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Communication Unit Supporting Code Scanner

WB9Z-CU100

# User's Manual


B-1964(0)

IDEC CORPORATION

# Introduction

## Attention

- IDEC Corporation holds all rights related to this manual. Unauthorized duplication, reproduction, sales, transfers, or leasing without the express consent of IDEC is prohibited.
- Information contained in this manual may be changed or updated without notice.
- Every effort has been made to ensure the accuracy of the information contained in this manual. However, if you do note any errors or inconsistencies please contact the dealer from which you purchased the product or an IDEC sales representative.

## Applicable Standards

This product is in compliance with the following standards:

- IEC/EN61000-6-1 (2007)
- EN61000-6-3 (2007)
- EN55032 (2012) Class B
- EN55024 (2010)
- UL60950-1, 2nd edition, 2011-12-19
- FCC Part15 SubpartB Class B (Verification)
- CSA C22.2 No.60950-1
- ICES-003 Class B (self-declared)
- VCCI Class B (compliance confirmed)

FCC Regulations

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

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

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures;

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian Dpartment of Communications Compliance Statement

- CAN ICES-3(B) / NMB-3(B)

For further details on any of the above standards, please contact your sales agent directly.

# Version Information

It is version upgrade information of communication unit supporting code scanner. Check the main application version of the firmware and use it.
To check the version, refer to [No.7 Get version] on page 5-4 in [5. 4 List of Control Commands].

| Fixes and Improvements | Main application version |
|---|---|
| | WB9Z-CU100 |
| Initial release | A-001.000.00 |

# General terms, abbreviations, and terminology used in this manual

The general terms, abbreviations, and terminology used in this manual are as follows.

| Item | Definition |
|---|---|
| Communication unit | Indicates "WB9Z-CU100". |
| PoE | Stands for Power over Ethernet.<br>Technology to supply power using Ethernet cables. |
| Receive buffer | This is a storage area for temporarily storing received data. |
| Transmit buffer | This is a storage area for temporarily storing data before transmission. |
| Control character | ASCII code 00H - 1FH, 7FH. In this document, [ ] is used for expressing these values. For details, refer to [5. 6 ASCII Code Table] on page 5-6. |
| Prefix | This is character data attached to the beginning of output data or a communication command. |
| Suffix | This is character data appended to the end of output data or a communication command. |
| Our website | www.idec.com/ |

# Graphic Symbol Glossary

This manual uses the following graphic symbols to simplify explanations:

## Notes

| Graphic Symbol | Description |
|---|---|
| ⚠ Warning | Failure to operate the product in accordance with the information provided may result in severe personal injury or death. |
| ⚠ Caution | Failure to operate the product in accordance with the information provided may result in personal injury or damage to equipment. |
|  | Notes information that should be carefully noted. Failure to operate the product in accordance with the information provided may affect the appearance and performance of the main unit as well as any peripheral devices. |
|  | Denotes additional information that may prove useful for using a given function. |

# SAFETY PRECAUTATIONS

- Please read this manual thoroughly before installing this product, wiring, operation, maintenance and inspection.
- In this manual, the degree of danger that is expected if the equipment is improperly used is categorized as "warning" or "attention". The meaning of each is as follows.

| | |
|---|---|
| ⚠ Warning | Incorrect handling may result in death or serious injury. |

| | |
|---|---|
| ⚠ Caution | Incorrect handling may result in personal injury or property damage. |

## Safety Precautions

| | |
|---|---|
| ⚠ Warning | • This product is not intended for use in applications requiring high reliability and safety such as medical equipment, nuclear power, railway, aviation, and passenger equipment. Do not use for these applications.<br>• Pay attention to redundancy design and safety design so that there is no possibility of affecting human life even if it generates erroneous data when it is incorporated into a system that may affect human life such as medicine dose management<br>• Never disassemble, repair, or remodel . There is a risk of causing a serious accident such as electric shock, breakage, fire, or malfunction.<br>• When using a part of a general electrical workpiece or when this device is connected as such, use a power supply with a PSE mark that complies with the technical standards of the Electrical Appliance and Material Safety Law In particular, do not use the built-in power supply when this product is used in applications other than embedded equipment It may cause fire or electric shock.<br>• This product is for general use electronic equipment Do not use it in situations where its malfunction or failure directly threaten human life.<br>• Always turn off the power before wiring work, maintenance and inspection Failing to do so may cause electric shock or malfunctions. |

| ⚠ Caution | |
|---|---|
| | • Do not connect a power supply or AC power supply outside the rated power supply voltage range. There is danger of explosion or burnout.<br>• Faulty wiring may cause damage to the internal circuit.Refer to the connection example of ☞ [2. 3. 1 Connecting the scanner port] on page 2-3 for wiring the input/output circuit. Also, since this product does not incorporate a power supply reverse connection protection circuit.<br>• If the power supply is reverse connected, it may be damaged. Be careful when connecting a power supply.<br>• Avoid parallel wiring in the same piping and conduit with high voltage lines and power lines (especially inverter power lines), which may cause a malfunction or damage due to induced noise.<br>• If wiring is long, or if there is a risk of being affected by power source/electromagnetic interference from equipment etc., make solitary wiring the rule.<br>• To guard against malfunctions or damage avoid installationin the following places:<br>- Near induction equipment, sources of heat<br>- Locations that experience mechanical vibration and shock impact<br>- Dusty places<br>- In an atmosphere of harmful gas such as that containing sulfur<br>- Places where there is risk of water, oil, chemicals etc. contamination<br>- Outdoors<br>• Since this product is not an item intended to be explosion-proof, confirm that explosion-proof performance is unnecessary for installation. |

## Precautions during Use

| ⚠ Caution | |
|---|---|
| | • Use as shown in the catalog, in an environment as directed in this manual. High temperature, humidity, condensation, corrosive gas, excessive vibration. Using in a place subject to mechanical shock may cause electric shock, fire, malfunction.<br>• The pollution tolerance degree for the usage environment of this product is "pollution degree 2". Comply with this requiremente (Based on standard IEC60664-1 ) |

- **Since the power reset time is 1s, perform operations at least 1s after turning n the power.**
- **When starting for the first time, perform operations at least 3s after turning on the power.**
- When the load and the main unit are connected to different power sources, be sure to turn on the main unit power first.
- The rewrite frequency of the nonvolatile memory installed in the communication unit is 100,000 times.

# Related Manuals

Related manuals are published on our website. Download and use the latest manuals from our website.
Please use this document together with the other manuals related to this communication unit as follows.

| Model | Manual name | Contents |
|---|---|---|
| B-1964 | Communication Unit<br>Supporting Code Scanner WB9Z-CU100<br>User's Manual (this manual) | Gives an overview of the functions and capabilities of the communication unit as well as instructions on its use. |
| B-1945 | Instruction Sheet:<br>WB2F 2D Code Scanner | Included with the product. |
| B-1946 | Instruction Sheet:<br>WB9Z-CU100 Communication Unit | Included with the product. |
| B-1952 | WB2F 2D Code Scanner<br>User's Manual | Gives an overview of the functions and capabilities of the WB2F, and instructions on its use. |
| B-1960 | WB2F 2D Code Scanner<br>PLC Connection<br>User's Manual | Explains about PLC Connection. |
| B-1962 | WB2F 2D Code Scanner<br>Menu Sheet | Explains about menu sheet. |
| B-1968 | Communication Unit<br>Supporting Code Scanner WB9Z-CU100<br>Support Tool Use's Manual | Included with the support tool for the communication unit.<br>Explains about support tool. |

# Contents

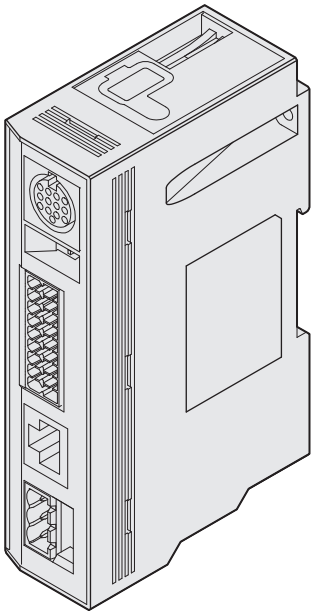
# 1 Overview

This chapter describes the product components, names and functions of each part, and basic system configuration during operation.

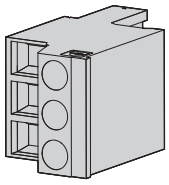
## 1. 1 Checking the packaged product and the product configuration

The package of the Communication Unit contains the following components.
Before use, confirm that all the contents, body and accessories are present and free from damage.

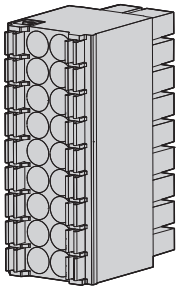
**Unit (WB9Z-CU100): 1**



**Connector for External Power Supply port: 1**



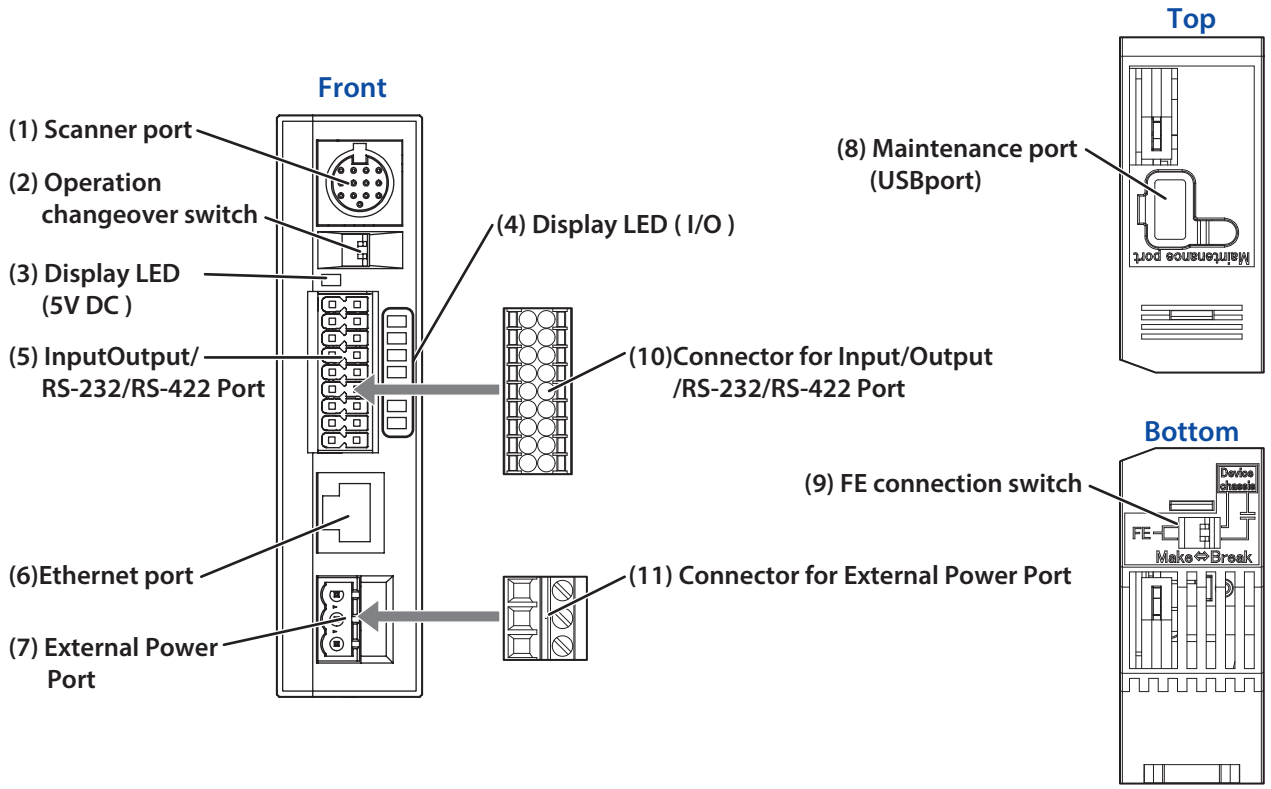
**Connector for Input/Output/RS-232/RS-422 Port: 1**



**Instruction Manual: 1**

# 1.2 Part names and functions

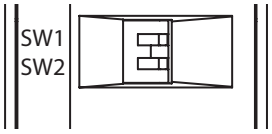
Here describes the names and functions of each part in the Communication Unit.




| No. | Name | Function |
|---|---|---|
| (1) | Scanner port | The connector is a DIN type. It connects with the code scanner. |
| (2) | Operation changeover switch | Used to changeover operation mode. |
| (3) | Display LED (DC 5V) | Lights up (green) when power is on. |
| (4) | Display LEDs (I/O) | Green LED flash with External input and External output of WB2F. |
| (5) | Input/Output/RS-232/ RS-422 Port | The communication unit is connected with "Input/Output/RS-232/RS-422 Port". |
| (6) | Ethernet port | Will connect to a Ethernet Compatible device.<br>PoE (Power over Ethernet) compatible. |
| (7) | External Power Port | The communication unit is connected with "External Power Port". |
| (8) | Maintenance port (USB port) | A port for maintenance using the USB interface. (USB2.0, Mini-B)<br>For connection with host devices, use accessories or commercially available USB cables. |
| (9) | FE Connection switch | Enables switching the FE connection to the scanner. |
| (10) | Connector for Input/ Output/RS-232/RS-422 Port | • Terminal plug: DFMC1.5/9-ST-3.5 (manufactured by PHOENIX CONTACT)<br>• It is used for control WB2F.<br>• It is connected with equipment of RS-232/RS-422. |
| (11) | Connector for External Power Port | External Power Port<br>Terminal plug: FRONT-MSTB2.5/3-ST-5.08 (manufactured by PHOENIX CONTACT) |

## Operation changeover switch

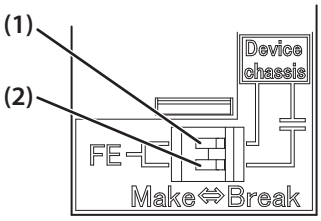
After setting the switches (SW1,SW2), turning the power ON can select the operation.
The relationship between the switches and the operation mode is as follows.
For the details of operation mode, refer to see [3. 1. 1 Operation mode] on page 3-1.




| Operation changeover switch | | Operation mode | Description |
|---|---|---|---|
| SW1 | SW2 | | |
| OFF | OFF | Slave mode | A communication with Ethernet |
| ON | OFF | Slave mode | At communication with RS-232 or RS-422 |
| OFF | ON | Maintenance mode | At maintenance |
| ON | ON | – | Not used |

## FE Connection Switch

Connection for shell of DIN connector and the FE terminal can be switched.
The relationship of the switches (1) and (2) and the connection method is as follows:



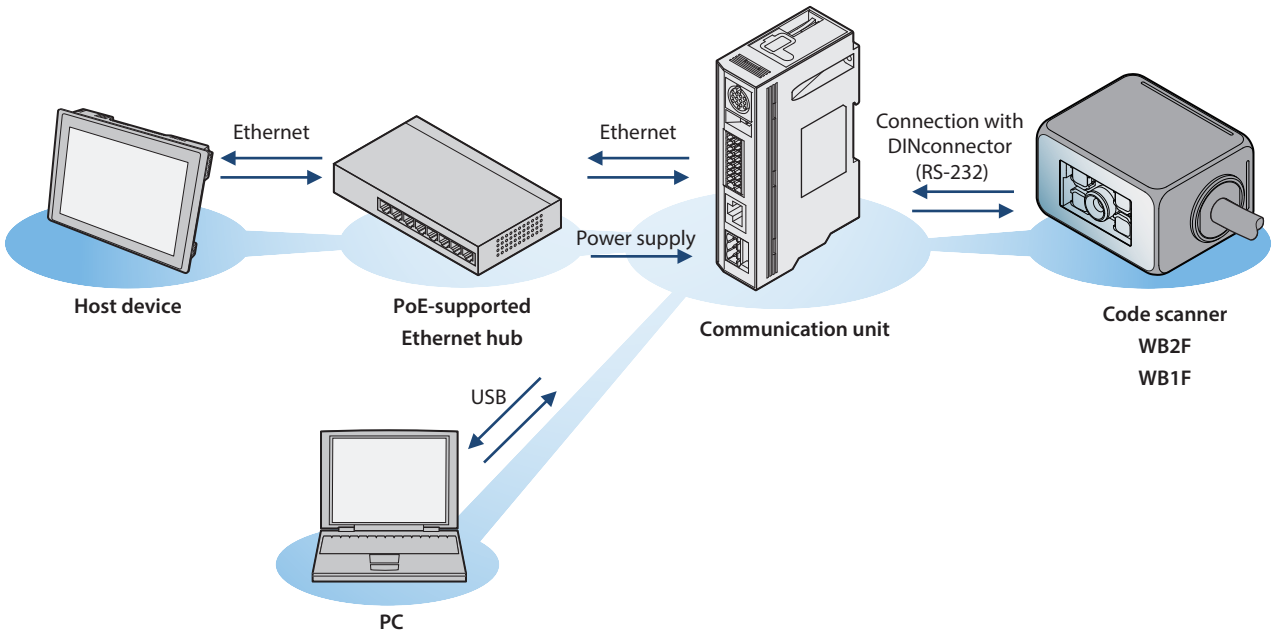

| FE connection switch | | Connection method | Remarks |
|---|---|---|---|
| (1) | (2) | | |
| Make | Make | Direct connection | |
| Break | Make | Capacitive coupling | |
| Make | Break | Direct connection | Factory shipping status |
| Break | Break | No connection | |

- Select the connection method depending on the noise environment.
- For the EMC Directive, the values are confirmed in the initial state ((1) : Make,(2) : Break) and performed self declaraion.

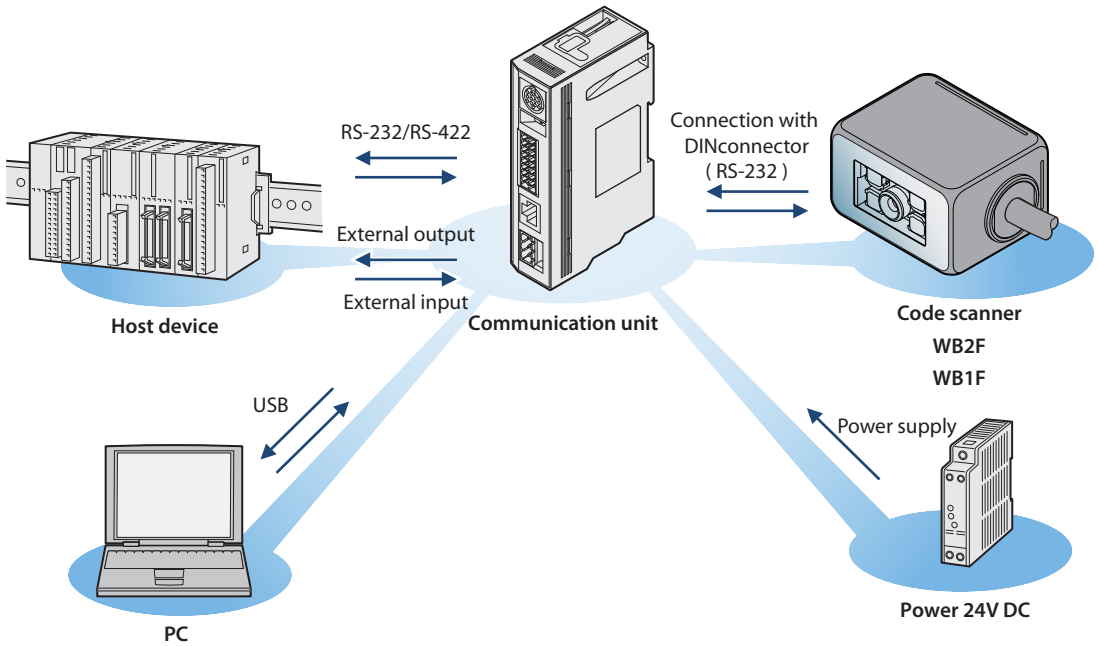
# 1.3 System configuration

The basic system configuration for using the Communication Unit is as follows:

## System using Ethernet




## System without using Ethernet



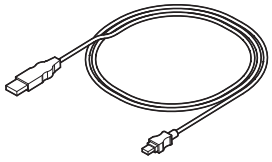

When connecting with PC via USB, the device driver must be installed. For how to install the device driver, Refer to [5. 7 Installing the USB driver] on page 5-8.

# 1.4 Accessories

Here describes the accessories for the Communication Unit.

## ● Accessories

USB Maintenance Cable
HG9Z-XCM42

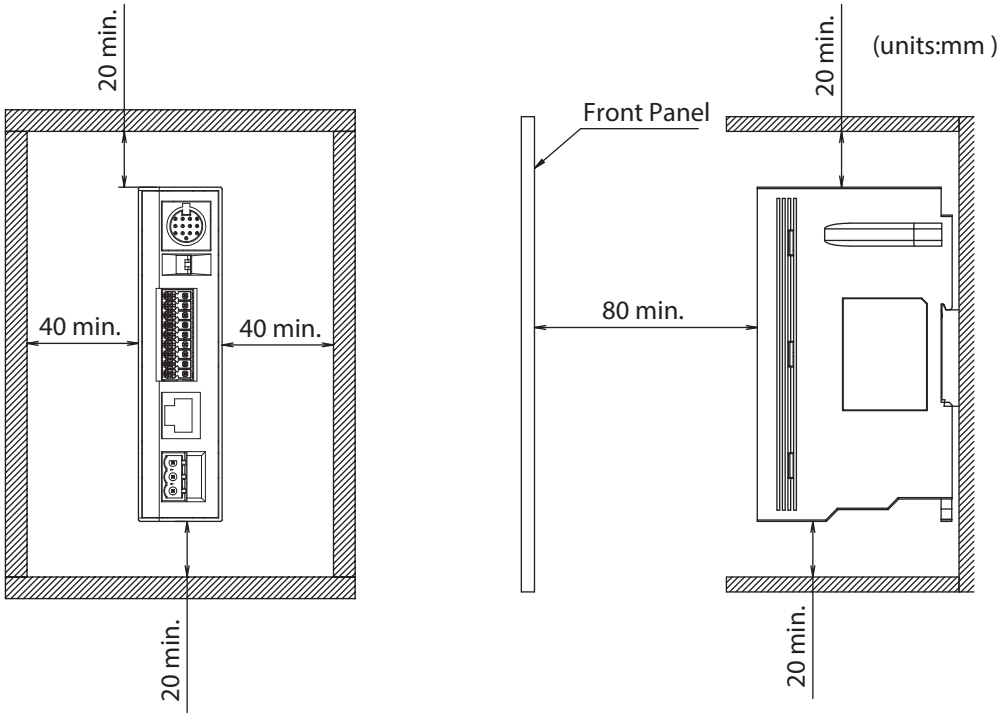


# 2 Installation & Wiring

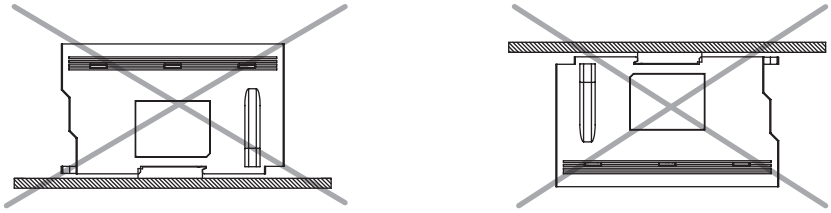
Here explains the installation location and installation method of the communication unit and wiring with peripheral devices.

## 2. 1 Installation precautions

For installation of the communication unit, consider the operability, maintainability, environmental resistance adequately with reference to the figure below.




Do not install facing upward or downward.



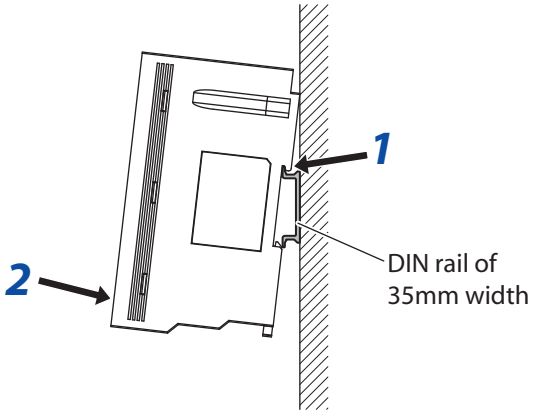
When using the maintenance port (USB port) after installation, consider operability and maintainability.

# 2.2 Mounting methods

## 2.2.1 How to install on a DIN rail

Be sure to use a 35 mm wide DIN rail.

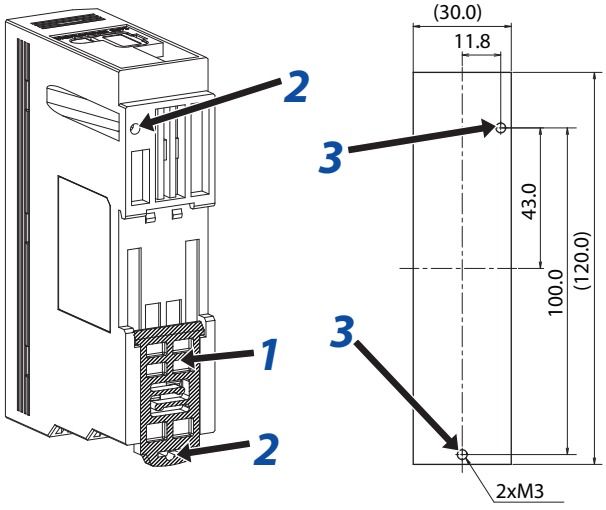
1. Hook the groove of the communication unit to the DIN rail.
2. Push the communication unit toward the DIN rail.




## 2.2.2 Direct panel-mounting method

1. Pull the DIN rail hook toward the outside of communication unit.
2. Align the screw mounting hole of the communication unit and that of the panel.
3. By using the M3 screws, install the panel
   In two positions. Torque: 0.4 to 0.5 Nm

(unit: mm)

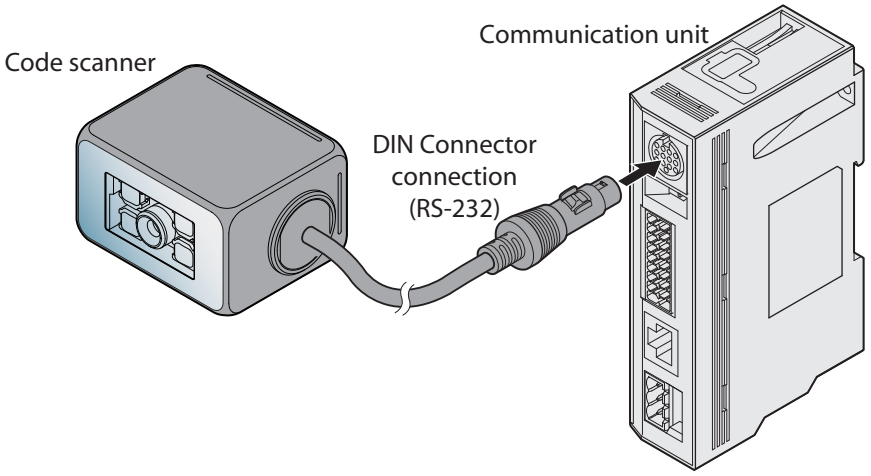


# 2.3 Wiring

## 2.3.1 Connecting the scanner port

### ● Connecting the code scanner

The connection diagram between the communication unit and the code scanner is as follows.

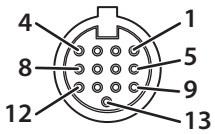



### ● Connector Pin Assignment

Communication Unit's connector pin assignment is as follows:

**Scanner port**

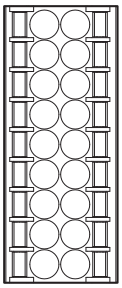
**DIN connector**




| Pin Number | Description | Function |
|---|---|---|
| 1 | Out_0 | Output from code scanner (NPN open collector) |
| 2 | Out_1 | |
| 3 | Out_2 | |
| 4 | Out_3 | |
| 5 | DC 5V | Power supply for code scanner (+ V) |
| 6 | S_RD | Code scanner receive data (RS-232) |
| 7 | In_0 | Input to code scanner |
| 8 | In_1 | |
| 9 | 0V | Power supply for code scanner (-V, SG common) |
| 10 | S_SD | Code scanner transmission data (RS-232) |
| 11 | S_RS | RS-232 control signal |
| 12 | S_CS | |
| 13 | 0V | Power supply for code scanner (-V, SG common) |

## Input/Output/RS-232/RS-422 port

### Connector for Input/Output/RS-232/RS-422 port

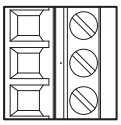


| | | | |
|---|---|---|---|
| SDA | • | • | OUT_COM |
| SDB | • | • | OUT_0 |
| RDA | • | • | OUT_1 |
| RDB | • | • | OUT_2 |
| SG | • | • | OUT_3 |
| RD | • | • | IN_COM |
| SD | • | • | IN_0 |
| CS | • | • | IN_1 |
| RS | • | • | NC |

| Description | Function | Description | Function |
|---|---|---|---|
| SDA | RS-422 connection with host device | OUT_COM | Output from code scanner |
| SDB | | OUT_0 | |
| RDA | | OUT_1 | |
| RDB | | OUT_2 | |
| SG | SG for RS-232/RS-422 connection with host equipment | OUT_3 | |
| RD | RS-232 connection with host equipment | IN_COM | Input to code scanner |
| SD | | IN_0 | |
| CS | | IN_1 | |
| RS | | NC | Not used |

## External Power Port

### Connector for an External Power Port



| | |
|---|---|
| 24V DC | • |
| 0V | • |
| FE | • |

| Name | Function |
|---|---|
| 24V DC | Power Supply (+V) for communication unit |
| 0V | Power Supply (-V) for communication unit |
| FE | Functional ground for communication unit |

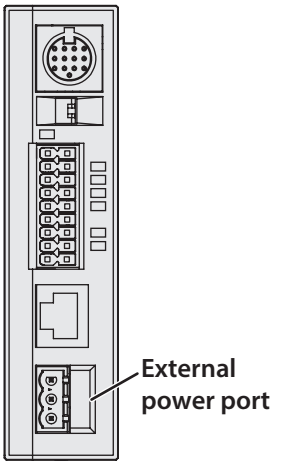
## 2. 3. 2 Connecting the Power Supply

There are two types of power supply connection method.

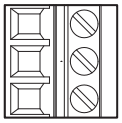
- Using an external power supply
- Using PoE (Power over Ethernet)

### ● Using an Exernal Power Supply

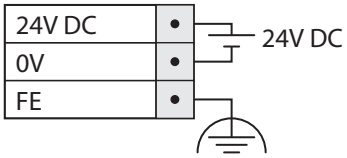
Connect the 24V DC power supply adaptor to the communication unit's external power port.




Connector for the External Power Port



Pin assignment for the External Power Supply Port




**⚠ Caution**

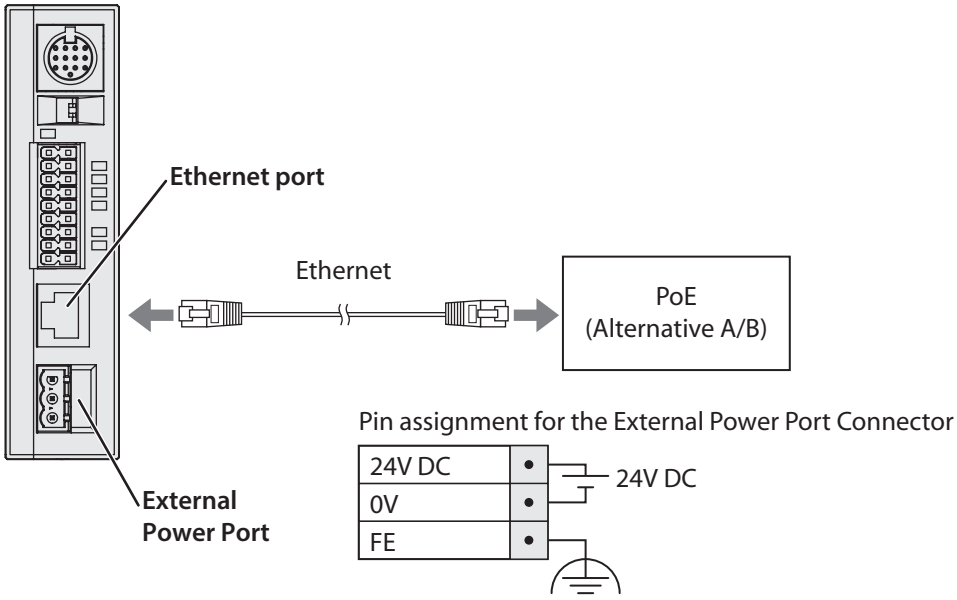
- Do not reverse the power supply connections under any circumstances. Doing so may result in damage.
- Use the product within the rated power supply voltage range. Otherwise there is a risk of explosion or burnout.

- Always turn off the WB2F's power supply before wiring the product.
- Do not simultaneously use an external power supply and PoE.
- Use an AWG12 to 24 Cable for wiring.

- If using as a UL certified product, the external power source must be at most 24V DC, 8A, 100VA Limited Power Source or Class 2 Power Source.
- A normal type fuse rated 2.5A, 60V DC is built into the product.

## ● Using PoE

Connect the PoE to the Communication Unit's Ethernet Port. Even if using PoE, ground the FE terminal of the external power supply's port connector.

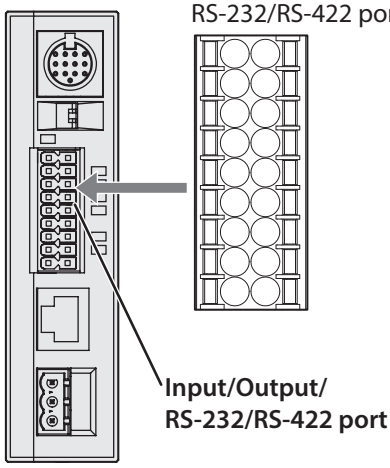



- Turn the communication unit's power to OFF prior to performing any wiring work.
- Do not simultaneously use an external power supply and PoE.

PoE is treated as Class 0.

## 2. 3. 3 RS-232 wiring

If connecting the code scanner to a host device such as programmable display or a computer using RS-232, do so according to the following wire instructions:




Host device

| Description | Pin Number |
|---|---|
| RXD | 2 |
| TXD | 3 |
| RTS | 7 |
| CTS | 8 |
| GND | 5 |
| DCD | 1 |
| DTR | 4 |
| DSR | 6 |
| RI | 9 |

D-sub 9-pin connector

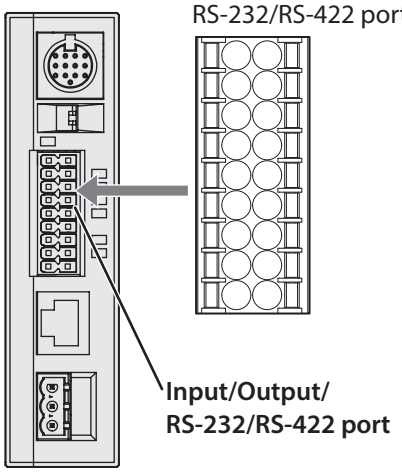
Connector for Input/Output/
RS-232/RS-422 port

| Description |
|---|
| SD |
| RD |
| CS |
| RS |
| SG |

- Ethernet/RS-232/RS-422 cannot simultaneously use more than two types of communication.
- Use an AWG16 to 24 Cable for wiring.

## 2. 3. 4 RS-422 wiring

If connecting the code scanner to a host device such as programmable display or a computer using RS-422, do so according to the following wire instructions:




Host device

| Description |
|---|
| RDA(RD+) |
| RDB(RD-) |
| SDA(SD+) |
| SDB(SD-) |
| SG |

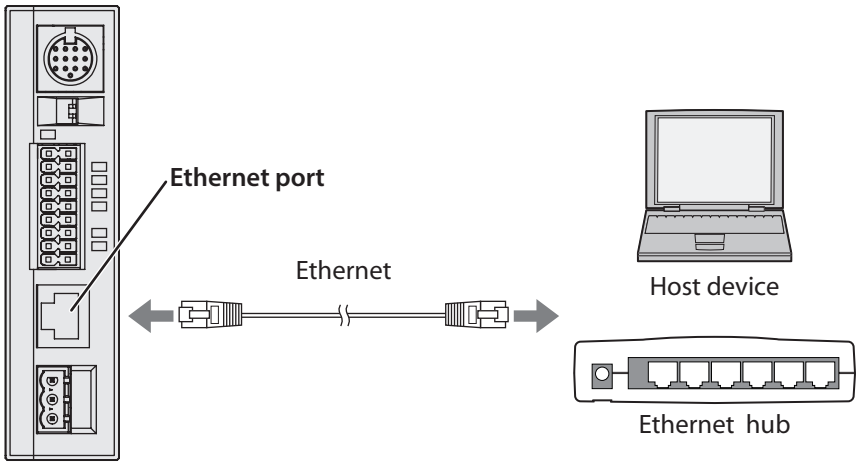
Connector for Input/Output/
RS-232/RS-422 port

| Description |
|---|
| SDA(SD+) |
| SDB(SD-) |
| RDA(RD+) |
| RDB(RD-) |
| SG |

- Ethernet/RS-232/RS-422 cannot simultaneously use more than two types of communication.
- Do not use a cable that is longer than 500m.
- If using a cable that is longer than 30m, use a shielded cable and connect the shield to the FE terminal. Wire the shield with sufficient consideration of the environment.
- Use an AWG16 to 24 Cable for wiring.

## 2. 3. 5 Wiring for Ethernet Communication

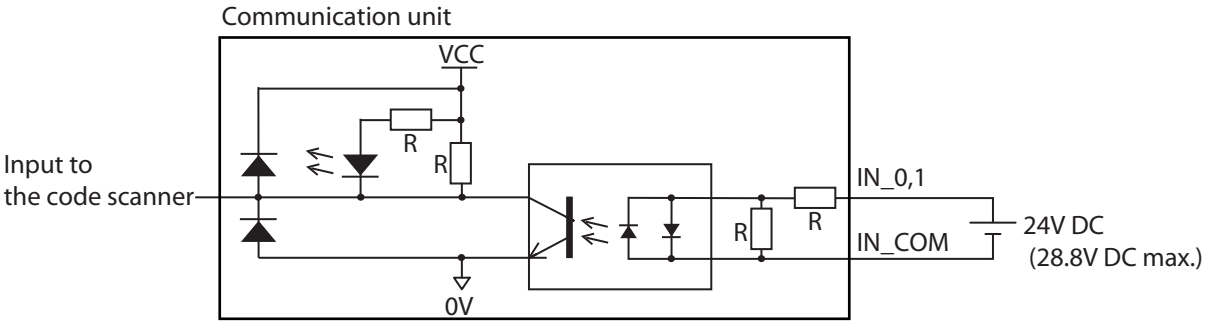
If connecting the code scanner to a host device such as programmable display or a computer using an ethernet connection, do so according to the following wire instructions:




- Ethernet/RS-232/RS-422 cannot use more than two types of communication at once.
- Connect the PoE to the Communication Unit's Ethernet Port. Even if using PoE, ground the FE terminal of the external power supply's port connector.
- Use a cable rated over category 5.
- Do not use a cable that is longer than 100m.
- If using a cable that is longer than 30m use a shielded cable.

## 2. 3. 6 Wiring for External Input

External Input is a trigger input used to turn Read Request ON/OFF.
External Input will operate given the following voltage input (VIL:0-5V, VIH: 15-28.8V).
Refer to the following example prior to wiring the code scanner.

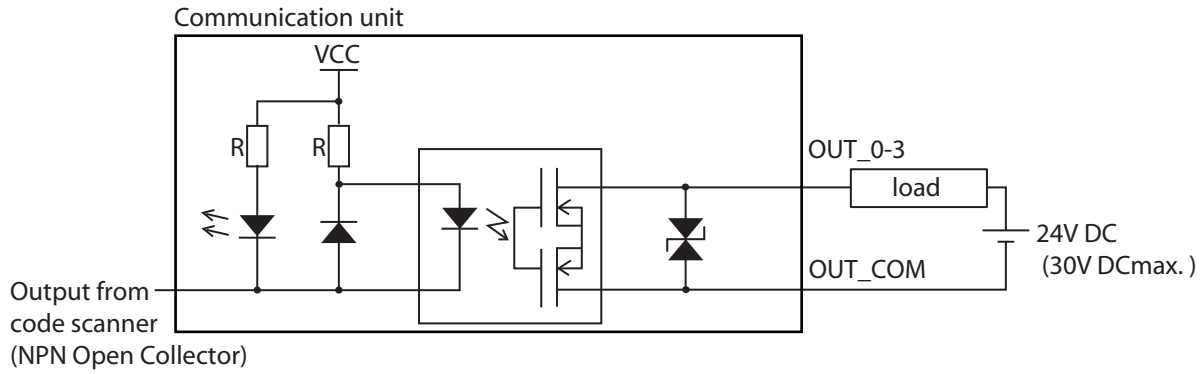



**Caution** Miswiring may cause damage to internal circuitry.

Use an AWG16 to 24 Cable for wiring.

## 2. 3. 7 Wiring for External Output

External Output is used to determine read success/read failure during read operations.
Refer to the following example prior to wiring the code scanner.




**Caution** Miswiring may cause damage to internal circuitry.

- If the Load and the WB2F are connected to separate power supplies, make sure that you turn the WB2F's power on first.
- Use an AWG16 to 24 Cable for wiring.

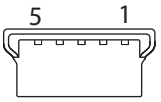
## 2. 3. 8 Connecting the USB Cable

### ● USB connector pin assignment

USB connector is Mini-B (Female) type.

| Pin number | Discription | Function |
|---|---|---|
| 1 | VBUS | bus power |
| 2 | D- | Data - |
| 3 | D+ | Data + |
| 4 | ID | maintenance |
| 5 | GND | ground |

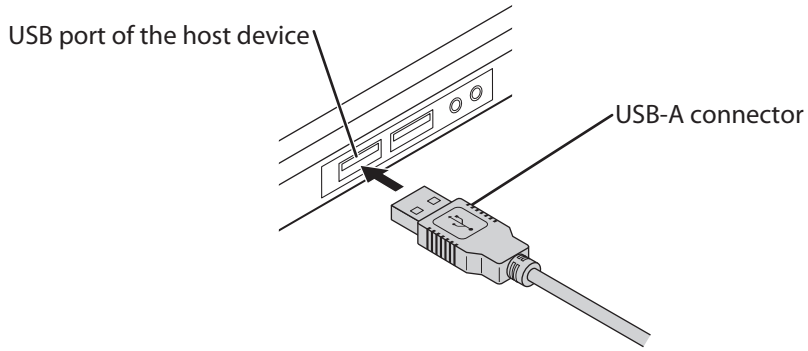
USB Connector (Mini-B)



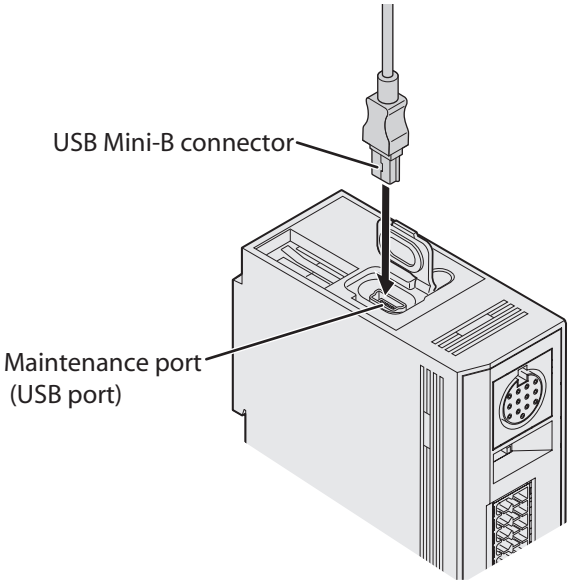

- The code scanner main unit can not be supplied with power from the USB connector.
- Do not use an On-the-Go cable. The ID pin is used internal circuit for maintenance.

### ● Connecting the USB connector

When connecting the unit to a host device, firmly insert the USB connector straight into the USB port on the host device in the correct orientation.




To connect the communication unit, open the cover of the maintenance port (USB port) and connect the USB Mini-B connector to the communication unit.
Insert straight, in the correct orientation to the maintenance port (USB port).



# 3 Function

This chapter describes the functions of the communication unit.

## 3. 1 Overview

### 3. 1. 1 Operation mode

Functions that can be executed depend on the operation mode of the communication unit.
There are two operation modes, Slave mode and Maintenance mode.

**■ Slave mode**

This mode is used during normal operation. Slave mode has the following functions:

| Function | Contents | Reference page |
|---|---|---|
| TCP/IP server communication function | A function to transmit and receive data between the device connected to the scanner port and the device connected to the Ethernet port by operating the communication unit as a TCP/IP server. | Page 3-3 |
| RS-232/RS-422 communication function | A function where the communication unit is operated as an RS-232 repeater and RS-422 converter, and data is transmitted and received between a device connected to the scanner port and a device connected to the input/output/RS-232/RS-422 port.. | Page 3-4 |
| Communication command function | Connected via communication interface of communication unit, this is a function to send and receive various data with the host device being used. | Page 3-5 |

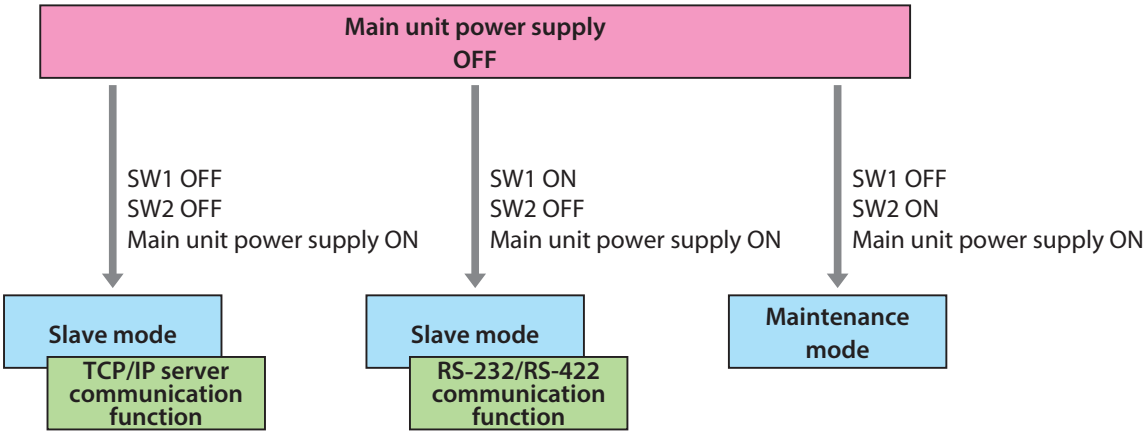
**■ Maintenance mode**

This mode is used for maintenance after installing the communication unit or for troubleshooting.Maintenance mode has the following functions:

| Function | Contents | Reference page |
|---|---|---|
| Maintenance auxiliary function | A function that forcibly operates with the factory setting | Page 3-8 |
| Firmware version update function | A function to update firmware of communication unit | Page 3-8 |

## 3. 1. 2 Operation mode function switching operation and state

Switch the operation mode and function using the operation changeover switch.
For the operation changeover switch, refer to the [Operation changeover switch] on page 1-3.




For details of each operation mode, refer to the following: