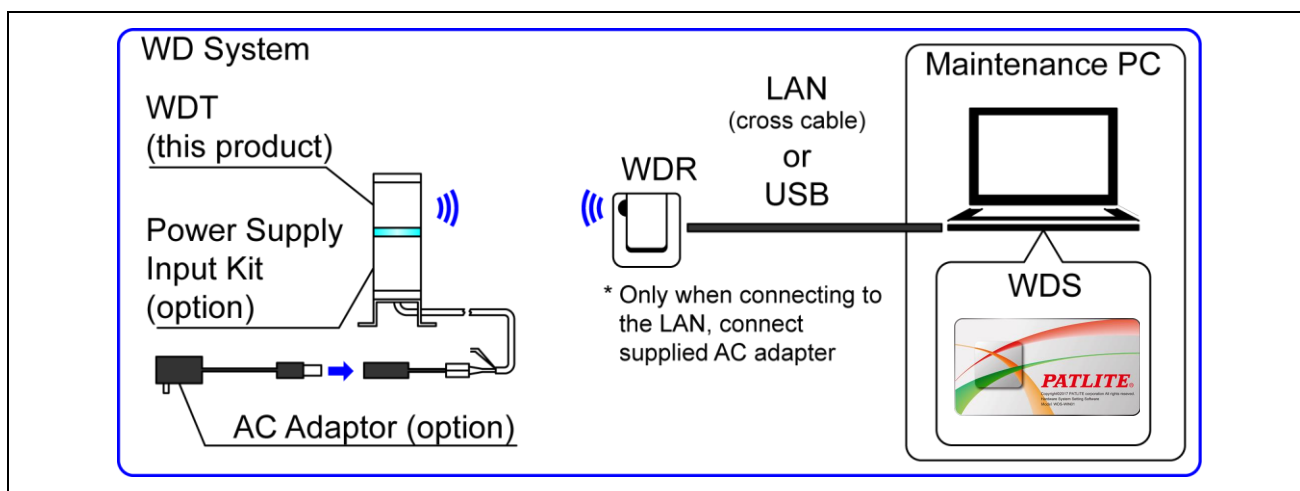| Item	Number of configuration items	Models
WDT	1 to 30 units*1 per receiver	WDT-5LR-Z2 or WDT-6LR-Z2 (this product)
WDR	1 to 20 units*2	WDR-LE-Z2
WDS	1	WDS-WIN01
Host PC*3	1	–

* 1 For more information, refer to ☞ "6.1(4) How many WDT you can connect to WDR".
* 2 When collecting CSV log data with WDS-WIN01.
* 3 When connecting the WDR directly to the host PC with a LAN cable, use a cross cable.

② Maintenance System Configuration (using the power supply input kit)

・ Diagram

・ Configuration

Item	Number of configuration items	Models
WDT	Number as required	WDT-5LR-Z2 (this product) WDT-6LR-Z2 (this product)
Power supply input kit (option)	1	WDX-5LRB WDX-6LRB
AC Adaptor (option)	1	ADP-001
WDR	1	WDR-LE-Z2
WDS	1	WDS-WIN01
Maintenance PC	1	–
LAN Cable[*2][*3]	1	–
USB Cable[*4][*5]	1	–

* 2 When configuring the WDR LAN settings, connect with a LAN cable.
* 3 When connecting the WDR directly to the host PC with a LAN cable, use a cross cable.
* 4 Use a USB cable 3 m or shorter.
* 5 Do not connect the LAN and USB cables at the same time.
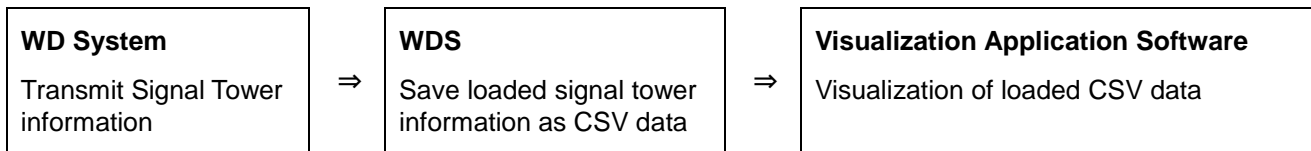
5.3 WD System Operation Overview

- ・WDT transmits signal tower information via the WDR to the WDS on the host PC.
- ・WDS collects the information and stores it as CSV log data. Load the data into visualization application software.
- ・You can also load WDR signal tower information directly into the visualization application software.

5.4 About Visualization Application Software

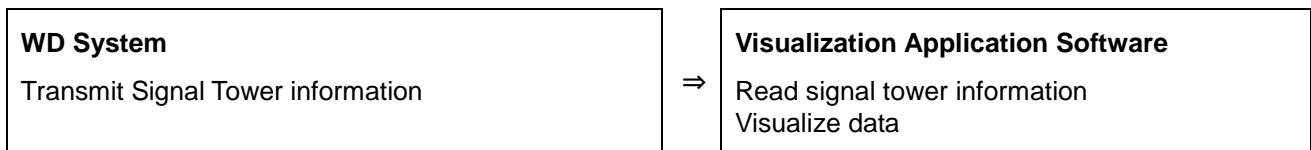| ⚠ CAUTION |
| --- |
| ⚠ ◆ The customer needs to provide the visualization application software.
 ◆ Select a visualization application software suitable for customer *visualization* requirements. |

- ・There are two ways the WD system passes collected information to the visualization application software: 1) CSV Assisted 2) Socket Communication.

◆ Pattern 1: CSV Assisted

WD System Transmit Signal Tower information	⇒	**WDS** Save loaded signal tower information as CSV data	⇒	**Visualization Application Software** Visualization of loaded CSV data

	Visualization Application Software Preparation	References
1	When using software packages from PATLITE partners that support the WD system	☞ Please contact our sales office. *
2	When customer develops their own solution	Refer to ☞ this manual. Refer to ☞ "WDS-WIN01 Instruction Manual".

◆ Pattern 2: Socket Communication

WD System Transmit Signal Tower information	⇒	**Visualization Application Software** Read signal tower information Visualize data

	Visualization Application Software Preparation	References
1	When using software packages from PATLITE partners that support the WD system	☞ Please contact our sales office.*
2	When customer develops their own solution	Refer to ☞ this manual. Refer to ☞ "Application Notes".

5.5 Function Table

(1) WDT

① Wireless Data Transmission Function

Function	Description	References

Signal Tower Transmission Information	Function whereby the WDT transmits the status of the signal tower wirelessly to the WDR. There are two transmission modes for the transmission:
	
	• Immediate transmission mode
	    Send immediately after the status of the signal tower changes.
	
	• Request transmission mode
	    Send only after receiving a signal tower status request from the host PC.
		Refer to ☞ "8.1(1)① Signal Tower Transmission Information"

Select Signal Tower Information Format	This function is for selecting one of two types of signal tower information, Extended Format or Standard Format. Select using a DIP switch.
	
	• Extended Format
	    Sets up six types of signal tower information.
	
	• Standard Format
	    Format compatible with WDT-5E-Z2 and WDT-6M-Z2.
	    Sets up five types of signal tower information.
		Refer to ☞ "8.1(1)② Select Format of Signal Tower Information"

Maintain Signal Tower Status	When a transmission failure occurs between the signal tower signal input and the actual transmission, this function temporarily retains the transmission information in the WDT.	Refer to ☞ "8.1(1)③ Maintain Signal Tower Status"
Mesh Network Transmission	Function that automatically connects the WDT over the optimum communication route to the WDR for transmitting the information.	Refer to ☞ "8.1(1)④ Mesh Network Transmission"
Simple Counter Function	By using a pulse input on a single signal wire, count up the number of pulse inputs (increment 1 at a time) and store the accumulated value (count) on the WDT. ・ The count is sent only when a request is received from the host PC. ・ You can use WDS-WIN01 (1.02 or later) to clear the count to zero.	Refer to ☞ "8.1(1)⑤ Simple Counter Function"
	There are two ways to select the counter signal wire: "Using a DIP switch on the unit" (selection fixed as blue) and "Using WDS-WIN01" (any selection).	Refer to ☞ "8.1(1)⑥ Selecting the signal wire for a simple counter"

② Signal Wire Input Functions

Function	Description	References
Determine Signal Tower Input	Function for determining the input status from the signal tower. There are two settings, Normal and Flashing. You can set this up on the WDS-WIN01 software. This function cannot determine the input status from inputs in a simple counter function.	Refer to ☞ "8.1(2)① Determine Signal Tower Input"

③ Install, Initialize, and Change Settings Functions

Function	Description	References
Display Communication Quality	Displays the communication quality as one of three levels for the wireless connection between the WDT and WDR.	Refer to ☞ "8.1(3)① Display Communication Quality"
Display WDT Call	When the device receives a specific command from the host PC, the indicator flashes blue for approximately 10 seconds.	Refer to ☞ "8.1(3)② Display WDT Call"
Display WDT MAC address	A label on the body of the WDT identifies its MAC address.	Refer to ☞ "6.1(3) About the MAC Address"
Periodic Transmission	Function for automatically transmitting from the WDT the current signal tower status. Select by toggling a DIP switch on the unit.	Refer to ☞ "8.1(3)③ Periodic Transmission"
Initialization	Function for resetting the unit to its factory default settings. Select by toggling a DIP switch on the unit.	Refer to ☞ "8.1(3)④ Initialization"

(2) WDR

⚠ CAUTION
⚠ ◆ You cannot operate the Contact Switch Function from the WDS. You can create these with the visualization application software provided by the customer.

① Communication Functions

Function	Description
WDT Wireless Communication Function	Function to communicate with multiple WDT wirelessly. Using this function, you can communicate with up to 30 WDT units.

Host PC Communication Function	Function to communicate with one host PC via LAN or USB. You can connect one session at a time for a LAN connection.

② Install, Initialize, and Change Settings Functions

Function	Description
Display Power Supply Status	Function for using an indicator (green LED) to display the WDR power supply input status. Green light: Power ON, light off: Power OFF
Initialize Network Settings	Function for resetting the LAN network settings to its factory default. Select by toggling a DIP switch on the unit.

③ Contact Terminal Block Control Function

| Function	Description
Contact Switch Function	By receiving commands from the host PC, this function controls the ON/OFF state of the contact terminal. This is a normally open contact.
Display Contact Status	This function displays the state of the contact with an LED indicator (red OUTPUT LED). Red light: ON, light off: OFF

6. Installation

6.1 Before Installation

(1)　What is the WD Wireless Network?

　① About the WD Wireless Network

　　・The WD wireless network operates on the IEEE802.15.4 (ZigBee) compliant 2.4 GHz frequency.
　　　Although it runs on the same 2.4 GHz frequency as a wireless LAN (Wi-Fi), because it conforms to IEEE802.15.4 the WD wireless network can operate without connecting to a wireless LAN. However, if the frequencies used overlap, the WD wireless network could experience transmission delays and other communication issues.
　　・The wireless communication is encrypted. The encryption standard used is AES-CCM (Advanced Encryption Standard-Counter with CBC-MAC), with an encryption key of 128 bits.

　② About Selecting a Wireless Channel

　　・The WD wireless network uses 16 wireless channels (CH11 to CH26).
　　・Select a wireless channel to avoid conflict with the frequency band of the LAN's wireless channel in your installation environment.
　　・The relationship between frequency bands of channels on the WD wireless network and on the wireless LAN is as follows.
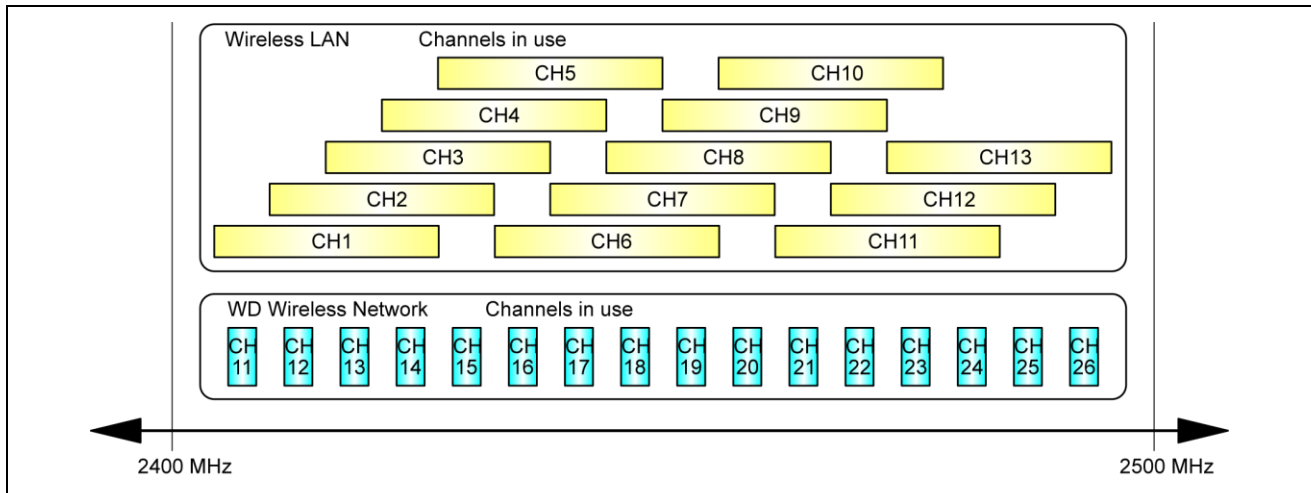
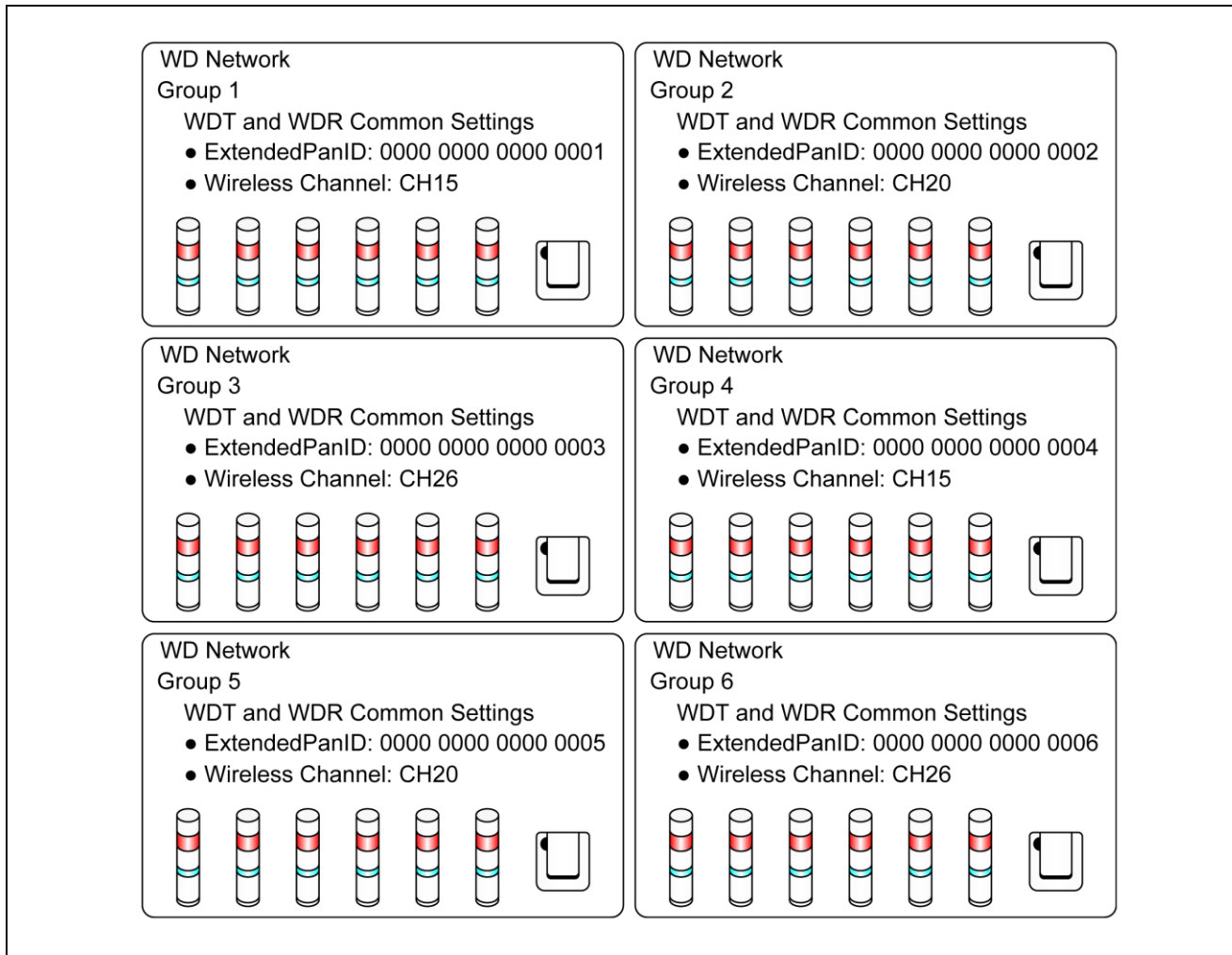・The frequency of channels on the WD wireless network is as follows.

Channel	Mid-range frequency (MHz)	Bandwidth (MHz)
CH11	2,405	2
CH12	2,410	2
CH13	2,415	2
CH14	2,420	2
CH15	2,425	2
CH16	2,430	2
CH17	2,435	2
CH18	2,440	2
CH19	2,445	2
CH20	2,450	2
CH21	2,455	2
CH22	2,460	2
CH23	2,465	2
CH24	2,470	2
CH25	2,475	2
CH26	2,480	2

③ Example Wireless Channel Selection

・When the wireless LAN uses three channels (CH1, CH6, and CH11), select either CH15, CH20, CH25, or CH26.
・In most cases selecting CH25 or CH26 will enable you to avoid the wireless LAN channels.

(2)　About Grouping and ExtendedPanID

・ The WD system requires grouping each WD wireless network (one WDR with multiple connected WDT). You can define the group by setting the **ExtendedPanID** property on the WDR and WDT to the same value. The ExtendedPanID consists of 16 single-byte, alphanumeric characters. Setup range: 0000 0000 0000 0000 to FFFF FFFF FFFF FFFE.
・ The following are examples of how you can set the ExtendedPanID and wireless channels for devices in multiple groups.

WD Network
Group 1
　WDT and WDR Common Settings
　● ExtendedPanID: 0000 0000 0000 0001
　● Wireless Channel: CH15

WD Network
Group 2
　WDT and WDR Common Settings
　● ExtendedPanID: 0000 0000 0000 0002
　● Wireless Channel: CH20

WD Network
Group 3
　WDT and WDR Common Settings
　● ExtendedPanID: 0000 0000 0000 0003
　● Wireless Channel: CH26

WD Network
Group 4
　WDT and WDR Common Settings
　● ExtendedPanID: 0000 0000 0000 0004
　● Wireless Channel: CH15

WD Network
Group 5
　WDT and WDR Common Settings
　● ExtendedPanID: 0000 0000 0000 0005
　● Wireless Channel: CH20

WD Network
Group 6
　WDT and WDR Common Settings
　● ExtendedPanID: 0000 0000 0000 0006
　● Wireless Channel: CH26

・ If there are multiple channels available for selection, you should use separate wireless channels for each group. By distributing groups over multiple channels, you can reduce the payload concentrated on each wireless channel.

⚠ CAUTION	
🚫 Prohibited	◆ When there are multiple WDR in your system, do not use duplicate ExtendedPanID values. The product may not operate properly.
❗ Mandatory	◆ When the WDT ExtendedPanID is 0000 0000 0000 0000, it is grouped with WDR that have ExtendedPanID set arbitrarily. In this scenario, because the grouped wireless network is unstable, set any value other than 0000 0000 0000 0000 during configuration.

(3)　About the MAC Address

・For identification, fixed addresses are assigned to WDT and WDR.
This address is called a MAC address (IEEE address).
・The MAC address is printed on a nameplate on the back of the WDT.
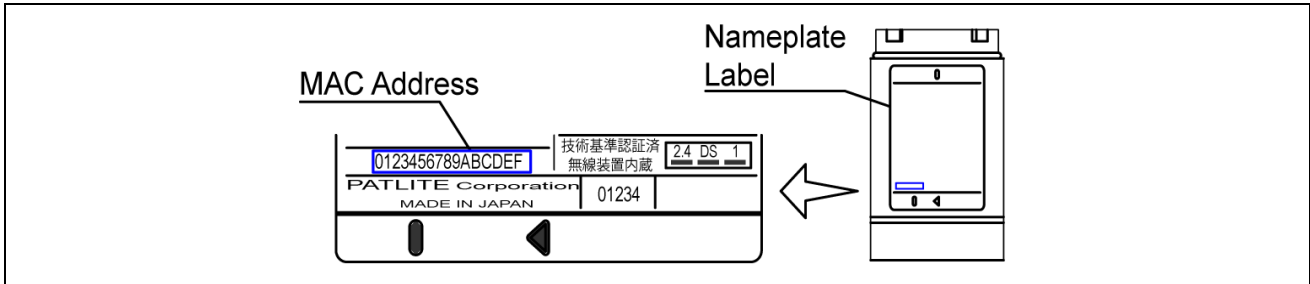
・The MAC address is printed on a nameplate on the back of the WDR.
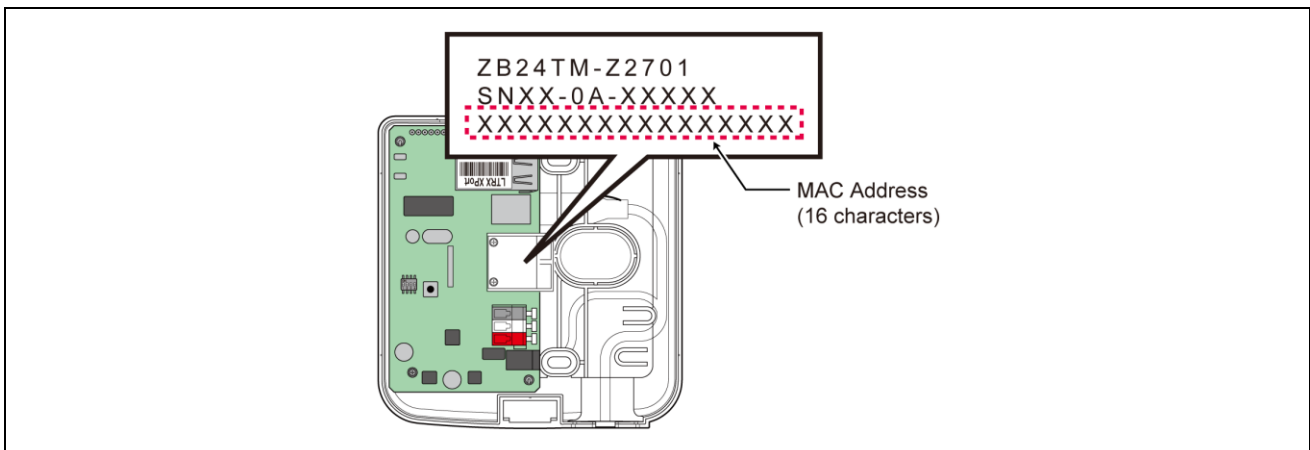
(4)　How many WDT you can connect to WDR

・The number of WDT units you can connect to a WDR is limited by how often signal tower information is sent to the WDR.
Limit the number of WDT so that the WDR processes an average of about 120 times per minute. If you connect WDT so they exceed this limit for the WDR, some of the signal tower information may not be able to reach the host PC.

Estimated Signal Tower transmissions per unit	WDT connection limit
4 times per minute	30 units
6 times per minute	20 units
12 times per minute	10 units
24 times per minute	5 units
120 times per minute	1 unit

6.2 About the Installation Environment

(1)   Installation Environment Main Points

・ There are five essential points to consider at installation.

Item	Description
1	◆ There is no influence in radio waves at the installation site. Also, the radio waves at the installation site should not change over time. Refer to ☞ "6.2(1-1) About the Influence of Surrounding Radio Waves"
2	◆ The distance between devices (WDR, WDT) does not exceed recommendations. Refer to ☞ "6.2(1-2) Distance Between Devices" ・ The recommended distance between all WDT and WDR is within line of sight.
3	◆ Line of sight between each device (WDR, WDT). ・ To ensure good line of sight, the location should not be cluttered and should be free of any obstacles. Refer to ☞ "6.2(1-3) Ensuring Line of Sight"
4	◆ WDR placement is appropriate. ・ Install in a location as high as possible. ・ And away from obstacles that could disrupt radio waves. Refer to ☞ "6.2(1-4) WDR Installation Position and Obstacles"
5	◆ Each device is always powered, and the mesh network is always available. ・ If power is not available for one of the WDT, the communication path could get interrupted and information may not be transmitted.

(1-1) About the Influence of Surrounding Radio Waves

・ If the WD wireless network is affected by radio interference from electronics, microwave ovens, or other manufacturing equipment, normal operation may not be possible. Check the radio wave environment before installation and confirm there is no radio interference on the wireless radio bands you are planning to use.

| Causes of Radio Interference	Description
Wireless devices	Wireless devices using the same frequency or nearby frequencies.
Noise from equipment	Noise caused by power supply circuits, electronic circuits, or oscillators.
Surrounding noise	Noise from motors and engine equipment. Noise from power transmission lines, power supplies, and industrial equipment. Noise from microwave ovens, fluorescent lamps, and so on.
Surrounding obstacles*	Interference caused by fading of own radio waves.

*   Various obstacles (wall, floor, ceiling, pillar, equipment) may exist in the installation environment. The reception of radio waves changes depending on the relationship between the position of each device (WDR, WDT), obstacles, and the surrounding environment. As shown in the figure below, radio waves transmitted from a single point are delivered to each device (WDR, WDT) from multiple directions, such as when radio waves travel in a direct line, and when radio waves reflect off obstacles. Radio wave interference could be caused by this scenario, and operation may not be possible due to canceling radio waves.
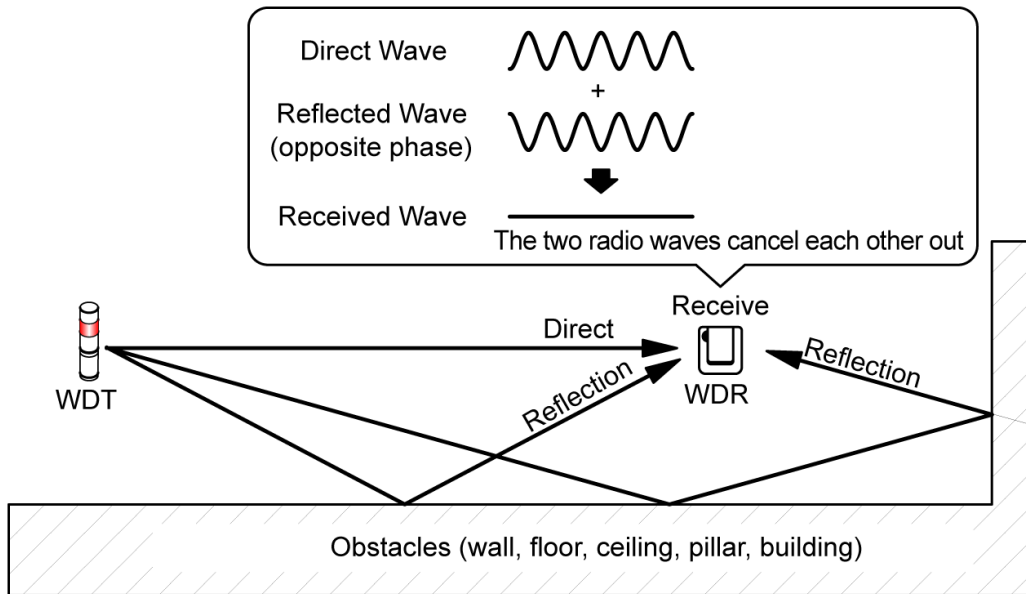
・ When wireless LAN and in-house PHS access points are installed in the surrounding environment, install WDR so they are 5 to 10 m or more away from access points.
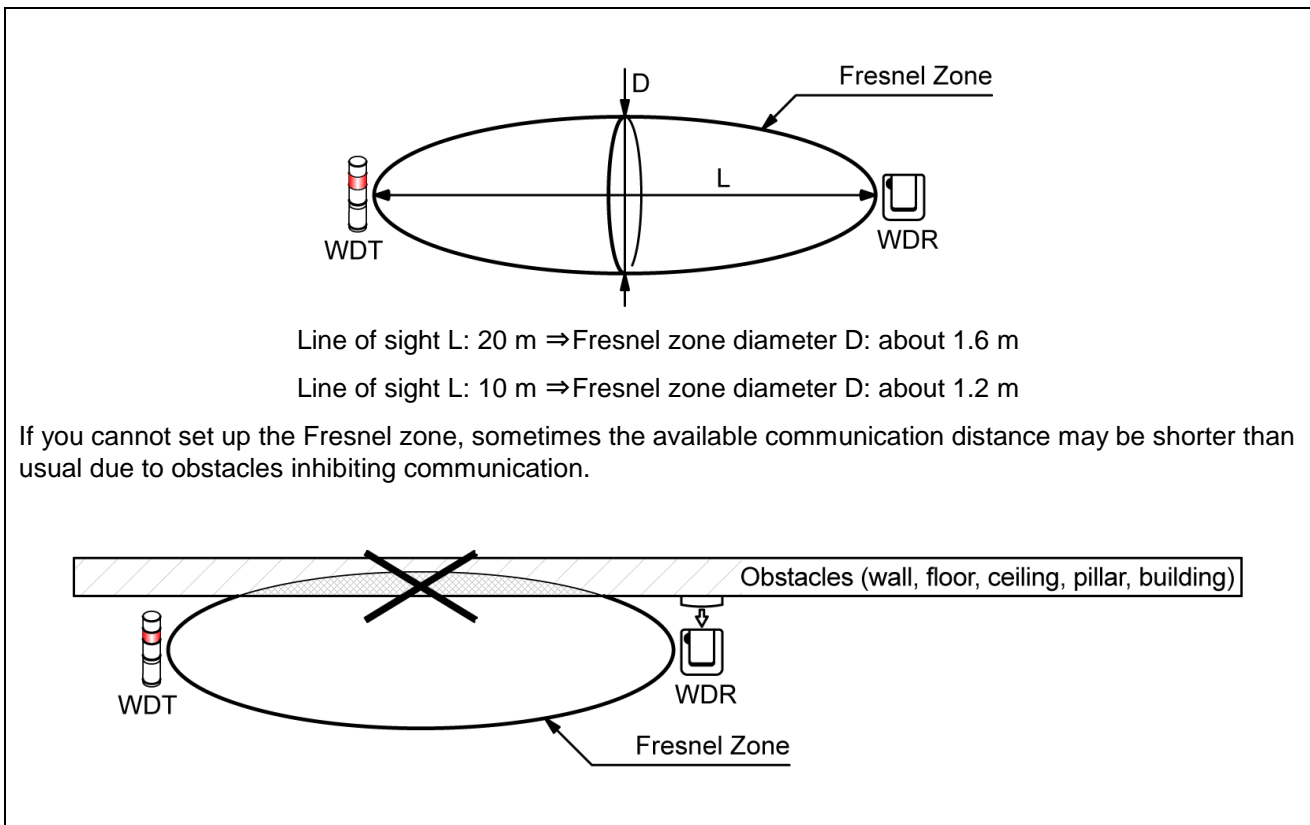
(1-2) Distance Between Devices

・ Place the WDT within a 20 m radius (recommended line-of-site distance) of the WDR.
・ If more distance is required, add another WDT.
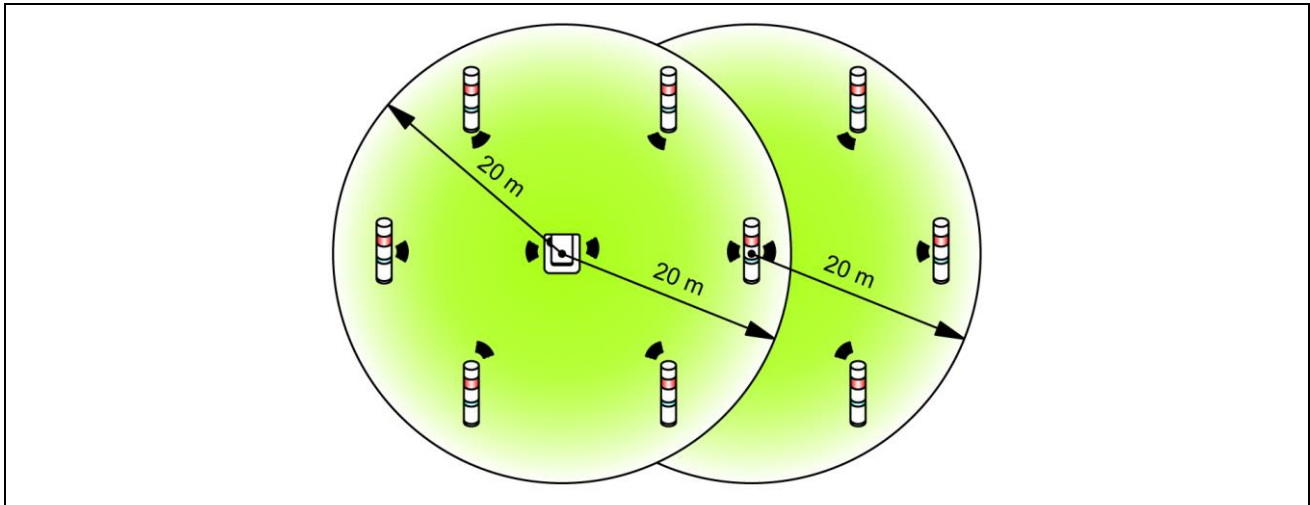
(1-3) Ensuring Line of Sight

・ Good line of sight for each device (WDR, WDT) and free of any obstacles hereafter referred to as the Fresnel Zone - is required. The Fresnel zone is a three-dimensional space, whose size is estimated as follows:

Line of sight L: 20 m ⇒ Fresnel zone diameter D: about 1.6 m

Line of sight L: 10 m ⇒ Fresnel zone diameter D: about 1.2 m

If you cannot set up the Fresnel zone, sometimes the available communication distance may be shorter than usual due to obstacles inhibiting communication.

・ When installing on a metal plate or concrete wall, install the devices in the Fresnel zone so they are free of any obstacles.

(1-4) WDR Installation Position and Obstacles

・ When installing onto a pillar such as the I-beam in a building, install the WDR in a direction that promotes the propagation of radio waves.
・ When storing the WDR in a box, use a resin box with radio wave permeability.

(2)　About the Signal Tower Power Supply status

・ To operate the WDT, you need to **constantly supply power** to the LR series signal tower's power line.
For more information, refer to ☞ "7.1 Wiring".

6.3 Equipment Settings

This section describes the steps for setting up and installing equipment. Refer to ☞ "7 Operation" as well as instruction manuals of related products.

(1)　Setup Information

・ Have the information for the settings below prepared beforehand.

Information required	Description		
Information about the equipment to connect	Equipment name and other identifiable equipment information		
Information about the target Signal Tower	Model, power supply specifications, operation information		
WDT and WDR common settings	Wireless settings	ExtendedPanID	Refer to ☞ "6.1(2) About Grouping and ExtendedPanID"
		Wireless channels	Refer to ☞ "6.1(1) What is the WD Wireless Network?"
WDT settings	Run time settings	Determine Signal Tower Input	Refer to ☞ "8.1(2)① Determine Signal Tower Input"
		Power supply settings	*1
		Simple counter function	Refer to ☞ "8.1(1)⑥Selecting the signal wire for a simple counter"
		Transmission mode	Refer to ☞ "8.1(1) Functions Related to Wireless Data Transmission"
WDR settings	Wireless settings	Network startup method	*2
	LAN communication	IP address	*3
		Subnet mask	–
		Default gateway DNS server port number	–

* 1 For this product's settings, select the "Power line". For more information, refer to ☞ "WDS-WIN01 Instruction Manual".

* 2 For network startup method, use "Auto Startup". For more information, refer to ☞ "WDS-WIN01 Instruction Manual".

* 3 Prepare beforehand the number of IP addresses required for use with the WDR.

NOTICE
◆ Information about settings is required not only for installing equipment, but also when adding equipment, maintaining the system, relocating, and for efficient and accurate work. Prepare the setup information before starting installation.

(2)　Equipment Settings

・Using the setup information in 6.3(1), begin the setup.
・For information on system configuration when setting up the equipment, refer to ☞ "5.2(2)② Maintenance System Configuration (using the power supply input kit)
・Use the system configuration software WDS-WIN01 for equipment settings.
・Install WDS-WIN01 on the maintenance PC and set up the equipment.
・For using WDS-WIN01, refer to ☞ the "WDS-WIN01 Instruction Manual".
・The setup procedure is as follows.

Step	Item	References
1	Prepare required equipment and create maintenance environment	Refer to ☞ "WDS-WIN01 Instruction Manual". Refer to ☞ "7.1(3) Setting up the WDT Main Unit" Refer to ☞ "7.1(4) WDT DIP Switch Operations"
2	Communication settings between WDR and Maintenance PC	
3	WDT setup	
4	WDR setup	

6.4 Equipment Installation

⚠ CAUTION	
! Mandatory	◆ When deciding the installation location of each device, carefully review the following procedure regarding installation location. The installation location could cause problems such as unstable operation or communication failure. ◆ Install each device after completing equipment settings.

(1)　WDT Installation

・The steps for installing the WDT are as follows.

Step	Item	References
1	Wire the LR series signal tower.	Refer to ☞ "7.1(1) WDT Wiring"
2	Attach the WDT to the LR series signal tower.	Refer to ☞ "7.1(2) Attaching and Detaching the WDT"

1. Wire the LR series signal tower.

    ・ If wiring is already done, check the wiring.
   ・ If wiring is insufficient, complete the wiring.

2. Attach the WDT to the LR series signal tower.

    ・ Install the WDT with its setup complete.

  (2)   WDR Installation

Step	Item	References
1	Mounting the WDR	Refer to ☞ "7.2(1) Mounting the WDR"
2	WDR wiring procedure	Refer to ☞ "7.2(2) WDR Wiring"

  (3)   Check the Connection Between WDT and WDR

Step	Item	References
1	Check the WDT wireless status	Refer to ☞ "8.1(3)① Display Communication Quality"
2	Check WDT and WDR setup items	Refer to ☞ "WDS-WIN01 Instruction Manual".

1. Check the WDT wireless status.

    ・ Turn on the WDT and WDR.
    ・ Check the WDT wireless status with its indicator. Refer to ☞ "8.1(3)①Display Communication Quality"
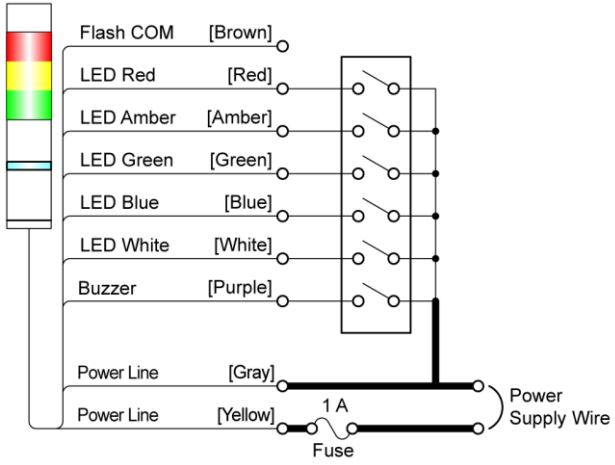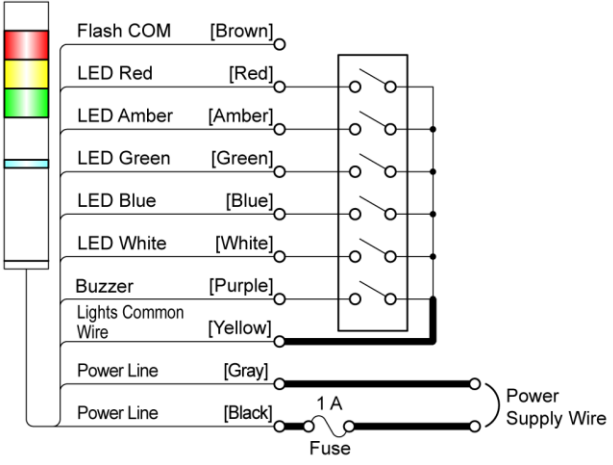

2. Check WDT and WDR setup items.

    ・ Use WDS-WIN01 to check the content of the setup items.

7. Operation

7.1 How to Use the WDT

(1) WDT Wiring

・ For the wiring method, carefully read and follow the instructions in the LR Series Instruction Manual.

⚠ WARNING	
🚫 Prohibited	◆ Before any wiring or fuse replacement, **disconnect the power**. Failure to follow this instruction could result in a short-circuit. ◆ Supply only the correct power, direct current or alternating current, and use the proper voltage. Failure to follow this instruction could result in fire.
⚠ CAUTION	
❗ Mandatory	◆ About the WDT power supply ・ To operate the WDT, you need to constantly supply power to the LR series signal tower's power line.

◆ Signal tower rated voltage: 12 / 24 VDC	◆ Signal tower rated voltage: 100 to 240 VAC
・ Applicable models: LR5-□01 / LR5-□02 / LR6-□02	・ Applicable models: LR6-□M2

Flash COM   [Brown]
LED Red   [Red]
LED Amber   [Amber]
LED Green   [Green]
LED Blue   [Blue]
LED White   [White]
Buzzer   [Purple]
Power Line   [Gray]
Power Line   [Yellow]
1 A Fuse
Power Supply Wire

Flash COM   [Brown]
LED Red   [Red]
LED Amber   [Amber]
LED Green   [Green]
LED Blue   [Blue]
LED White   [White]
Buzzer   [Purple]
Lights Common Wire   [Yellow]
Power Line   [Gray]
Power Line   [Black]
1 A Fuse
Power Supply Wire

Wireless Data Acquisition System Instruction Manual

⚠ CAUTION	
! **Mandatory**	◆ To protect external equipment, install a **fuse** on the power supply side. ・ Recommended fuse: 250 V / 1 A 5x20 mm Fast-blow glass tube fuse. * When the signal tower rated voltage is 100 to 240 VAC, use the following parts. ・ If you are not using a regulated power supply, use a fuse that meets or exceeds Class CC. ・ Use a fuse holder with UL Standards certification.
	◆ Insulate the leads of unused signal wires, one by one. Failure to follow this instruction could result in a short-circuit.

(2)   Attaching and Detaching the WDT

⚠ WARNING	
! **Mandatory**	◆ Before any work is done, disconnect the power.

⚠ CAUTION	
🚫 **Prohibited**	◆ Do not apply excessive force to the unit or body. Failure to follow this instruction could result in equipment damage. ◆ Do not touch the connectors on the unit or body, or the LED in LED units. Failure to follow this instruction could result in equipment damage. ◆ Securely lock each unit when attaching. Failure to follow this instruction could result in equipment damage.

NOTICE
◆ The maximum number of attachments per Signal Tower is five LED units + one buzzer unit + this product. Do not attach units beyond that.

⚠ CAUTION

🚫 Prohibited	◆ Attach this product to the upper part of the adjoining body unit. If you attach this product on top of an LED unit, it is difficult to assess the status shown by the lamp on this product.

⚠ CAUTION

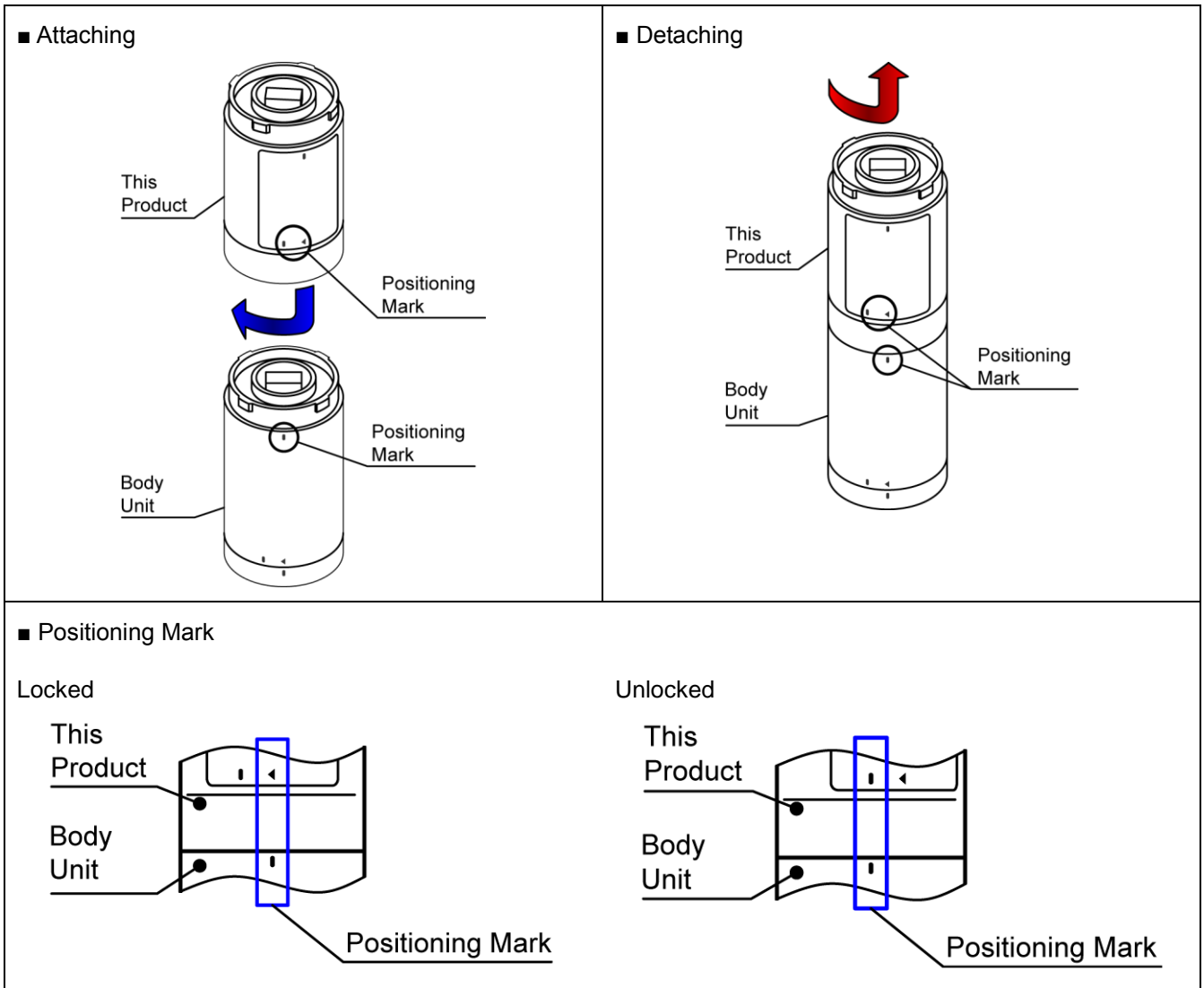|	
🚫 Prohibited	◆ Do not detach multiple connected units (except head cover) from this product or the body unit. ◆ When detaching units (this product, LED unit, or buzzer unit) from the body unit or this product, detach units one at a time. Failure to follow these instructions could result in equipment damage.

① Attaching the WDT to the LR Series Signal Tower

■ Attaching

■ Attaching

This Product

Positioning Mark

Positioning Mark

Body Unit

■ Detaching

This Product

Positioning Mark

Body Unit

■ Positioning Mark

Locked

This Product

Body Unit

Positioning Mark

Unlocked

This Product

Body Unit

Positioning Mark

② The following are the steps for attaching the WDT to the LR series signal tower.

Attach or detach units in the prescribed order, beginning with 1.
Detach and attach units one at a time.

Detaching Units

Buzzer Unit
①
LED Unit
②
LED Unit
③
LED Unit
④
Body Unit

Attaching Units

Buzzer Unit
⑤
LED Unit
④
LED Unit
③
LED Unit
②
This Product
①
Body Unit

This Product

Body Unit
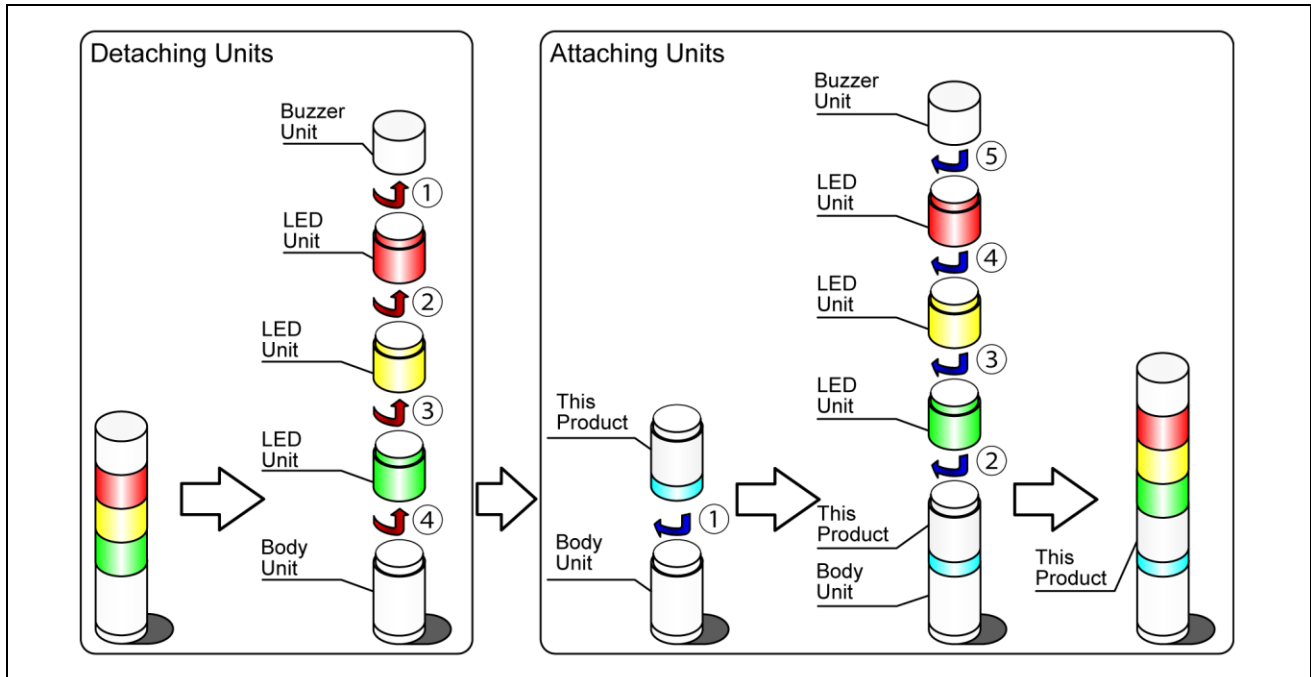
This Product

③ The following are the steps for detaching the WDT from the LR series signal tower.

Detach units in the prescribed order, from 1 to 5.
Detach and attach units one at a time.

Buzzer Unit
①
LED Unit
②
LED Unit
③
LED Unit
④
This Product
Body Unit

This Product

This Product
⑤
Body Unit
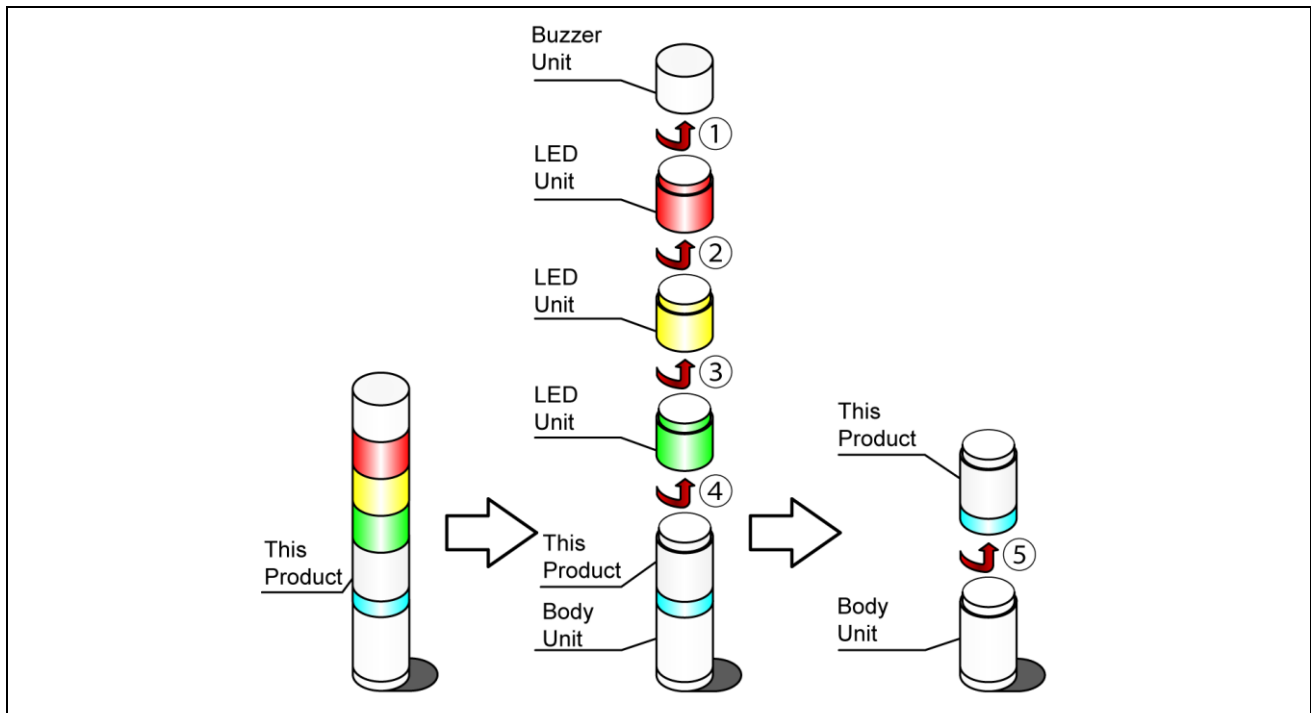
⚠ CAUTION

◆ If this product does not attach properly to the body unit, confirm the tab of the cylinder-shaped part at the top of this product is fitted correctly into the groove. If the tab is outside the groove as shown in Figure 1, refer to Figure 2 on how to reposition it. Additionally, depending on how it is removed, the tab may come out of the groove (as shown in Figure 1) when detaching this product from the body unit. If the product is attached again while the tab is still in this state, it may become damaged.
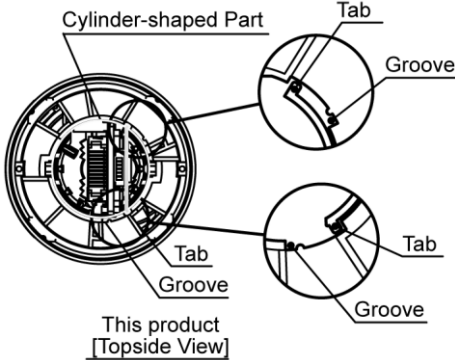

Figure 1

⚠ CAUTION

◆ If this product does not attach properly to the body unit, follow the steps below.
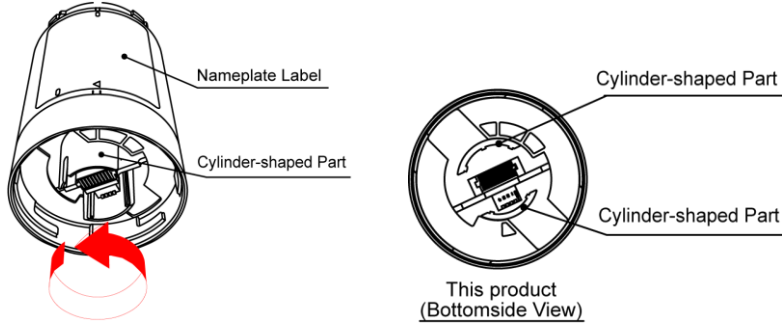

Figure 2

· In the center of the underside of the product, turn the cylinder-shaped part counter-clockwise. Turn the cylinder-shaped part until it snaps into place, then attach it to the body unit.
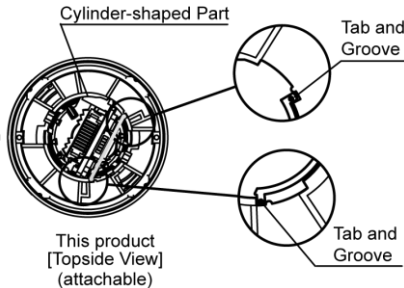

Figure 3

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(3) Setting up the WDT Main Unit

① Setting up the Main Unit

WDS-WIN01 configuration software is required. Download the software from our website. Install the software on the computer that will be used to set up and configure the system. (Member registration is required for downloading from the home page.) For more information about usage and setup, refer to ☞ "WDS-WIN01 Instruction Manual".

② Setup Items

・Setup items are as follows.

Setup item		References
Wireless settings	ExtendedPanID	Refer to ☞ "6.1(2) About Grouping and ExtendedPanID"
	Wireless channels	Refer to ☞ "6.1(1) What is the WD Wireless Network?"
Operation settings	Determine signal tower input	Refer to ☞ "8.1(2)① Determine Signal Tower Input"
	Power supply settings	*1
	Simple counter settings	Refer to ☞ "8.1(1)⑥ Selecting the signal wire for a simple counter"
	Transmission mode	Refer to ☞ "8.1(1) Functions Related to Wireless Data Transmission"

* 1 For this product's settings, use "Power Supply Wire". Refer to ☞ "WDS-WIN01 Instruction Manual".

③ Required Equipment

・For information on system configuration when setting up the equipment, refer to ☞ "5.2(2)② Maintenance System Configuration (using the power supply input kit)
・Use the system configuration software WDS-WIN01 for equipment settings.
・Install WDS-WIN01 on the maintenance PC and set up the equipment.
  For information about using WDS-WIN01, refer to ☞ "WDS-WIN01 Instruction Manual".
・The setup procedure is as follows.

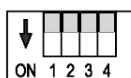| Step	Item	References
1	Prepare required equipment and create maintenance environment	Refer to ☞ "5.2(2)② Maintenance System Configuration (using the power supply input kit)
2	Communication settings between WDR and Maintenance PC	Refer to ☞ "WDS-WIN01 Instruction Manual"
3	WDT setup	
4	WDR setup	

(4)　WDT DIP Switch Operations

　①　DIP Switch Operations

⚠ CAUTION	
🚫 Prohibited	◆ Do not use excessive force on this product. Failure to follow this instruction will result in equipment damage. ◆ Do not use sharp tipped objects with this product. Operation may become impossible as scratches develop on switches and switch contacts are interfered with.

・DIP switches for this product are on the bottom of the main unit.

DIP switch

・DIP Switch Settings

Switch number	Description	Initial settings
1	Initialize setting values 　・OFF　　　Normally use with this setting OFF. 　・ON　　　Initializes the value for various settings. Refer to ☞ "7.2(5)① Initialization Process"	OFF
2	Methods for defining Count Input signal wire 　・OFF　　　Define in the simple counter settings. 　・ON　　　Use blue signal wire (fixed). Refer to ☞ "8.1(1)⑥ Selecting the signal wire for a simple counter"	OFF
3	Select format of signal tower information 　・OFF　　　Send in standard format. 　・ON　　　Send in extended format. Refer to ☞ "8.1(1)② Select Format of Signal Tower Information"	OFF
4	Periodic Transmission 　・OFF　　　Normally use with this setting OFF. 　・ON　　　Send transmissions at regular intervals. Refer to ☞ "8.1(3)③ Periodic Transmission"	OFF

(5)　Checking WDT Indicator Operation

①　Checking wireless communication status
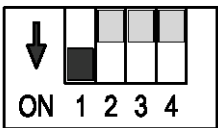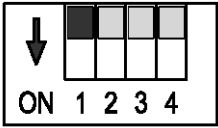
　・Check using the indicator on the main unit.
　　For more information, refer to ☞ "8.1(3)①Display Communication Quality".
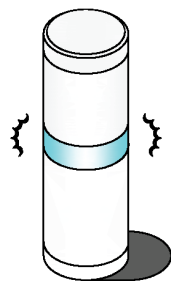
(6)　Initializing the WDT

①　Initialization process

　・Follow the instructions to run initialization.

Step	Item
1	Turn on DIP switch 1 on the product.
2	Turn on the power. After a few seconds, the indicator repeatedly alternates between red and green.
3	Turn off the power.
4	Turn off DIP switch 1 on the product.
5	Complete

　＊　For the list of settings that are initialized, refer to ☞ "8.1(3)④ Initialization".

7.2 How to Use the WDR

(1)   Mounting the WDR

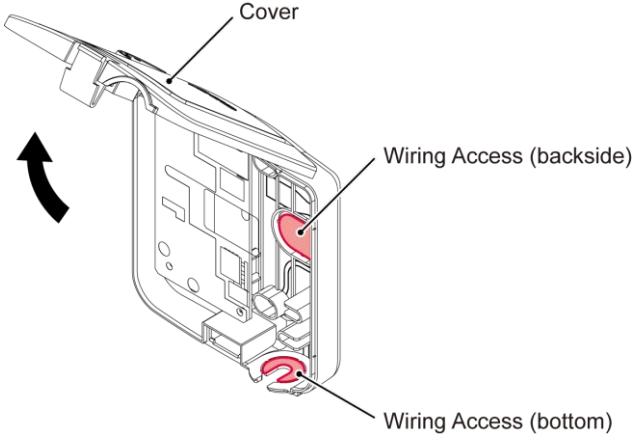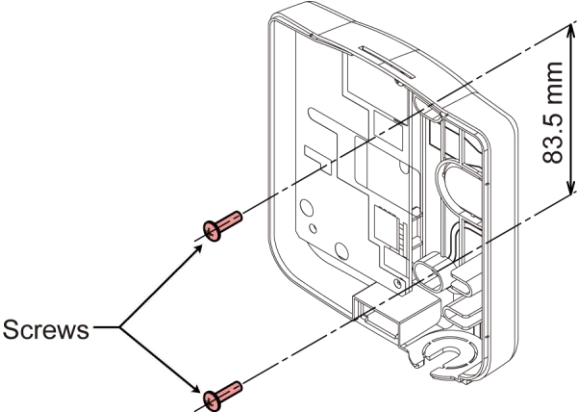| ⚠ WARNING	
Mandatory	◆ Before any work is done, disconnect the power. ◆ After cutting open wiring access, remove any burrs. Failure to follow these instructions could result in broken wires. ◆ Be careful when cutting open wiring access. Failure to follow this instruction could result in injury. ◆ Turn off the power before performing any electric wiring or product installation. Do not touch the board directly. Failure to follow this instruction could result in malfunction. ◆ Turn off the power before performing any electric wiring or product installation. Failure to follow this instruction could result in electric shock. ◆ When working in narrow or high places, pay attention to safety and follow all safety protocols. Failure to follow this instruction could result in injury. ◆ Maintain secure and stable footing when working. Failure to follow this instruction could result in injury. ◆ Do not drop any tools or parts. Failure to follow this instruction could result in injury.
Prohibited	◆ Do not use or install the WDR in locations where liquids such as water is present, oil will splatter, or locations that are humid or dusty. Failure to follow this instruction could result in fire, electric shock or product failure.
⚠ CAUTION	
Mandatory	◆ When using this product in Korea, supply power with the AC adaptor provided (ADP-001). Do not supply power directly to the 24 Vdc power terminal block. ◆ When using this product in Brazil, supply power with the AC adaptor provided (ADP-001). Do not supply power directly to the 24 Vdc power terminal block.

■ Mounting Method

Step	Item
1	Remove the cover.
2	Cut to increase the size of the wiring access. 1) When the size of the wiring access is appropriate If the current wiring access is large enough, use it without cutting. 2) When wiring access insufficient (backside) When using the wiring access from the rear of the unit, cut open the cover (colored) with nippers. 3) When wiring access insufficient (bottom) When using the wiring access from the bottom of the unit, and the current access is too small, remove the cover (colored) and cut to increase the size of the access with nippers.
3	Affix the WDR. Use M4 screws or tapping screws with a nominal diameter of 4 mm. * Screws are not included. The thickness of the receiver's case is 3 mm. Consider the thickness of the case when selecting screws.
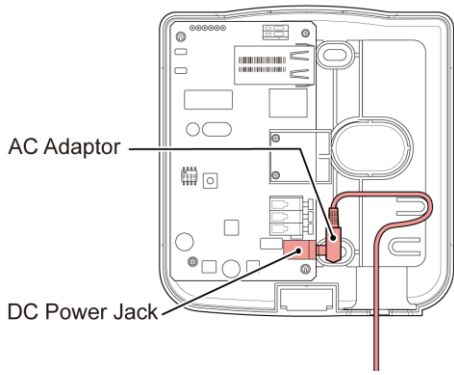
(2)   WDR Wiring
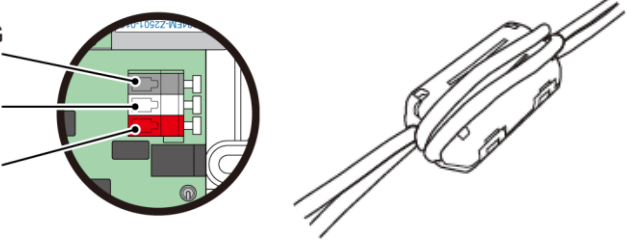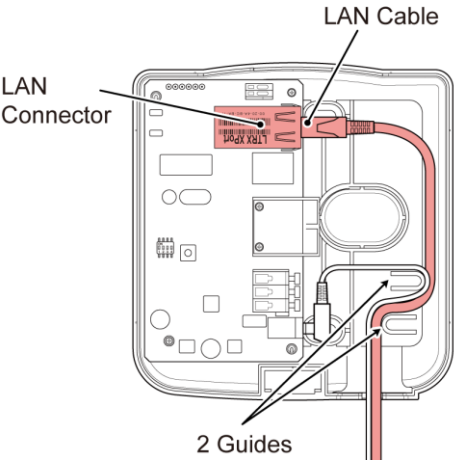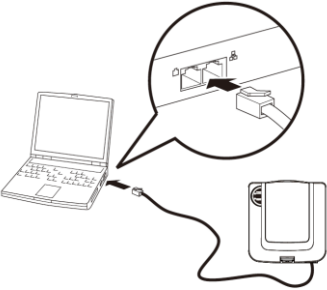
①   Power Supply Wiring

⚠ WARNING
<table><tr><td>🛇 Mandatory</td><td>◆ Before any work is done, disconnect the power. ◆ For the DC jack, use only the supplied AC adaptor. ◆ Input power from either the power terminal block or the DC jack. Failure to follow this instruction could result in equipment failure. ◆ Do not connect the USB cable and LAN connector at the same time. WDR will not operate properly.</td></tr></table>
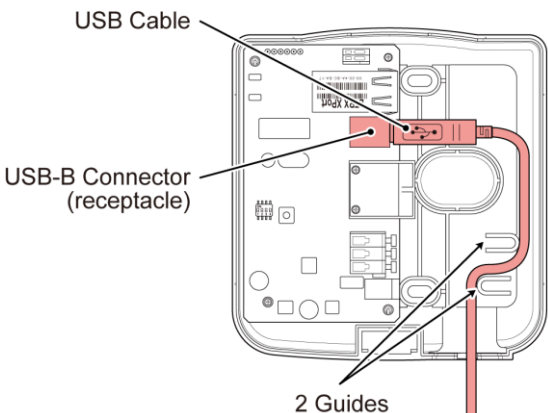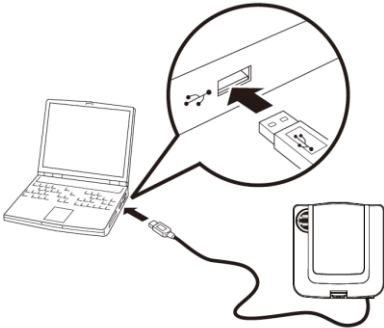
NOTICE
◆ Use 28-14 AWG wires. ◆ Use the two guides for securing wires.

■ When Connecting to LAN

Step	Item
1	Wiring for WDR main unit's power supply. 1) When using AC Adaptor 　・ Insert the AC adaptor into the DC jack. (When using AC Adaptor) 　　* At this point, do not turn on the power.

Step	Item
	2) When using the Power Terminal Block ・ Insert the leads of wires into the contact terminal block connectors. (When using a contact terminal block) 　 * At this point, do not turn on the power. ・ Wrap the lead wire around a ferrite core.
2	Insert the LAN cable into the WDR main unit's LAN connector. * LAN cable is not included.
3	Insert the other end of the LAN cable into the PC. * When connecting the WDR directly to the host PC with a LAN cable, use a cross cable.
4	Turn on the power.

■ When Connecting via USB
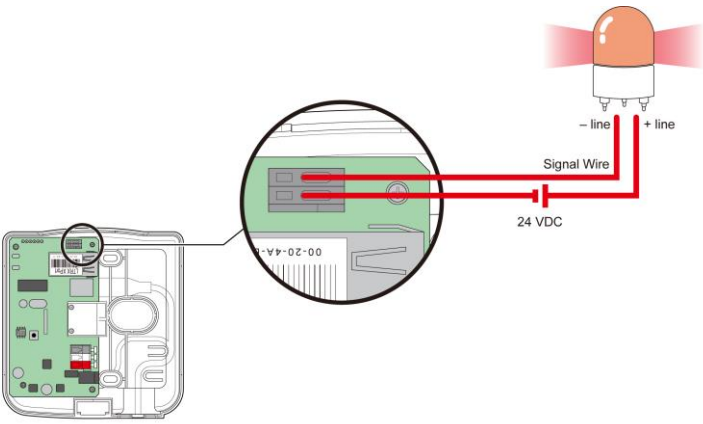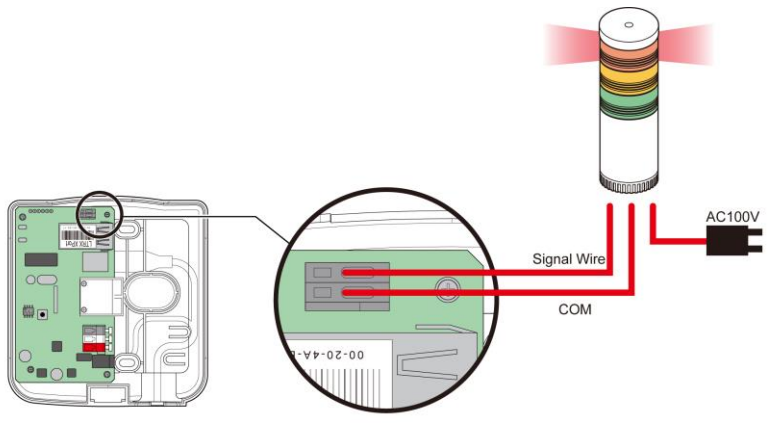
Step	Item
1	Connect a USB cable to the WDR main unit. 　*　USB cable is not included. 　*　Power is supplied via the bus for the USB cable. USB Cable USB-B Connector (receptacle) 2 Guides
2	Insert the USB cable to the PC.

NOTE:
・ On the first USB connection, the [Found New Hardware] wizard starts up. For more information, refer to
　☞　"WDS-WIN01 Instruction Manual".

② Using Contact Output

NOTICE
◆ Use 24-20 AWG wires.

Step	Item
1	Connecting a 24 VDC revolving warning light Connecting a 100 VAC signal tower

NOTE:

‧ Contact capacity is 24 VDC 500 mA.
‧ When using contact outputs, you can control them with contact control commands.

 * For information about contact control commands, refer to ☞ "Application Notes".

⚠ CAUTION

⚠	◆ You cannot operate the Contact Switch Function from the WDS. You can create these with the visualization application software provided by the customer.

(3)　Setting up the WDR Main Unit

　① Setting up the Main Unit

　　WDS-WIN01 configuration software is required. Download the software from our website and install on the computer that will be used to set up the system. (Member registration is required for downloading from the home page.)
　　For more information about usage and setup, refer to ☞ "WDS-WIN01 Instruction Manual".

　② Setup Items

　　・Setup items are as follows.

Setup Item		References
Wireless settings	ExtendedPanID	Refer to ☞ "6.1(2) About Grouping and ExtendedPanID"
	Wireless channels	Refer to ☞ "6.1(1) What is the WD Wireless Network?"
LAN communication	LAN communication settings	Refer to ☞ "6.3(1) Setup Information"

　③ Required equipment

　　For information on system configuration when setting up the equipment, refer to ☞ "5.2(2)② Maintenance System Configuration (using the power supply input kit)

　　・Use the system configuration software WDS-WIN01 for equipment settings.
　　・Install WDS-WIN01 on the maintenance PC and set up the equipment.
　　・For information about using WDS-WIN01, refer to ☞ "WDS-WIN01 Instruction Manual".
　　・The setup procedure is as follows.

■ When Connecting via USB

Step	Item	References
1	Prepare required equipment and create maintenance environment	Refer to ☞ "5.2(2)② Maintenance System Configuration (using the power supply input kit)
2	Communication settings between WDR and Maintenance PC	
3	USB driver setup	Refer to ☞ "WDS-WIN01 Instruction Manual".
4	WDT setup	
5	WDR setup	

■ When Connecting to LAN

Step	Item	References
1	Prepare required equipment and create maintenance environment	Refer to ☞ "5.2(2)② Maintenance System Configuration (using the power supply input kit)
2	Application for outputting wireless settings and signal tower information to CSV	Refer to ☞ "Downloading WDS-WIN 01 from our website"
3	Communication settings between WDR and Maintenance PC	Refer to ☞ "WDS-WIN01 Instruction Manual".
4	WDT setup	
5	WDR setup	

(4)　WDR DIP Switch Operations

① DIP Switch Operations

⚠ CAUTION	
🚫 Prohibited	◆ Do not use excessive force on this product. Failure to follow this instruction will result in equipment damage. ◆ Do not use sharp tipped objects with this product. Operation may become impossible as scratches develop on switches and switch contacts are interfered with.

・ DIP switches for this product are inside the main unit.
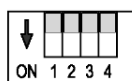
DIP switch

・ DIP Switch Settings
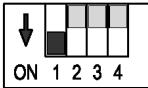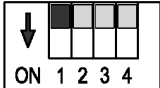
Switch number	Description	Initial settings
1	Initialize LAN communication settings • OFF　　　Normally use with this setting OFF. • ON　　　Initializes LAN communication settings. Refer to ☞ "7.2(5) Initializing WDR LAN communication settings"	OFF
2	OFF (static)	OFF
3	OFF (static)	OFF
4	OFF (static)	OFF

(5) Initializing WDR LAN communication settings

⚠ WARNING
Mandatory ◆ During initialization, do not turn off the power. Failure to follow this instruction could result in equipment failure.

① Initialization Process

・Resets the network settings to their default values.

Step	Item
1	Power down the WDR.
2	Turn on DIP switch 1 on the product.
3	Power up the WDR. The power LED (green) lights up.
4	Wait for the output LED (red) to light up. (About 60 seconds)
5	After confirming the output LED (red) turned on, power down the WDR.
6	Turn off DIP switch 1 on the product.

② Initial Settings

Item	Default value
IP address	192.168.0.1
Subnet mask	255.255.255.0
Default gateway	0.0.0.0
DNS server	0.0.0.0
Local port	10001

8. Function Details

8.1 WDT Function

(1)   Functions Related to Wireless Data Transmission

① Signal Tower Transmission Information

・Function whereby the WDT transmits the status of the signal tower wirelessly to the WDR. There are two transmission modes for the transmission:

Transmission mode	Description
Immediate transmission mode	Send immediately after the status of the signal tower changes.
Request transmission mode	Send only after receiving a signal tower status request from the host PC.

・Signal tower information transmitted by the WDT is as follows.

Description	Signal Tower information					Buzzer*
	Signal display					
	Red	Amber	Green	Blue	White	
Status	light on / flashing / light off					sound / no sound

*   Only when extended format is selected.

・Relationship between the units and wiring

WDT transmits information input to the signal tower, regardless of the type (LED unit, Buzzer unit) and number of units connected.

② Select Format of Signal Tower Information

・Using a DIP switch, this function selects the format of signal tower information transmitted by the WDT.
・You can select the following two communication formats.

Function	Description
Extended Format	Sets up six types of signal tower information (red, amber, green, blue, white, and buzzer).
Standard Format	Format compatible with WDT-5E-Z2 and WDT-6M-Z2. Sets up five types of signal tower information (red, amber, green, blue, and white).

③ Maintain Signal Tower Status

・When a transmission failure occurs between the signal tower signal input and the actual transmission, this function temporarily retains the transmission information in the product.
・Once communication is possible again, information that was retained is transmitted in sequential order from old to new.
・The function can retain up to 32 units of information.

④ Mesh Network Transmission

・Function that automatically connects the WDT over the optimum communication route to the WDR for transmitting the information. A dense mesh status increases communication redundancy.
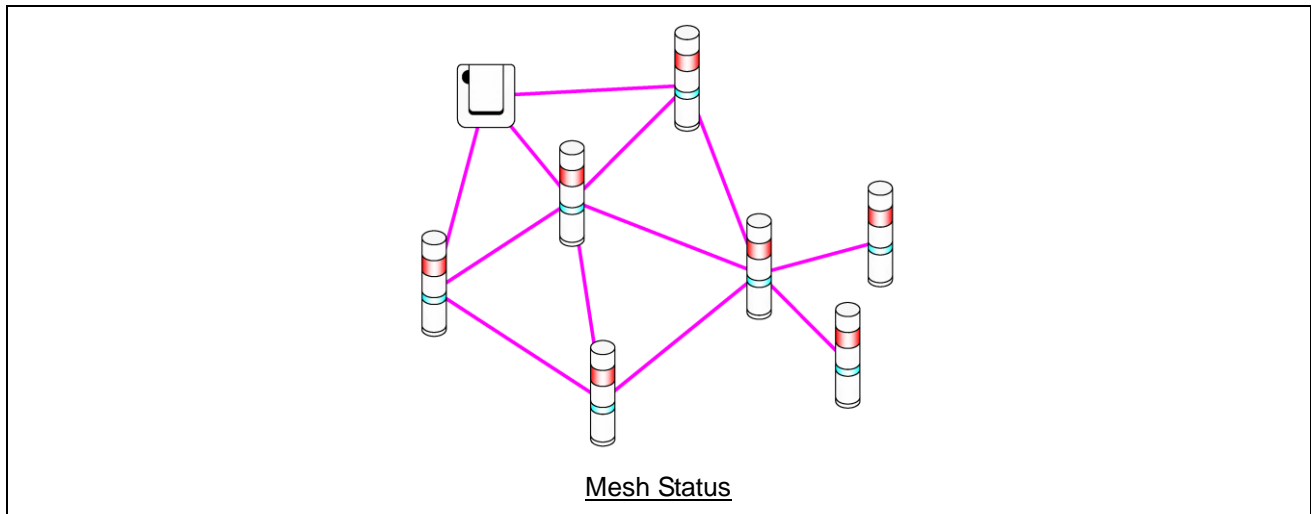
Mesh Status

⑤ Simple Counter Function

・By using a pulse input on a single signal wire, count up the number of pulse inputs (increment 1 at a time) and store the accumulated value (count) on the WDT.
・At startup the count is 0 (initial value).
・The value range of the count is 0 to 4,294,967,295.
・Pulse inputs are determined using the following criteria.
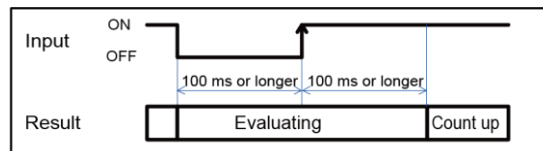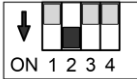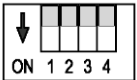
⚠ CAUTION

◆ When the count exceeds the upper limit, the count returns to 1.

◆ When the power is shut down, the counter is cleared to 0.

◆ The signal tower information defined in the counter settings is not sent, regardless of changes in status (signal tower information is treated as if the light is off and buzzer is off).

---

⑥ Selecting the signal wire for a simple counter

・ Use one of the following to select the signal wire.

Signal wire selection method	DIP Switch	Wire used by the simple counter
Using a DIP switch on the unit	ON 1 2 3 4	Blue (fixed)
Using WDS-WIN01	ON 1 2 3 4	You can select any one of red, amber, green, blue, white, or buzzer.

(2)　Functions Related to Signal Tower Input

①　Determine Signal Tower Input

・There are two types of decisions for signal tower inputs, Normal and Flashing. Selection is done with WDS-WIN01. If there is no flashing state, use "Normal".

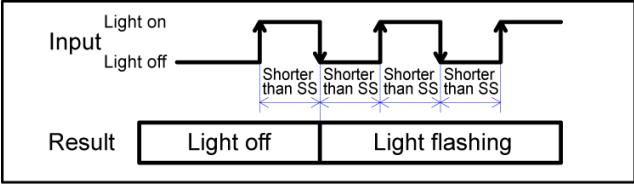| Setting	Determination	Description
Normal	Light on	When the signal input status changes from "light off" to "light on", the result is "light on" and information is transmitted.
	Light off	When the signal input status changes from "light on" to "light off", the result is "light off" and information is transmitted.
Flashing*	Flashing	When the signal input repeatedly changes "light on" to "light off" to "light on" to "light off" and so on, the result is "flashing" and information is transmitted. You can select from 3 different time periods in WDS-WIN01 before flashing is determined. ・Flashing (short) ・Flashing (medium) ・Flashing (long)
	Light on	When the signal input status changes from "light off" to "light on", the result is "light on" and information is transmitted.
	Light off	When the signal input status changes from "light on" to "light off", the result is "light off" and information is transmitted.
	* Flashing is determined when there are two status changes within a defined period. This period is called "SS seconds".	

* Flashing is determined when there are two status changes within a defined period.
This period is called "SS seconds".

You can select "SS seconds" from three different time periods.

・ Flashing (short): SS seconds = 0.7 seconds

・ Flashing (medium): SS seconds = 1.5 seconds

・ Flashing (long): SS seconds = 2.5 seconds

The status and determination operations are as follows. (Information in square brackets "[ ]" represent buzzer operation.)

Setting	Determination	Description	
		Change in state	Operation result
Normal	Light on	Light off → light on	
	Light off	Light on → light off	
Flashing	Flashing	Light off → flashing	
		Light on → flashing	
	Light on	Light off → light on	
		Flashing → Light on	
	Light off	Light on → light off	
		Flashing → light off	

⚠ CAUTION

◆ Maintain each of the signal tower's light off and light on states for 100 ms or longer. It is difficult to determine state changes when they occur faster than 100 ms.

◆ When using normal determination and you need to change the input state of multiple signal towers at the same time, the interval between these state changes need to be within 20 ms.

Input (red)
Light on
Light off

Shorter than 20 ms

Input (green)
Light on
Light off

Result (red)	Light off	Light on

Result (green)	Light on	Light off
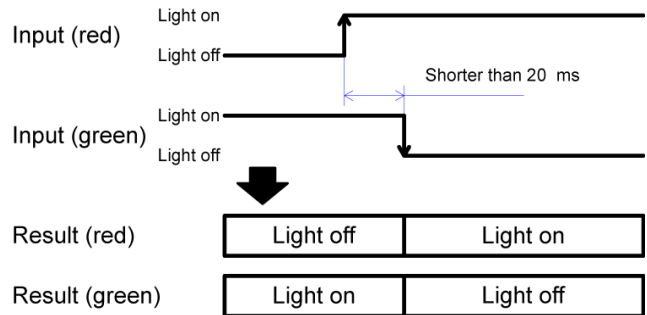
◆ When using normal determination and the input state of multiple signal towers change at different times, these state changes should be longer than 100 ms of each other.

Input (red)
Light on
Light off

100 ms or longer

Input (green)
Light on
Light off

Result (red)	Light off	Light on

Result (green)	Light on	Light off
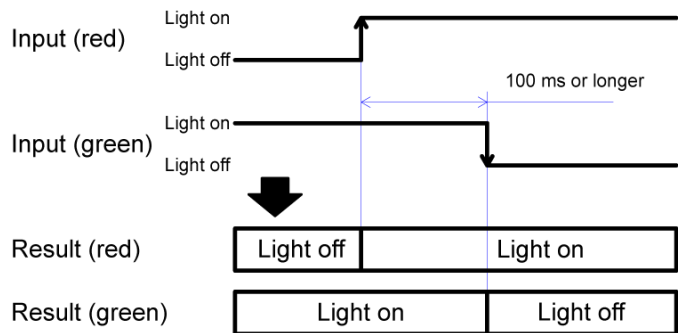
(3)　Install, Initialize, and Change Settings Functions

① Display Communication Quality

・You can use this product's display status indicator to determine the wireless communication status.
・The indicator operates as follows.

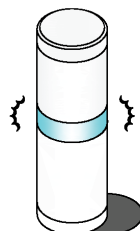| Indicator Light	Wireless Connection Status
Green pulse	Indicates a good status. This status indicates the product can communicate directly with the WDR without relying on other WDT. (If the WDT and WDR are close together (within tens of centimeters), WDT may display a red pulse. For an accurate display, use the units with a separation of about 1 m.)
Amber pulse	Direct wireless connection with the WDR is not good, but the connection with nearby WDT is good. If nearby WDT have a green pulse, the WDT will be used as a repeater for communication.
Red pulse	Connection is not good with any WDR or WDT in the WD wireless network.
Red light	Product is waiting to join the WD Network.

・Pulse is where the lamp fades between bright and dark repeatedly.
・When the indicator light displays something other than the above, refer to ☞ "10.1 Troubleshooting".

② Display WDT Call

・When the device receives a specific command from the host PC, the WDT indicator flashes blue for approximately 10 seconds. Display is also possible with a WDS-WIN01 operation.

③ Periodic Transmission

・By setting DIP switch 4 ON, the WDT transmits the current signal tower status every 10 seconds.
　If the frequency of signal tower information is low (a few times per hour), you can use this function so communication is more stable than when using immediate transmission mode.

④ Initialization

・Use this switch to reset all the settings in the main unit to their initial state. Initialized items and their initial settings are as follows.
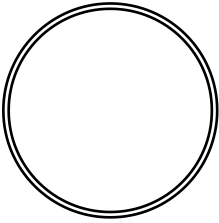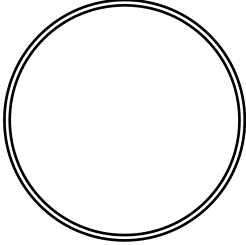
・ Settings

Item	Initial settings
ExtendedPanID	0000 0000 0000 0000
Frequency Channel	Select all
Determine signal tower input	Flashing (medium)
Power supply	Power line
Transmission mode	Immediate transmission
Simple counter settings	Do not use

9. Replacement and Optional Parts

9.1 Replacement Parts

Several kinds of parts are available to the customer for exchange or replacement.
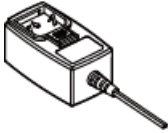
(1)   WDT

WDT-5LR replacement parts	WDT-6LR replacement parts
O-ring 50	O-ring 60
5 pieces	5 pieces

9.2 Optional Parts

The following options and related parts are available for this product.

Software	Power Supply Input Kit	
WDS-WIN01	WDX-5LRB	WDX-6LRB

AC Adaptor
ADP-001

10. Troubleshooting

10.1 Troubleshooting

(1) WDT

Issue	Checklist
Indicator does not light up.	Check if the unit is installed correctly.
	Even if the signal tower is ON all the time, power may not be supplied to the WDT main unit. Correctly wire the power supply for the signal tower.
The indicator flashes red (not pulsing).	Turn off the power on the WDT and turn on again.
	If it continues to flash red, it may be an indication that the settings are corrupted. Initialize the product and set up again.
The indicator does not change from a red light to a red pulse.	Wireless connection with WDR is in progress. ・ Depending on the radio wave environment, it may take some time to complete the connection. Check the indicator again after about 5 minutes. ・ Check if the WDR is working properly. ・ The ExtendedPanID in the WDR must match the wireless channel setting for a connection. Make sure the settings are correct. ・ Check for any sources of noise (such as microwave ovens) in the surrounding area that could impede wireless communication.
The indicator flashes blue.	When the host sends a call command to the WDT, the indicator flashes blue for a short period of time.
The indicator flashes alternating between green and red	Starting up in initialization mode. If operations are normal, turn off DIP switch 1 on the product.
The host cannot determine if the WDT is available.	If a wireless connection cannot be completed, the host cannot check if the WDT is available. Check if the indicator on the target WDT is pulsing, to indicate connection is complete.

(2)   WDR

Issue	Checklist
Power LED indicator (green) does not light up.	When using the DC jack, connect only the supplied AC adaptor.
	When using the power terminal block, check the polarity (+/-) of the power lines and turn on the power supply.
	When power is supplied from an USB cable, do not use a hub. Normal operation may not be possible as the current may be insufficient.
Power LED indicator (green) and output LED indicator (red) are flashing.	There may be a problem with the hardware. Please contact your local sales representative.
Contact output does not output.	Wire correctly and check the operation. Send the correct command.
The host and USB are connected, but communication does not work.	Select the correct port and connect the COM port. Operation when connecting via a hub has not been confirmed. Use this product by connecting directly to the USB port.
The host and LAN are connected, but communication does not work.	Default is 192.168.0.1:10001. If you changed the IP address, set that IP address and connect. If you do not know the IP address anymore, initialize the LAN communication settings and check the communication again. Refer to ☞ "7.2(2) WDR Wiring".
There is no notice on the host that the WDT has powered down.	Notices from the 30th or later connected WDT is not output.

11. Specifications

11.1 Specifications

(1)   WDT

Model	WDT-5LR-Z2	WDT-6LR-Z2
Connected model	LR5 Series Signal Tower Body unit top attachment	LR6 Series Signal Tower Body unit top attachment
Rated Voltage *	24 VDC	
Operating Voltage Range *	19.0 to 26.4 VDC	
Rated Current Consumption *	Maximum 55 mA	
Ambient Operating Temperature	-10 °C to +50 °C	
Ambient Operating Humidity	85% RH or less, no condensation	
Storage Ambient Temperature	-20 °C to +60 °C	
Storage Ambient Humidity	85% RH or less, no condensation	
Mounting Location	Indoors	
Mounting Direction	Upright	
Protection Rating	IP65 (IEC 60529), NEMA TYPE 4X,13	
Mass	74 g	85 g
Communication Standard	IEEE 802.15.4 (wireless communication)	
Communication Frequency	2405 to 2480 MHz (16 channels)	
Communication Distance	Approximately 30 m from source (reference value)	
External Contact Input	Control signal input	
Number of Contacts	6 points (red, amber, green, blue, white, buzzer)	
Input Reaction Time	100 ms or longer	
Display Unit	Indicator for monitoring the status	
Operation Unit	DIP switches	

* This is the specification for a single product.

・ Specifications may change without prior notice.

(2) WDR

Model	WDR-LE-Z2 (LE: LAN/USB connector model for overseas only)
Rated Voltage	24 VDC
Operating Voltage Range	21.6 to 26.4 VDC
Rated Current Consumption	45 mA (on standby) 55 mA (at maximum)
Ambient Operating Temperature	-10 °C to +60 °C (no condensation)
Storage Ambient Temperature	-20 °C to +70 °C, free from freezing
Relative Humidity	85% RH or less, no condensation
Mounting Location	Indoors
Mounting Method	Horizontal installation, wall mount
Protection Rating	IP20
Mass	170 g
Wireless Communication Standard	IEEE 802.15.4
Wireless Communication Frequency	2405 to 2480 MHz (16 channels)
Communication Distance	Approximately 30 m from source (reference value)
External Contact Output	1 point (24 VDC, 500 mA)

PATLITE Corporation

G2G

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