OMRON

CIDRW SYSTEM

V640 SERIES

USER'S MANUAL

AMPLIFIER UNITS

V640-HAM11-ETN-V2

V640-HAM11-L-ETN-V2

CIDRW HEADS

V640-HS61

V640-HS62

Man. No. Z361-E1-03

Introduction

Thank you for purchasing the V640-series CIDRW System.
Please observe the following points when operating the V640-series CIDRW System:

- Allow the CIDRW System to be installed and operated only by qualified specialist with a sufficient knowledge of electrical systems.
- Please read and understand the contents of this manual before using the system.
- After reading this manual, store it in a convenient location for easy reference whenever necessary.

Introduction	Table of Contents/Precautions in Using the Products
SECTION 1	Product Outline
SECTION 2	Installation and Connections/Wiring
SECTION 3	Preparing for Communications
SECTION 4	Reading from/Writing to ID Tags
SECTION 5	Browser Interface
SECTION 6	Troubleshooting
SECTION 7	Appendix

CIDRW System

V640-HAM11-ETN-V2	Amplifier Unit
V640-HAM11-L-ETN-V2	Amplifier Unit
V640-HS61	CIDRW Head
V640-HS62	CIDRW Head

User's Manual

READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.
NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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Safety Precautions

● Definition of Precautionary Information

The following notation and alert symbols are used in this User's Manual to provide precautions required to ensure safe usage of a V640-series CIDRW System. The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.
The following signal words are used in this manual.

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

● Meanings of Alert Symbols

	Prohibition Indicates general prohibitions for which there is no specific symbol.

Precautions for Safe Use

Please observe the following precautions for safe use of the products.

- Never use the product in an environment where combustible or explosivegas is present.
- Please separate from a high-pressure equipment and the power equipment to secure the safety of the operation and maintenance.
- In the installation, please tighten the screw surely. (Recommended 1.2N·m)
- Please do not insert foreign bodies such as water and the wires from the space of the case.
- Please do not dismantle, repair or modify this product.
- Please process as industrial waste when you abandon this product.
- When you work on wiring and put on and take off cables, CIDRW head, please perform it after switching off this product.
- Provide enough space around this product for ventilation.
- Please avoid installing this product near the machinery (a heater, a transformer, large-capacity resistance) that has high the calorific value. hen you felt abnormality to this product, and having switched it off.

Confirm the effects of radio waves on medical devices. The following guideline is from JAISA (Japan Automatic Identification Systems Association).

> This product is a reader-writer that uses radio waves for RFID equipment. The application and location of this product may affect medical devices. The following precaution must be observed in the application of the product to minimize the effects on medical devices.
> Any person with an implanted medical device must keep the area where the device is implanted at least 22 cm away from the antenna of a stationary or modular RFID device.

Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunctions, or undesirable effects on product performance.

■ About installation Site

Do not install this product in the locations subject to the following conditions.

- Place where direct sunshine strikes.
- Place with corroded gas, dust, metallic powder, and salinity.
- Place with condensation due to rapid temperature fluctuations.
- Place with condensation due to high humidity.
- Place where vibration and impact more than being provided by specification are transmitted directly to main body.
- Place with spray of water, oil, and chemical medicine.
- The working temperature is within the range stipulated in the specifications.

■ About depositoty Site

- Please follow the save ambient temperature / humidity, and keep this product.

■ About wiring

- Use the power supply voltage specified in this cocument.
- Ensure correct polarity when connecting to the +/- power supply terminals.
- Do not run high-voltage lines and power lines though the same conduit.
- To avoid static-induced failure, wear a wrist band or equivalent means to release a static charge before touching a terminal or a signal line within a connector.
- When you put on and take off a CIDRW head, please do not add excessive power to a connector.
- Please connect the correct CIDRW head to the amplifier unit.

■ About cleaning

- Use alcohol to clean this product.
- Never use an organic solvent such as thinner, benzene, acetone or kerosene, as it will attack resin components or case coating.

■ Power and Graound Cables

- Use an appropriate ground. An insufficient ground can affect this product operation or result in damage to this product.

■ About the communication range and time

- Do the communication test with Transponder in the installation environment because the metal, noise and ambient temperature around CIDRW head damage to the communication range and time.
- Install CIDRW head and ID tag in the appropriate distance because the communication range can change by the difference of ID tag specifications.

■ About mounting

- This product communicates with ID Tags using the 134 kHZ frequency band. Some transceivers, motors, monitoring equipment, and power supplies (power supply ICs) generate electrical waves (noise) that interfere with communications with ID Tags, If you are using the product in the vicinity of any of these devices, check the effect on communications in advance.
- In order to minimize the effects of noise, ground nearby metal bodies with a grounding resistance not exceeding 100 ohms.
- When mounting CIDRW Heads, tighten the screws tightly.(Recommended 0.6N·m)
- When multiple CIDRW Heads are mounted next to each other, communications performance could be impaired by mutual interference. Read and follow the information in this manual on mutual interference when installing multiple heads.

Refer to page 86.

■ Screw Locking Adhesive

- Screw locking adhesive (screw lock) may cause deterioration and cracking of resin parts; do not use it for screws in resin parts or anywhere where resin washers are used.

■ Startup Precaution

Never turn OFF the power supply while the CIDRW Controller is starting, including when power is turned ON, when the mode is changed, or when the CIDRW Controller is being reset. Doing so may damage the CIDRW Controller.

■ Application Precaution

Never turn OFF the power supply while setting the IP address, subnet mask, or Web password. Doing so may damage the Amplifier Unit.

■ About Transponder and RF module made by Texas Instruments Co.

(1) We can’t warrant the specifications of the communication with Transponder and RF module.
(2) When the RF module is at fault, we can’t analyze the RF module.

■ The characteristics of the V640-HAM11(-L)-ETN / V640-HAM11(-L)-ETN-V2

It is a circuit, designed to communicate characteristics match, but because it is intended to carry out the communication with RF module and the transponder, can not be guaranteed.

Reading this Manual

Visual Aids

NOTICE

Indicates an explanation of a point that must be observed to ensure that the product is capable of its proper functions and performance. Read this information carefully and follow the cautions. If the product is used incorrectly, data or the equipment itself could be destroyed.

CHECK!

Indicates summaries of points of particular importance relating to product performance, e.g., points to note during operation and advice on how to use the product.

Indicates the number of a page where related information can be found.

Indicates information for reference when you encounter a problem.

Indicator Status

The following symbols are used to show the status of the indicators on the CIDRW Controller and Amplifier Units.

OFF

Flashing

ON

Table of Contents

Introduction

- Safety Precautions 4
- Precautions for Safe Use 5
- Precautions for Correct Use 6
- Reading this Manual 8
- Table of Contents 9

SECTION 1 Product Outline 11

- What Is a CIDRW System 12
- Features 13
- System Configuration 14
- Component Names and Functions 15
- Flowchart for Getting Started 18

SECTION 2 Installation and Connections/Wiring 21

- Installation 22
- Connections and Wiring 25

SECTION 3 Preparing for Communications 29

- Setting the Communications Conditions for Amplifier Units 30
- Communications Test 31

SECTION 4 Reading from/Writing to ID Tags 33

- Command/Response Format 34

SECTION 5 Browser Interface 51

- Browser Operation Windows 52
- Window Configuration 53

SECTION 6 Troubleshooting 67

Troubleshooting 68

SECTION 7 Appendix 75

Specifications and Dimensions 76
Connection Examples 80
Characteristic Data According to Conditions of Use 81
ID Tag Memory Maps 111
Regular Inspection 112
ASCII Code Table 113
Protective Construction 114

SECTION 8 Revision History 116

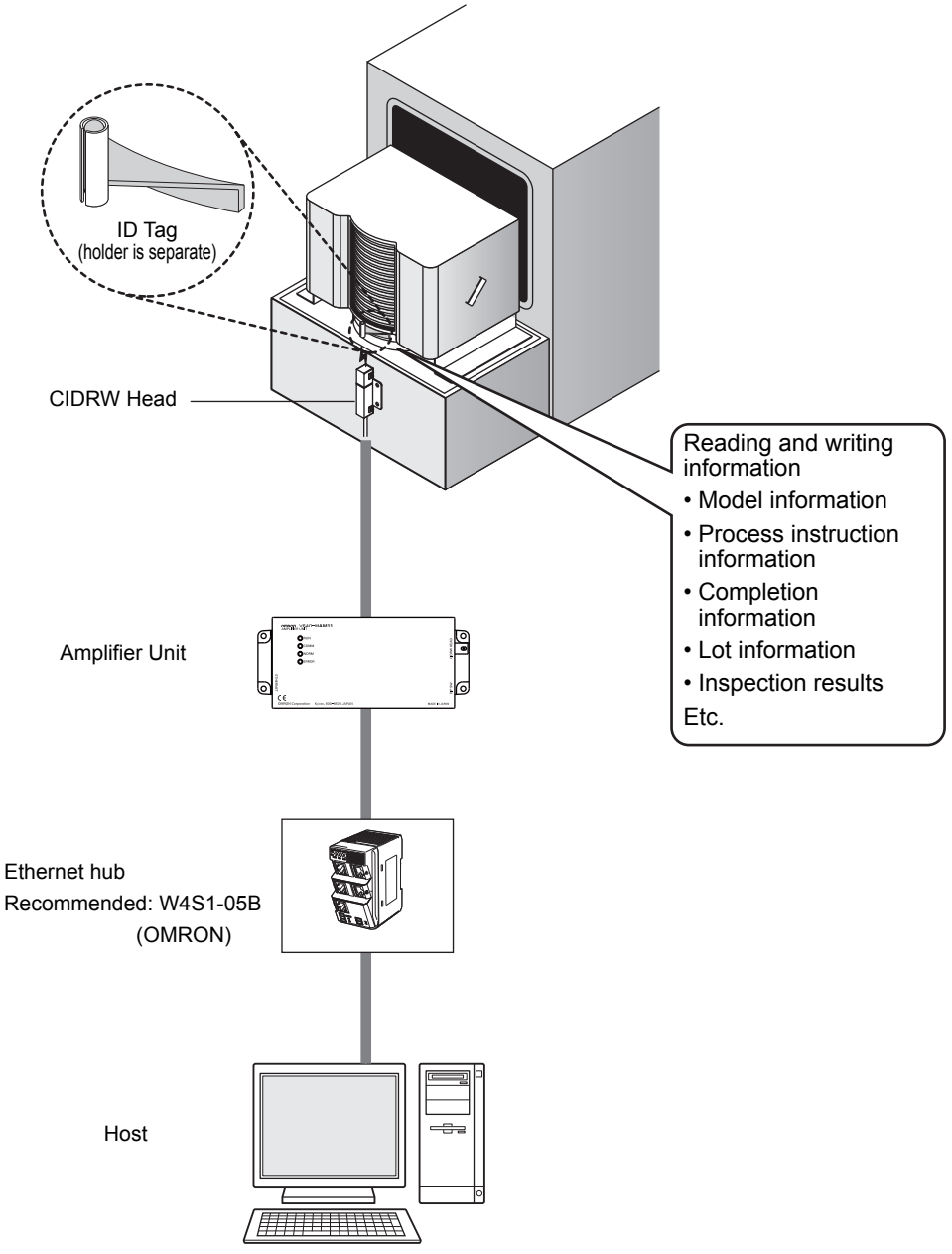
SECTION 1
Product Outline

What Is a CIDRW System	12
Features	13
System Configuration	14
Component Names and Functions	15
Flowchart for Getting Started	18

What Is a CIDRW System

The CIDRW system writes data to, and reads data from, the carrier IDs (ID Tags) mounted on the carriers (FOUP) in semiconductor manufacturing processes without contacting these ID Tags. CIDRW is the abbreviation of Carrier ID Reader/Writer and this abbreviation is used throughout this manual.
Reading and writing information such as models, process instructions, lots, and inspection results to and from ID Tags makes it possible to manage work instruction information from a host device.

Example: Management of information in semiconductor and wafer manufacturing processes



Features

A V640-series CIDRW Head can be connected to a V640-HAM11-ETN-V2 or V640-HAM11-L-ETN-V2 Amplifier Unit to read and write ID Tags manufactured by Texas Instruments (TI). Reading and writing is performed according to commands from the host device.

■ V640-HAM11-ETN-V2

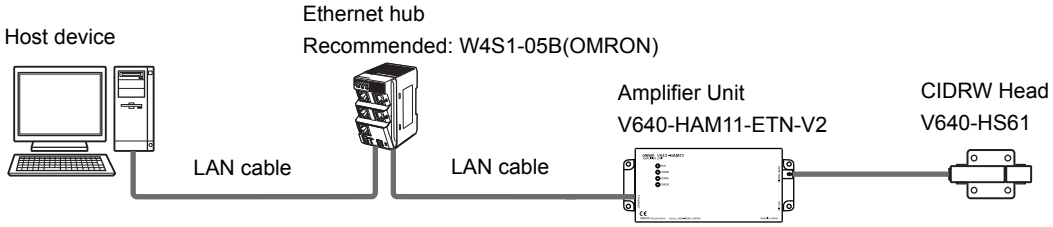
The V640-HAM11-ETN-V2 Amplifier Unit is equipped with Ethernet. The host device is connected through a LAN cable and controls the Amplifier Units using TCP/IP. The Amplifier Units provide a Web browser function that allows communications to be set and status to be managed using simple command communications.

■ V640-HAM11-L-ETN-V2

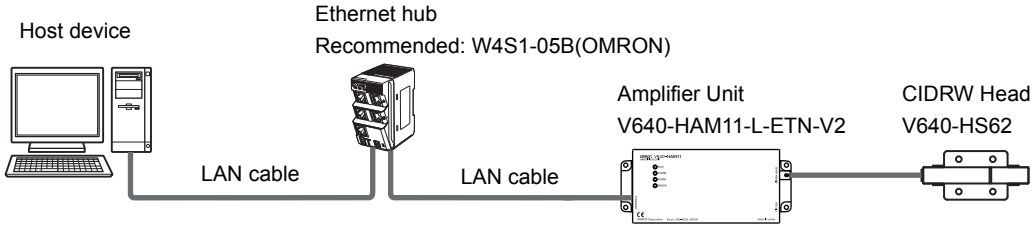
The V640-HAM11-L-ETN-V2 Amplifier Unit is equipped with Ethernet and can be connected to a V640-HS62 CIDRW Head to perform long-distance communications. The functions of the V640-HAM11-L-ETN-V2 Amplifier Unit are the same as those of the V640-HAM11-ETN-V2 Amplifier Unit.

System Configuration

V640-HAM11-ETN-V2



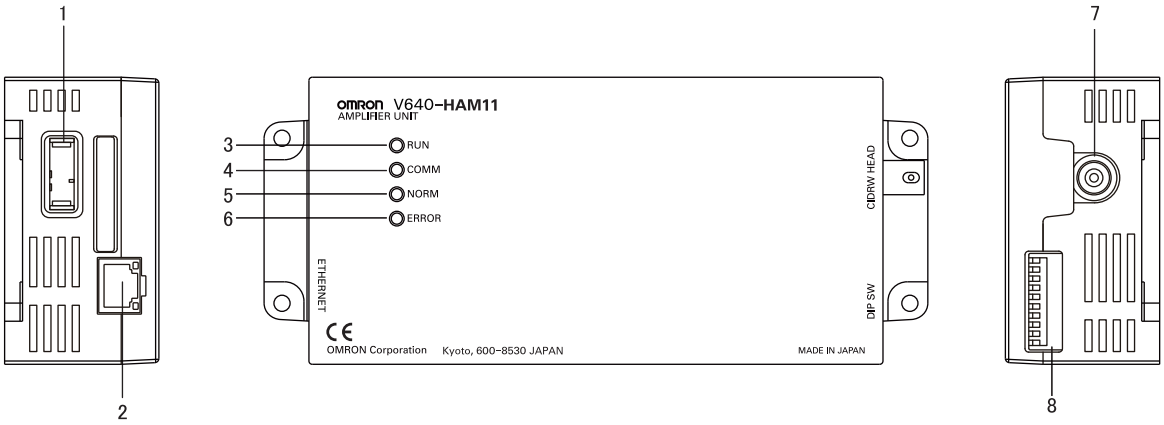
V640-HAM11-L-ETN-V2



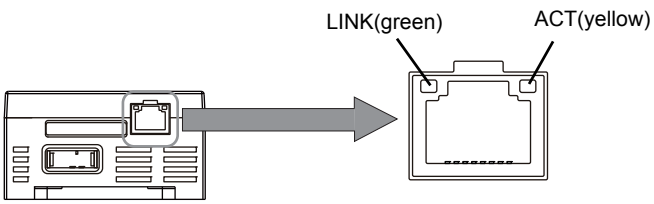
CHECK! If the IP address is set on the DIP switch, it will be in the form 192.168.1.□□□. The subnet mask is always 255.255.255.0
The IP address of the Amplifier Unit can be either set on this DIP switch or the desired IP address can be set in ROM. If pins 1 to 5 on the DIP switch are all turned OFF, the IP address that is set in ROM will be used.

Component Names and Functions

V640-HAM11-ETN-V2 and V640-HAM11-L-ETN-V2 Amplifier Units



No.	Name	Function
1	Dedicated power supply connector	Connect to the 24 VDC power supply.
2	Ethernet port	Connect to the host device through a LAN cable.
3	RUN indicator (green)	Turns ON when the Amplifier Unit is in normal operation.
4	COMM indicator (yellow)	Turns ON during communications with the host device or during communications with an ID Tag.
5	NORM indicator (green)	Turns ON when the communications finish with no error.
6	ERROR indicator (red)	Turns ON when an error occurs during communications with the host device, or during communications with an ID Tag.
7	CIDRW Head connection port	A CIDRW Head is connected here. The V640-HS61 CIDRW Head is used with the V640-HAM11-ETN-V2. The V640-HS62 CIDRW Head is used with the V640-HAM11-L-ETN-V2.
8	Setting DIP switches	Set the IP address and enable/disable the Test Mode with this DIP switch.



LINK---lights while linking normally.
ACT---lights when detects a carrier.

■ Functions

• NOISE MEASUREMENT

The levels of noise in the vicinity of the CIDRW Head are measured and the noise level is expressed numerically in the range "00" to "99.

Refer to page 47, page 110.

• Detecting for CIDRW Head status

You can confirm if the CIDRW Head is connected to the Amplifier Unit correctly.

Refer to page 45.

• Test Mode

Test Mode can be used to check communications between the ID Tags and Amplifier Units without connecting a host device. Communications with ID Tags are automatically performed every second and the communications results are displayed on the OPERATING indicator.

Refer to page 30.

CHECK!

Refer to *V640-HAM11-ETN-V2 and V640-HAM11-L-ETN-V2 Amplifier Units* for information on the OPERATING indicator for communications results.

Refer to page 15.

CHECK!

Always connect the CIDRW Head before operating the Amplifier Unit in Test Mode. If Test Mode is used without connecting a CIDRW Head, the ERROR inductor will light and Amplifier Unit operation will stop.

CHECK!

Commands from the host device are not accepted during operation in Test Mode. To end Test Mode, turn OFF the Test Mode pin on the DIP switch and restart the Amplifier Unit.

• Browser Interface

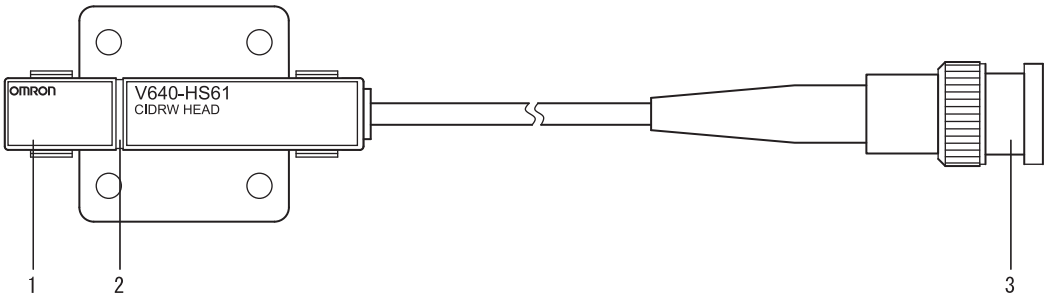
You can confirm the status of the Amplifier Unit or control the Amplifier Unit by using Browser Interface.
You can...

- confirm the status of the Amplifier Unit
- set the Network Settings and Web Password
- communicate with ID tags
- measure the levels of noise

Refer to page 51.

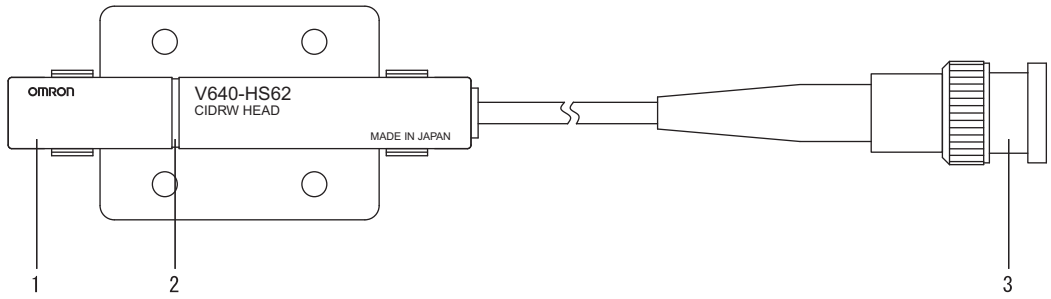
V640-HS61 and V640-HS62 CIDRW Heads

■ V640-HS61



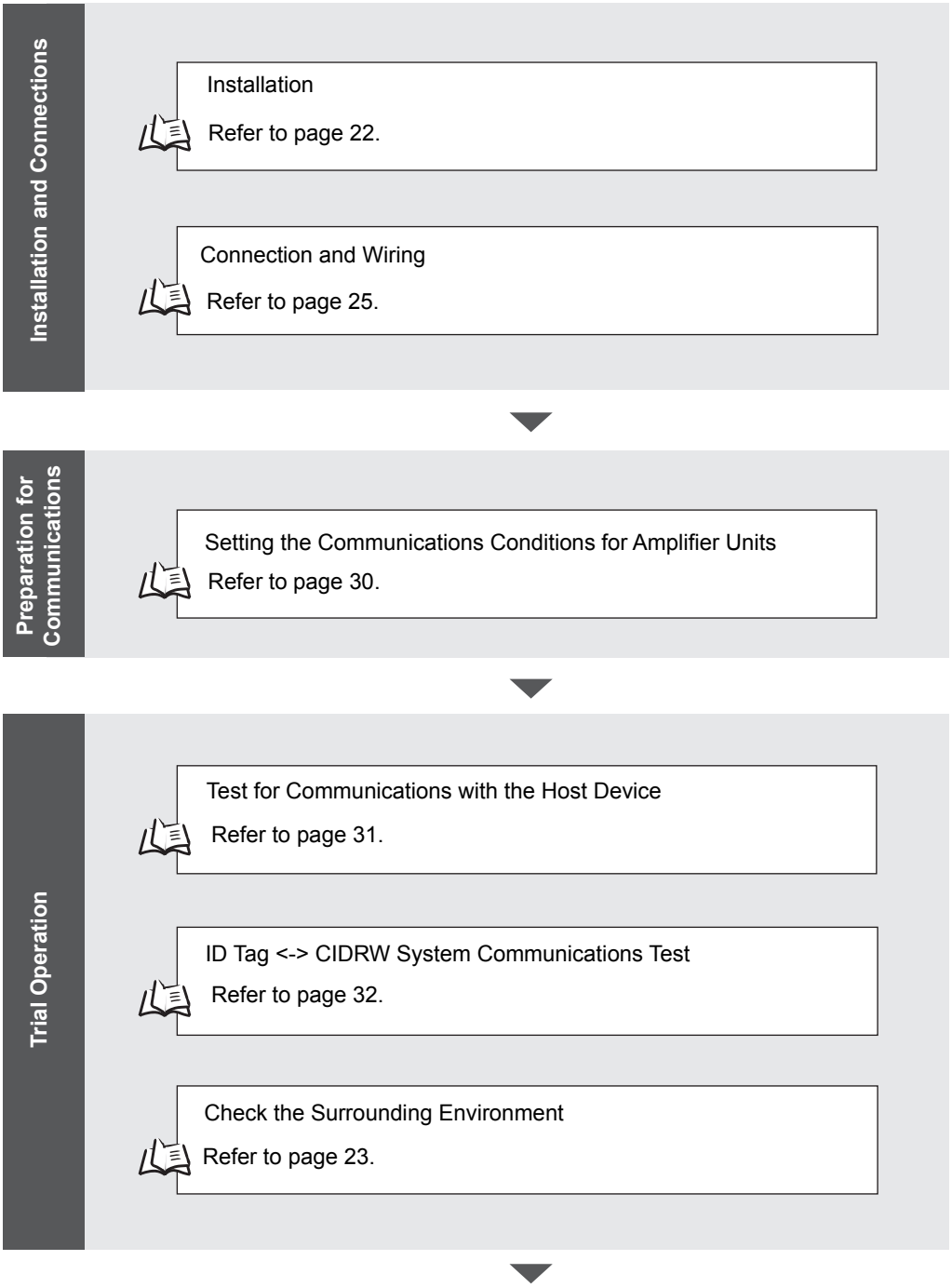
No.	Name	Function
1	Antenna	Used to communicate with ID Tags.
2	Antenna center	This is the center of the communications area.
3	Connector	Connect to an Amplifier Unit.

■ V640-HS62



No.	Name	Function
1	Antenna	Used to communicate with ID Tags.
2	Antenna center	This is the center of the communications area.
3	Connector	Connect to an Amplifier Unit.

Flowchart for Getting Started



Communications

Communications Test with Actual Commands

Refer to page 34.

When you Encounter a Problem...

Troubleshooting

Refer to page 68. List of Error Messages

Refer to page 68. Amplifier Unit Indicators

Refer to page 69. Operation Check Flowchart

MEMO

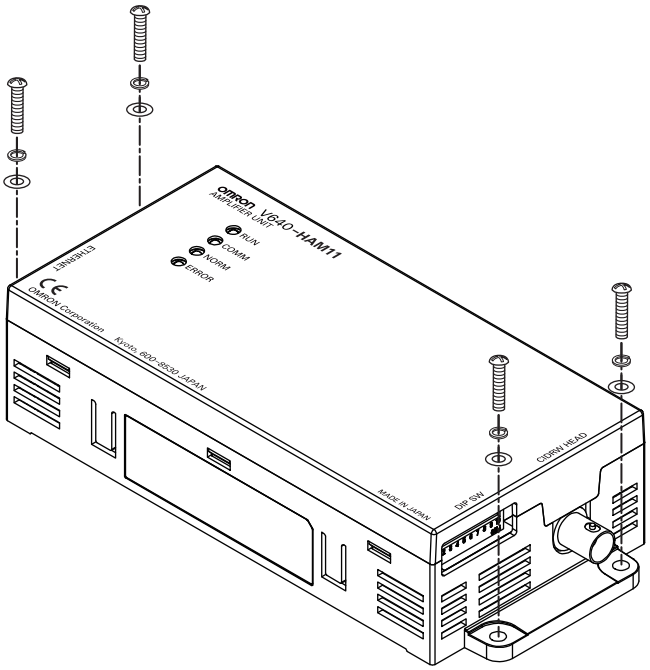
SECTION 2
Installation and Connections/Wiring

Installation	22
Amplifier Unit	22
CIDRW Head	23
Connections and Wiring	25
Amplifier Unit	25

Installation

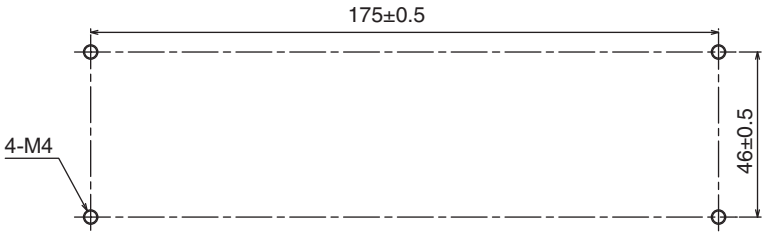
Amplifier Unit

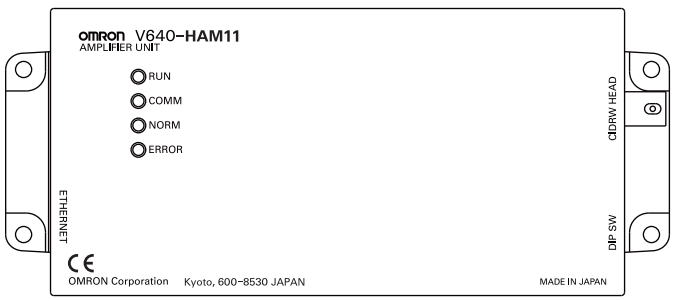
Use spring washers and flat washers with the four M4 screws when mounting the Amplifier Unit.



Mounting dimensions

(Unit: mm)





NOTICE Tighten the M4 screws with a torque not exceeding 1.2 N·m.

CIDRW Head

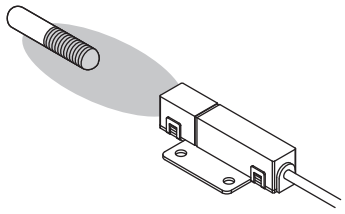
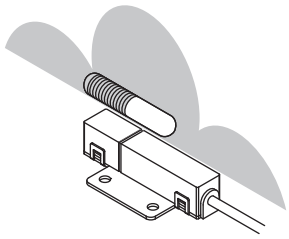
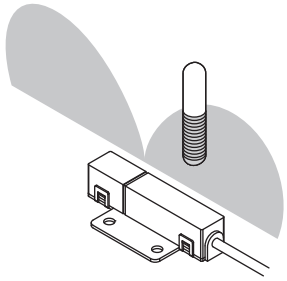
The area for communications with ID Tags varies substantially according to the installation orientations and the background conditions (metals, noise, etc.). Check the communications area before deciding the installation position.

For details on actual communications distances, see *Characteristic Data depending on Conditions of Use* in *Appendix*.

Refer to page 81.

■ Positional Relationship between the CIDRW Head and the ID Tag

The communications area differs according to the positional relationship during communications.

Mounting orientation	Communications area (purely illustrative)	Explanation
Coaxial		The maximum communications area is obtained when the center lines of the CIDRW Head and the ID Tag coincide.
Parallel		The maximum communications area is obtained when the center point of the antenna on the CIDRW Controller is aligned with the center line of the ID Tag.
Vertical		When the center point of the antenna on the CIDRW Head is aligned with the center line of the ID Tag, the communications area is substantially reduced.

■ Data Reading and Writing

The communications distances for reading and writing are not the same; the distance is shorter for writing. Therefore, when data is to be both read and written, take the distance for writing as the reference distance when installing the CIDRW Head and the ID Tag.

■ Influence of Background Metal on ID Tag

Metals in the vicinity of the communications area will affect the range, making it smaller.

Refer to page 106.

■ Influence of Noise

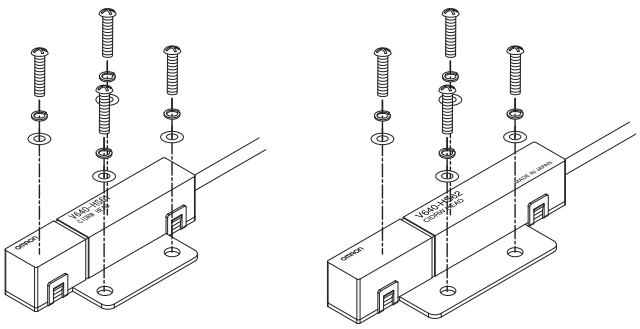
This CIDRW system uses a frequency of 134 kHz for communications with ID Tags. Equipment such as switching power supplies, inverters, servomotors, or monitors in the surrounding area will adversely affect communications, restricting the communications area.

The noise levels in the vicinity of the CIDRW Head can be determined with the environmental NOISE MEASUREMENT command (applies only when SECS is not used). Refer to page 41.

For details on the relationship between noise and communications distance, see *Appendix*. Refer to page 110.

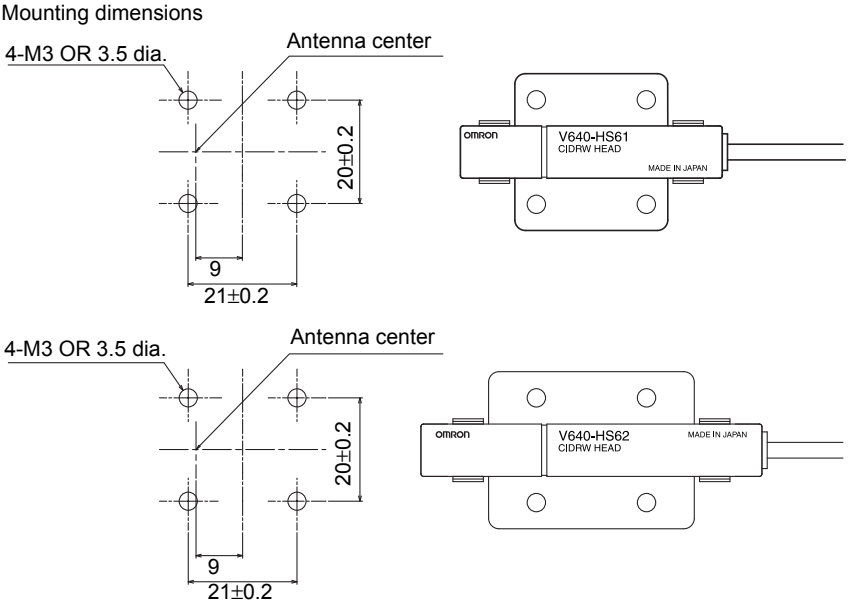
■ Mounting

Use spring washers and flat washers with the four M3 screws when mounting a CIDRW Head.



Mounting dimensions

(Unit: mm)



*The mounting dimensions are same between V640-HS61 and V640-HS62.

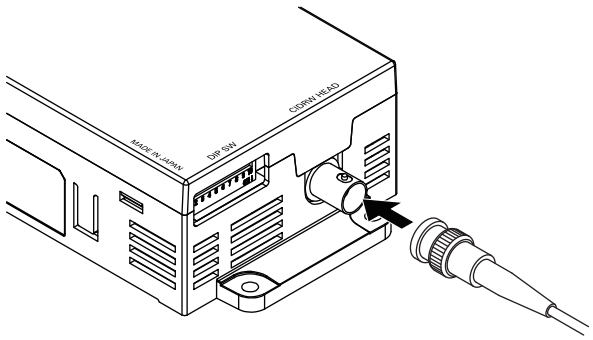
NOTICE Tighten the M3 screws with a torque not exceeding 0.6 N·m.

Connections and Wiring

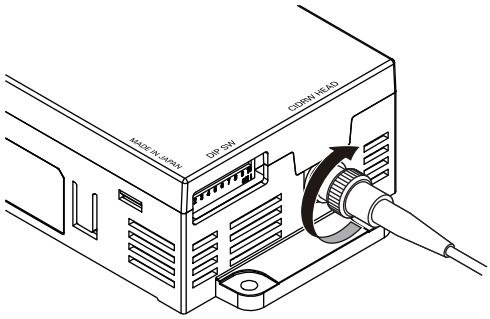
Amplifier Unit

■ Connector for Connecting a CIDRW Head

1. Align the pin on the connector with the channel in the cable connector and insert the cable connector.
   Hold the fixed part of the connector while making this insertion.



2. After inserting the connector fully home, turn the fixed part clockwise to lock it.

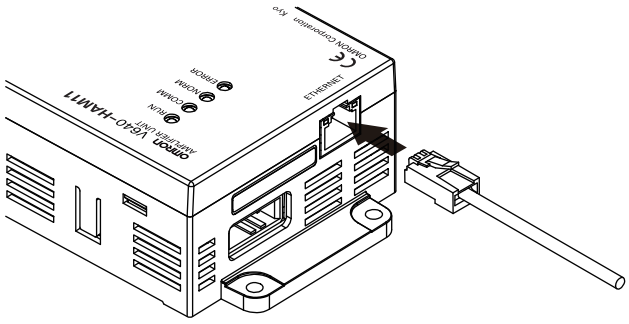


CHECK!

Disconnecting the CIDRW head.
Please pull it straight out after turn a connector counterclockwise and removing a lock.
If it is difficult to pull the connector out , press down on the Amplifier Unit while pulling on the connector.
Please do not pull a cable forcibly.

■ Ethernet Connector

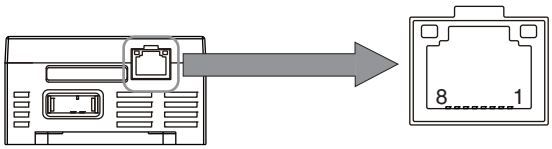
1. Hold the connector on the cable and insert it into the Ethernet connector on the Amplifier Unit.



CHECK! Press in the connector until it locks in place when connecting the Amplifier Unit to Ethernet, including when connecting it to a hub.

• Connector

The Amplifier Unit provides an auto-MDIX function that enables communications by connecting either a cross LAN cable or straight LAN cable.



Pin No.	Signal name	Description	I/O
1	TX_D+	Send data +	Output
2	TX_D–	Send data –	Output
3	RX_D+	Receive data +	Input
4	–	–	–
5	–	–	–
6	RX_D–	Receive data –	Input
7	–	–	–
8	–	–	–

Recommended Ethernet HUB

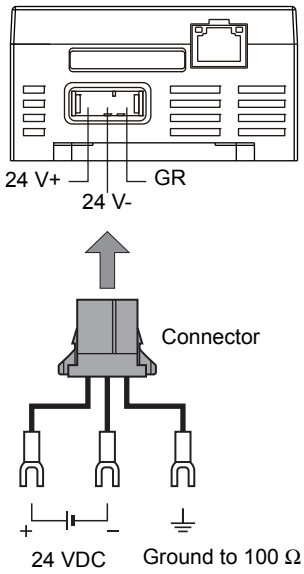
Manufacturer	Model	Type	Port
OMRON	W4S1-05B	switching hub	5

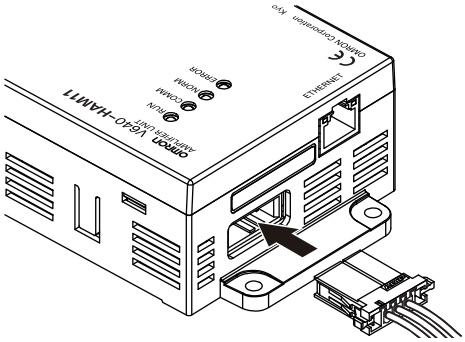
CHECK! The shape and dimensions of plugs and jacks for Ethernet connectors are specified in ISO/IEC 8877:1992 (JIS X 5110:1996) To prevent faulty connections for connectors, the jack on the Amplifier Unit is designed so that non-standard plugs cannot be connected. If a commercially available plug cannot be connected, it may be non-standard.

CHECK! If you use a Hub in your network, please choose a Switching-type Hub (Recommended: W4S1-05B(OMRON)).

■ Power Supply and Grounding Wires

Connect the power supply and grounding wires to the dedicated power supply connector.





NOTICE

- The grounding wire should be connected to a ground exclusive to the Amplifier Unit. If the grounding wire is shared with another unit, or connected to a beam in a building, there may be adverse effects.
- Make the grounding point as close as possible and the length of the grounding wire used as short as possible.
- When using the Amplifier Unit in Europe, the connecting cable between the Amplifier Unit and the DC power supply must be 3 m or less.

• Dedicated Power Supply Connector

Prepare a V640-A90 (can be purchased as an accessory).

Contents of the V640-A90 set (accessory)

Name	Quantity	When procured individually	
		Manufacturer	Model
Power supply connector	One	Tyco Electronics	1-178288-3
Pins for power supply connector	Three		175217-3
Connector for RS-485 port	One	Phoenix Contact	MSTB2.5/2-STF-5.08

* “Connector for RS-485 port“ is not able to use for the Amplifier Unit.

• Dedicated Power Supply Cable

Use an AWG20 to AWG24 cable.

Use a dedicated tool for crimping the cable to the connector pins.

Recommended Crimping Tool

Manufacturer	Model
Tyco Electronics	919601-1

• Power Supply

Use a power supply that satisfies the following conditions.

Recommended Product

Manufacturer	Model	Output current	Input voltage
OMRON	S8VS-01524	24 VDC, 650 mA	100 to 240 VAC

*The maximum power consumption of the Amplifier Unit is 150 mA at 24 VDC(V640-HAM11-V3), 400 mA at 24 VDC(V640-HAM11-L). The inrush current, however, must be considered when selecting the power supply capacity. A power supply with an output of 650 mA min. at 24 VDC is recommended.

MEMO

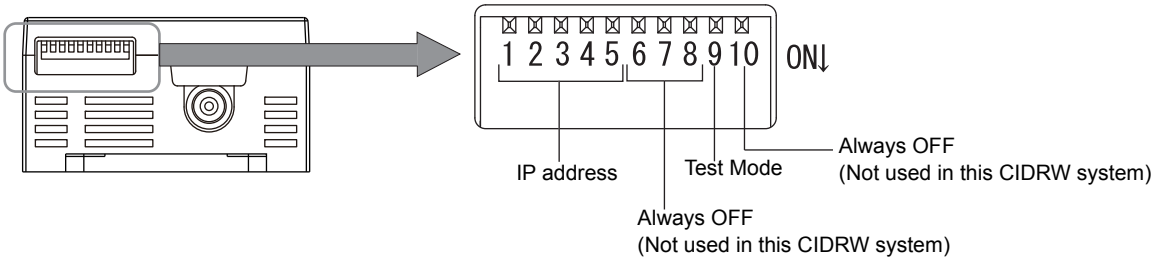
SECTION 3
Preparing for Communications

Setting the Communications Conditions for Amplifier Units 30

Communications Test 31

Setting the Communications Conditions for Amplifier Units

Set the communications conditions using the DIP switches on the side face of the Amplifier Unit.
After changing the DIP switch settings, restart the system. The new settings will not become effective until the system is restarted.



■ Default network settings(IP Address and Subnet mask)

IP Address: 192.168.1.200 Subnet mask: 255.255.255.0 (Port: 7090)

- If the IP address is set on the DIP switch, it will be in the form 192.168.1.□□□. The subnet mask is always 255.255.255.0
- The IP address of the Amplifier Unit can be either set on this DIP switch or the desired IP address can be set in ROM. If pins 1 to 5 on the DIP switch are all turned OFF, the IP address that is set in ROM will be used.

IP Address

IP address	DIP switch				
	1	2	3	4	5
Setting in ROM	OFF	OFF	OFF	OFF	OFF
192.168.1.1	ON	OFF	OFF	OFF	OFF
192.168.1.2	OFF	ON	OFF	OFF	OFF
192.168.1.3	ON	ON	OFF	OFF	OFF
192.168.1.4	OFF	OFF	ON	OFF	OFF
192.168.1.5	ON	OFF	ON	OFF	OFF
192.168.1.6	OFF	ON	ON	OFF	OFF
192.168.1.7	ON	ON	ON	OFF	OFF
192.168.1.8	OFF	OFF	OFF	ON	OFF
192.168.1.9	ON	OFF	OFF	ON	OFF
192.168.1.10	OFF	ON	OFF	ON	OFF
192.168.1.11	ON	ON	OFF	ON	OFF
192.168.1.12	OFF	OFF	ON	ON	OFF
192.168.1.13	ON	OFF	ON	ON	OFF
192.168.1.14	OFF	ON	ON	ON	OFF
192.168.1.15	ON	ON	ON	ON	OFF

IP address	DIP switch				
	1	2	3	4	5
192.168.1.16	OFF	OFF	OFF	OFF	ON
192.168.1.17	ON	OFF	OFF	OFF	ON
192.168.1.18	OFF	ON	OFF	OFF	ON
192.168.1.19	ON	ON	OFF	OFF	ON
192.168.1.20	OFF	OFF	ON	OFF	ON
192.168.1.21	ON	OFF	ON	OFF	ON
192.168.1.22	OFF	ON	ON	OFF	ON
192.168.1.23	ON	ON	ON	OFF	ON
192.168.1.24	OFF	OFF	OFF	ON	ON
192.168.1.25	ON	OFF	OFF	ON	ON
192.168.1.26	OFF	ON	OFF	ON	ON
192.168.1.27	ON	ON	OFF	ON	ON
192.168.1.28	OFF	OFF	ON	ON	ON
192.168.1.29	ON	OFF	ON	ON	ON
192.168.1.30	OFF	ON	ON	ON	ON
192.168.1.31	ON	ON	ON	ON	ON

Test Mode

Test Mode	DIP-SW	Description
	9	
Enabled	ON	Set the Test Mode and then restart the Amplifier Unit to make the setting effective.
Disabled	OFF	

Refer to page 16.

Communications Test

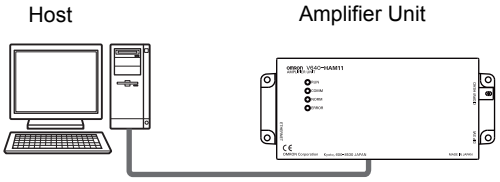
Communications Test with the Host Device

A communications test is performed to confirm that the host device and Amplifier Unit are connected correctly.

CHECK!

Refer to *Host Communications Specifications*.

Refer to page 77.



A test is preformed for the Amplifier Unit using the data 12345678.

Command

Command code		Test data								CR
		Data 1		Data 2		Data 3		Data 4		
1	0	1	2	3	4	5	6	7	8	0Dh

Response

Response code		Test data								CR
		Data 1		Data 2		Data 3		Data 4		
0	0	1	2	3	4	5	6	7	8	0Dh

Communications Test between ID Tags and CIDRW System

Send a command from the host device and check that normal communications with the ID Tag is possible. Place an ID Tag in the communications area of the CIDRW Head connected to the Amplifier Unit for which communications is to be tested.

- READ

The data is read from pages 1 and 3 of the Amplifier Unit.

ID Tag contents

Page 1	12h	34h	56h	78h	90h	12h	34h	56h
Page 2								
Page 3	11h	22h	33h	44h	55h	66h	77h	88h
Page 4								

Command

Command code				Page designation								CR
0	1	0	0	0	0	0	0	0	0	1	4	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0

Response

Response code		Page 1															Page 3														CR
0	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	0Dh

- WRITE

The data is written to pages 8 and 10 of the Amplifier Unit.

Command

Command code				Page designation							Data of page 8																Data of page 10														CR
0	2	0	0	0	0	0	0	0	A	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0

Response

Response code		CR
0	0	0Dh

If the command ends normally, the contents of the ID Tag will be as follows:

Page 8	11h	22h	33h	44h	55h	66h	77h	88h
Page 9								
Page 10	01h	23h	45h	67h	89h	ABh	CDh	EFh

SECTION 4
Reading from/Writing to ID Tags

Command/Response Format	34
READ	35
WRITE	36
SAME WRITE	38
BYTE WRITE	39
TEST	40
NAK	41
GET PARAMETER	41
GET LAST COMMAND	46
GET COMMUNICATIONS HISTORY	46
CLEAR COMMUNICATIONS HISTORY	47
NOISE MEASUREMENT	47
RESET	48
SET WEB PASSWORD	48
SET NETWORK	49

Command/Response Format

Command

Command code				Parameter						CR
				1		· · ·		n		
										0Dh

Response

Response code		Parameter						CR
		1		· · ·		n		
								0Dh

Command

Command Code List

Name	Value	Function	See
READ	0100	When this command is received, the system communicates with the ID Tag, and reads the specified page(s) of data. Any pages up to a maximum of 16 can be selected.	p.35
WRITE	0200	When this command is received, the system communicates with the ID Tag, and writes the specified page(s) of data. Any pages up to a maximum of 16 can be selected.	p.36
SAME WRITE	0300	When this command is received, the system communicates with the ID Tag, and writes the same data in page units to the specified pages. Up to 17 pages, which is the maximum number of pages for an ID Tag, can be specified.	p.38
BYTE WRITE	0400	When this command is received the system communicates with the ID Tag, and writes data to the area specified by a first address and number of bytes. A maximum of 128 bytes can be specified.	p.39
TEST	10	Sends received data to the host device.	p.40
NAK	12	Sends the response made immediately before again.	p.41
GET PARAMETER	14	Gets the model number, MAC address, or another parameter.	p.41
GET LAST COMMAND	15	Gets the command code of the last command that was executed.	p.46
GET COMMUNICATIONS HISTORY	16	Gets the history of communications from when the power was turned ON (total number of communications, total successful communications, and total number of failed communications).	p.46
CLEAR COMMUNICATIONS HISTORY	17	Clears the communications history.	p.47
NOISE MEASUREMENT	40	Measures the noise in the vicinity of the CIDRW Head.	p.47
RESET	7F	Resets the Amplifier Unit.	p.48
SET WEB PASSWORD	A2	Sets the Web password.	p.48
SET NETWORK	A3	Sets the network.	p.49

Response Code List

Type	Response code	Name	Description
Normal end	00	Normal end	Command execution is completed normally.
Host communications error	14	Format error	There is a mistake in the command format. (For example, the command code is undefined, or the page or address specification is inappropriate.)
Communications error	70	Communications error	Noise or another hindrance occurs during communications with an ID Tag, and communications cannot be completed normally.
	71	Verification error	Correct data cannot be written to an ID Tag.
	72	No Tag error	Either there is no ID Tag in front of the CIDRW Head, or the CIDRW Head is unable to detect the ID Tag due to environmental factors (e.g., noise).
	7B	Outside write area error	A write operation was not completed normally because the ID Tag was in an area in which the ID Tag could be read but not written.
	7E	ID system error (1)	The ID Tag is in a status where it cannot execute command processing.
	7F	ID system error (2)	An inapplicable ID Tag has been used.
CPU hardware error	9A	Hardware error in CPU	An error occurred when writing to EEPROM.

■ READ

Reads any pages of data from the ID Tag. The maximum number of pages that can be read at one time is 16.

Command

Command code				Page designation (8 characters)								CR
0	1	0	0									0Dh

Bit	7	-	0	7	-	3	2	1	0	7	6	-	1	0	7	6	-	2	1	0
Page	Sys	-	Sys	Sys	-	Sys	17	16	15	14	13	-	8	7	6	5	-	1	Sys	Sys
Designation	0*	0*		0*	0*	0*	0/1	0/1	0/1	0/1	0/1	•••	0/1	0/1	0/1	0/1	•••	0/1	0*	0*
Value	00			00 to 07						00 to FF					00 to FC					

* Always specify 0. If you specify 1 an error (Response code: 14) will occur.

Parameter Description

Parameter	Description
Page designation	Pages are specified by setting the bits corresponding to pages that are to be read to 1 and setting the other bits to 0, then converting the result to a hexadecimal character string.

ID Tag Memory Maps Refer to page 111.

The response code (when normal: 00) and the data in the specified pages are returned in ascending order of page numbers.

Response

Response code		Read data														CR
		Page n						. . .		Page m (n<m)						
		Data 1		. . .		Data 8				Data 1		. . .		Data 8		
0	0															0Dh

Example: Reading Data from Pages 1 and 3 of the Amplifier Unit.

Data Content of the ID Tag

Page 1	12h	34h	56h	78h	90h	12h	34h	56h
Page 2								
Page 3	11h	22h	33h	44h	55h	66h	77h	88h
Page 4								

Command

Command code				Page designation								CR
0	1	0	0	0	0	0	0	0	0	1	4	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0

Response

Response code		Page 1															Page 3														CR
0	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	0Dh

CHECK!

If you send a “Read“ command that specified 1 to 2 page to a 1-page only ID Tag, the Amplifier Unit will response 2nd page data as all zero.

■ WRITE

Data is written in page units to the ID Tag. Any page(s) can be specified. It is possible to write to a maximum of 16 pages at one time.

Command

Command code				Page designation (8 characters)								Write data														CR
												Page n								Page m (n<m)						
												Data 1				Data 8				Data 1				Data 8		
0	2	0	0																							0DH

Bit	7	-	0	7	-	3	2	1	0	7	6	-	1	0	7	6	-	2	1	0
Page	Sys	-	Sys	Sys	-	Sys	17	16	15	14	13	-	8	7	6	5	-	1	Sys	Sys
Designation	0*	0*		0*	0*	0*	0/1	0/1	0/1	0/1	0/1	•••	0/1	0/1	0/1	0/1	•••	0/1	0*	0*
Value	00			00 to 07						00 to FF					00 to FC					

* Always specify 0. If you specify 1 an error (Response code: 14) will occur.

Parameter Description

Parameter	Description
Page designation	Pages are specified by setting the bits corresponding to pages that are to be read to 1 and setting the other bits to 0, then converting the result to a hexadecimal character string.
Write data	The data to be written to the specified pages is specified in ascending order of page numbers.

ID Tag Memory Maps Refer to page 111.

Response

The response code (when normal: 00) is returned.

Response code		CR
0	0	0Dh

Example: Writing Data to Pages 8 and 10 of the Amplifier Unit

Command

Command code	Page designation	Data of page 8	Data of page 10	CR
02	00	00000A00	1122334455667788	0Dh
			0123456789ABCDEF	

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0

Response

Response code		CR
0	0	0Dh

The ID Tag status on normal completion is as shown below.

Page 8	11h	22h	33h	44h	55h	66h	77h	88h
Page 9								
Page 10	01h	23h	45h	67h	89h	ABh	CDh	EFh

■ SAME WRITE

This command writes the same data to multiple pages of an ID Tag. Any page(s) can be specified.

Command

Command code				Page designation (8 characters)								Write data						CR
												Data 1				Data 8		
0	3	0	0															0DH

Bit	7	-	0	7	-	3	2	1	0	7	6	-	1	0	7	6	-	2	1	0
Page	Sys	-	Sys	Sys	-	Sys	17	16	15	14	13	-	8	7	6	5	-	1	Sys	Sys
Designation	0*	0*		0*	0*	0*	0/1	0/1	0/1	0/1	0/1	•••	0/1	0/1	0/1	0/1	•••	0/1	0*	0*
Value	00			00 to 07						00 to FF					00 to FC					

* Always specify 0. If you specify 1 an error (Response code: 14) will occur.

Parameter Description

Parameter	Description
Page designation	Pages are specified by setting the bits corresponding to pages that are to be read to 1 and setting the other bits to 0, then converting the result to a hexadecimal character string.
Write data	Specify the write data.

ID Tag Memory Maps Refer to page 111.

Response

The response code (when normal: 00) is returned.

Response code		CR
0	0	0Dh

Example: Clearing All Data on Pages 1 and 17 of the Amplifier Unit to 0

Command

Command code				Page designation								Write data																				CR
0	3	0	0	0	0	0	7	F	F	F	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0

Response

Response code		CR
0	0	0Dh

■ BYTE WRITE

This command writes data to any specified number of bytes starting from the address specified in the ID Tag. The maximum number of bytes that can be written at one time is 128.

Command

Command code				First address		Write data						CR
						Data 1		•••		Data n		
0	4	0	0									0Dh

* Data number n = number of bytes written to (2-character units)

Parameter Description

Parameter	Description
First address	Addresses can be specified in the range 00h to 87h.
Write data	Up to 128 bytes of write data, starting from the specified address, can be specified.

ID Tag Memory Maps Refer to page 111.

Response

The response code (when normal: 00) is returned.

Response code		CR
0	0	0Dh

Example: Writing Two Bytes of Data to Address 05h of the Amplifier Unit

Command

Command code				First address		Write data				CR
						Data 1		Data 2		
0	4	0	0	0	5	1	2	3	4	0Dh

Response

Response code		CR
0	0	0Dh

The ID Tag status on normal completion is as shown below.

Page 1						12h	34h	
Page 2								

■ TEST

Performs a communications test on communications between the host device and Amplifier Unit. When an Amplifier Unit receives a test command, it sends the response code and command test data to the host device as the response.

Command

Command code		Test data						CR
		Data 1		•••		Data n		
1	0							0Dh

* Number of data n < 136 (2-character units)

Parameter Description

Parameter	Description
Test data	The data to be sent in the test is specified with a hexadecimal value. (270 characters max.) However, note that odd numbers of characters cannot be used.

Response

The response code (when normal: 00) and the received test data are returned.

Response code		Test data						CR
		Data 1		•••		Data n		
0	0							0Dh

Example: Performing a Test for the Amplifier Unit Using the Data 12345678

Command

Command code		Test data								CR
		Data 1		Data 2		Data 3		Data 4		
1	0	1	2	3	4	5	6	7	8	0Dh

Response

Response code		Test data								CR
		Data 1		Data 2		Data 3		Data 4		
0	0	1	2	3	4	5	6	7	8	0Dh

■ NAK

Sends the response made immediately before again.

Command

Command code		CR
1	2	0Dh

Response

Sends the response made immediately before again.

CHECK!

A response will not be returned if a NAK command is executed immediately after startup.

■ GET PARAMETER

This command gets the model number, firmware version, or another parameter.

Command

Command code		Parameter type		CR
1	4			0Dh

Parameter Description

Parameter	Value	Description
Parameter type	01	Model number
	02	Firmware version
	03	MAC address
	10	DIP switch enabled/disabled status
	11	IP address on DIP switch
	12	Subnet address on DIP switch
	13	IP address in ROM
	14	Subnet address in ROM
	20	Memory status
	21	Antenna connection status

Response

The response code (00: normal) and received parameter value are returned.

Response code		Parameter value						CR
0	0							0Dh

* The contents and length of the parameter value depend on the parameter type that is specified for the command.

Example 1: Getting the Model Number of Amplifier Unit

Command

Command code		Parameter type		CR
1	4	0	1	0Dh

Response

The product model number is returned as an ASCII text string.

Response code		Model number														CR
0	0	V	6	4	0	-	H	A	M	1	1	-	E	T	N	0Dh

Example 2: Getting the Firmware Version of Amplifier Unit

Command

Command code		Parameter type		CR
1	4	0	2	0Dh

Response

The response code (00: normal) and firmware version are returned as a 4-digit decimal number.

Response code		Firmware version				CR
0	0	0	1	0	0	0Dh
		Major version		Minor version		

* The above response is for a firmware version of 1.00.

Example 3: Getting the MAC Address of Amplifier Unit

Command

Command code		Parameter type		CR
1	4	0	3	0Dh

Response

The response code (00: normal) and MAC address are returned.

Response code		MAC address												CR
0	0	0	0	1	F	1	6	1	A	B	9	8	E	0Dh

* The above response is for a MAC address of 00:1F:16:1A:B9:8E.

Example 4: Checking If Network Settings on DIP Switch on Amplifier Unit Are Enabled or Disabled

Command

Command code		Parameter type		CR
1	4	1	0	0Dh

Response

The response code (00: normal) and enabled/disabled status of the DIP switch network settings are returned.

Response code		DIP switch enabled/disabled		CR
0	0	0	1	0Dh

* The above response is for when the DIP switch settings are enabled. The response will show 00 for disabled status.

Example 5: Checking IP Address on DIP Switch on Amplifier Unit

Command

Command code		Parameter type		CR
1	4	1	1	0Dh

Response

The response code (00: normal) and IP address on the DIP switch (decimal, four octets of 3 digits each) are returned.

Response code		IP address on DIP switch											CR
0	0	1	9	2	1	6	8	0	0	1	0	2	0	0Dh
		First octet			Second octet			Third octet			Fourth octet			

* The above response is for when the IP address on the DIP switch is 192.168.1.20.
* The following response will be returned if the DIP switch network settings are disabled.

Response code		IP address on DIP switch											CR
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0Dh
		First octet			Second octet			Third octet			Fourth octet			

Example 6: Checking the Subnet Mask on the DIP Switch of Amplifier Unit

Command

Command code		Parameter type		CR
1	4	1	2	0Dh

Response

The response code (00: normal) and subnet mask (decimal, four octets of 3 digits each) are returned.

Response code		Subnet mask on DIP switch												CR
0	0	2	5	5	2	5	5	2	5	5	0	0	0	0Dh
			First octet			Second octet			Third octet			Fourth octet		

* The subnet mask is always 255.255.255.0 regardless of whether the DIP switch network settings are enabled or disabled.

Example 7: Checking IP Address in ROM

Command

Command code		Parameter type		CR
1	4	1	3	0Dh

Response

The response code (00: normal) and IP address in ROM (decimal, four octets of 3 digits each) are returned.

Response code		IP address on DIP switch												CR
0	0	1	9	2	1	6	8	0	0	1	2	0	0	0Dh
			First octet			Second octet			Third octet			Fourth octet		

* The above response is for when the IP address in ROM is 192.168.1.200.

Example 8: Checking the Subnet Mask in ROM

Command

Command code		Parameter type		CR
1	4	1	4	0Dh

Response

The response code (00: normal) and subnet mask (decimal, four octets of 3 digits each) are returned.

Response code		IP address on DIP switch												CR
0	0	2	5	5	2	5	5	2	5	5	0	0	0	0Dh
			First octet			Second octet			Third octet			Fourth octet		

* The above response is for when the subnet mask in ROM is 255.255.255.0.

Example 9: Getting the Memory Status of Amplifier Unit

Command

Command code		Parameter type		CR
1	4	2	0	0Dh

Response

The response code (00: normal) and memory check results for internal EEPROM are returned.

Response code		Memory status		CR
0	0	0	1	0Dh

* “Memory status” will be if the memory is normal:”01”, and is error:”00”.

Example 10: Getting the Antenna Connection Status of Amplifier Unit

Command

Command code		Parameter type		CR
1	4	2	1	0Dh

Response

The response code (00: normal) and Antenna connection status are returned.

Response code		Antenna connection status		CR
0	0			0Dh

* “Antenna connectionstatus” will be if the antenna is connected correctly:”01”, and is not correctly:”00”.

■ GET LAST COMMAND

Gets the command code of the last command that was executed.

Command

Command code		CR
1	5	0Dh

Response

This command returns the command code of the last command that was executed.

When There Is a Previously Executed Command

Response code		Command code				CR
0	0					0Dh

* The command code is given as two or four characters.

When There Is No Previously Executed Command

Response code		Command code		CR
0	0	0	0	0Dh

■ GET COMMUNICATIONS HISTORY

This command gets the history of communications from when the power was turned ON (total number of communications, total successful communications, and total number of failed communications).

Command

Command code		CR
1	6	0Dh

Response

This command returns the history of communications from when the power was turned ON. Four hexadecimal digits each are returned for the total number of communications, total number of successful communications, and total number of failed communications.

If the total number of communications exceeds 65,535, all data in the communications history will be reset to 0.

Response code		Total number of communications				Total number of successful communications				Total number of failed communications				CR
0	0													0Dh

Example 1: Getting the Communications History of Amplifier Unit

Command

Command code		CR
1	6	0Dh

Response

The following response is returned if there are 32,000 total communications, 30,000 successful communications, and 2,000 failed communications.

Response code		Total number of communications				Total number of successful communications				Total number of failed communications				CR
0	0	7	D	0	0	7	5	3	0	0	7	D	0	0Dh

■ CLEAR COMMUNICATIONS HISTORY

This command clears the communications history.

Command

Command code		CR
1	7	0Dh

Response

Response code		CR
0	0	0Dh

■ NOISE MEASUREMENT

The levels of noise in the vicinity of the CIDRW Head are measured and the noise level is expressed numerically in the range "00" to "99."

Command

Command code		CR
4	0	0Dh

Response

The response code (when normal: 00) and the noise level "00" to "99" are returned.

Response code		Noise level		CR
0	0			0Dh

Influence of background noise on communications distance Refer to page 110.

■ RESET

All Amplifier Unit processing is stopped, and the initial status is re-established.

Command

Command code		CR
7	F	0Dh

Response

There is no response to this command.

■ SET WEB PASSWORD

This command sets the Web password.

If you set a password, a Password entry window will be displayed when you start the browser window.

Command

When the Password Is Not Set

Command code		Password (1 to 16 characters)															CR
A	2																0Dh

* Only the following characters can be used in passwords: 0 to 9, a to z, and A to Z. If any other characters are used, error 14 will occur.

* If the password is not between 1 and 16 characters long, error 14 will occur.

When the Password Is Not Set

Command code		CR
A	2	0Dh

Response

Response code		CR
0	0	0Dh

CHECK! Never turn OFF the power supply to the Amplifier Unit before a response is received from the Amplifier Unit for this command. Doing so may damage the Amplifier Unit.

CHECK! The values are enabled when the Amplifier Unit is restarted.

■ SET NETWORK

This command sets the IP address and subnet mask in ROM.

Command

Command code		First octet			Second octet			Third octet			Fourth octet			CR
A	3													0Dh

Parameter Description

Parameter	Description
Type	IP address setting: 00 Subnet mask setting: 01
First to fourth octets	The address is set in decimal in four octets of three characters each.

Response

Response code		CR
0	0	0Dh

* If an error occurs when writing to EEPROM, error 9A will be returned.

CHECK!

Never turn OFF the power supply to the Amplifier Unit before a response is received from the Amplifier Unit for this command. Doing so may damage the Amplifier Unit.

CHECK!

The values are enabled when the Amplifier Unit is restarted.

MEMO

SECTION 5
Browser Interface

Browser Operation Windows	52
Window Configuration	53

Browser Operation Windows

To operate an Amplifier Unit from a browser, connect the Ethernet cables, start a browser on the computer, and specify the IP address of the Amplifier Unit as the URL. The Browser Window will be displayed. The Status Window will be displayed first. (If a Web password is set, the Status Window will be displayed after the Password Entry Window.) Menu buttons to move to the other windows are provided at the top of the window. Click a menu button to move to another window.

Precautions

- The system requirements to use the Web browser are as follows:
  - •Confirmation environment: Internet Explorer 7 or higher running on Windows XP or Windows 7
  - •The combination of the firmware version of Amplifier Unit and the JRE version

JRE version / Amplifier Units firmware version	Java 5	Java 6	Java 7	Java 8
Ver1.00	Available	Available	Available	Available See Note.
Ver1.01	Not available	Available	Available	Available

Note. Java8 update65 or later can not be connected with Firmware Ver.1.00.

CHECK! There is case where WEB browser can not be used in a combination of the firmware version of Amplifier Unit and the JRE version.
Refer to the table above, please use the JRE version that was appropriate for your Amplifier Unit.

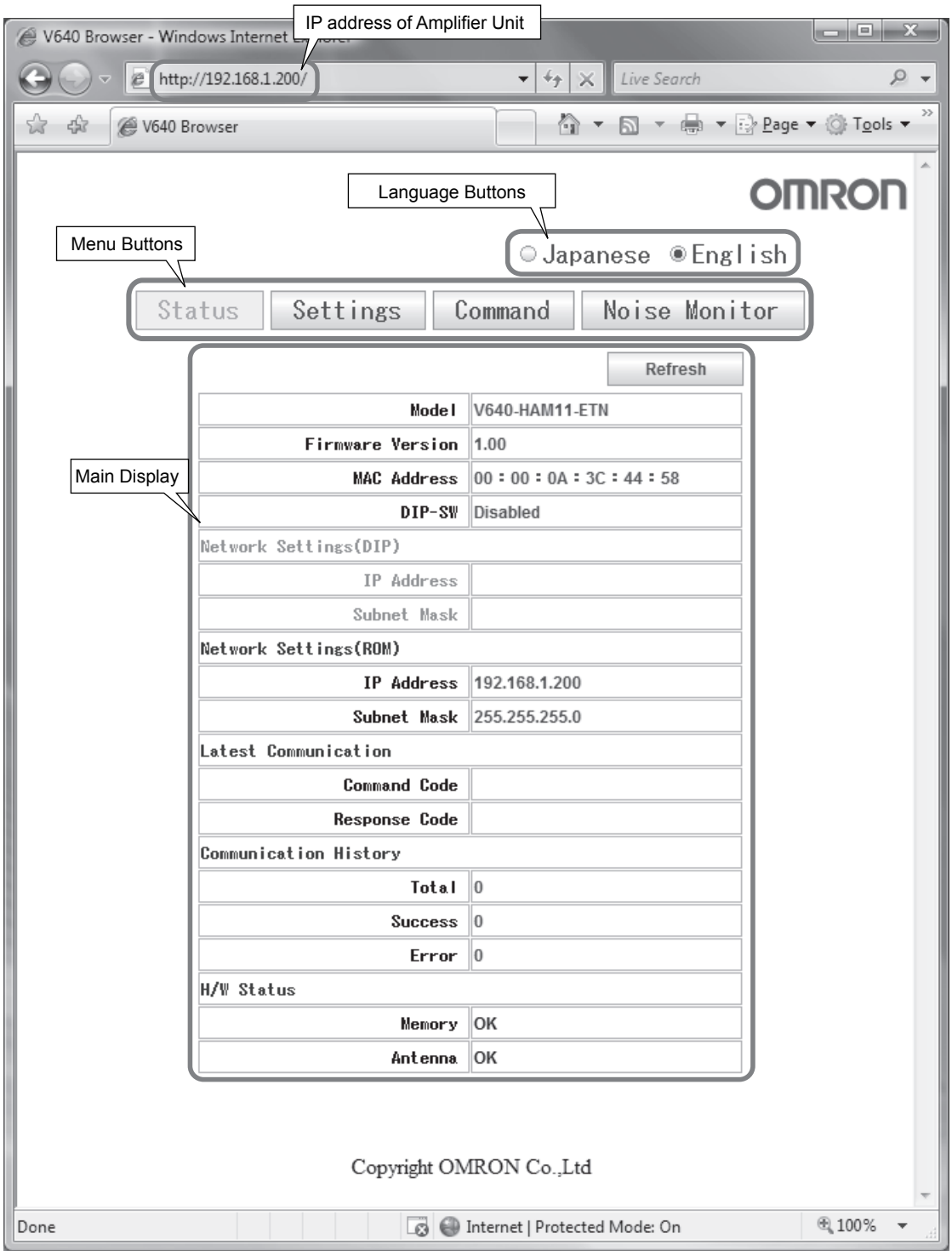
Java software can be downloaded from the following URL: http://www.java.com/ja/.
(Java and other trademarks that contain “Java” are the registered trademarks of Oracle Corporation or its related companies.)

- Before starting the Browser Window, make sure that the Amplifier Unit is not executing a command from terminal software or another source. The Amplifier Unit must be in idling status. If the Browser Window is started while the Amplifier Unit is executing a command, responses will not be returned for the commands sent from the terminal software or Browser Window.
- Access is possible from only one browser at a time. If the Amplifier Unit is accessed from another browser (B) while it is connected to a browser (A), the control right will move to browser B.

Before you begin the Browser Interface

1. Connect the PC to the Amplifier Unit through the LAN cable.
2. Turn on of the Amplifier Unit.
3. Start the browser (ex.Internet Explorer).
4. Input the IP Address of the Amplifier Unit in the URL column.
5. The Amplifier Unit browser screen will be displayed.

Window Configuration



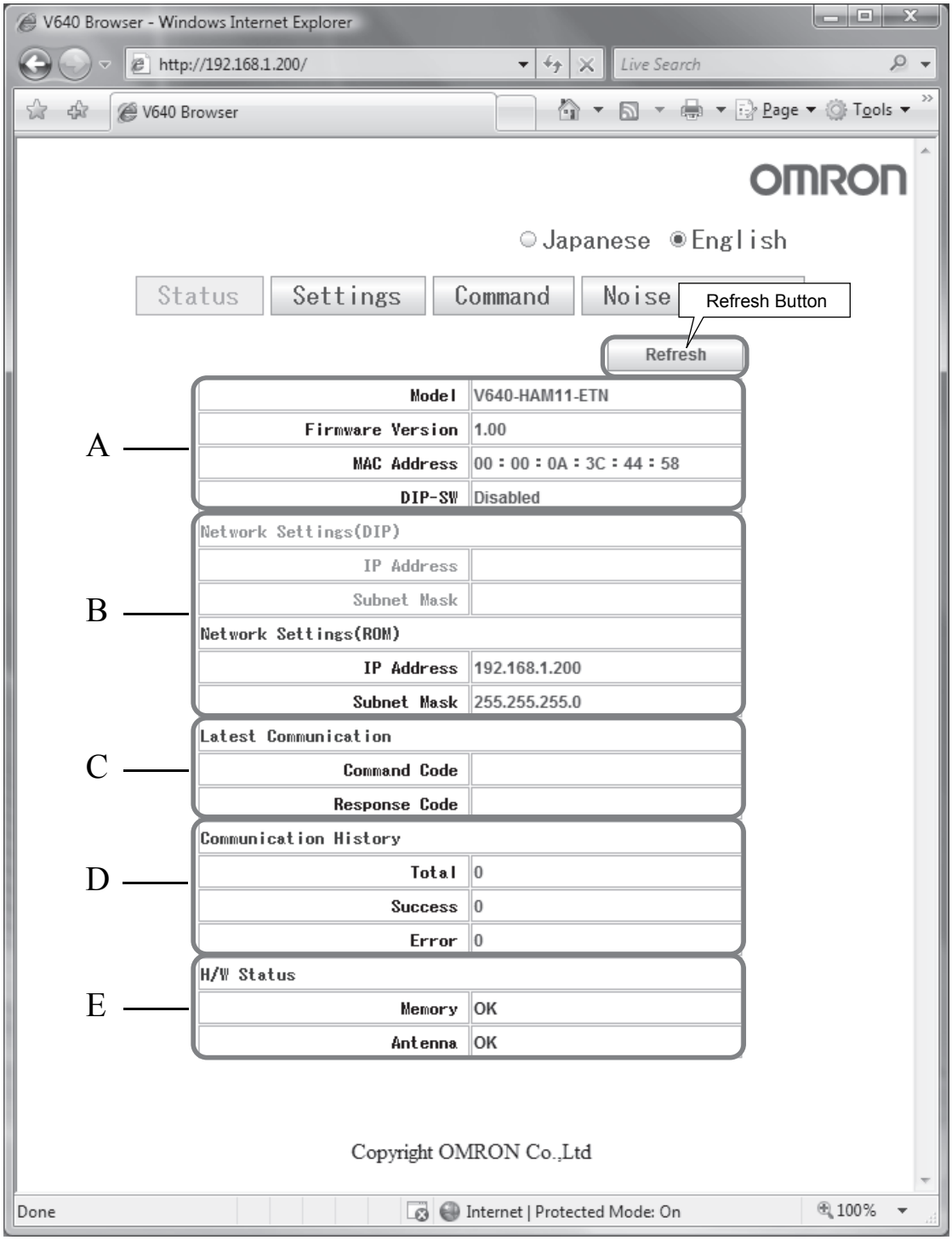
Password Entry Window

If a Web password is set in the Amplifier Unit, the Password Entry Window will be displayed before the Browser Window is displayed. Enter the password and click the **OK** Button in this window. If the password is correct, the Status Window will be displayed.
The following characters can be used for the password: 0 to 9, a to z, and A to Z.

If the password is not correct, the following window will be displayed.
Click the **Retry** Button. The Password Entry Window will be displayed again.

Status Window

The Status Window displays the model number, firmware version, MAC address, and other information on the Amplifier Unit so that you can check it. Click the **Refresh** Button at the top of the window to update the displayed information (latest communication, communication history, and H/W status).



A Amplifier Unit Information

Item	Description	Comments
Model	The product model number is displayed.	
Firmware Version	The firmware version is displayed.	
MAC Address	The MAC address is displayed.	
DIP-SW	"Enabled" is displayed if the Amplifier Unit is set to use the IP address that is set on the DIP switch. "Disabled" is displayed if the Amplifier Unit is set to use the IP address that is set in ROM.	

B Network Setting Information

Item	Description	Comments
Network Settings(DIP)	If the Amplifier Unit is set to use the IP address that is set on the DIP switch, this item is displayed in blue, and the IP address and subnet mask of the Amplifier Unit are displayed.	If the Amplifier Unit is set to use the IP address that is set on the DIP switch, this item is grayed out.
IP Address		
Subnet Mask		
Network Settings(ROM)	If the Amplifier Unit is set to use the IP address that is set in ROM, this item is displayed in blue, and the IP address and subnet mask of the Amplifier Unit are displayed.	If the Amplifier Unit is set to use the IP address that is set in ROM, this item is grayed out.
IP Address		
Subnet Mask		

C Last Command Information

Item	Description	Comments
Latest Communication	The last command code that was executed and the last response code that was returned by the Amplifier Unit are displayed.	Nothing is displayed if a command has not been executed since the Amplifier Unit was started.
Command Code		
Response Code		

D Communications History Information

Item	Description	Comments
Communication History	History information on communications with the ID Tags is displayed.	
Total	Total number of communications	
Success	Total number of successful communications	
Error	Total number of failed communications	

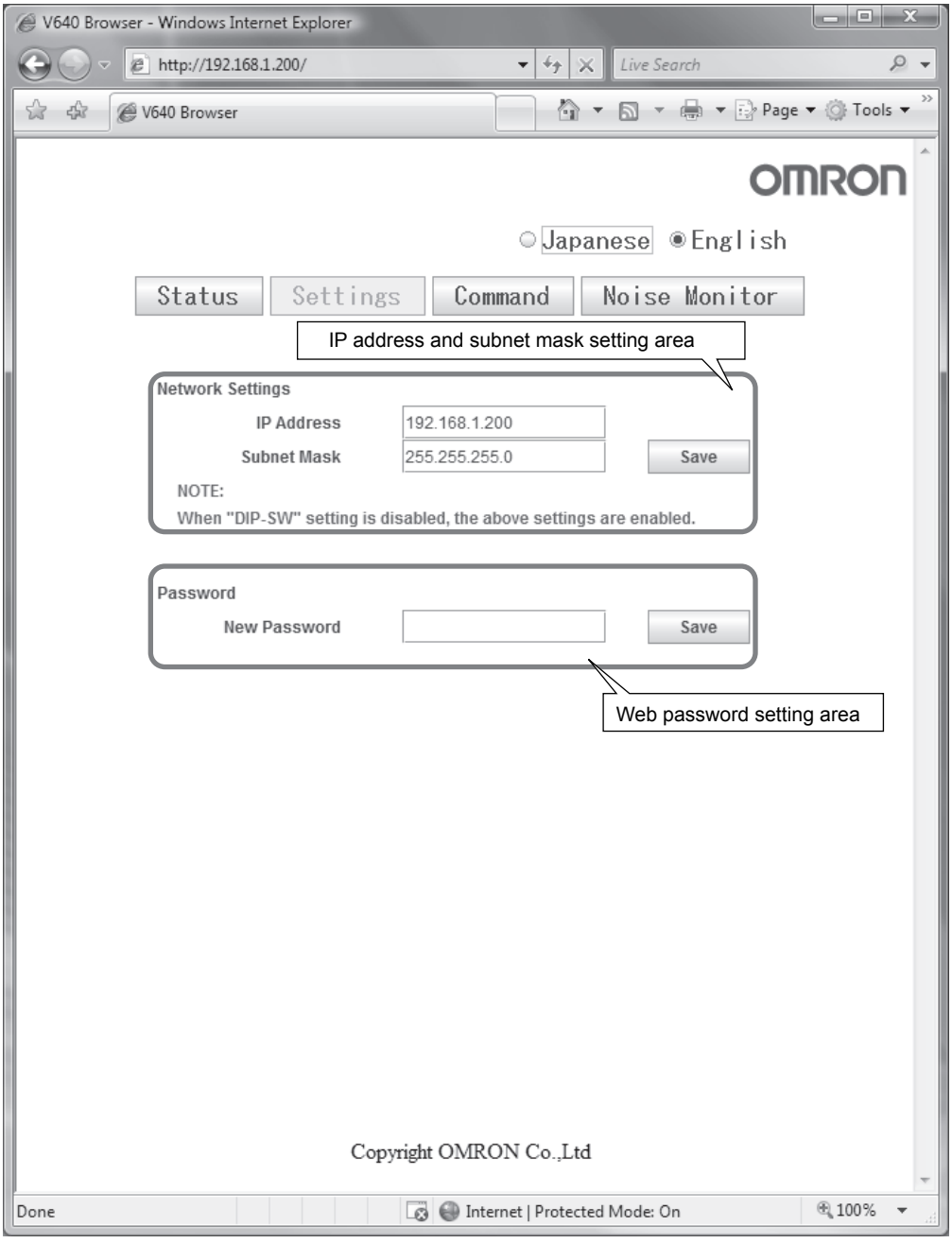
E Hardware Information

Item	Description	Comments
H/W Status	Hardware information is displayed.	"OK" is displayed for normal status.
Memory	"Error" is displayed if a memory error was detected during the memory check at startup.	
Antenna	"Error" is displayed if an error is detected in the CID Head that is connected to the Amplifier Unit (or if a CID Head is not connected).	

Setting Window

The network settings (IP address and subnet mask) of the Amplifier Unit and the Web password can be set in the Setting Window. The values that are set are enabled when the Amplifier Unit is restarted.

If the **Save** Button is clicked when the password box is empty, the Web password will be cleared. In this state, the browser interface can be used without entering the Web password.
The following characters can be used for the Web password: 0 to 9, a to z, and A to Z.

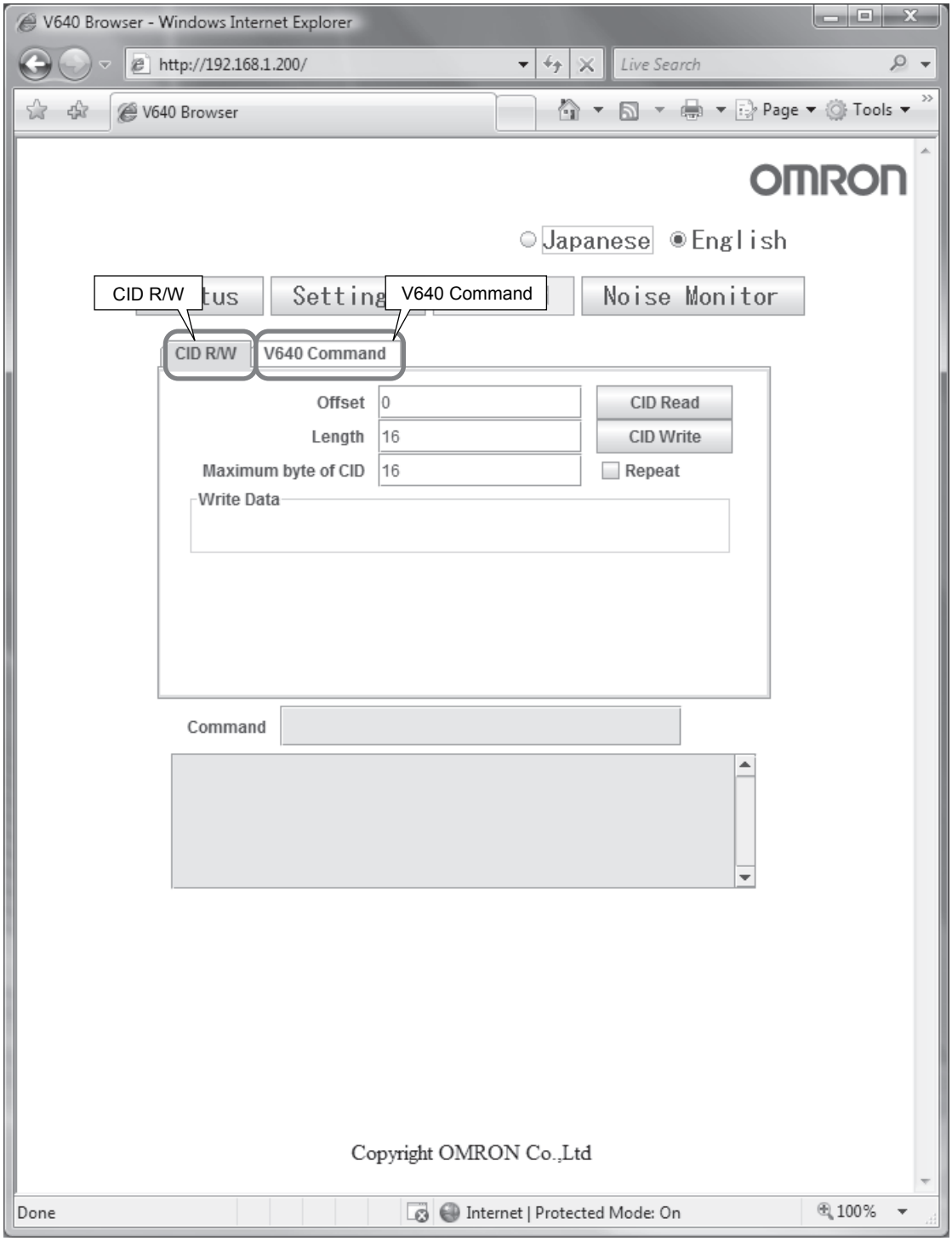


CHECK!

Never turn OFF the power supply to the Amplifier Unit before a response is received after clicking the **Save** Button. Doing so may damage the Amplifier Unit.

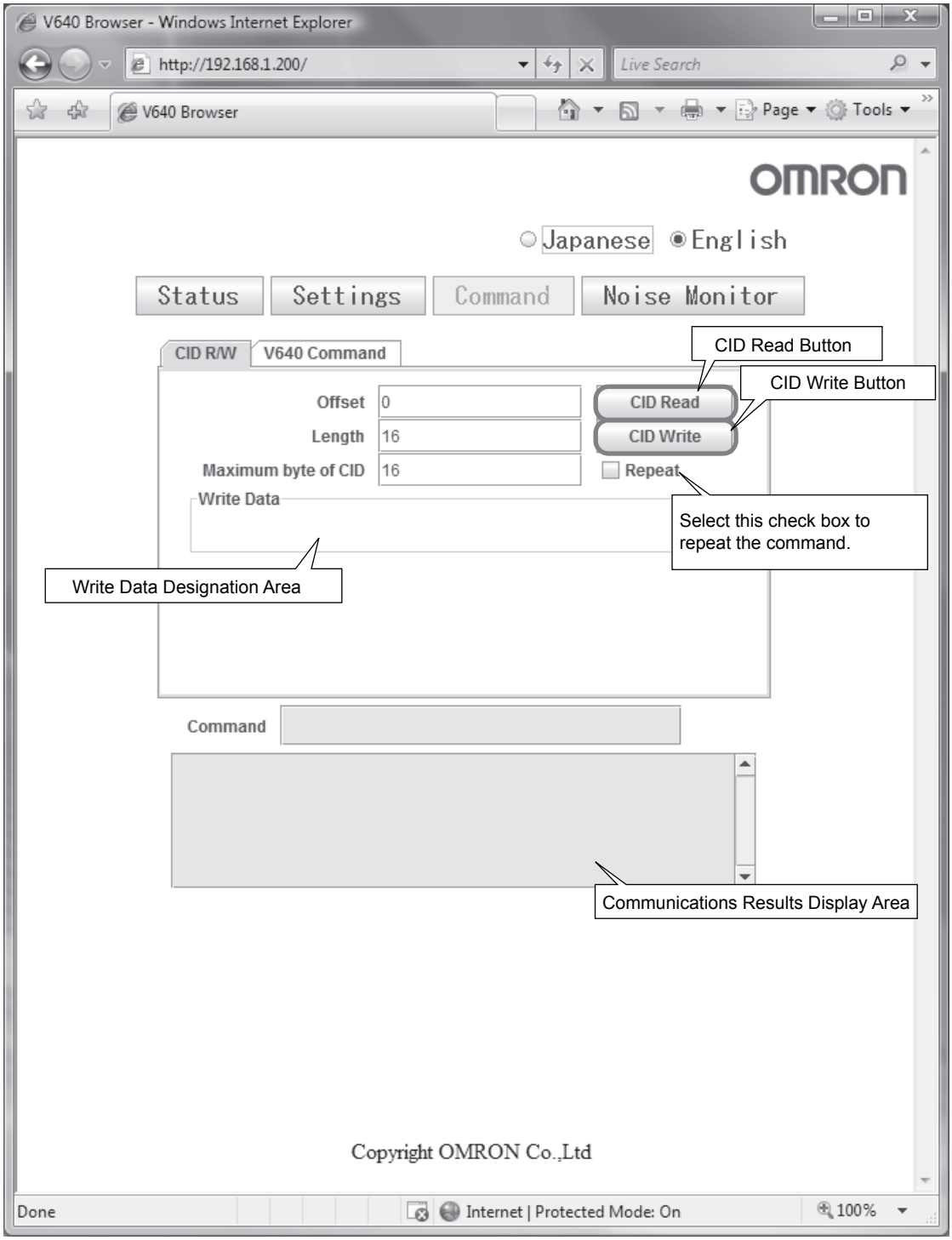
Command Window

The Command Window can be used to communicate with ID Tags. The Command Window has two tab pages: "CID R/W" and "V640 Command."



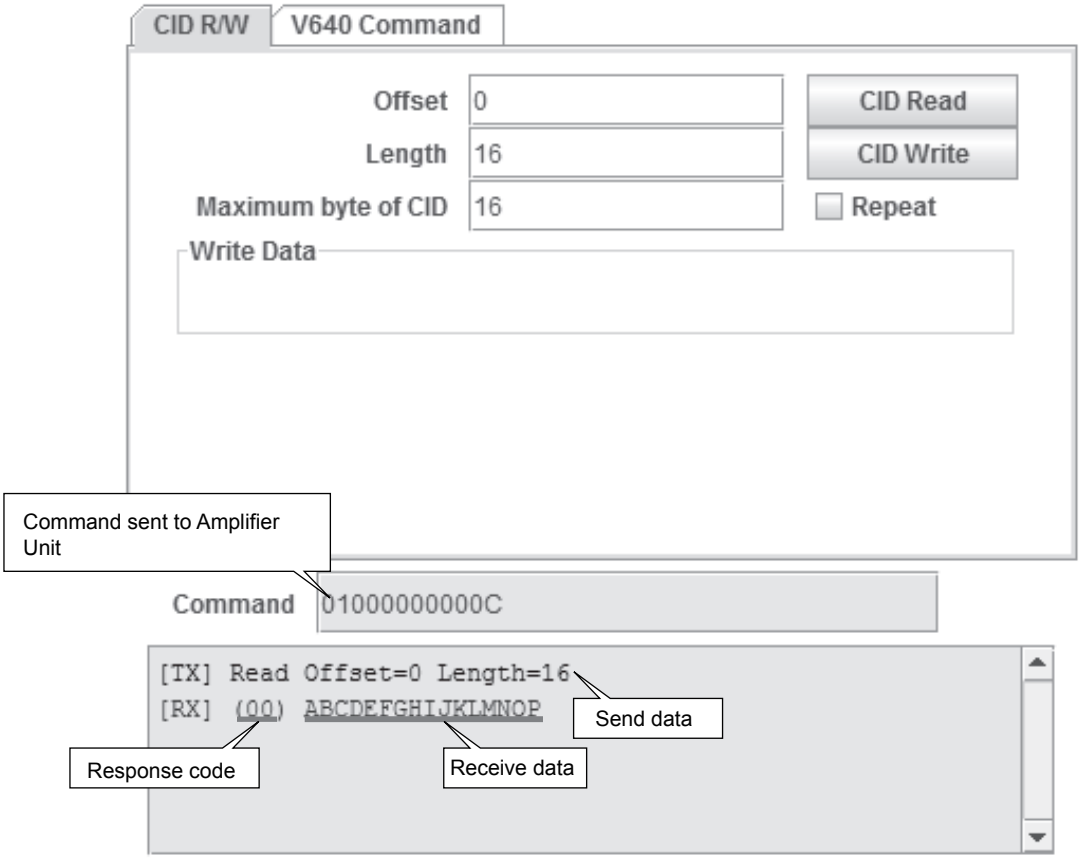
CID R/W Tab Page

The CID R/W Tab Page allows you to read or write ID Tag data by specifying the offset, length, and maximum bytes of CID. If writing is executed, you must also specify the write data.

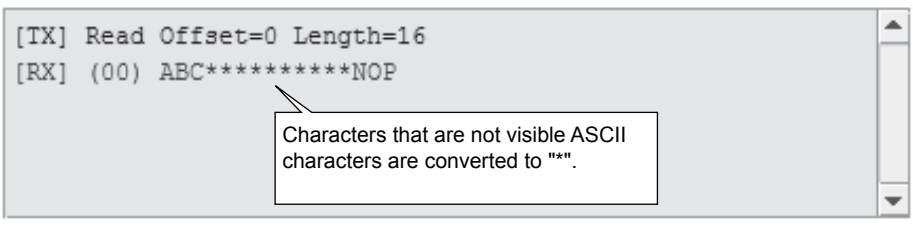


Item	Description	Comments
Offset	Specify the CID offset between 0 and 15 bytes.	
Length	Specify the CID length between 1 and 16 bytes.	
Maximum byte of CID	Specify the maximum CID length between 1 and 16 bytes.	
Write Data	For the write data, specify only the number of bytes for the specified length.	Specify only visible ASCII characters.

For example, the results display would be as shown below if a CID read was executed with an offset of 0, a length of 16, and a maximum bytes of CID of 16.

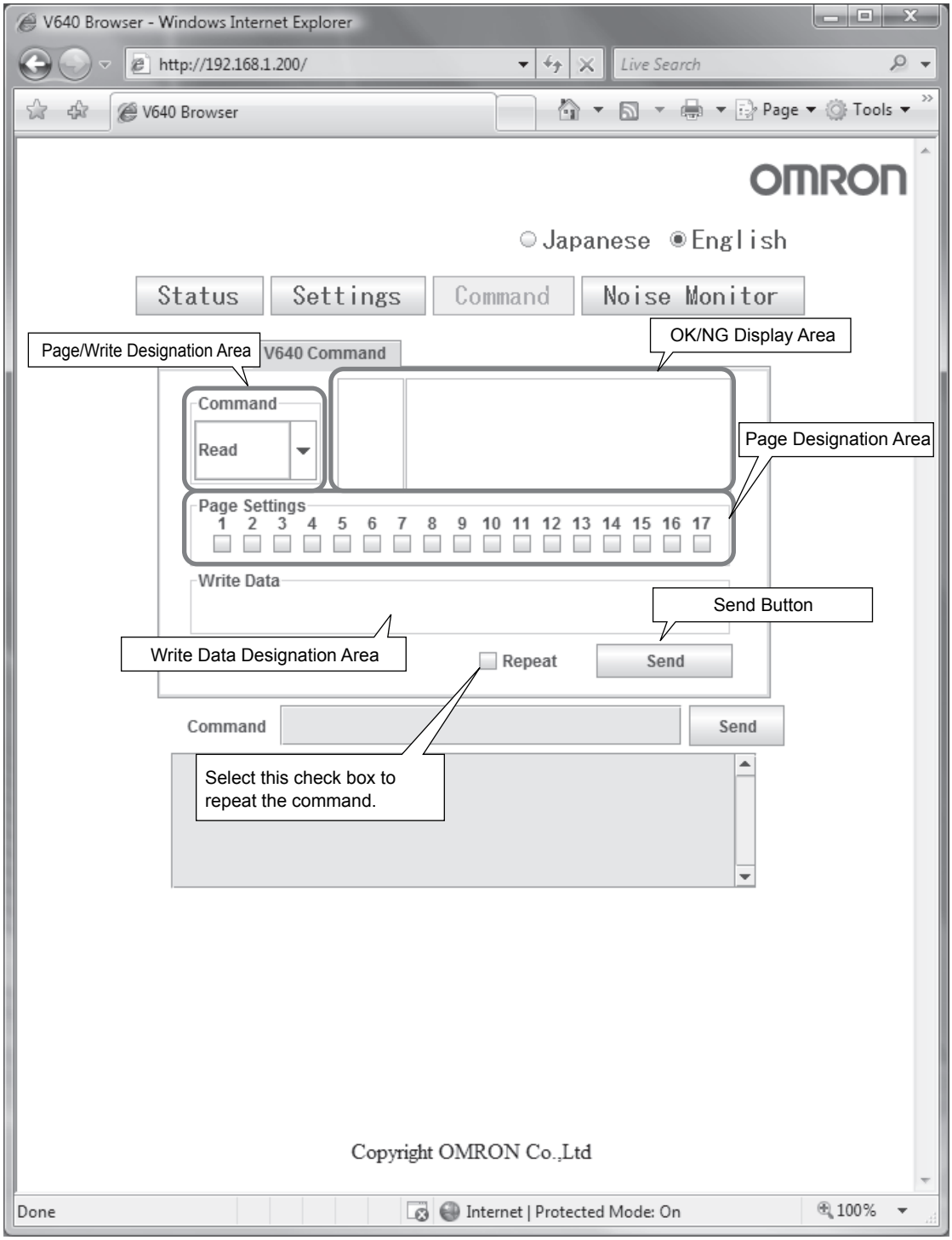


Only visible ASCII characters can be used to read and write data on the CID R/W Tab Page. If characters that are not visible ASCII characters are detected for a CID read, they will be converted to asterisks (*).



V640 Command Tab Page

The V640 Command Tab Page allows you to read and write data according to the command format of the Amplifier Unit



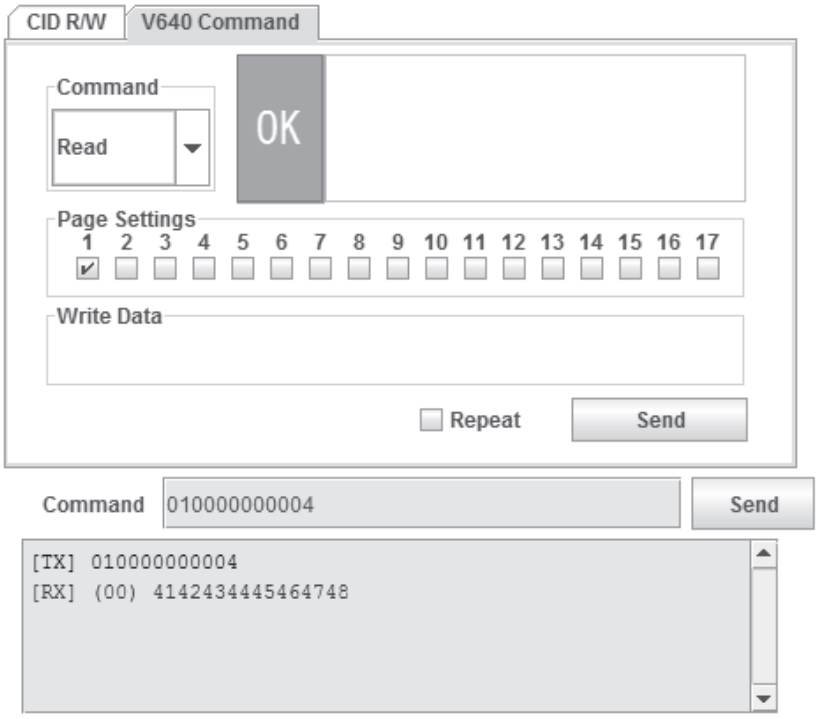
■ Page/Write Designation Area

Select *Read* or *Write* in the Page/Write Designation Area.

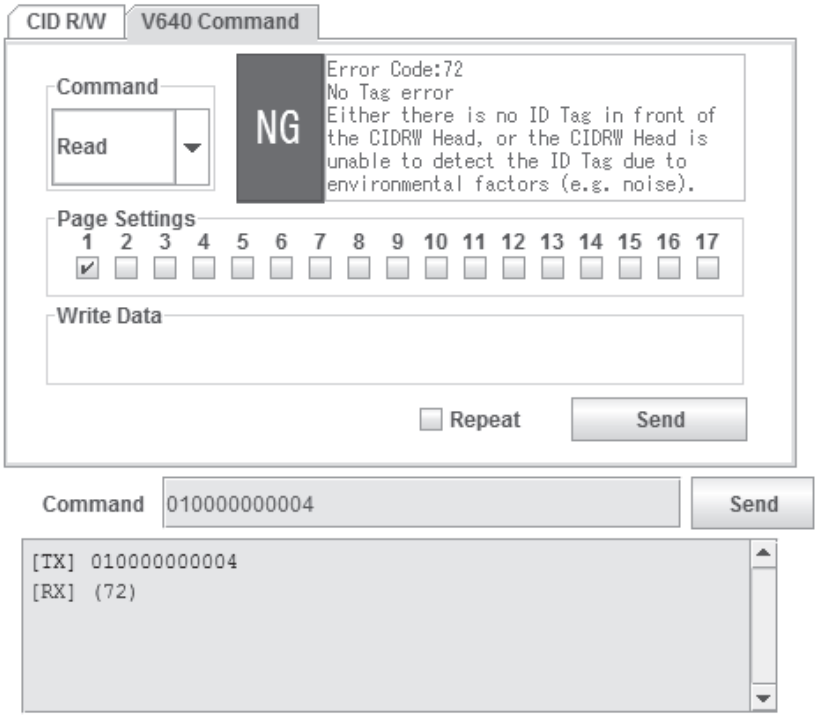
■ OK/NG Display Area

The command execution results will be displayed as "OK" or "NG" in the OK/NG Display Area. If "NG" is displayed, information on the error will be displayed.

• Successful Communications



• Failed Communications



■ Page Designation Area

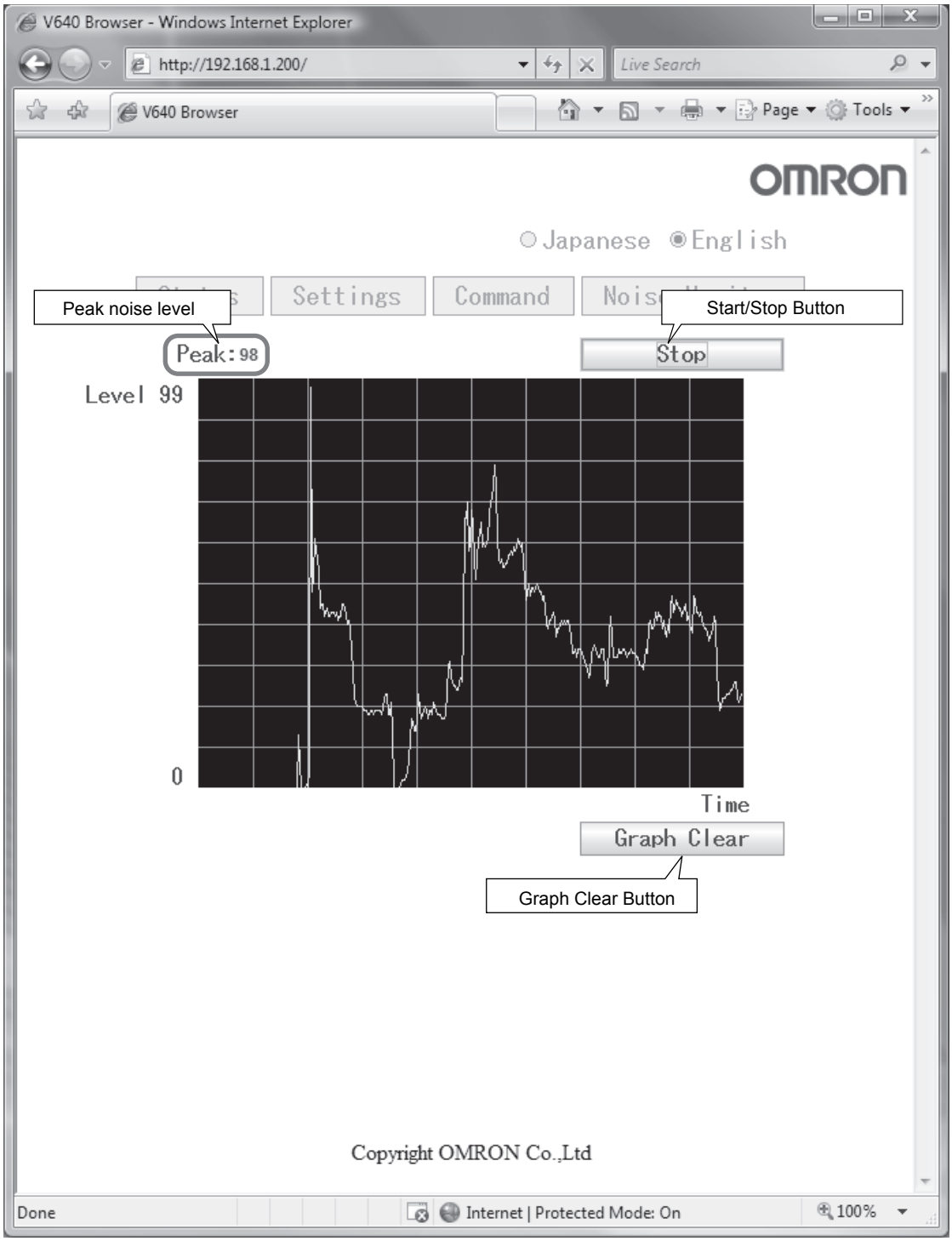
Select the check boxes to specify the pages to be read or written.

■ Write Data Designation Area

When writing data, specify the data to write to the ID Tag as a hexadecimal string. Specify 16 characters for each page that you specify in the Page Designation Area.

Noise Measurement Window

The Noise Measurement Window allows you to continuously send the NOISE MEASUREMENT command to the Amplifier Unit and display the results in realtime.
The horizontal axis gives the time and the vertical axis gives the noise level (0 to 99).



MEMO

SECTION 6
Troubleshooting

Troubleshooting 68

Troubleshooting

Errors are indicated by the presence or absence of a response to an Amplifier Unit command, and by the indicators.

List of Error Messages

Type	Response code	Name	Description
Host communications error	14	Format error	There is a mistake in the command format. (For example, the command portion is undefined, or the page or address specification is inappropriate.)
Communications error between the CIDRW Head and ID Tag	70	Communications error	Noise or another hindrance has occurred during communications with an ID Tag, and communications cannot be completed normally.
	71	Verification error	Correct data cannot be written to an ID Tag.
	72	No Tag error	Either there is no ID Tag in front of the CIDRW Head, or the CIDRW Head is unable to detect the ID Tag due to environmental factors (e.g., noise).
	7B	Outside write area error	The ID Tag is at a position where reading is possible but writing is not, so writing does not complete normally.
	7E	ID system error (1)	The ID Tag is in a status where it cannot execute the command processing.
	7F	ID system error (2)	An inapplicable ID Tag has been used.
CPU hardware error	9A	Hardware error in CPU	An error occurred when writing to EEPROM.

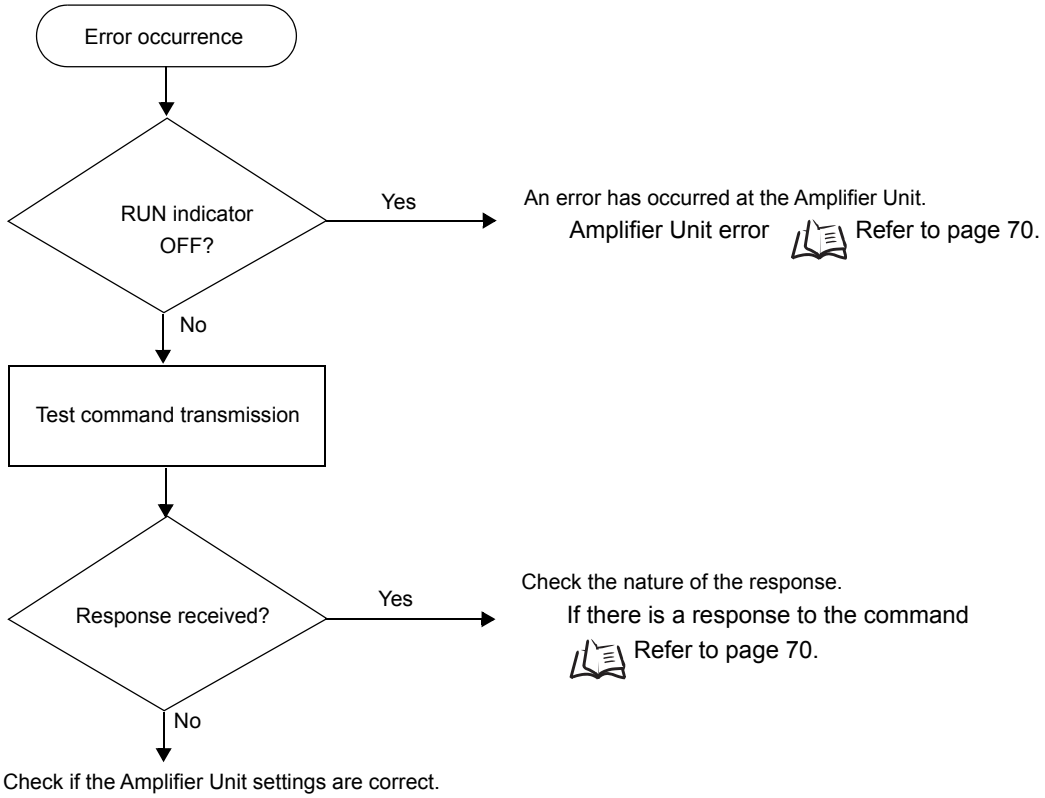
Amplifier Unit Indicators

Name	Indications
RUN (green)	Turns ON when the Amplifier Unit is in normal operation.
COMM (orange)	Turns ON during communications with the host device or during communications with an ID Tag.
NORM (green)	Turns ON when the communications finish with no error.
ERROR (red)	Turns ON when an error occurs during communications with the host device, or during communications with an ID Tag.

Operation Check Flowchart

■ From Installation to Trial Operation

Errors are indicated by whether or not a response to the test command is received and by the status of the Amplifier Unit indicators.



If There Is No Response to the Command: Refer to page 70.

• If the Test Command Was Received Normally:

Indicators

RUN	COMM	NORM	ERROR
☼	☼ (Lights once)	●	●

Response Code for the Response

Type	Response code	Function
Normal	00	The command was received normally.

• Amplifier Unit Error

Check the status of the indicators after transmission of the test command.

After taking appropriate corrective action, restart the Amplifier Unit, send the test command again and check again.

RUN	COMM	NORM	ERROR	Main check points
●	—		☼	The Amplifier Unit may be damaged.
●	—		●	• Influence of background noise (change installation position) • Amplifier Unit power supply If the error cannot be resolved after checking, the Amplifier Unit may be damaged.

• If There Is No Response to the Command:

Check the status of the indicators after transmission of the test command.

After taking appropriate corrective action, restart the Amplifier Unit, send the test command again and check again.

RUN	COMM	NORM	ERROR	Main check points
☼	●	●	●	• Pleas establish the connection between the PC and the Amplifier Unit again, because the TCP/IP connection may be disconnected. • Connection and wiring of the cable between the host device and Amplifier Unit • Routing of each cable (influence of background noise) If the error cannot be resolved after checking, the Amplifier Unit may be damaged.
☼	●	●	☼ (Lights once)	• Connection and wiring of the cable between the host device and Amplifier Unit • Routing of the cables (influence of background noise) • There is a mistake in the command format (number of characters, character code, etc.)

• If There Is a Response to the Command:

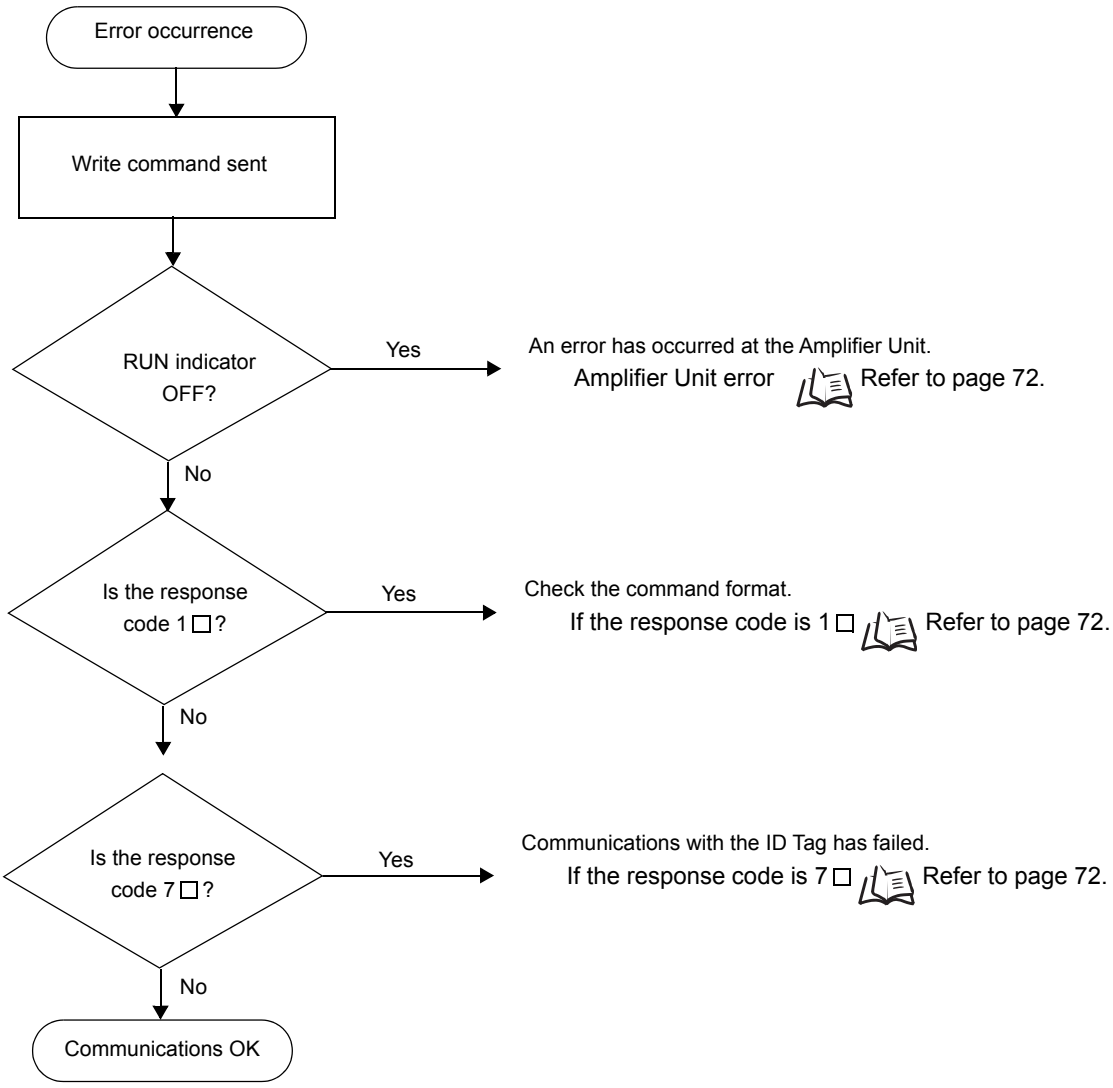
Check the status of the indicators after transmission of the test command.

After taking appropriate corrective action, restart the Amplifier Unit, send the test command again and check again.

RUN	COMM	NORM	ERROR	Main check points
☼	●	●	☼ (Lights once)	There is a mistake in the command format (number of characters, character code, etc.).
☼	●	●	☼	By an interruption of the power supply, the memory may be damaged.

■ From Trial Operation to Communications

Errors are indicated by the status of the indicators after transmission of the write command, and by the response code of the response.



• If the ID Tag Was Processed Normally:

Indicators

RUN	COMM	NORM	ERROR
☼	☼ (Lights once)	☼ (Lights once)	●

Response Code for the Response

Type	Response code	Function
Normal	00	The ID Tag was processed normally.

CHECK!

If there is no response to the write command, refer to the *From Installation to Trial Operation*, *Operation Check Flowchart*. Refer to page 69.

• Amplifier Unit Error

Check the status of the indicators after transmission of the command. After taking appropriate corrective action, send the write command again and check again.

RUN	COMM	NORM	ERROR	Main check points
●	— (If RUN is OFF, the status of the other indicators can be ignored.)			• Influence of background noise (Change installation position) • Amplifier Unit power supply If the error cannot be resolved by checking the two points above, the Amplifier Unit may be damaged.

• If the Response Code is 1□:

There is a host device communications error.

Check the status of the indicators and the response code of the response after transmission of the command. After taking appropriate corrective action, send the write command again and check again.

RUN	COMM	NORM	ERROR
☼	●	●	☼ (Lights once)

Response code	Main check points
14	Command format (Command code, page designation, address designation, processed data volume, etc.)

• If the Response Code is 7□:

There is a communications error in communications between the CIDRW Head and ID Tag.

Check the status of the indicators and the response code of the response after transmission of the command. After taking appropriate corrective action, send the write command again and check again.

RUN	COMM	NORM	ERROR
☼	☼ (Lights once)	●	☼ (Lights once)

Response code	Main check points
70	• Background noise levels of the CIDRW Head (Check the surroundings with the environmental noise level measurement function) • Distance to another CIDRW Head • Influence of background noise (Change installation position) • Please check the Antenna Connection Status by using “GET PARAMETER“ command. Refer to page 45, page 16. If the error cannot be resolved after checking, the Amplifier Unit may be damaged.
71	• ID Tag overwrite life (Replace the ID Tag) • Environment of use of the ID Tags (ID Tag breakage due to use in unanticipated ways)
72	• Connection to the CIDRW Head • Distance between the ID Tag and CIDRW Head • CIDRW Head background noise levels (Check the surroundings with the environmental noise level measurement function) • Distance to another CIDRW Head • Please check the Antenna Connection Status by using “GET PARAMETER“ command. Refer to page 45, page 16.
7B	• Distance between the ID Tag and CIDRW Head • Background noise levels of the CIDRW Head (Check the surroundings with the environmental noise level measurement function) • Distance to another CIDRW Head • Influence of background noise (Change installation position)
7E 7F	• Type/specifications of the ID Tags used • Settings of the ID Tags used (The ID Tag lock function is used.*) • Environment of use of the ID Tags (ID Tag breakage due to use in unanticipated ways)

* The ID Tag has a lock function, but the Amplifier Unit has no function for locking an ID Tag.

■ Other Troubleshooting

• Operating in Test Mode

Always connect the CIDRW Head before operating the Amplifier Unit in Test Mode. If Test Mode is used with abnormal CIDRW Head cable or without connecting a CIDRW Head, the ERROR indicator will light and Amplifier Unit operation will stop.

RUN	COMM	NORM	ERROR	Main check points
☼	●	●	☼	• Please check that the CIDRW Head is connected correctly. If the error cannot be resolved after checking, the Amplifier Unit or the CIDRW Head may be damaged.

• When a browser screen is not displayed

Please confirm the following items.

•Please confirm whether the network settings is correct.

•Please confirm JRE (version 5.0 or newer) is installed in the host.

•Please confirm whether setting of Proxy does not have an error.

MEMO

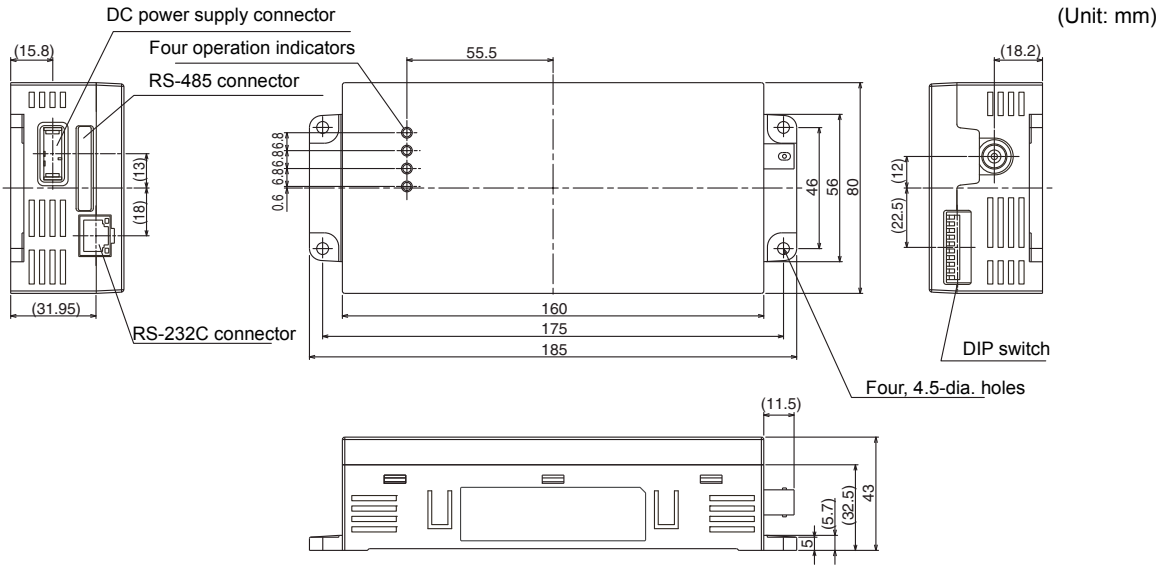
SECTION 7
Appendix

Specifications and Dimensions	76
Connection Examples	80
Characteristic Data According to Conditions of Use	81
ID Tag Memory Maps	111
Regular Inspection	112
ASCII Code Table	113
Protective Construction	114

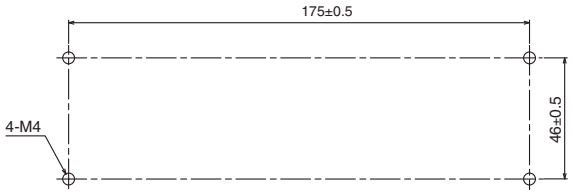
Specifications and Dimensions

Amplifier Units

V640-HAM11-ETN-V2 and V640-HAM11-L-ETN-V2



Mounting dimensions



Item	Specifications	
	V640-HAM11-ETN-V2	V640-HAM11-L-ETN-V2
Power supply voltage	24 VDC +10% -15%	
Current consumption	150 mA max.	400 mA max.
Degree of protection	IP20 (IEC60529: 2001)	
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +65°C (with no icing)	
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)	
Insulation resistance	20 MΩ min.(with 100 VDC megohmmeter) between power supply terminals and the frame ground terminal	
Dielectric strength	1,000 VAC (50/60 Hz for 1 min.) leak current consumption 5 mA max. between both power supply terminals and the frame ground terminal	
Vibration resistance	10 to 150 Hz, double amplitude: 0.20 mm, Max. Acceleration: 15 m/s² with 10 sweeps for 8 min. each in 3 directions	
Shock resistance	150 m/s², 3 times each in 6directions	
Ground	Ground to 100 Ω or less.	
Case material	PC/ABS resin	
Dimensions	80×185×43 mm (W×D×H, excluding protruding parts)	
Mass	Approx. 250 g	
Frequency	134.2 kHz	
Rediated magnetic field strength	maximum 35 dBμA/m at 10 meters (fixed)	
Environmental pollution degree	Degree 2	
Over voltage category	Category I	
Mounting method	Secured with four M4 screws. (tightening torque: 1.2N·M)	
CIDRW Head	V640-HS61	V640-HS62

■ Host Communications Specifications

Item	Description
Compliant standards	10Base-T and 100Base-TX
Protocol	TCP/IP
IP Address	• If the IP address is set on the DIP switch, it will be in the form 192.168.1.□□□. The subnet mask is always 255.255.255.0 • The IP address of the Amplifier Unit can be either set on this DIP switch or the desired IP address can be set in ROM. If pins 1 to 5 on the DIP switch are all turned OFF, the IP address that is set in ROM will be used. Refer to page 30. **Default network settings** IP Address: 192.168.1.200, Subnet mask: 255.255.255.0 (Pins 1 to 5 on the DIP switch are all turned OFF)
Applicable port	TCP/IP: port 7090
MTU	1,500 bytes

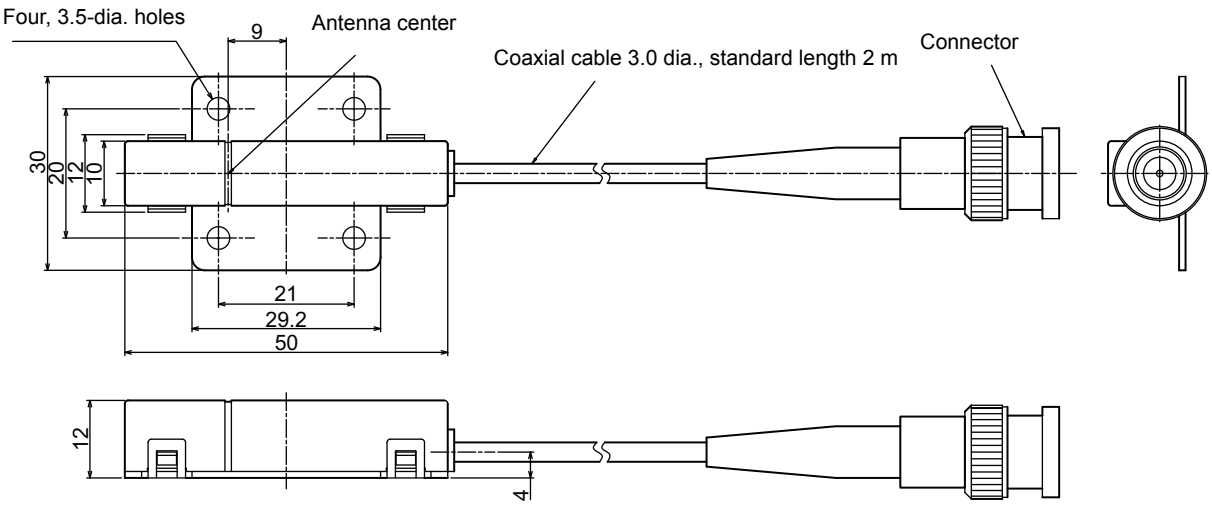
CHECK! Access to an Amplifier Unit is possible from only one host device at a time. If a host device (A) is connected to an Amplifier Unit and another host device (B) connects to the Amplifier Unit, the connection between host device A and the Amplifier Unit will be automatically broken and host device B will have the control right.

CHECK! When the connection between a PC and a Amplifier Units have been disconnected, an Amplifier Unit can reopen communication from a PC again by establishing a connection.

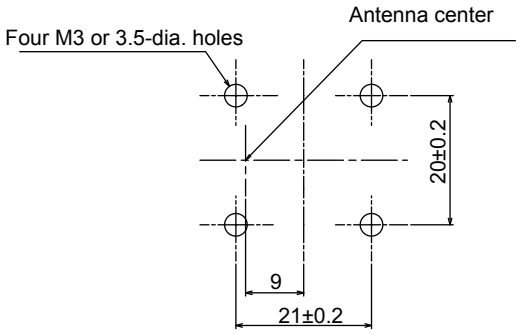
CHECK! Communications with the ID Tag will be aborted if the Ethernet cable is disconnected or the connection is broken while the Amplifier Unit is communicating with an ID Tag.

CIDRW Heads
V640-HS61

(Unit: mm)



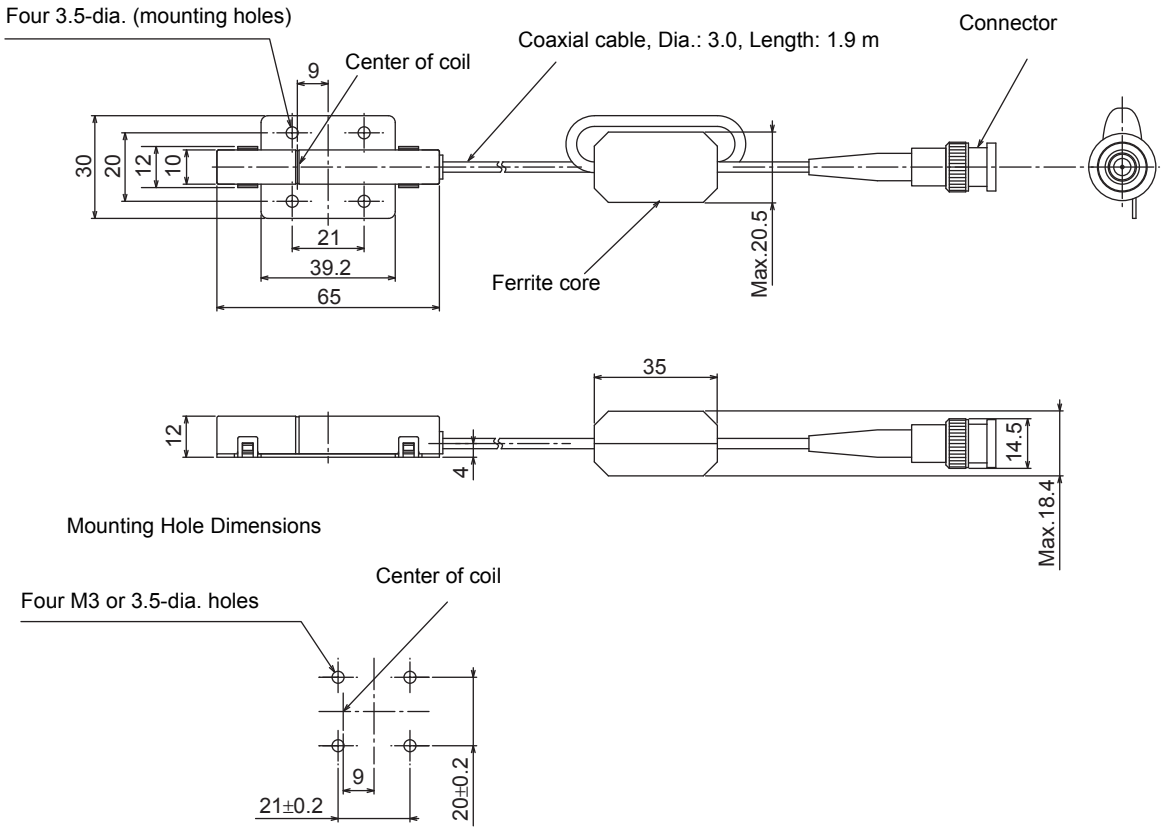
Mounting dimensions



Item	Specifications
Transmission frequency	134 kHz
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +65°C (with no icing)
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)
Degree of protection	IP60 (IEC60529)
Insulation resistance	20 MΩ min. between all terminals and the case (100 VDC M)
Dielectric strength	Leak current not to exceed 5 mA on application of 1000 VAC (50/60 Hz for 1 minute) between all terminals and the case
Vibration resistance	Frequency: 10 to 150 Hz; double amplitude: 0.20 mm; acceleration: 15 m/s² for 8 minutes, 10 times each in X, Y, and Z directions
Shock resistance	Shock of 150 m/s² in X, Y, and Z directions, 3 times each for 18 repetitions
Casing material	ABS/epoxy resin Stainless steel mount
Weight	Approx. 70 g
Cable length	2 m
Cable specification	3-mm-dia. coaxial cable

V640-HS62

(Unit: mm)



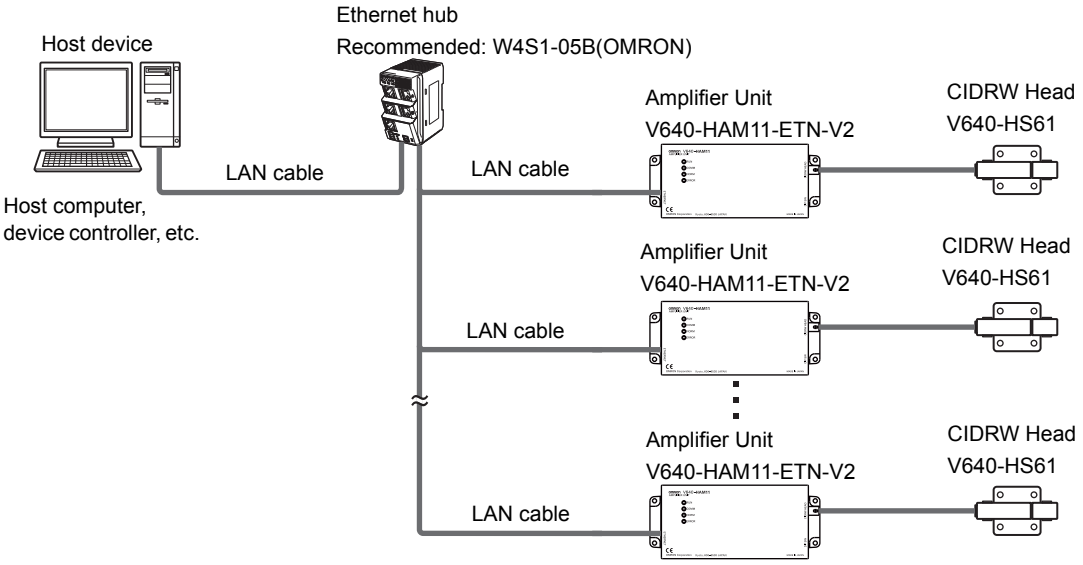
Mounting Hole Dimensions

Item	Specifications
Transmission frequency	134 kHz
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +65°C (with no icing)
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)
Degree of protection	IP60 (IEC60529)
Insulation resistance	20 MΩ min. between all terminals and the case (100 VDC M)
Dielectric strength	Leak current not to exceed 5 mA on application of 1000 VAC (50/60 Hz for 1 minute) between all terminals and the case
Vibration resistance	Frequency: 10 to 150 Hz; double amplitude: 0.20 mm; acceleration: 15 m/s² for 8 minutes, 10 times each in X, Y, and Z directions
Shock resistance	Shock of 150 m/s² in X, Y, and Z directions, 3 times each for 18 repetitions
Casing material	ABS/epoxy resin Stainless steel mount
Weight	Approx. 100 g
Cable length	1.9 m
Cable specification	3-mm-dia. coaxial cable

Connection Examples

V640-HAM11-ETN-V2

Connect the host device and Amplifier Unit using a LAN cable.

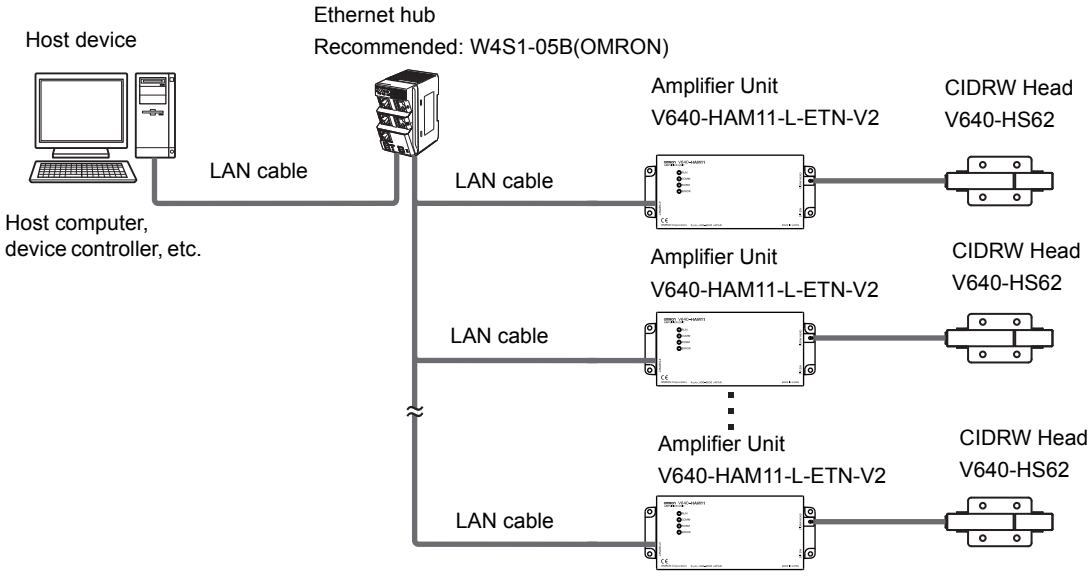


The Amplifier Unit controls the CIDRW Head.

The CIDRW Head is the antenna. It reads and writes carrier IDs and performs other processing for ID Tags.

V640-HAM11-L-ETN-V2

Connect the host device and Amplifier Unit using a LAN cable.



The Amplifier Unit controls the CIDRW Head.

The CIDRW Head is the antenna. It reads and writes carrier IDs and performs other processing for ID Tags.

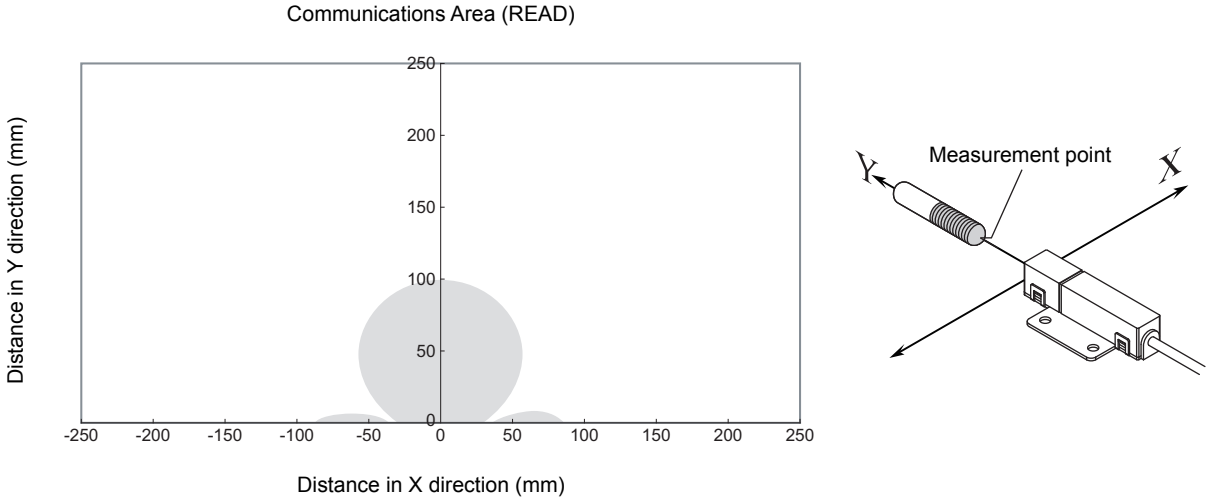
Characteristic Data According to Conditions of Use

Maps of Communications Areas (Reference Only)

The figures given below for communications areas (communications distances) are reference values only. The maps of communications areas will vary according to the ID Tags that you use, the background metals, the ambient noise, the effects of temperature and so on, and should be thoroughly confirmed on installation. The direction of the ID Tags will affect communications performance. Check the direction of the coils in the ID Tags before using the ID Tags.

■ V640-HAM11-ETN-V2

- Coaxial Mounting (RI-TRP-DR2B-30)
  - READ



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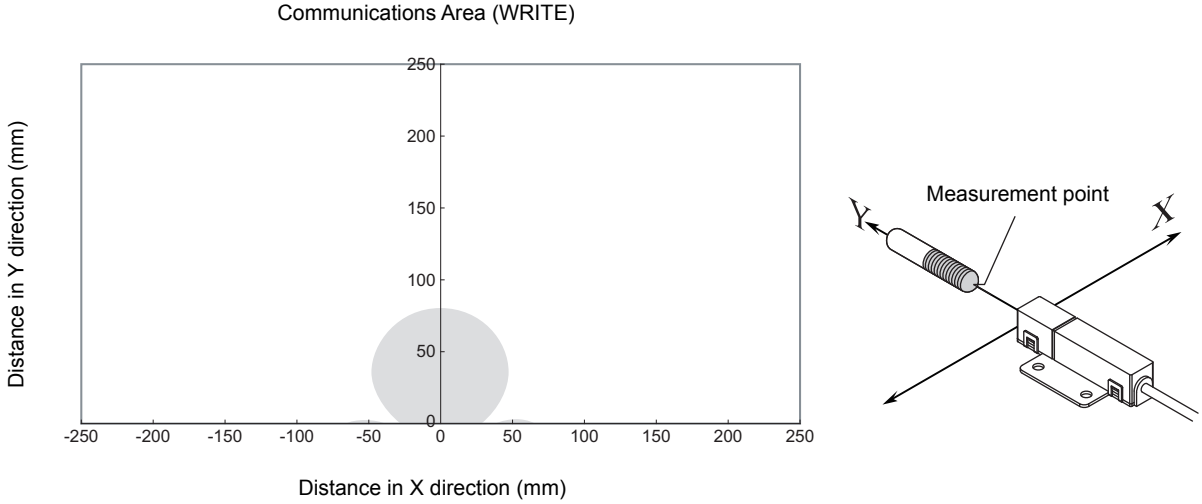

- Coaxial Mounting (RI-TRP-DR2B-30)
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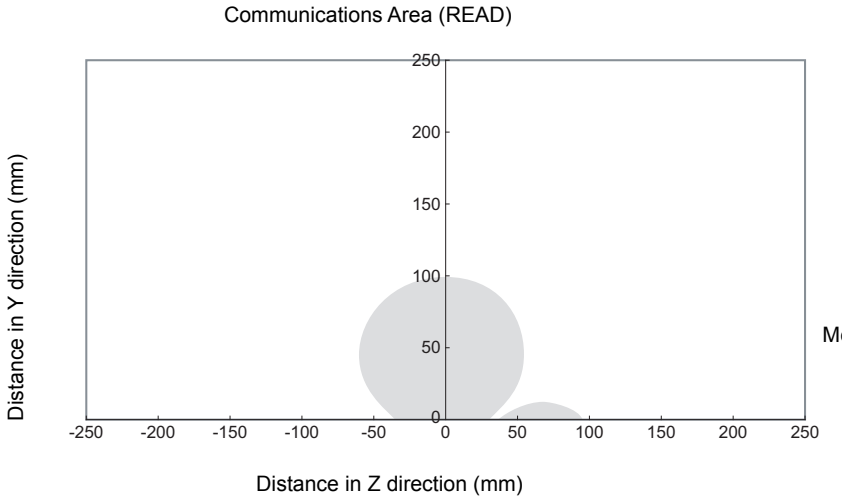

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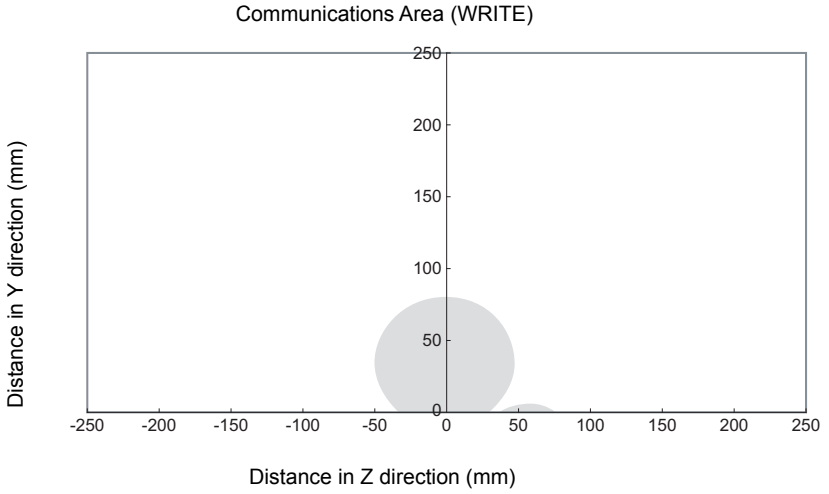
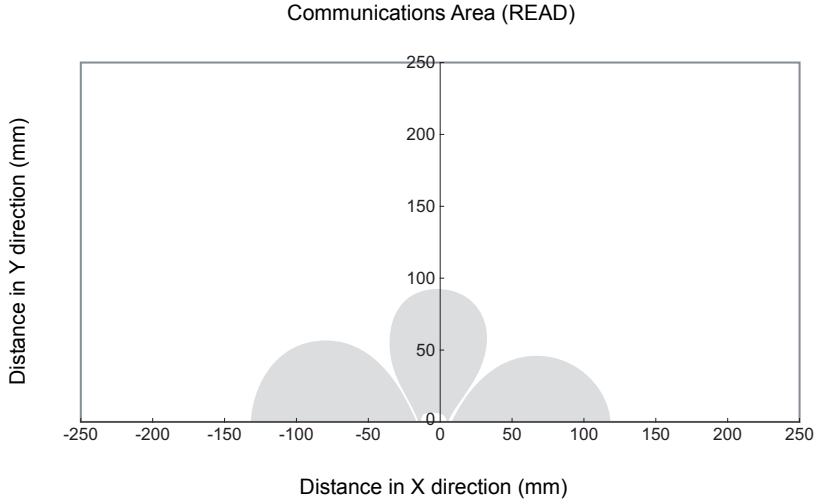
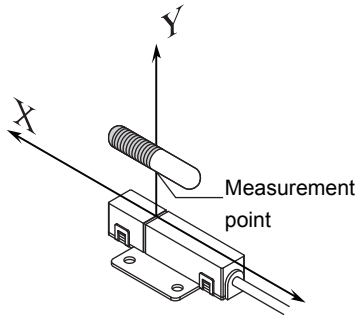


• Parallel Mounting (RI-TRP-DR2B-30)

• READ





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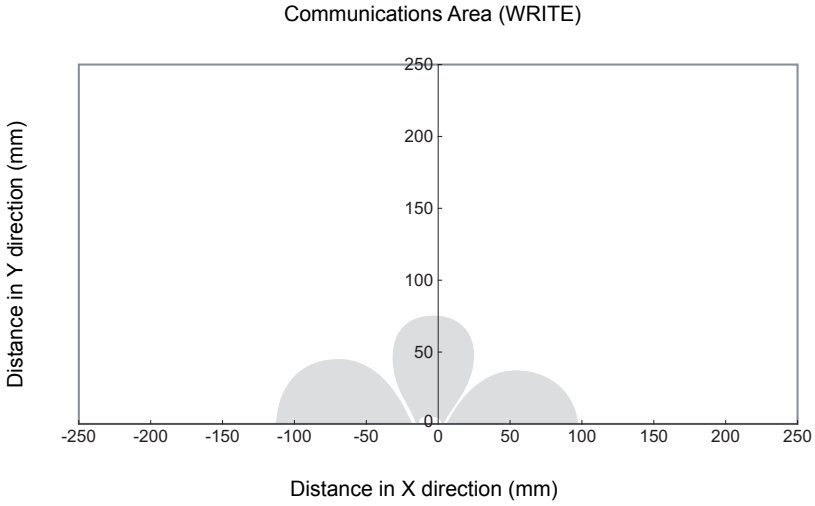
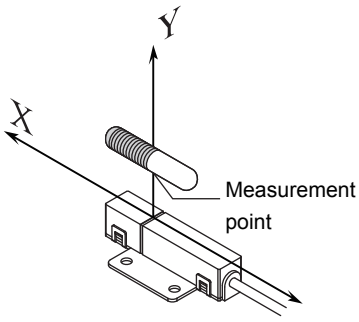
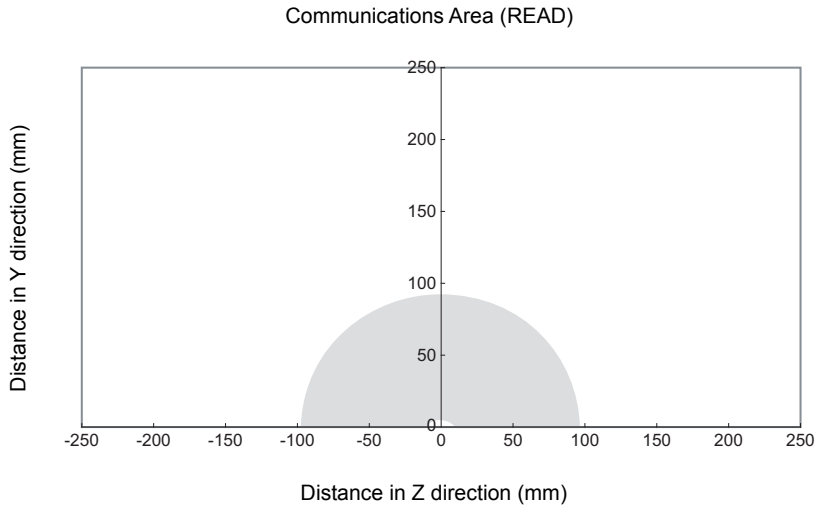
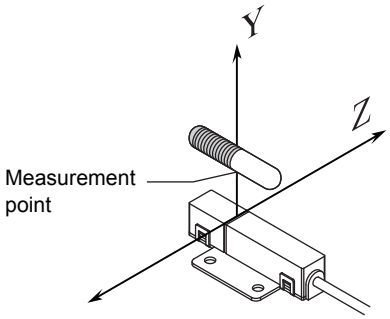




- Parallel Mounting (RI-TRP-DR2B-30)
  - READ





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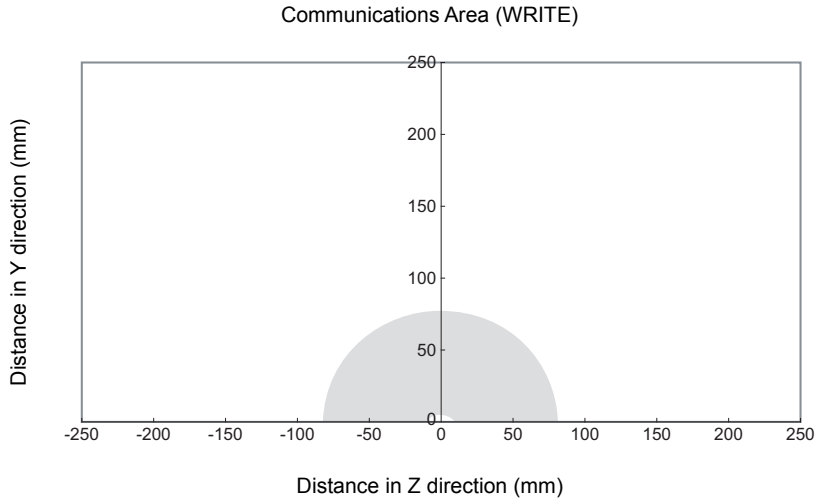
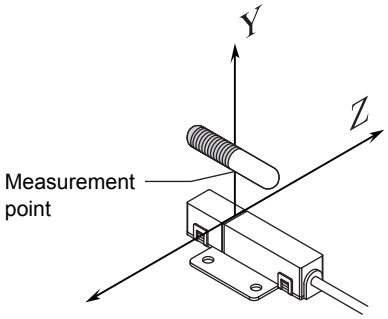
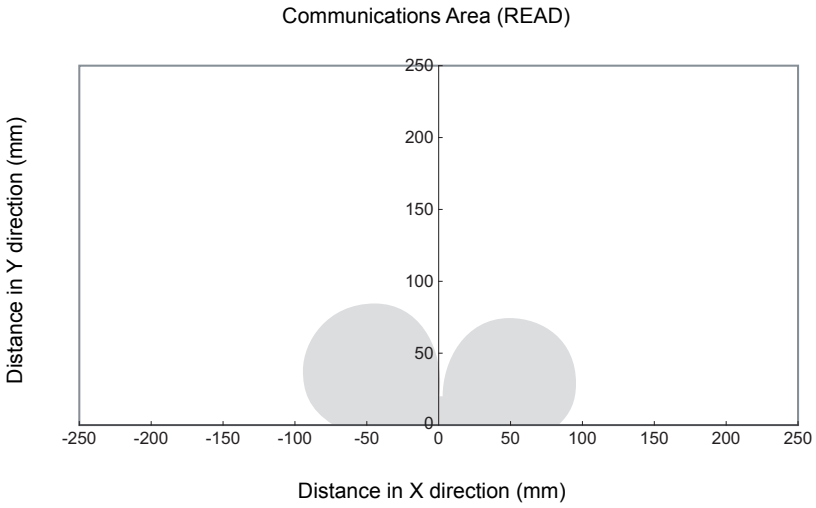
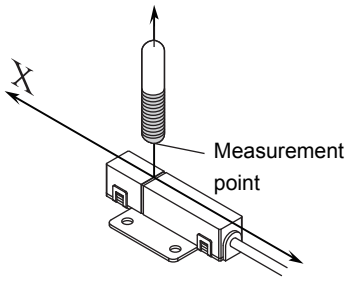




• Vertical Mounting (RI-TRP-DR2B-30)

• READ





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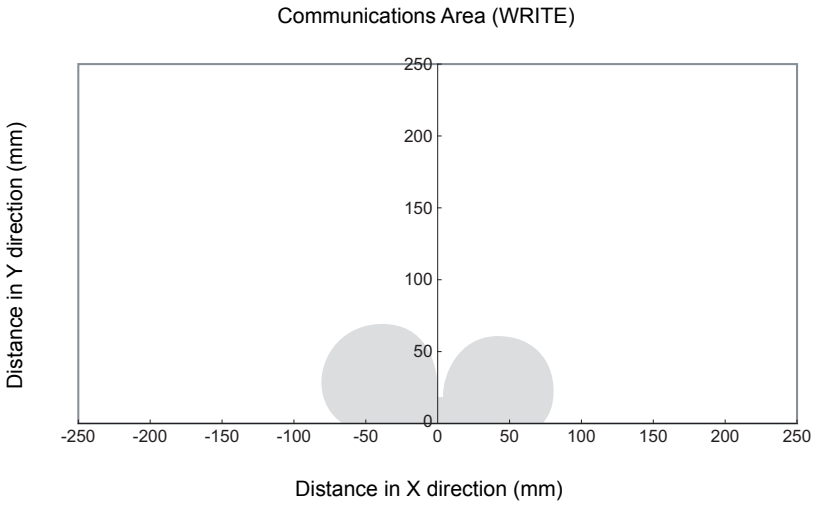
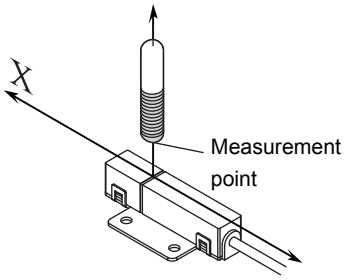
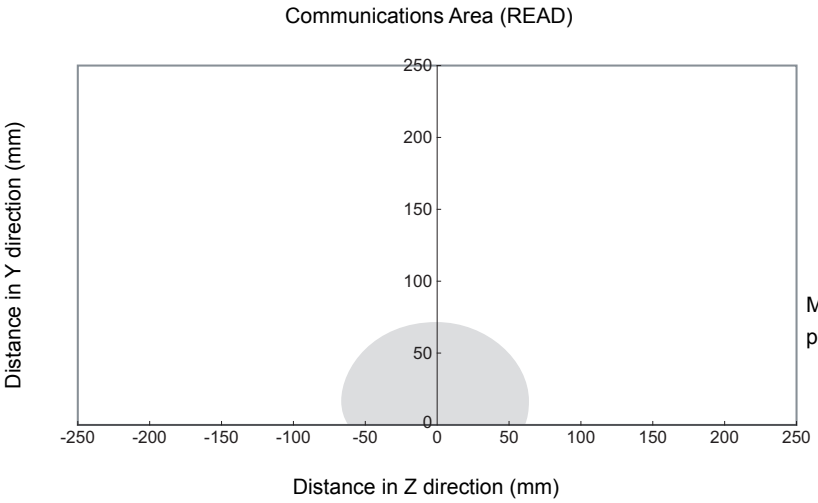
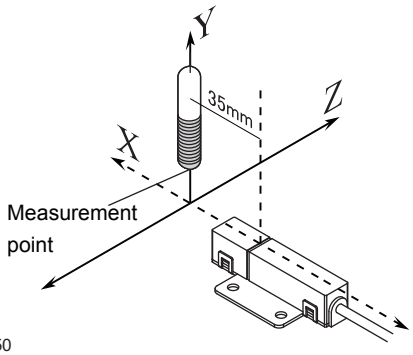




• Vertical Mounting (RI-TRP-DR2B-30)

• READ





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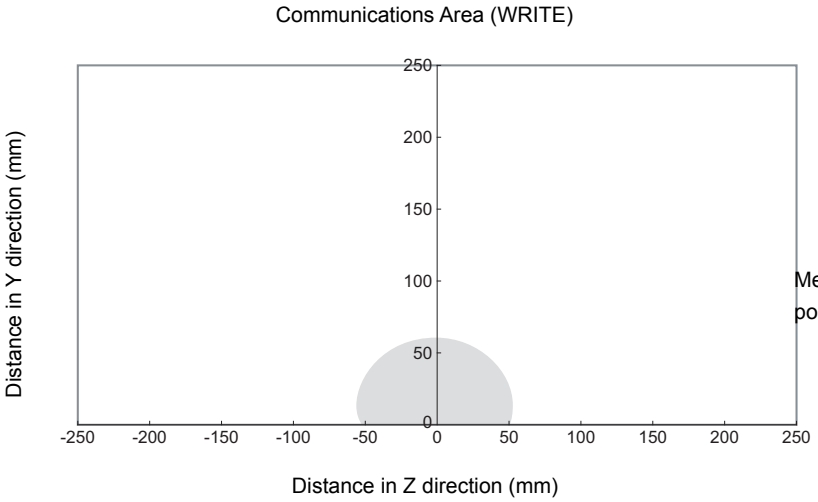

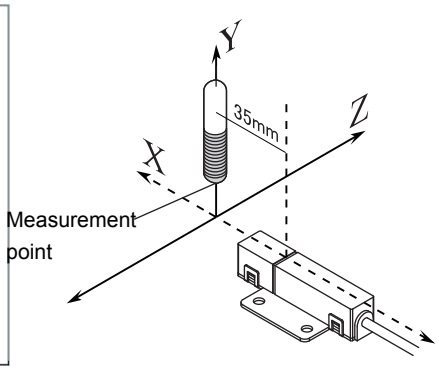

- Coaxial Mounting (RI-TRP-WR2B)
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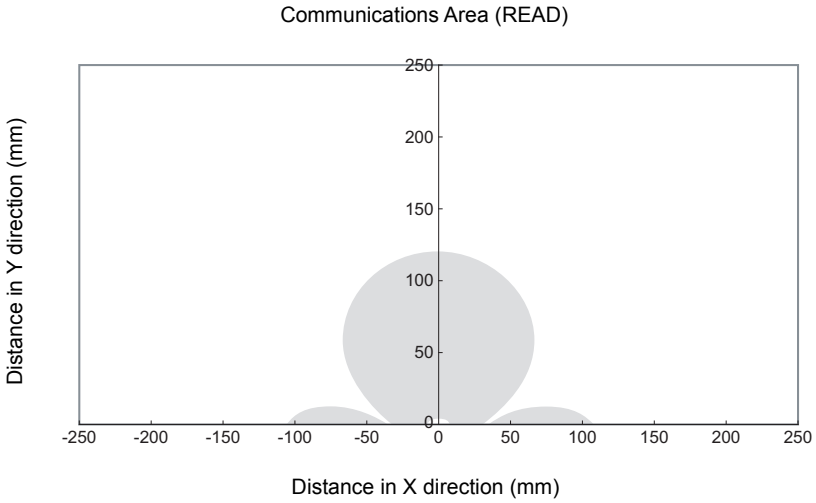

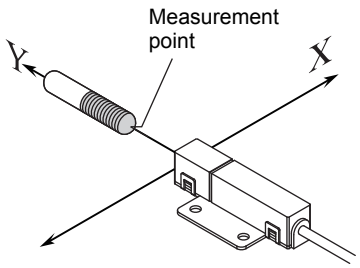

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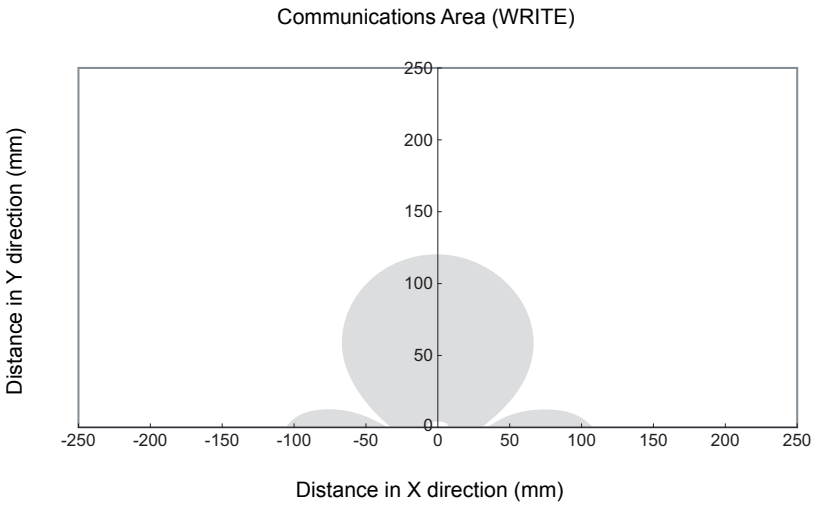

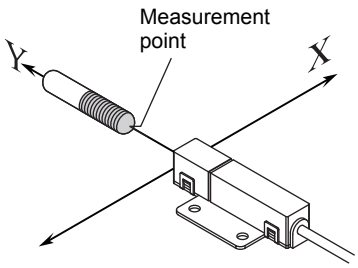

- Coaxial Mounting (RI-TRP-WR2B)
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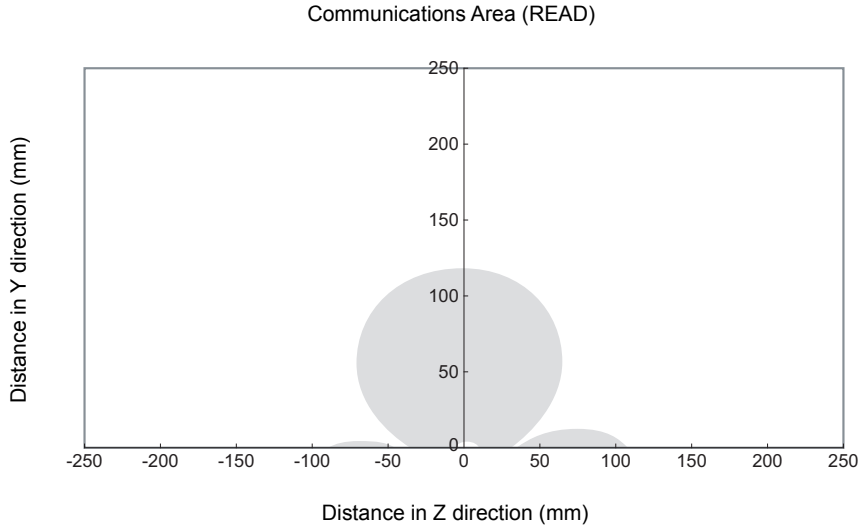

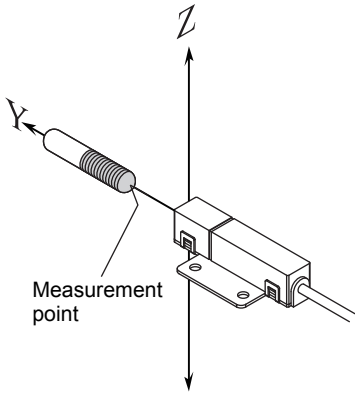

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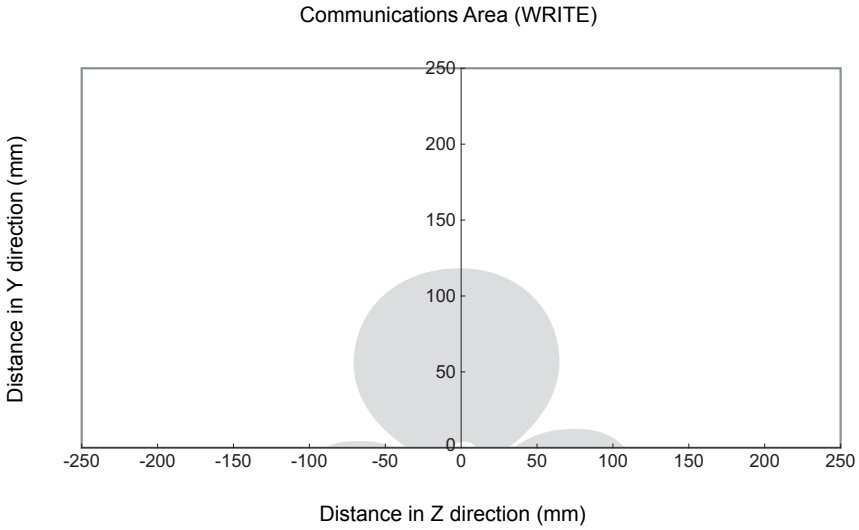

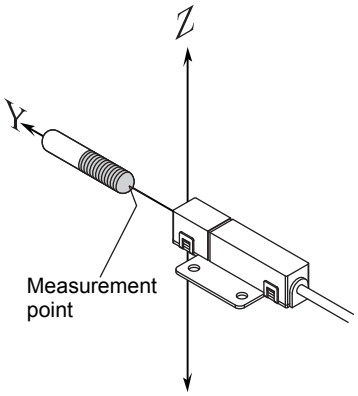

• Parallel Mounting (RI-TRP-WR2B)

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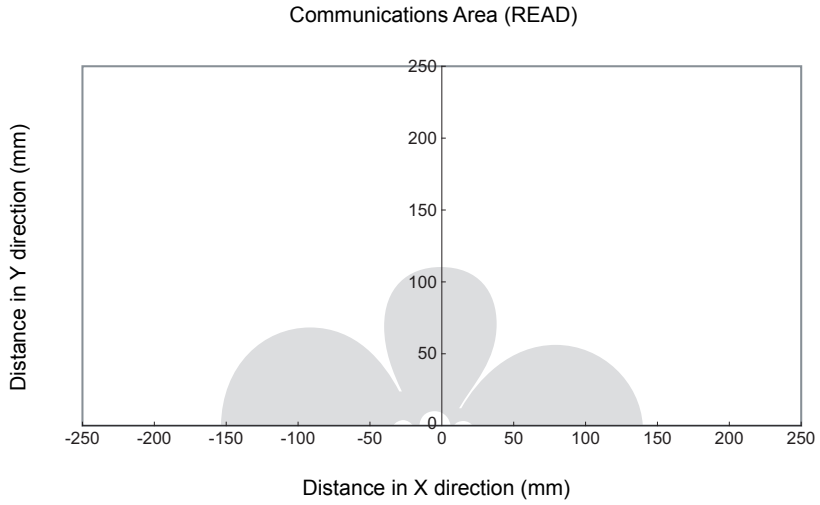

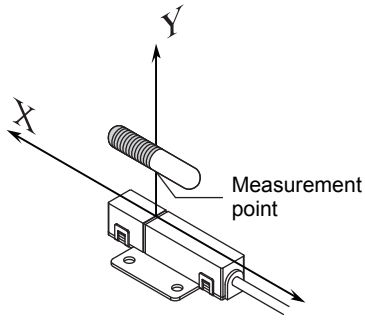

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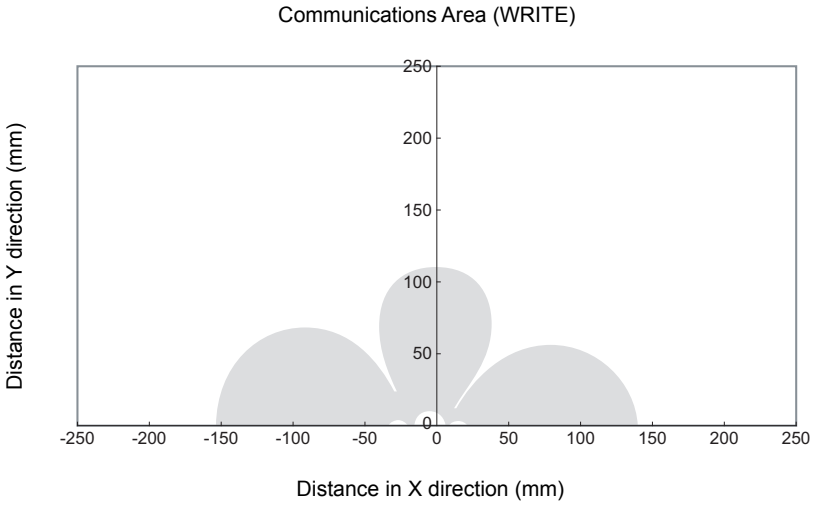

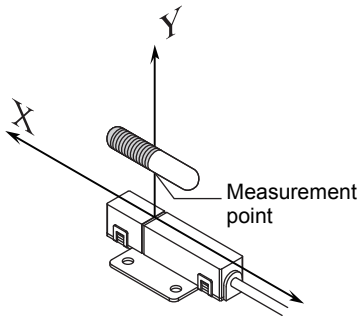

• Parallel Mounting (RI-TRP-WR2B)

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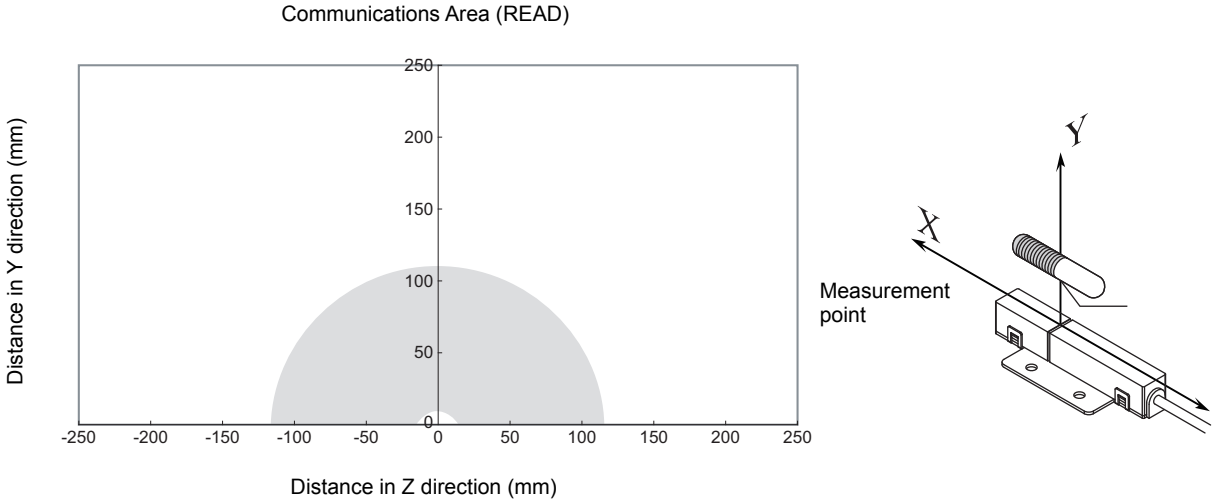

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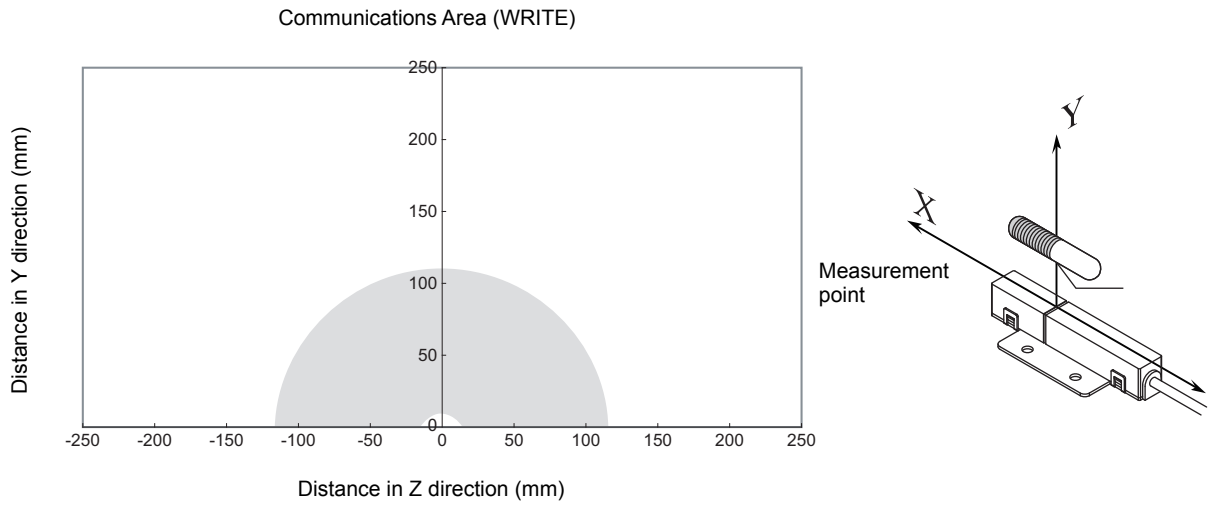

• Vertical Mounting (RI-TRP-WR2B)

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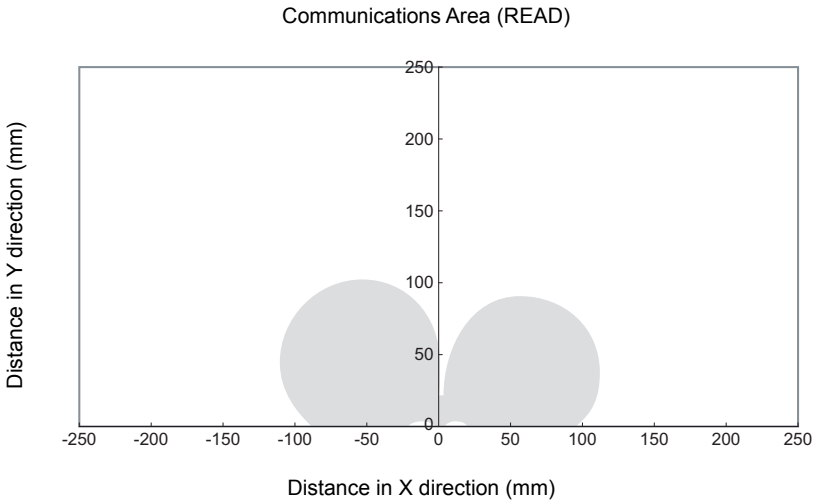

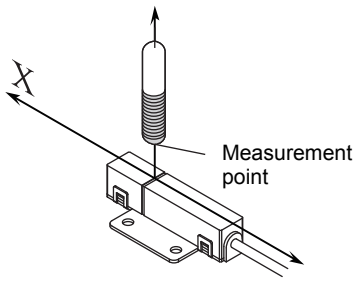

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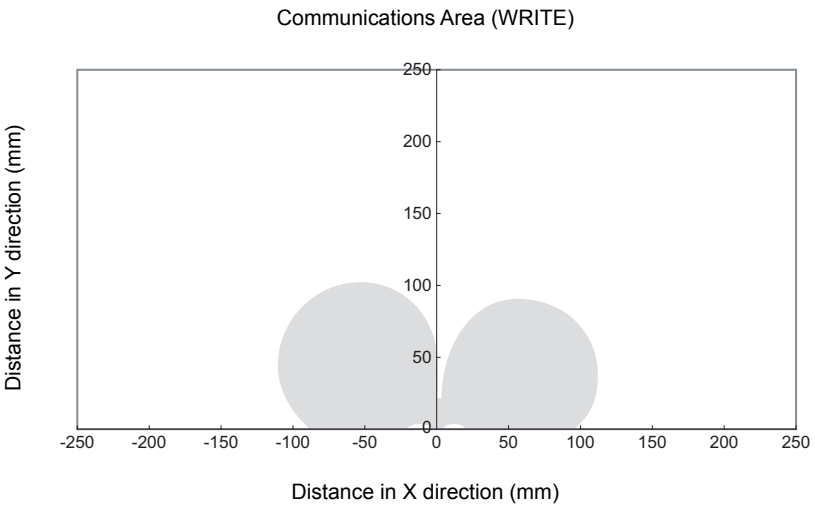

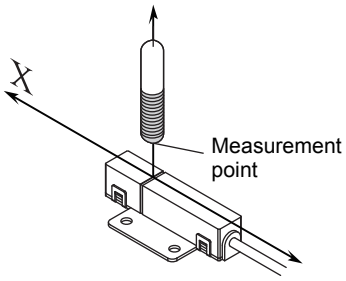

• Vertical Mounting (RI-TRP-WR2B)

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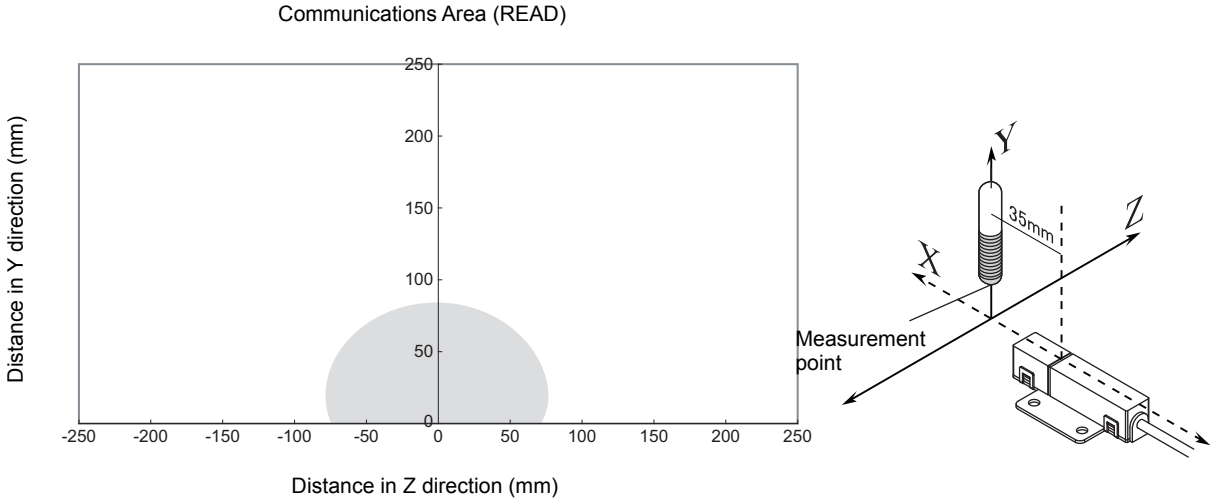

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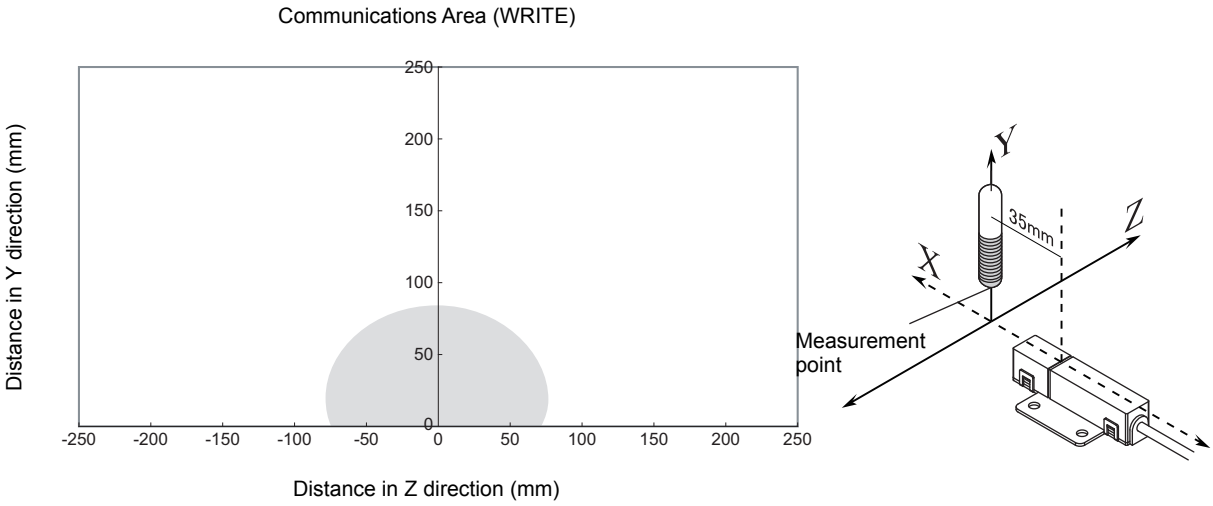

■ V640-HAM11-L-ETN-V2

• Coaxial Mounting (RI-TRP-DR2B-30)

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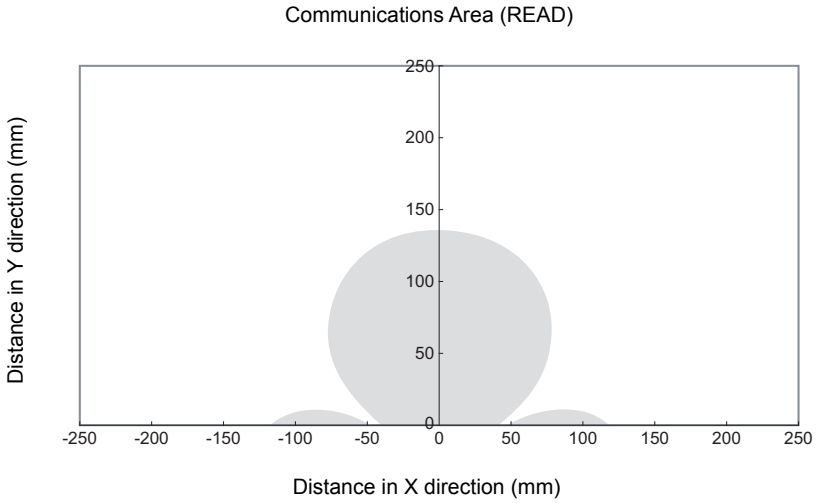

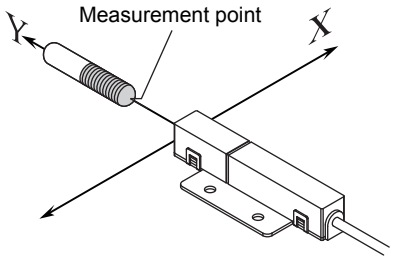

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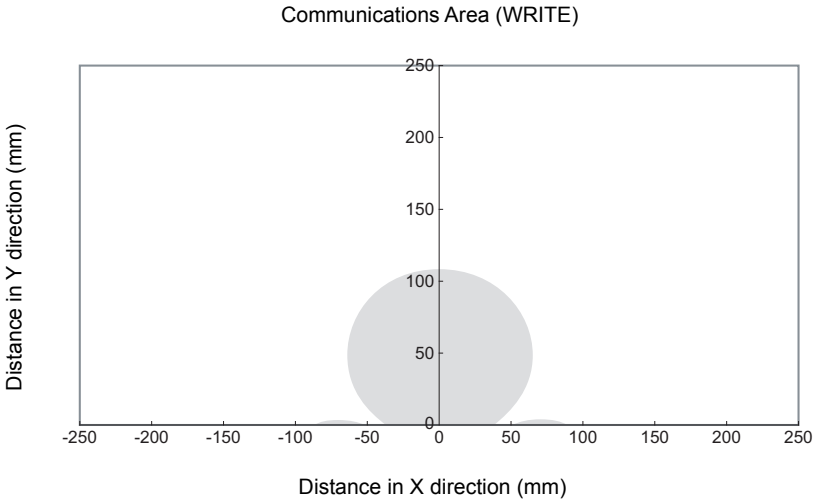

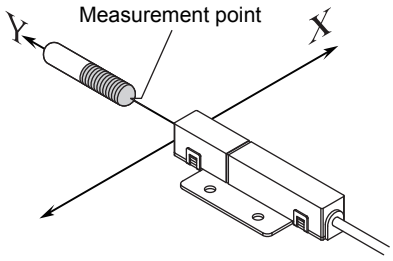

- Coaxial Mounting (RI-TRP-DR2B-30)
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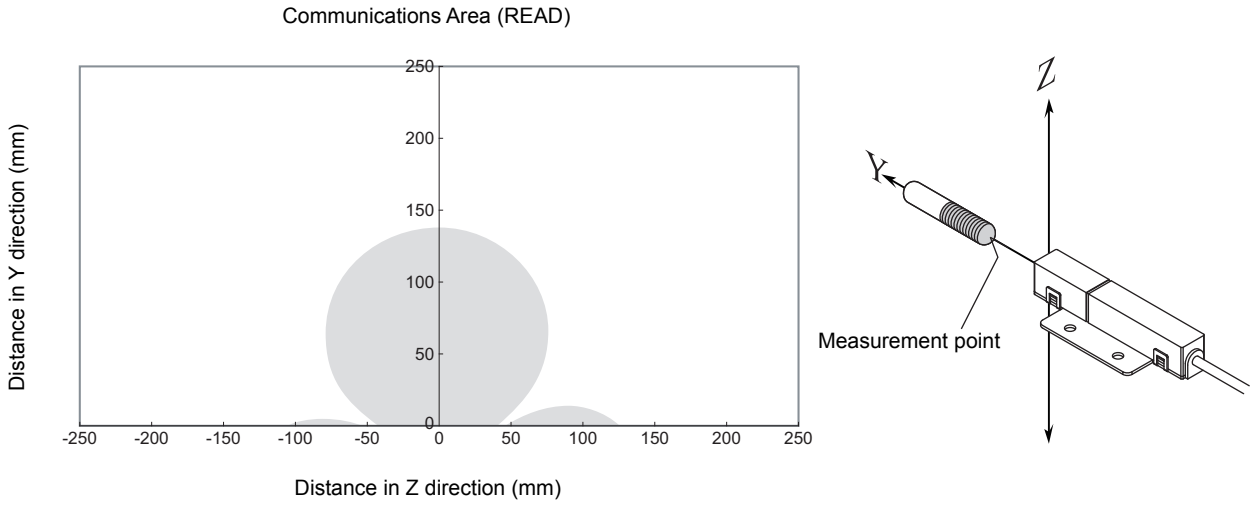

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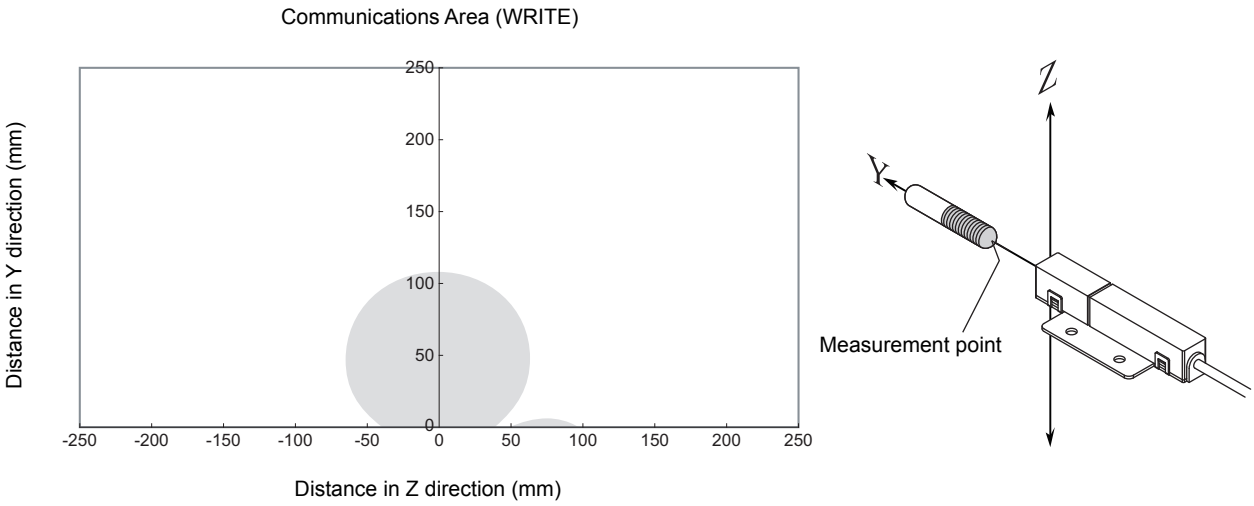

• Parallel Mounting (RI-TRP-DR2B-30)

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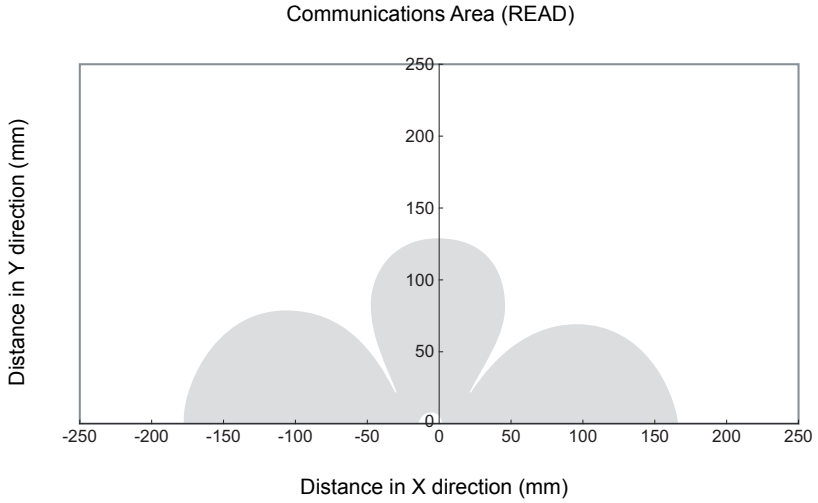

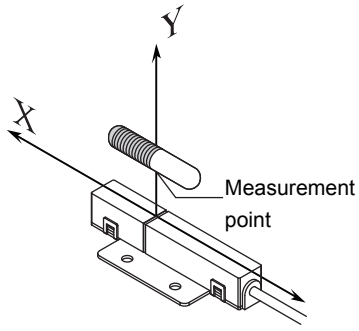

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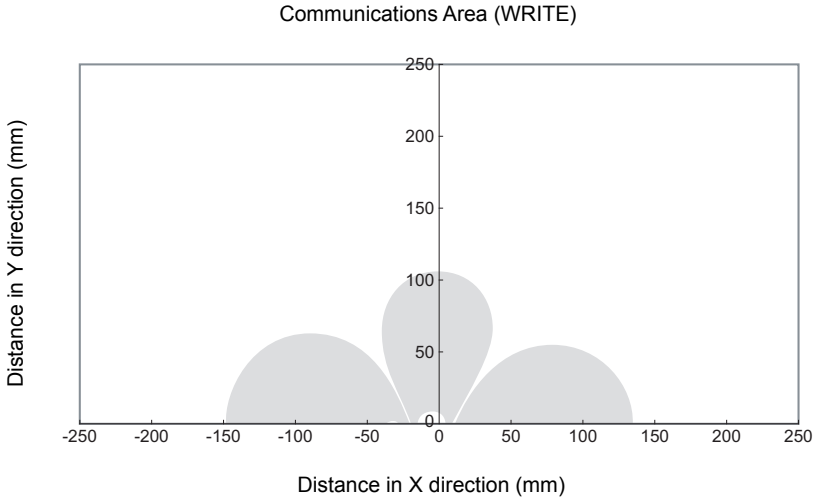

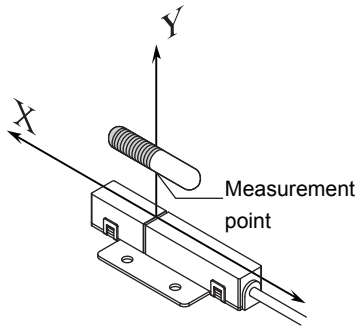

• Parallel Mounting (RI-TRP-DR2B-30)

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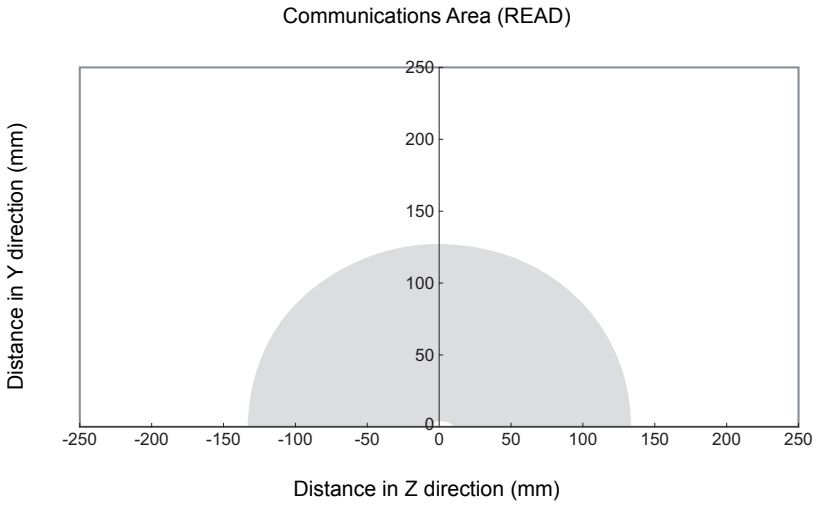

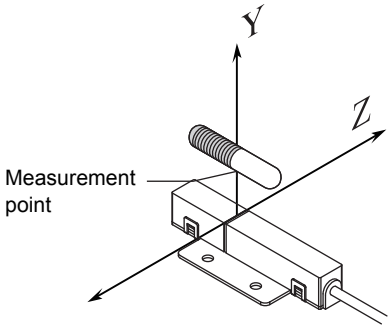

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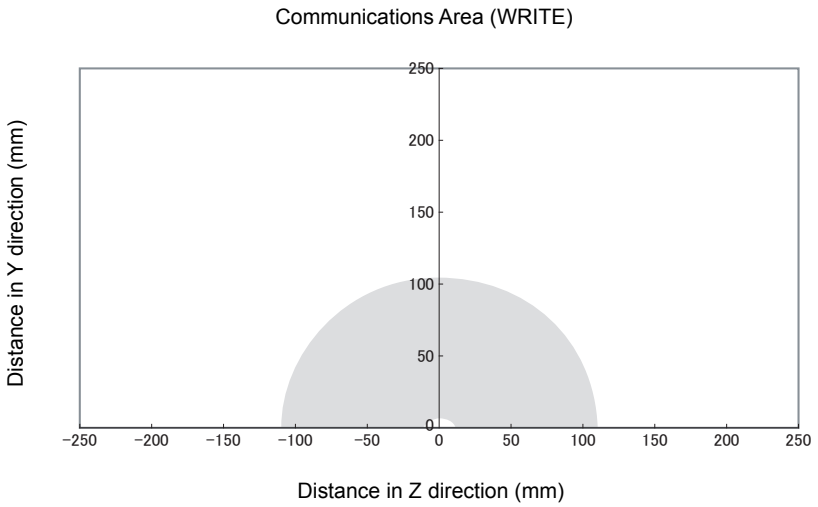

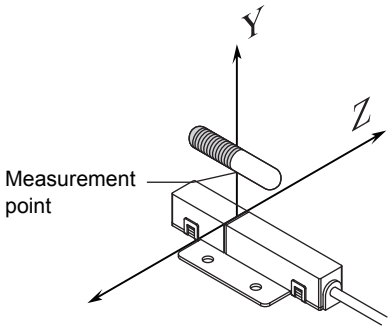

• Vertical Mounting (RI-TRP-DR2B-30)

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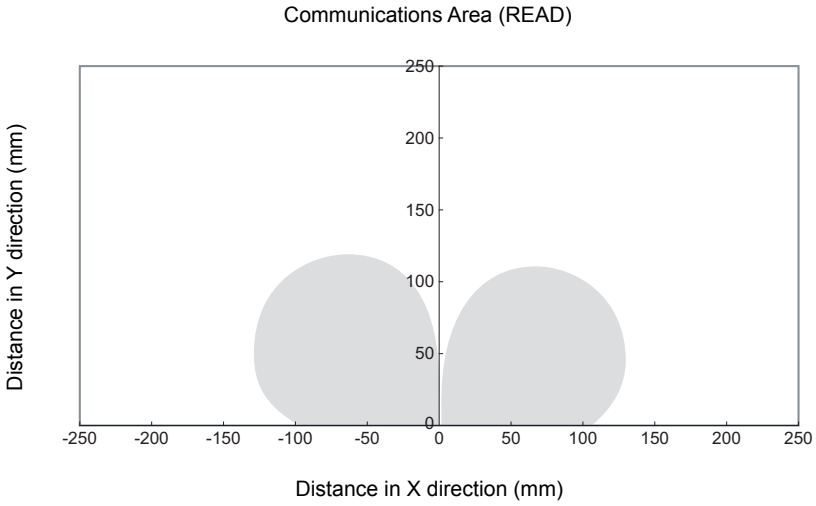

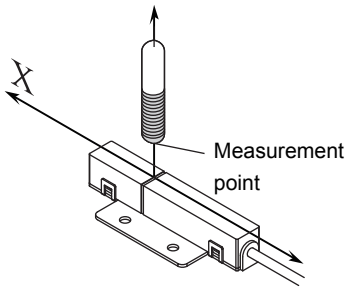

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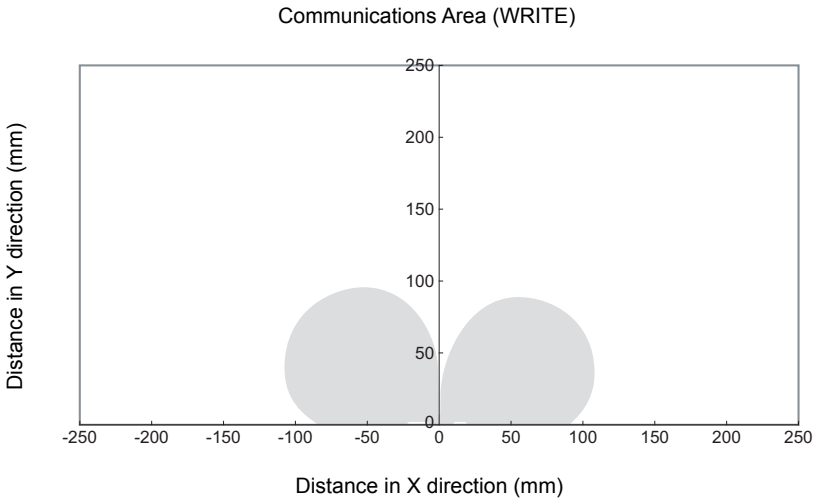

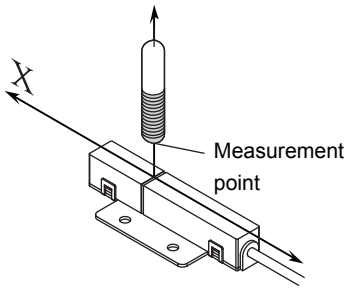

• Vertical Mounting (RI-TRP-DR2B-30)

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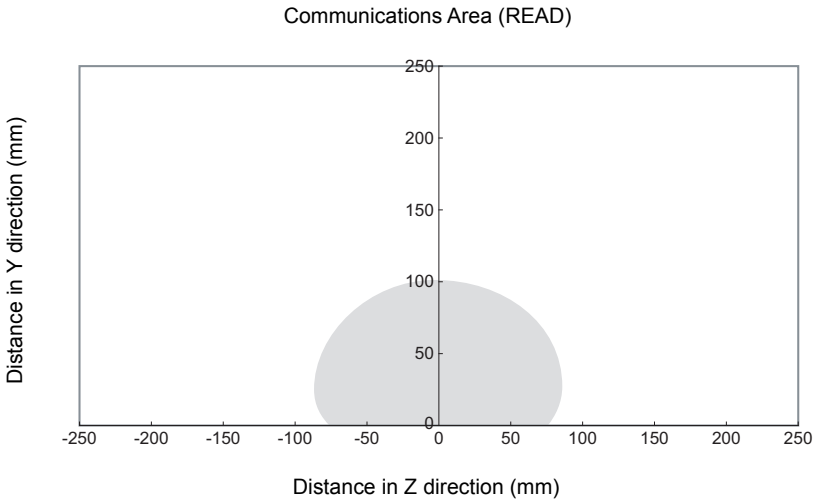

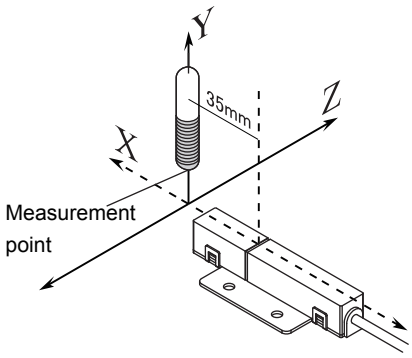

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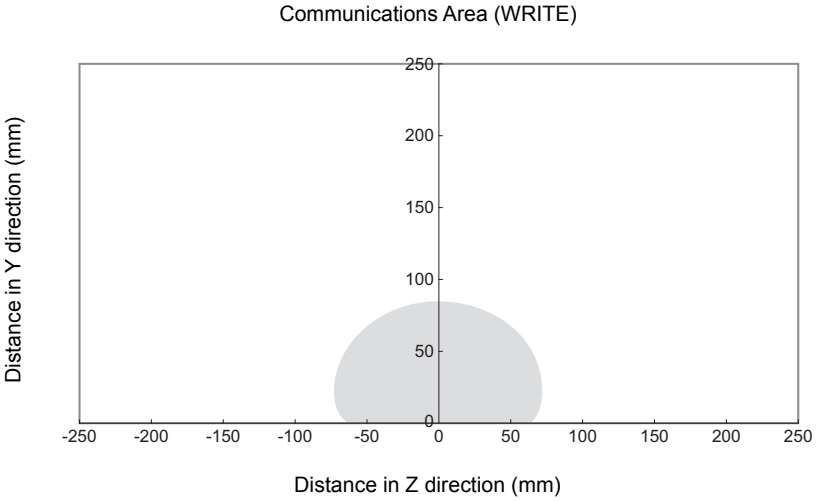

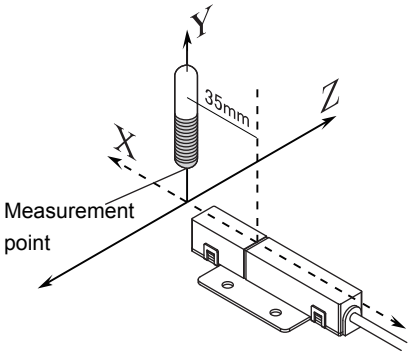

• Coaxial Mounting (RI-TRP-WR2B)

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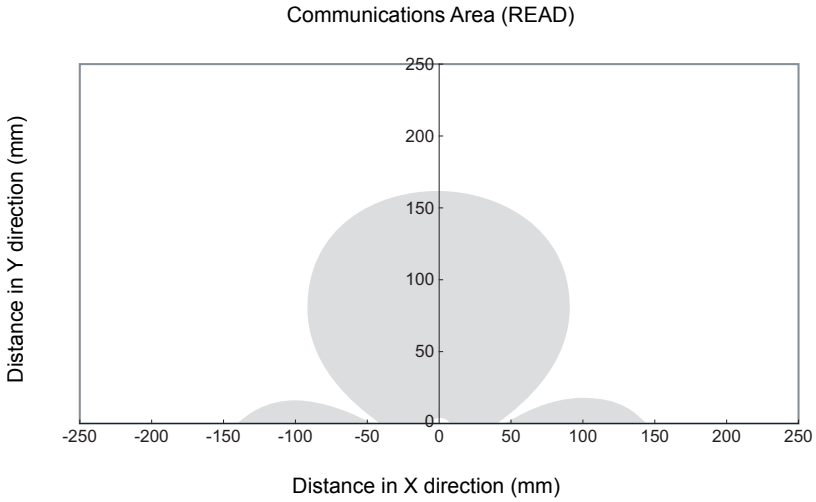

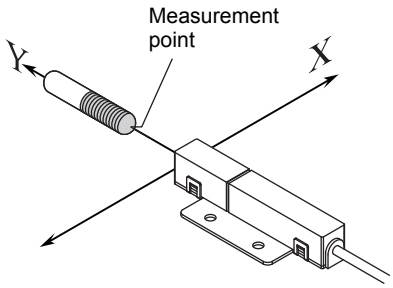

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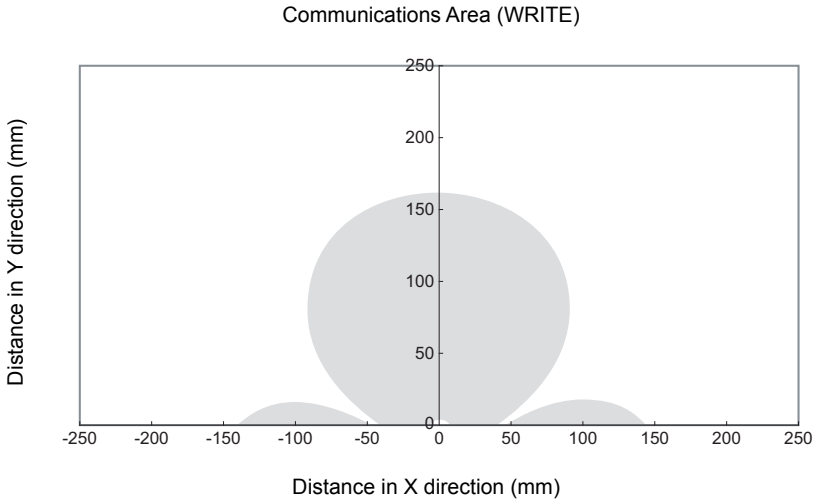

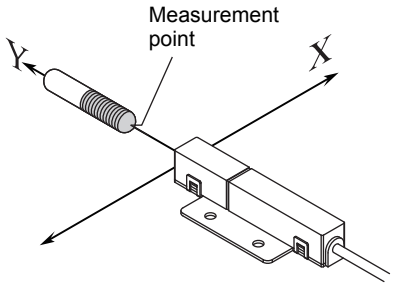

- Coaxial Mounting (RI-TRP-WR2B)
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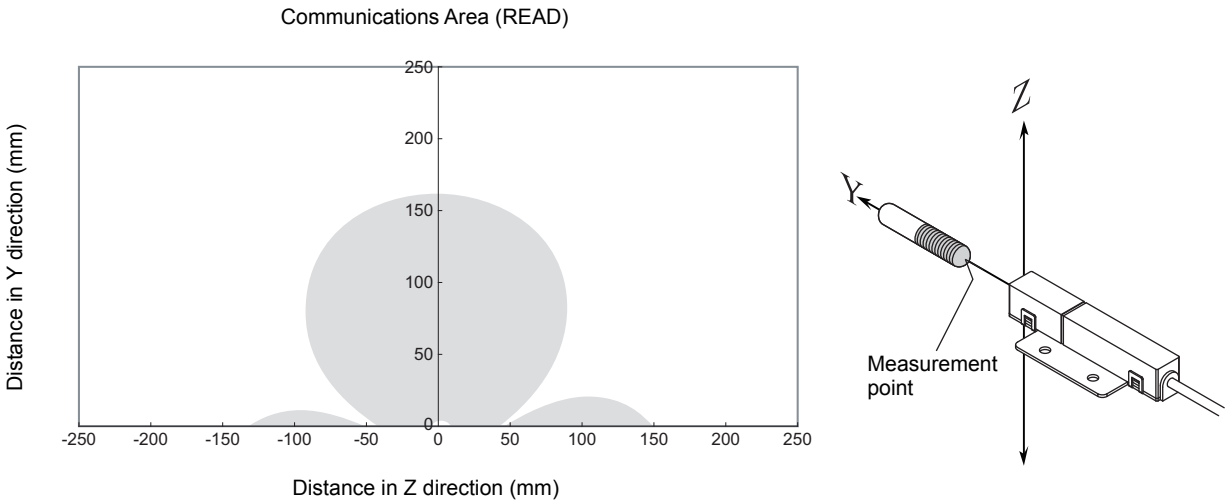

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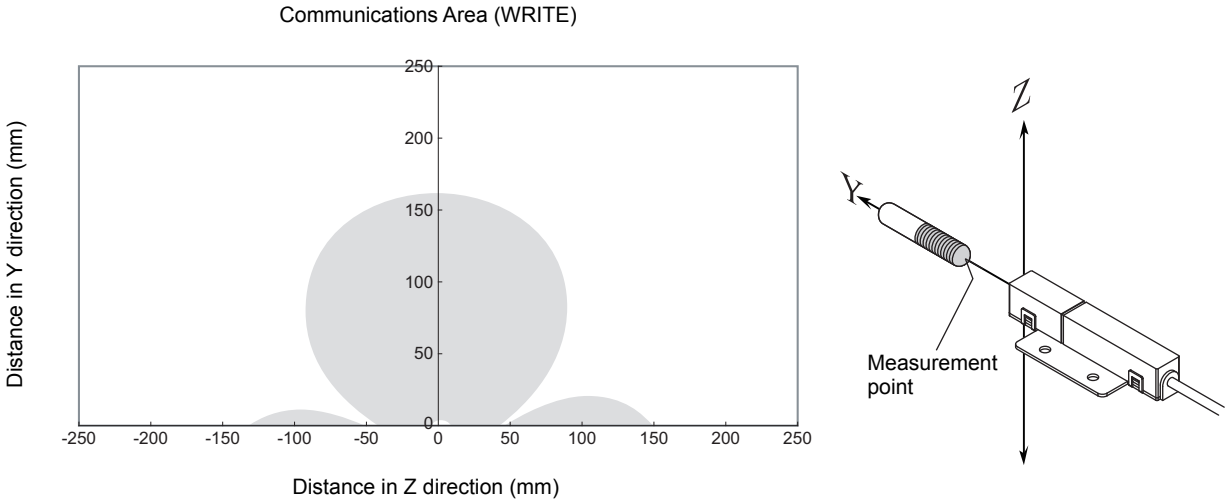

• Parallel Mounting (RI-TRP-WR2B)

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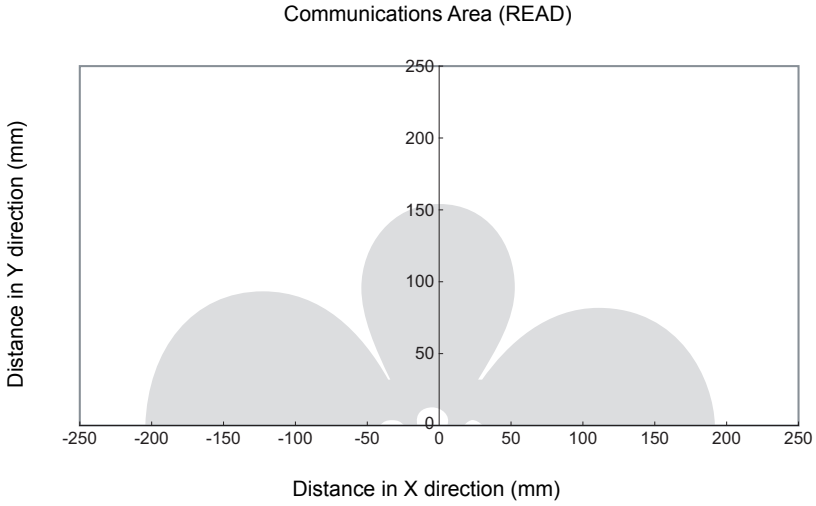

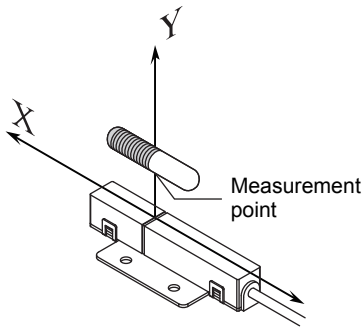

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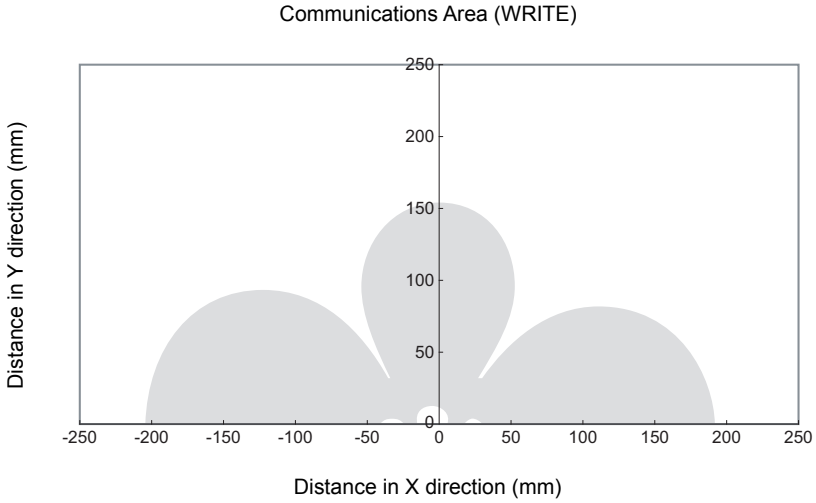

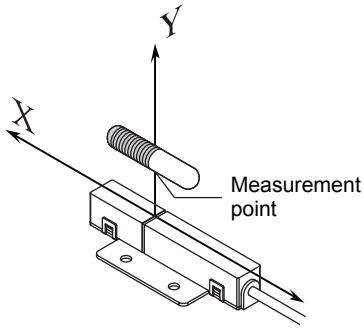

• Parallel Mounting (RI-TRP-WR2B)

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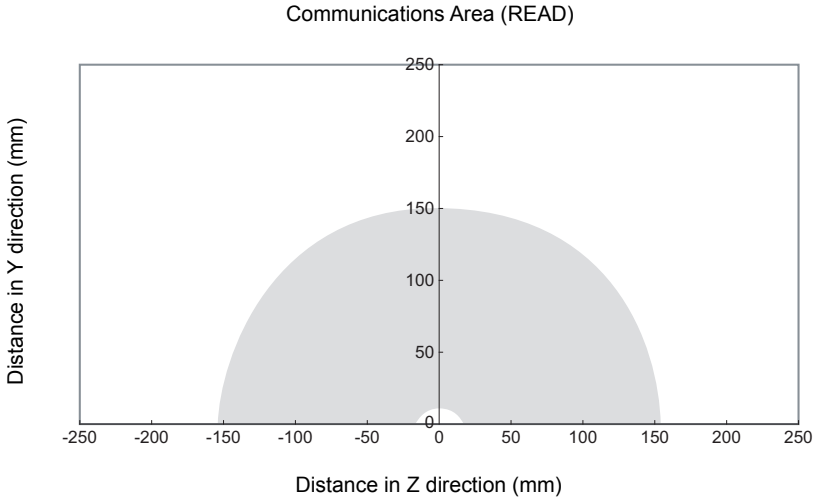

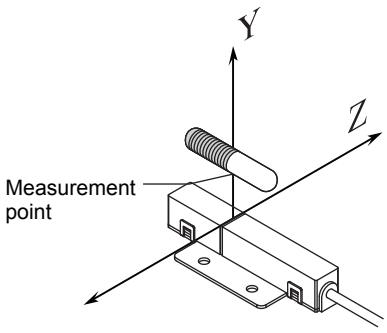

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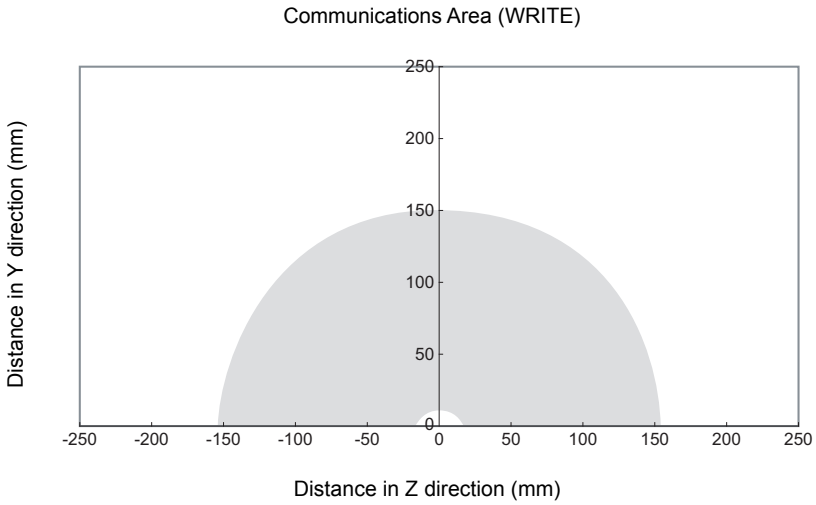

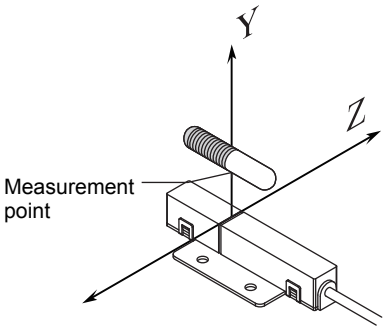

• Vertical Mounting (RI-TRP-WR2B)

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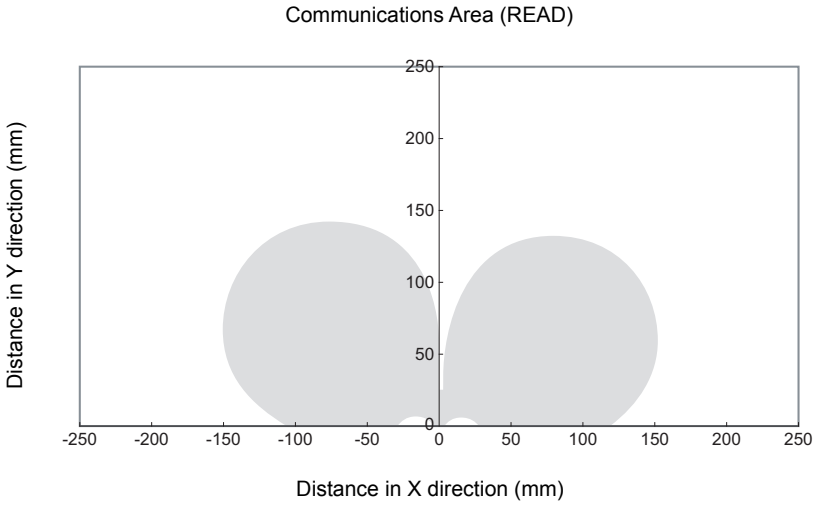

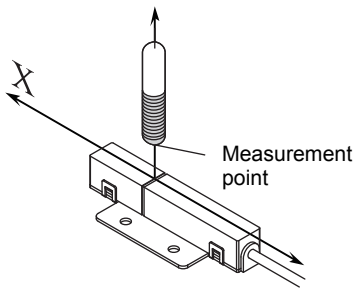

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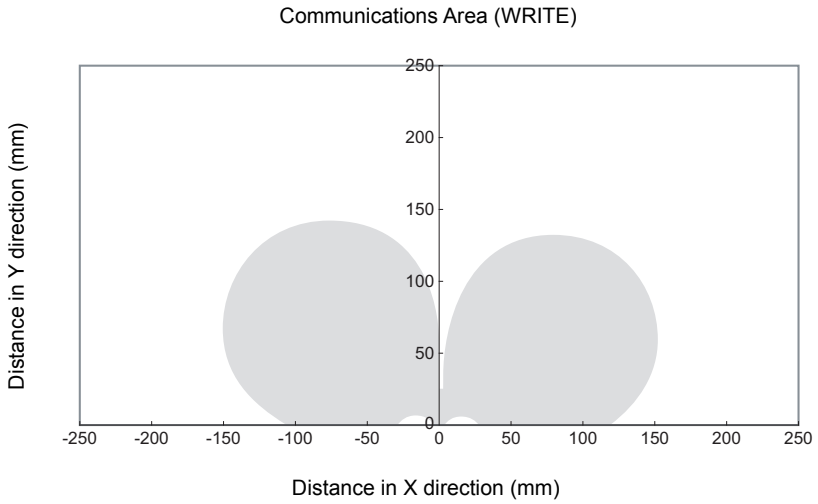

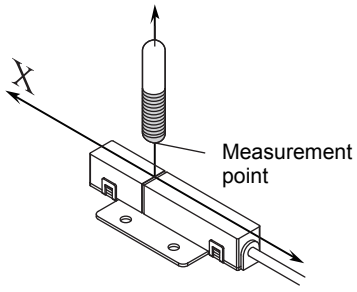

• Vertical Mounting (RI-TRP-WR2B)

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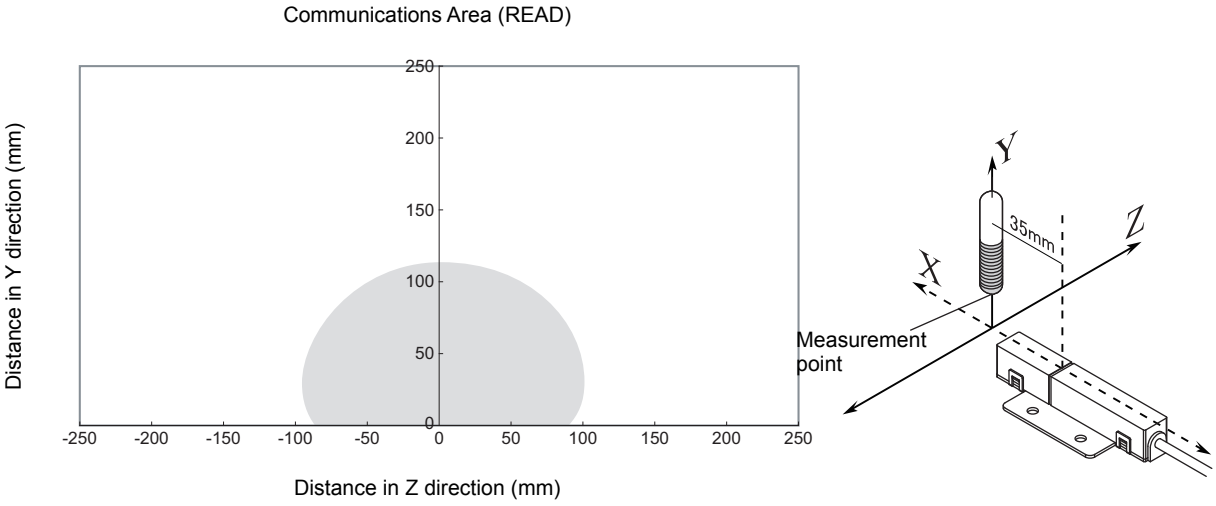

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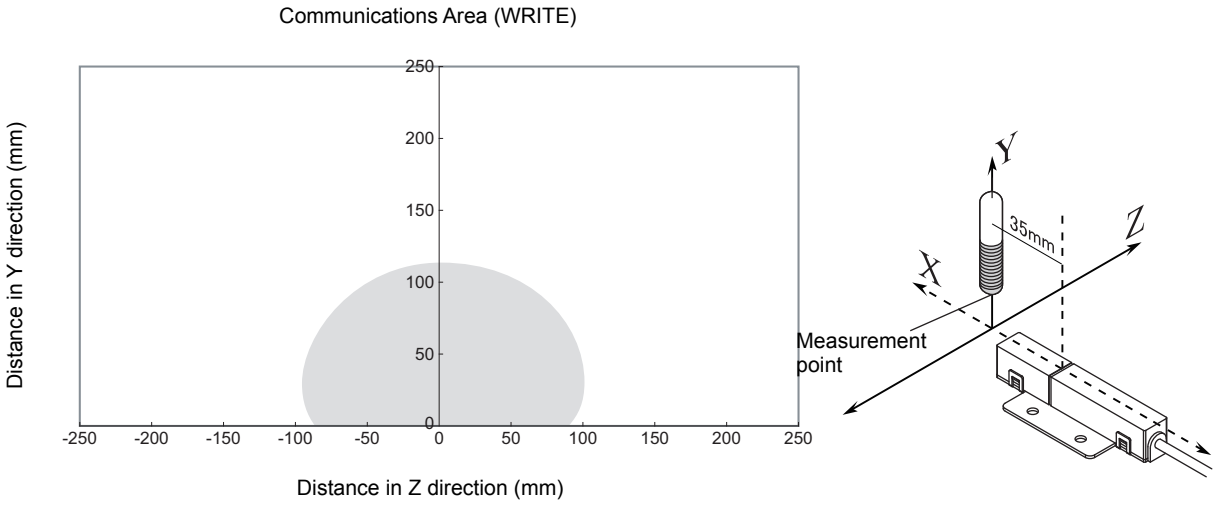


Mutual Interference Distances (Reference Only)

If Amplifier Units are connected using multidrop connections and multiple CIDRW Heads are used, the CIDRW Heads will not process commands simultaneously. In this case, install the CIDRW Heads at least 0.1 m apart from each other.

Distance between Antennas and Changes in Communications Distances (Reference Only)

- V640-HS61

Distance between Antennas	Change in communications distance
1,000 mm	100%
900 mm	100%
800 mm	100%
700 mm	99%
600 mm	90%
500 mm	74%
400 mm	55%
300 mm	40%
200 mm	15%

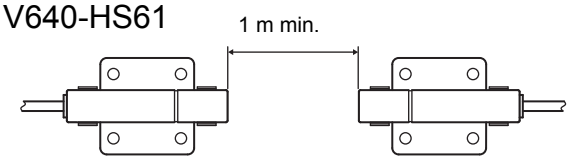
- V640-HS62

Distance between Antennas	Change in communications distance
2,000 mm	99%
1,600 mm	99%
1,400 mm	95%
1,200 mm	84%
1,000 mm	68%
800 mm	53%
600 mm	34%
400 mm	15%
200 mm	0%

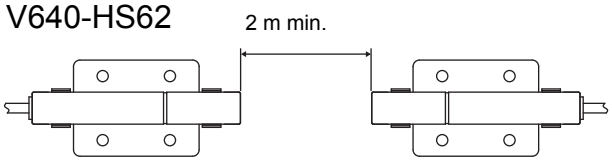
If CIDRW Heads in separate CIDRW systems process commands simultaneously when the CIDRW Systems are installed close to each other, mutual interference between the Heads can result in malfunctions. If this is a problem, install the CIDRW Heads separated at least by the distances shown in the following illustrations.

■ For Coaxial Installation

- V640-HS61

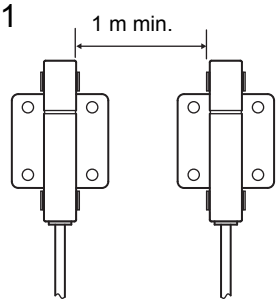


- V640-HS62

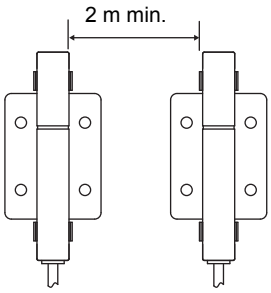


■ For Parallel Installation

- V640-HS61

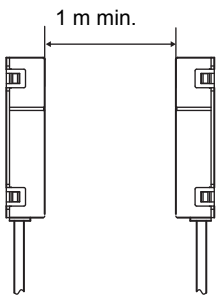


- V640-HS62

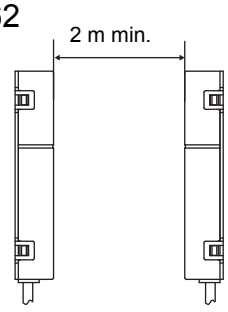


■ For Face-to-Face Installation

- V640-HS61

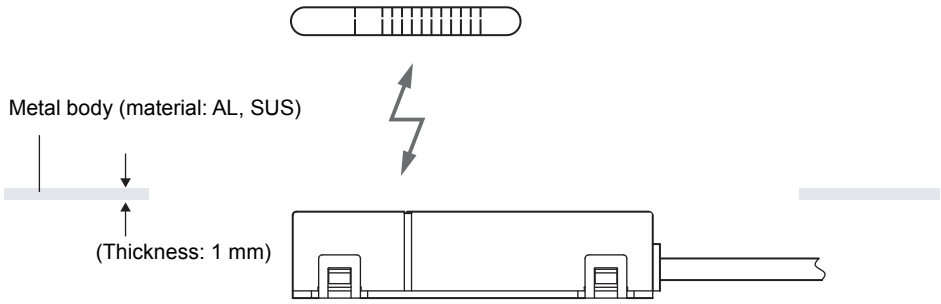


- V640-HS62



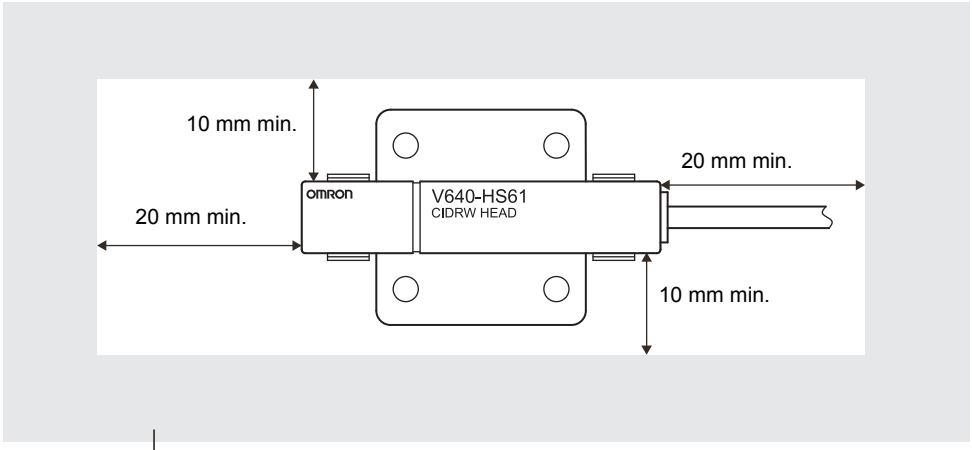
Influence of Background Metals (Reference Only)

The CIDRW Head can also communicate from an opening in a ceiling panel (metal body).

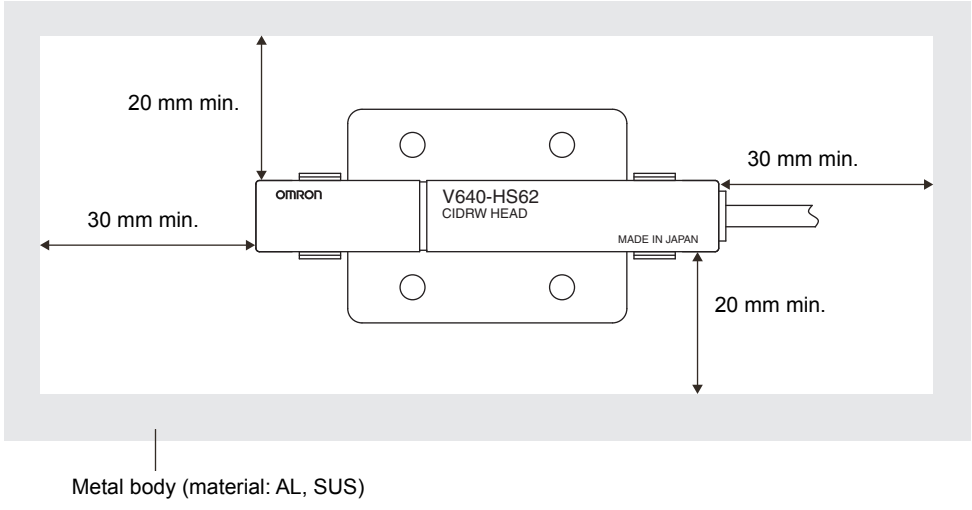


However, ensure the distances indicated below between the CIDRW Head and the metal body. If you do not ensure these distances the communications distance will be substantially shortened.

- V640-HS61

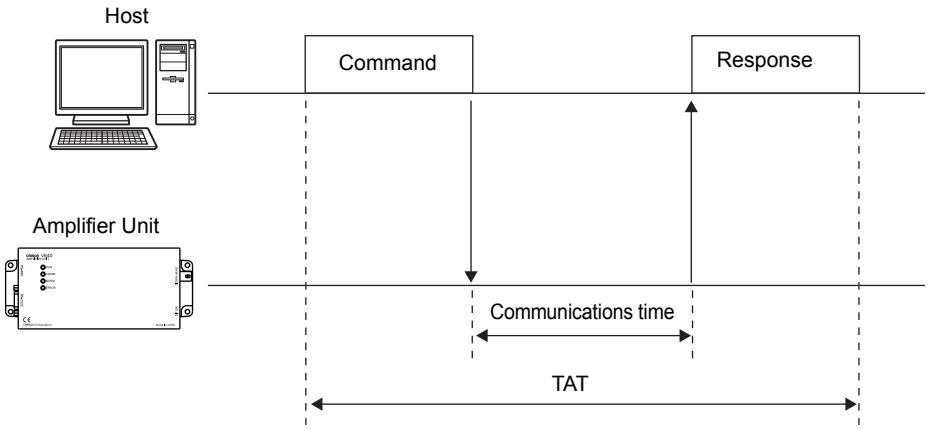


- V640-HS62



Communications Time

Regardless of whether SECS is used or not, take the time required for processing between the host device and Amplifier Units into account when designing the system.



Time	Description
Communications time	This is the time required for communications between an ID Tag and the CIDRW Head.
TAT	This is the time required for processing at the Amplifier Unit, seen from the host device.

Communications time calculation formula (unit: ms)

READ: 138.7 × (number of pages) + 10.0

WRITE, SAME WRITE: 379.8 × (number of pages) + 145.4

BYTE WRITE: 383.0 × (number of pages/8) + 249.0

Rounding up

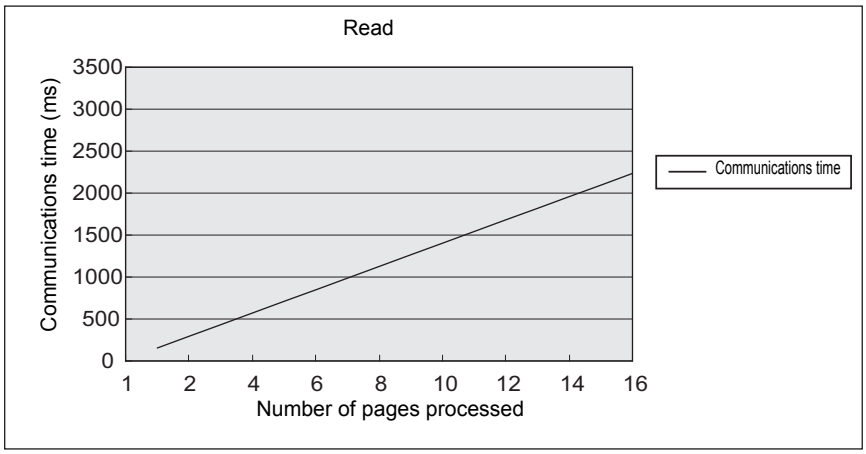
TAT calculation formula (units: ms)

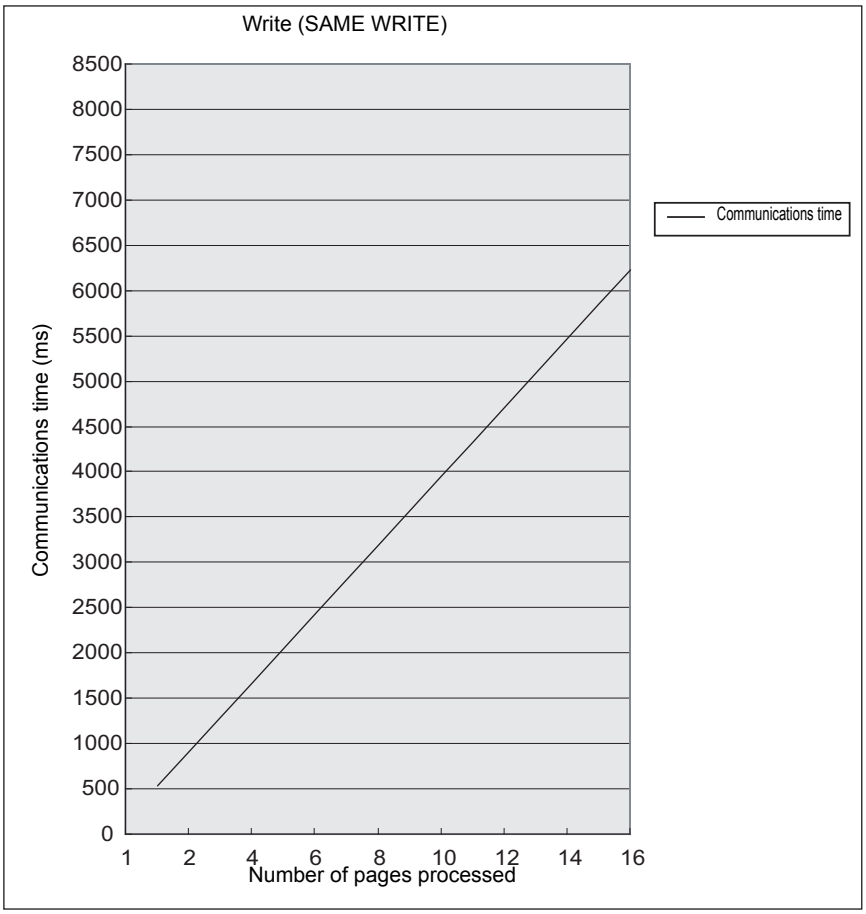
TAT = command and response transmission time + communications time

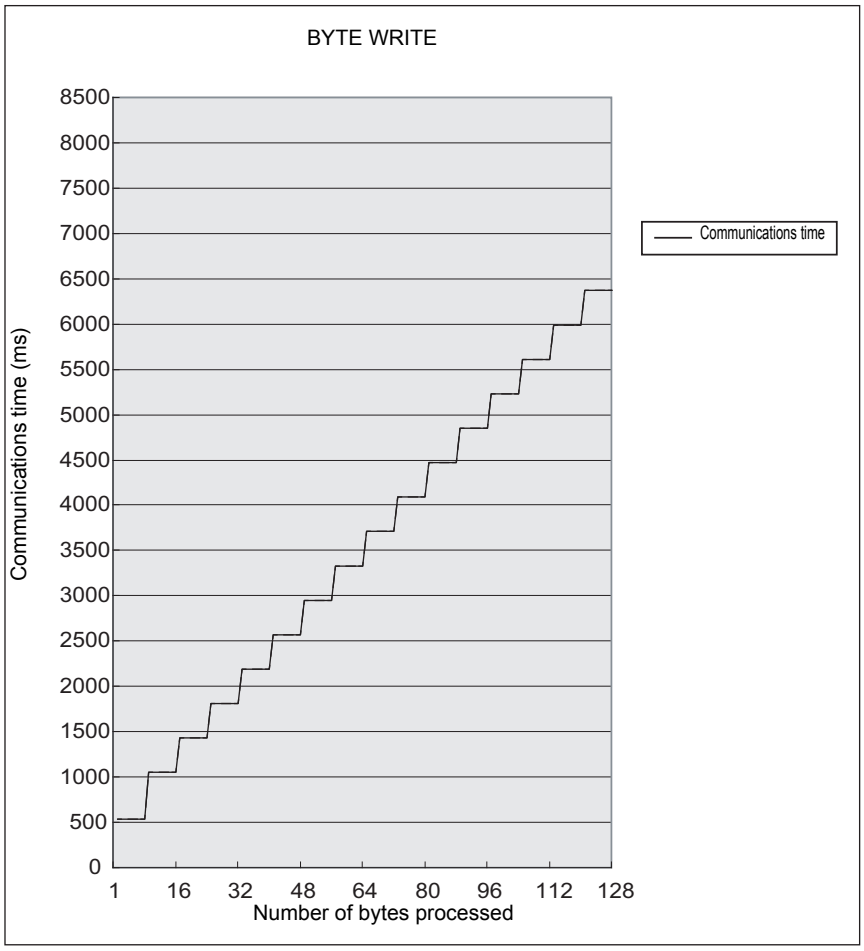
*The command and response transmission time differs depending on the network environment.

For example: Command and response transemission time is about from 10 to 40msec, when connect between PC and the Amplifier Unit directly by the lan cable(100M).

The graph for communications time for communications between the ID Tag and CIDRW Head, and TAT (when the baud rate is 9600 bps), is shown below.
The communications time and TAT, however, may increase substantially according to the conditions of use.







CHECK!

Please confirm beforehand, there is a difference in comparision with V640-HAM11-ETN and V640-HAM11-L-ETN in communication time.

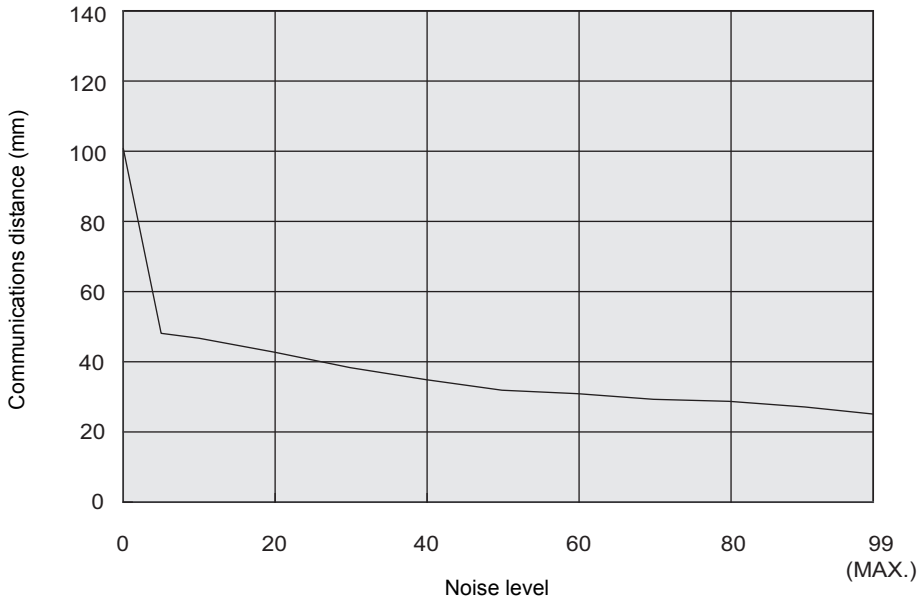
Communications Distance Characteristics vs. Ambient Noise

The graph below compares the results of measurement using the noise measurement function with communications distances.
At installation implement measures in regard to metal in the vicinity of the CIDRW Head, power supply noise, and atmospheric noise, to ensure that the noise level does not exceed 10.

NOISE MEASUREMENT command (applies only when SECS is not used) Refer to page 47.

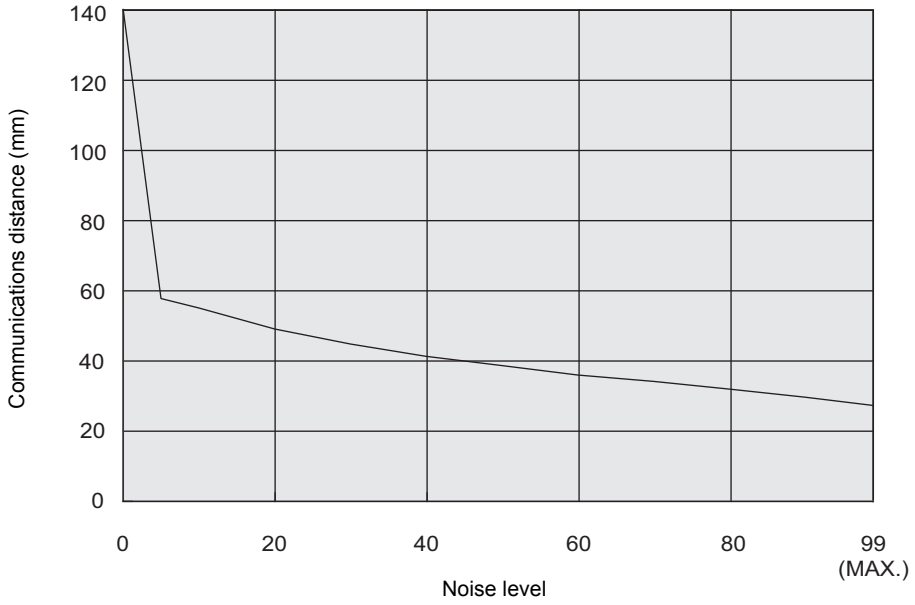
■ V640-HAM11-ETN-V2

Relationship between noise level and communications distance (reference values)



■ V640-HAM11-L-ETN-V2

Relationship between noise level and communications distance (reference values)



ID Tag Memory Maps

The memory maps of the RI-TRP-DR2B(-30) and RI-TRP-WR2B(-30) ID Tags are given below.

■ RI-TRP-DR2B(-30)

ID Tag Memory Map

Page	8 bytes/1 page							
1	00h	01h	02h	03h	04h	05h	06h	07h
2	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
3	10h	11h	12h	13h	14h	15h	16h	17h
4	18h	19h	1Ah	1Bh	1Ch	1Dh	1Eh	1Fh
5	20h	21h		•••	•••			27h
6	28h	29h		•••	•••			2Fh
7	30h	31h		•••	•••			37h
8								
9								:
10	:							:
11	:							
12								
13								
14	68h	69h		•••	•••			6Fh
15	70h	71h		•••	•••			77h
16	78h	79h		•••	•••			7Fh
17	80h	81h		•••	•••			87h

Carrier ID (16 byte)

Data area (Total of 120 bytes)

Example of data segment settings

DATASEG	LENGTH
Carrier ID	16
"S01"	8
"S02"	8
"S03"	8
"S04"	8
"S05"	8
"S06"	8
"S07"	8
"S08"	8
"S09"	8
"S10"	8
"S11"	8
"S12"	8
"S13"	8
"S14"	8
"S15"	8

CHECK!

- The carrier ID memory area starts from page 1 (fixed).
- 00h to 87h in the table are addresses.
- The RI-TRP-WR2B(-30) has a memory capacity of 136 bytes.

■ RI-TRP-WR2B(-30)

ID Tag Memory Map

Page	8 bytes/1 page							
1	00h	01h	02h	03h	04h	05h	06h	07h

Carrier ID (8 byte)

Example of data segment settings

DATASEG	LENGTH
Carrier ID	8

CHECK!

- The RI-TRP-WR2B(-30) has a memory capacity of 8 bytes.

Regular Inspection

In order to maintain optimum performance of the functions of the CIDRW system, daily and periodic inspections are necessary.

Inspection item		Detail	Criteria	Tools required
Supply voltage fluctuation		Check that the supply voltage fluctuation at the power supply terminal block is within the permissible range.	To be within supply voltage rating.	Multimeter
		Check that there are no frequent instantaneous power failures or radical voltage drops.	To be within permissible voltage fluctuation range.	Power supply analyzer
Environment	Ambient temperature	Check that the ambient temperature and humidity are within specified range.	To be within the specified range.	Maximum and minimum thermometer Hygrometer
	Ambient humidity			
	Vibration and shock	Check that no vibration or shock is transmitted from any machines.		
	Dust	Check that the system is free of dust accumulation.	To be none.	
	Corrosive gas	Check that no metal part of the system is discolored or corroded.		
I/O power supply	Voltage fluctuation	Check on the I/O terminal block that the voltage fluctuation and ripple are within the permissible ranges.	To be within the specified range.	Multimeter Oscilloscope
	Ripple			
Mounting condition		Check that each device is securely mounted.	There must be no loose screws.	—
		Check that each connector is securely connected.	Each connector must be locked or securely tightened with screws.	
		Check that no wire is broken or nearly broken.	There must be no wire that is broken or nearly broken.	
		Check if grounding to 100 Ω or less has been done.	To be grounded to 100 Ω or less.	

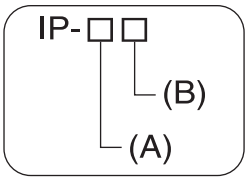
ASCII Code Table

Leftmost bits / Right-most bits: b8 to b5	0000	1001	0010	0011	0100	0101	0110	0111	1000	1101	1010	1011	1100	1101	1110	1111
b4 to b1 / Row / Line	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0000	0	NUL	TC7(DLE)	(SP)	0	@	P	`	p	Undefined	Undefined				Undefined	
0001	1	TC1(SOH)	DC_1	!	1	A	Q	a	q							
0010	2	TC2(STX)	DC_2	"	2	B	R	b	r							
0011	3	TC3(ETX)	DC_3	#	3	C	S	c	s							
0100	4	TC4(EOT)	DC_4	$	4	D	T	d	t							
0101	5	TC5(NEQ)	TC_8(NAK)	%	5	E	U	e	u							
0110	6	TC6(ACK)	TC_9(SYN)	&	6	F	V	f	v							
0111	7	BEL	TC_{10}(ETB)	'	7	G	W	g	w							
1000	5	FE0(BS)	CAN	(	8	H	X	h	x							
1001	9	FE1(HT)	EM	)	9	I	Y	i	y							
1010	10	FE2(LF)	SUB	*	:	J	Z	j	z							
1011	11	FE3(VT)	ESC	+	;	K	[	k	{							
1100	12	FE4(FF)	IS_4(FS)	,	<	L	\	l	|							
1101	13	FE5(CR)	IS_3(GS)	-	=	M	]	m	}							
1110	14	S0	IS_2(RS)	.	>	N	^	n	ÅP							
1111	15	S1	IS_1(US)	/	?	O	_	o	DEL							

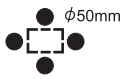
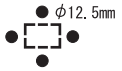
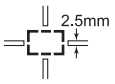
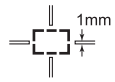
Protective Construction

IP-□□ is governed by the test methods described below. Check in advance the seal characteristics under the actual environment and conditions of use.
IP is the abbreviation of International Protection.

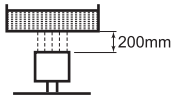
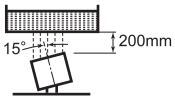
■ IEC (International Electrotechnical Commission) Standard (IEC60529: 2001)

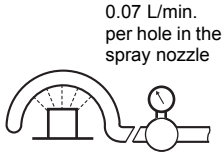
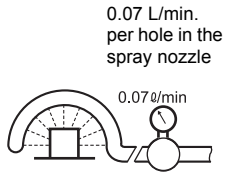
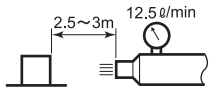
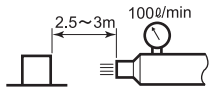
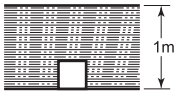


(A) First numeral in code: Class of protection against entry of solid foreign material

Class	Degree of protection	
0		No protection
1		Protected against access by solid objects with a diameter of 50 mm or greater (e.g., human hands).
2		Protected against access by solid objects with a diameter of 12.5 mm or greater (e.g., fingers).
3		Protected against access by wires and solid bodies with a diameter of 2.5 mm or greater.
4		Protected against access by wires and solid bodies with a diameter of 1 mm or greater.
5		Entry of volumes of dust that would cause difficulties in normal operation of devices or compromise safety is prevented.
6		Entry of dust is prevented.

(B) Second numeral of code: Class of protection against the entry of water

Class	**Degree of protection**		**Outline of test methods (tests using water)**
0	No special protection	No protection against the entry of water.	No test
1	Protection against droplets of water	The product suffers no ill effects from droplets of water falling vertically onto it.	Water droplets are sprayed onto the product from directly above for 10 minutes by water droplet exposure test apparatus. 
2	Protection against droplets of water	The product suffers no ill effects from droplets of water directed at it at an angle of up to 15° to vertical.	The water droplet exposure test apparatus is set to 15° from vertical and water droplets sprayed onto the product for 10 minutes (total of 25 minutes in each direction). 

Class	Degree of protection		Outline of test methods (tests using water)
3	Protection against spraying water	The product suffers no ill effects from a water spray directed at it at up to 60° from vertical.	Using the test apparatus shown in the figure to the right, water is sprayed from both directions, onto both sides of the product, at angles up to 60° from vertical for 10 minutes. 
4	Protection against splashing water	The product suffers no ill effects from water splashed on it from all directions.	Using the test apparatus shown in the figure to the right, water is splashed onto the product from all directions for 10 minutes. 
5	Protection against water jets	The product suffers no ill effects from a water jet aimed directly at it from all directions.	Using the test apparatus shown in the figure to the right, a water jet is directed at the product from all directions for 1 minute per square meter of outer casing, with a minimum total exposure of 3 minutes.  Diameter of spray nozzle head: 6.3
6	Protection against powerful jets of water	Water does not enter the product when a powerful jet of water is directed at it from all directions.	Using the test apparatus shown in the figure to the right, a water jet is directed at the product from all directions for 1 minute per square meter of outer casing, with a minimum total exposure of 3 minutes.  Diameter of spray nozzle head: 12.5
7	Protection against immersion in water	No entry of water on immersion in water at the stipulated pressure for the stipulated time.	Immerse in water for 30 minutes at a depth of 1 meter (when the height of the apparatus is less than 850 mm). 
8 (See note.)	Protection against immersion in water	The product can be used while continually immersed in water.	Depends on arrangements made between the manufacturer and the user of the product.

Note: OMRON Test Method

Usage condition: 10 m or less under water in natural conditions

1. No water ingress after 1 hour under water at 2 atmospheres of pressure.
2. Sensing distance and insulation resistance specifications must be met after 100 repetitions of half hour in 5°C water and half hour in 85°C water.

About IPX9K

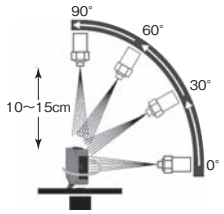
IPX9K is a protection standard regarding high temperature and high-pressure water which is defined by the German standard (DIN 40050 PART9).

Water is sprayed on 80 °C hot water with the water pressure of 80 to 100BAR from a nozzle to the test piece.

Amount of water is 14 to 16 liters/minute.

The distance between the test piece and a nozzle is 10 to 15 cm, and the directions of water-drainage are 0 degrees, 30 degrees, 60 degrees, and 90 degrees horizontally.

They are evaluated with the test piece is rotating on a horizontal plane by 30 seconds in each direction.



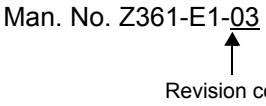
■ Oil Resistance (OMRON in-house standard)

Protection	
Oil-resistant	No adverse affect from oil drops or oil spray approaching from any direction.
Oil-proof	Protects against penetration of oil drops or oil spray approaching from any direction.

Note. Oil resistance has been tested using a specific oil as defined in the OMRON test method. (JIS C 0920:2003, Appendix 1)

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	June 2015	Original production
02	November 2015	Changed the Maps of Communications Areas.
03	January 2017	Change the description of the operating environment of the WEB browser.

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