

**FOR
RFID SYSTEM
FOR SEMI CONDUCTOR
DEVICE FABRICATION LINE
USER'S MANUAL**

ID Link Unit

Model V700-L11

IDRW Head

Model V700-HMD13□

Model V700-HMD11-1

ID Tag

Model V700-D23P41-1

OMRON Corporation

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Catalog No. Z213-E1-01B

Introduction

Thank you for purchasing the OMRON product.

To be able to operate the product safely and efficiently, carefully study this user's manual and get fully familiar with the instruction in it before attempting to use the product. Keep this manual at hand for speedy reference while operating, maintaining or servicing the equipment.

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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OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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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.

PERFORMANCE DATA

Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

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.

ERRORS AND OMISSIONS

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Meanings of Signal Words

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.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Meanings of Alert Symbols

The following alert symbols are used in this manual.



Indicates general prohibitions for which there is no specific symbol.



Indicates instruction for the user to always connect the ground wire.



Indicates prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.

Alert statements in this Manual

The following alert statements apply to the products in this manual. Each alert statement also appears at the locations needed in this manual to attract your attention.



WARNING



This product is not designed to be used either directly or indirectly in applications that detect human presence for the purpose of maintaining safety. Do not use this product as a sensing device for protecting human lives.



CAUTION



Do not disassemble the Unit or touch the internal parts of the Unit while the power is turned ON. Doing so may result in electric shock due to the high-voltage internal parts.



The GR (frame ground) terminal is in the multi-connection port. Always ground the multi-connection port to 100 Ω or less, regardless of whether it is used or not. Performance may deteriorate if the port is not ground.

Precautions for Correct Use

To operate the system more reliably and to allow the system to fully perform as designed, follow the instructions below:

■ About environments of installation

Do not install or leave the product to a location such as:

- Location subjected to direct sunlight
- Location where corrosive gas, dust, metal dust, salty air is present
- Location where the operating temperature can exceed or drop below a range defined in the specification
- Location where temperature change is great, and can lead to dew condensation
- Location with higher humidity, and can lead to dew condensation
- Location where vibration or impact whose magnitude greater than specified can be directly transmitted to the product proper
- Location where splash of water, oil or chemical product is present

■ About installation

- This product operates on the 125 kHz frequency band to communicate with an ID tag. Certain transceivers, motors, monitors, and power supplies (power ICs) can emit a radio frequency wave (noise) that can adversely affect communications with an ID tag. When planning to use the product near such a source, study the possible result in advance.
- To minimize the possible noise interference, earth-ground (class D earth work) a metal object that will be located around the product.

■ About wiring work

- Be sure to earth-ground the product per class D earth work. Otherwise, the product will not perform as designed.
- Before starting a wiring work or disconnecting a cable, be sure to power OFF the product.
- Do not run the cable for the product in a conduit common to a high voltage line and a power supply line.
- 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.

■ About thread glue

- A thread glue can deteriorate and lead to crack on a resin part. Thus, do not apply a thread glue to the threading on a resin part or to resin-made washers.

■ About cleaning

- NEVER use an organic solvent such as thinner or benzene, as it will attack resin components or case coating.

Limitations about Model V700-HMD13

When a Model V700-HMD13 (not Model V700-HMD13□) is used to configure a system, there will be the operating limitations described below.

<Description of limitations>

Among the memory page 1 through 30 on an ID tag, page 1 through 12 are available to the user. Do not access to page 13 to 30 with commands. However, note that data read/write is possible with a plurality of pages as a block.

(1) Operation to read data in page 1 through 30 as a block

The data read process is divided into two steps: read of page 1 through 14 and that of page 15 through 30.

①0100 0000FFFC [CR]

②0100 FFFF0000 [CR]

(2) Operation to write data in page 1 through 30 as a block

①0200 0000FFFC (write data with page 1)(write data with page 2)

... (write data with page 14) [CR]

②0200 FFFF0000 (write data with page 15)(write data with page 16)

... (write data with page 30) [CR]

(3) Operation to write data in page 3 through 30 as a block

The data write process is divided into two steps: write of page 3 through 14 and that of page 15 through 30.

①0200 0000FFF0 (write data with page 3)(write data with page 4)

... (write data with page 14) [CR]

②0200 FFFF0000 (write data with page 15)(write data with page 16)

... (write data with page 30) [CR]

A RFID system configuration using Model V700-HMD13A will serve free of the above-mentioned limitations.

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Section 1

System Features and Configuration

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1.1 System features

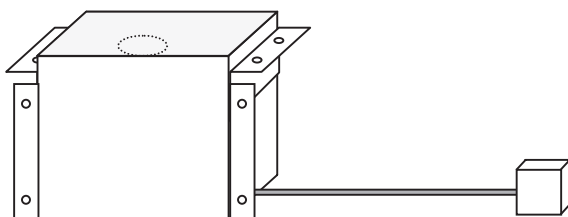
OMRON's RFID system for semiconductor device fabrication line is configured with the following units:

● Model V700-HMD13□, or V700-HMD11-1 (ID R/W head)

An ID R/W head that reads or writes data from or into the memory on ID tag without a need to contact the ID tag. It will be hereunder simply called IDRW head (or, more simply, IDRWH). It is operated independently or via a link unit.

Two differently formed IDRW head types are available:

- ① Model V700-HMD13□ features a form and data transaction performance suitable for the "undocked position" per SEMI standards.



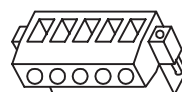
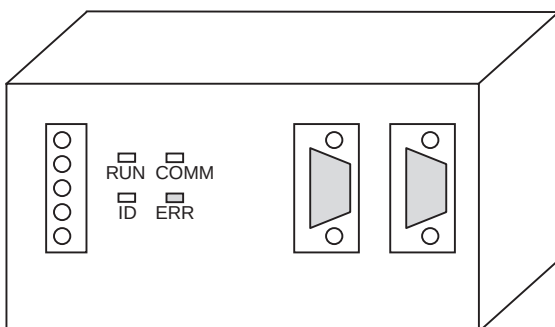
- ② Model V700-HMD11-1 features a form and data transaction performance suitable for the "docked position" per SEMI standards. It is delivered together with two mounting nuts.



Mounting nut (2 × M4)

● Model V700-L11 (ID link unit)

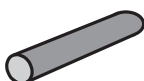
This unit allows one or more ID R/W heads to be linked to one port of an upstream controller, and will be hereunder simply called "link unit". Being driven by a 24 VDC power supply, it supplies 5 VDC power to the IDWR heads. When delivered, it includes a connector (COMBICON screw-down plug: Model XW4B-05C1-H1-D) for multi-connection ports.



Connector for multi-connection port

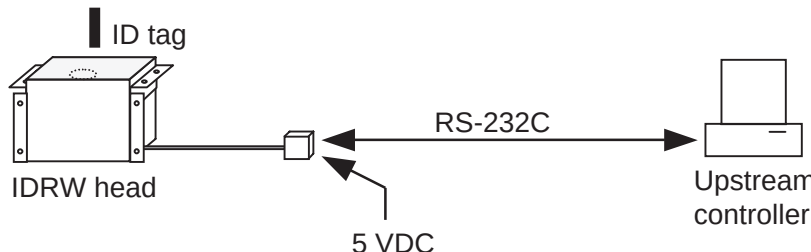
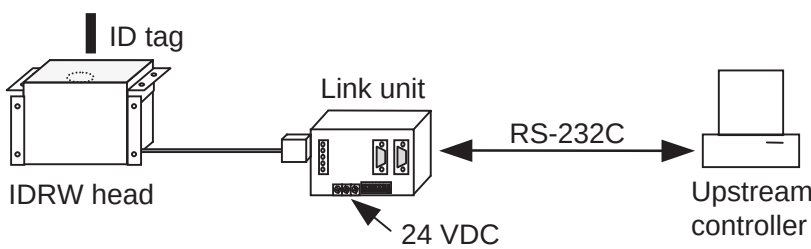
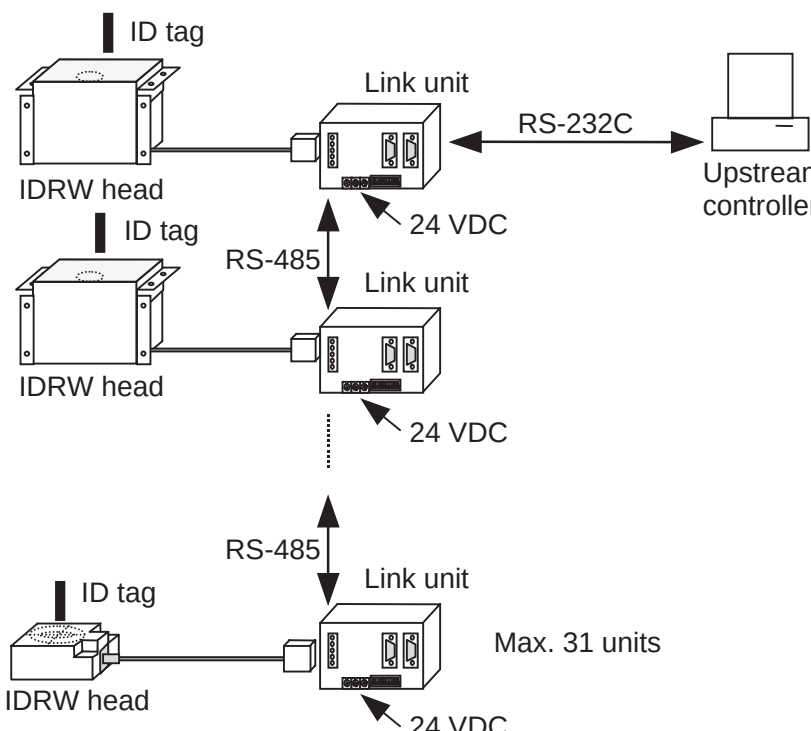
● Model V700-D23P41-1 (ID tag)

This is a round rod type ID tag that measures 3.9 mm in diameter and 25 mm in length. It contains a memory space of 240 bytes that allows a user to read or write data from or into it.



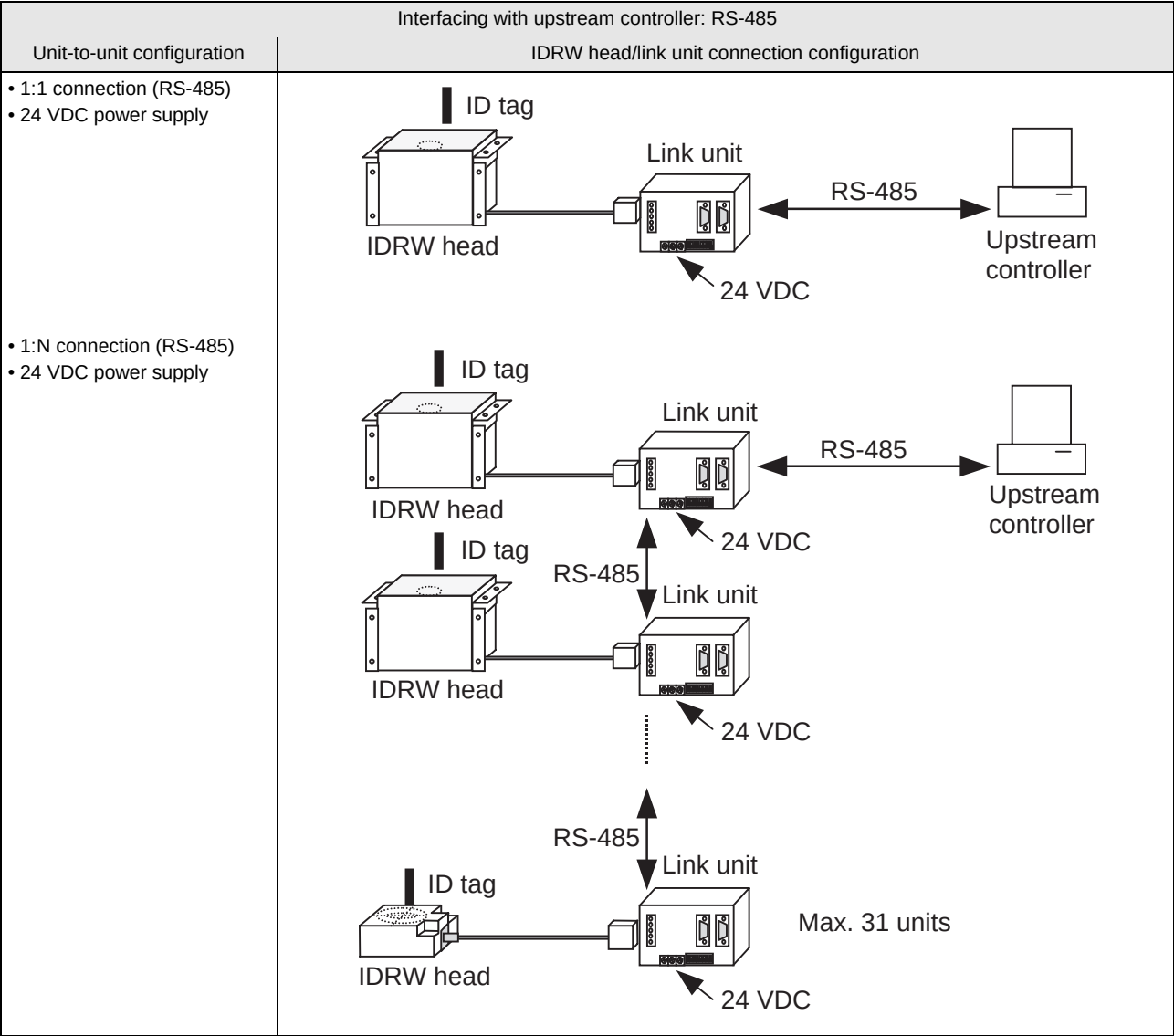
1.2 System configuration

By combining an IDRW head and a link unit, various system configurations (connection configuration, supply voltage).

Interfacing with upstream controller: RS-232C	
Unit-to-unit configuration	IDRW head/link unit connection configuration
• 1:1 connection (RS-232C) • 5 VDC power supply	 The diagram shows an IDRW head connected to an upstream controller via an RS-232C cable. A 5 VDC power supply is connected to the IDRW head. An ID tag is shown above the IDRW head.
• 1:1 connection (RS-232C) • 24 VDC power supply	 The diagram shows an IDRW head connected to a link unit. The link unit is connected to an upstream controller via an RS-232C cable. A 24 VDC power supply is connected to the link unit. An ID tag is shown above the IDRW head.
• 1:N connection (RS-232C) • 24 VDC power supply	 The diagram shows a 1:N connection configuration. Multiple IDRW heads are connected to multiple link units. The link units are connected to an upstream controller via RS-232C. A 24 VDC power supply is connected to each link unit. An ID tag is shown above each IDRW head. The text 'Max. 31 units' is shown next to the link units.

Precautions for trouble-free operation
For a 1:N connection involving a link unit, it is necessary to add an normal controlled RS signal from an upstream controller to a CS signal. The RS signal must be turned OFF within 15 msec after completion of data transmission. Otherwise, this configuration does not operate correctly. (For details, refer to Sec. 2.3.2 Interface specifications.)

By altering the connection to a link unit, it is possible to connect the link unit to an upstream controller that has RS-485 interface.



Precautions for trouble-free operation
The upstream controller must be able to be ready to receive data within 15 ms after data transmission. <u>Without this control scheme, the whole system fails to operate correctly.</u>

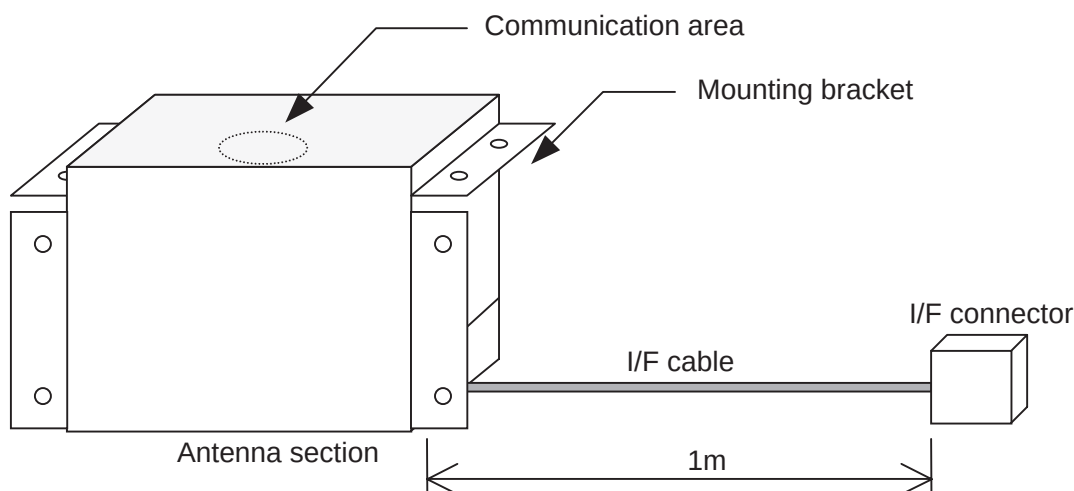
Section 2

V700-L11

User's Manual

2.1 IDR/W head: Model V700-HMD13□

2.1.1 Names and functions of various components/specifications



● Antenna section

This section reads or writes data from or into an ID tag.

● Mounting bracket

This bracket is for securing the antenna section. The vertical position of the mounting bracket can be adjusted in a range of 0 to 45 mm.

● I/F connector

This interface connector supplies power to IDR/W head, and permits data transmission with an upstream controller.

■ General specifications

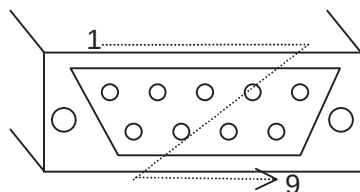
Characteristic	Specification	Comment
Supply voltage	5 VDC $\pm$ 5%	Supplied from the I/F connector
Current consumption	400 mA max.	When 5 VDC is input: approx. 8 A max. with rush current
Dimensions	44.8 $\times$ 149.8 $\times$ 73 mm	Except for cable
Cable length	1 m (dia. 6 mm)	Can be extended to 4 m in conjunction with Model V700-L11
Protection rating	IP30 (IEC 60529)	
Operating ambient temperature	0 to +40°C	No freezing
Operating ambient humidity	35 to 85%RH	No dew condensation
Storage ambient temperature	-15 to +50°C	No freezing
Storage ambient humidity	35 to 85%RH	No dew condensation
Mounting system	Screwed down at four points.	Capable of mounting to sheet metal*

* Be sure to ground the sheet metal that accepts the IDR/W head by class D earth work (grounding resistance of 100 Ω or less, diameter of grounding conductor of 1.6 mm or greater).

2.1.2 Interface specifications (same as with Model V700-HMD11-1)

Characteristic		Specification				
Connector specification		9-pin D-SUB connector plug, with M2.6 lock screws				
Power supply section	Power supply	5 VDC±5%				
Communications section	Communication standard	RS-232C				
	Synchronization	Asynchronous mode, start-stop synchronization				
	Communications control standard	OMRON original 1:1 protocol				
	Baud rate (fixed)	9600 bps				
	Character format (fixed)	Start bit	Data bit	Parity bit	Stop bit	Total
		1	8	Even	1	11
	Error control	Even parity				

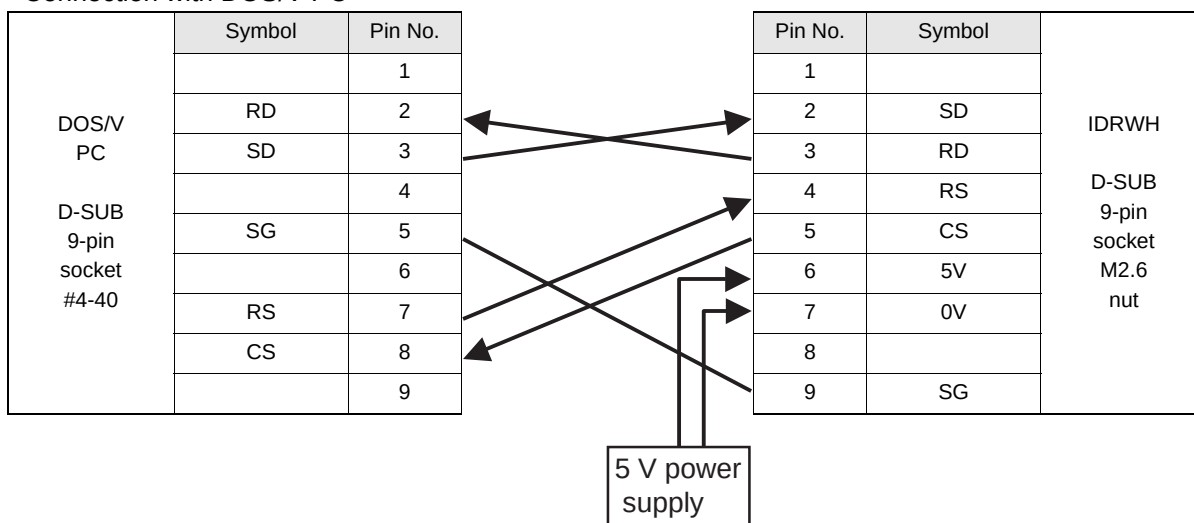
(Pin arrangement)



Pin No.	Signal name	Symbol	Direction	Comment
1				
2	Send data	SD	Input	
3	Receive data	RD	Output	
4	Request send	RS	Input	
5	Clear to send	CS	Output	Normally ON
6	+5 V input	5V	Input	5 VDC±5%
7	0 V input	0V	Input	Internally connected to SG
8				
9	Signal ground	SG	---	Internally connected to 0V

■ Cable connection example

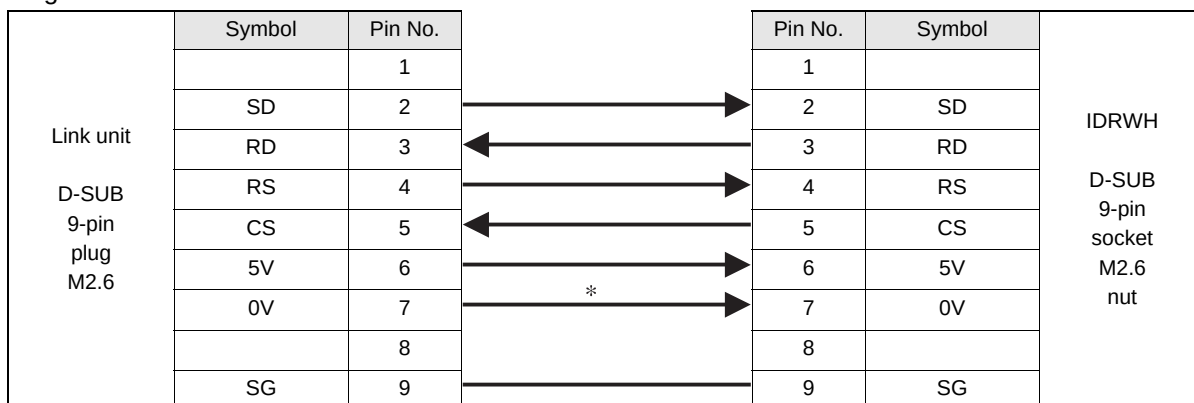
<Connection with DOS/V PC>



- Recommended cable : CO-MA-VV-SB 5PX28AWG (Hitachi Cable, Ltd.)
- Recommended connector : <IDRWH side> socket-Model XM2D-0901 (OMRON),
hood-Model XM2S-0911 (OMRON),
lock-Model XM2Z-0001 (OMRON)
: <DOS/V PC side> socket-Model XM2D-0901 (OMRON),
hood-Model XM2S-0911(OMRON)
- Recommended 5 V power supply : <for AC input> Model S82S-0705 (OMRON),
<for DC input> Model S82S-7705 (OMRON)

<Connection with link unit>

The IDR/W head can be directly connected to the ID connection port on the link unit. When considering extending the cable, use the cable whose configuration is specified below. Limit the whole cable length to 4 m.



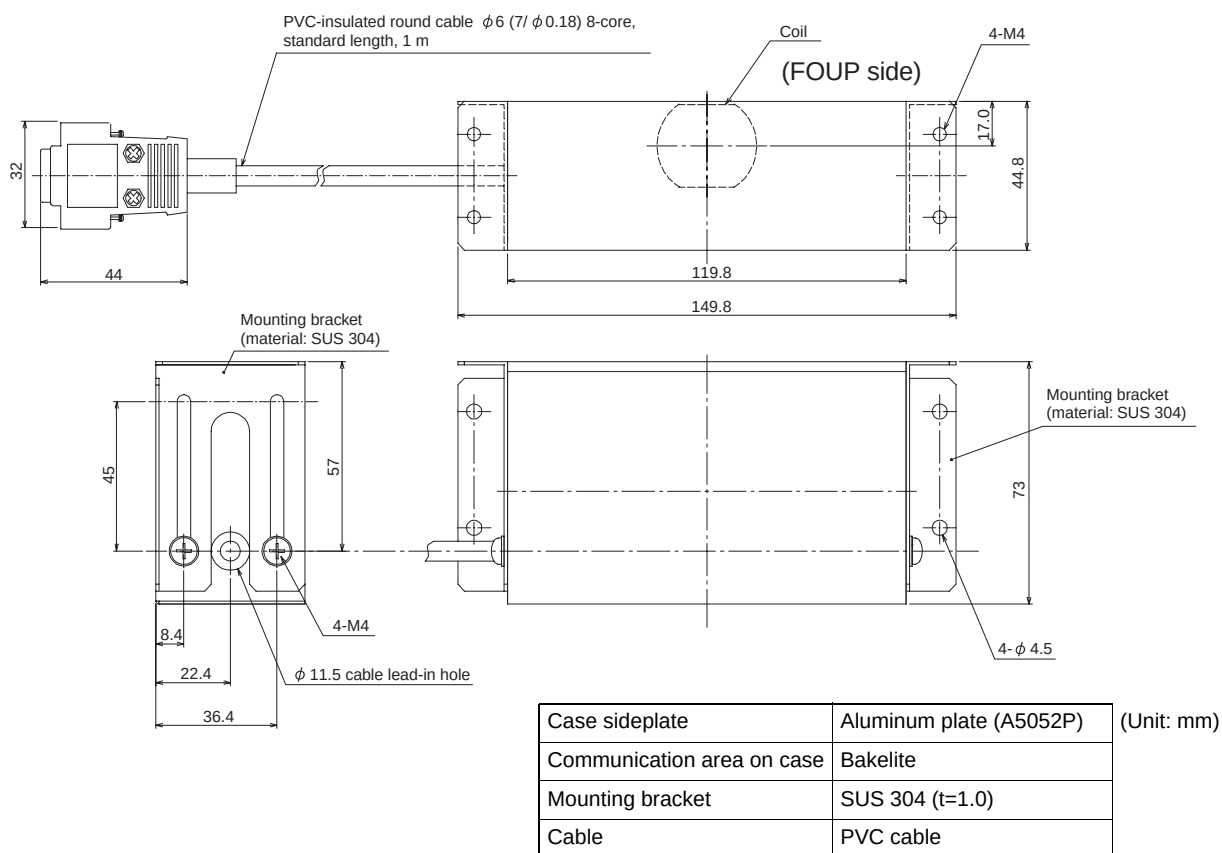
- * For the 5 V/0 V power line, use a cable whose conductor size is AWG22 or greater.
- Recommended cable : OTSC-8PVB-2 No. 22AWG (Onamba)
- Recommended connector : <IDRWH side> socket-Model XM2D-0901 (OMRON),
hood-Model XM2S-0911 (OMRON),
lock-Model XM2Z-0001 (OMRON)
: <Link unit side> plug-Model XM2A-0901 (OMRON),
hood-Model XM2S-0911(OMRON)



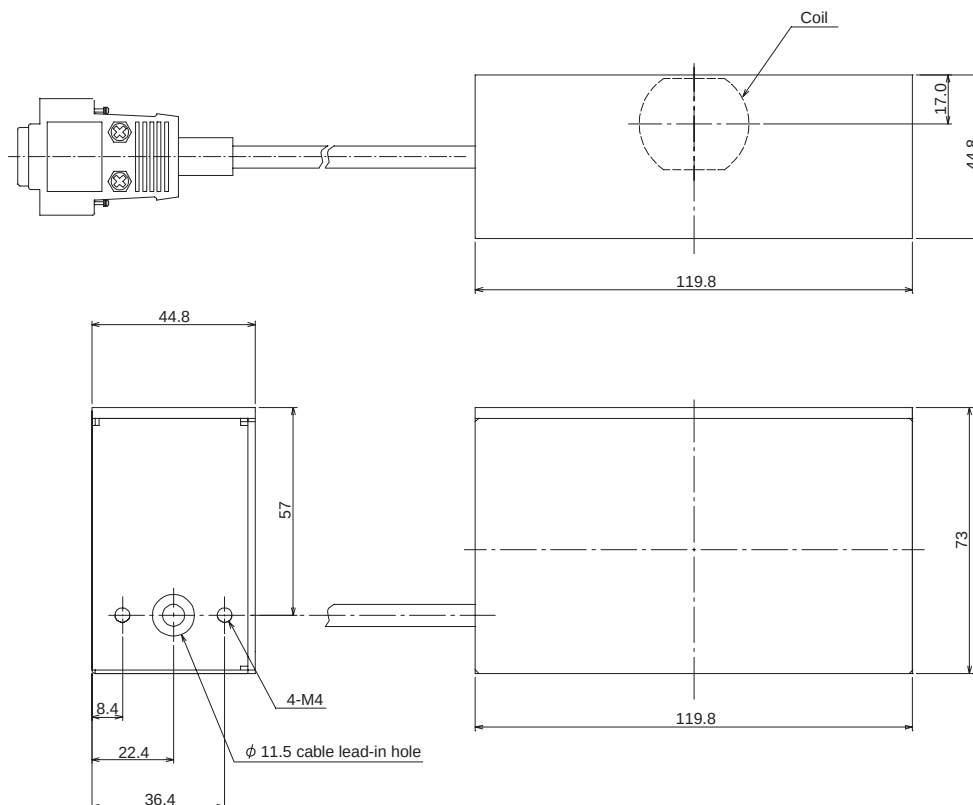
Wrong wiring connection can lead to a malfunction of the equipment. Be fully sure of the correct wiring connections.

2.1.3 Dimensional drawing and mounting method

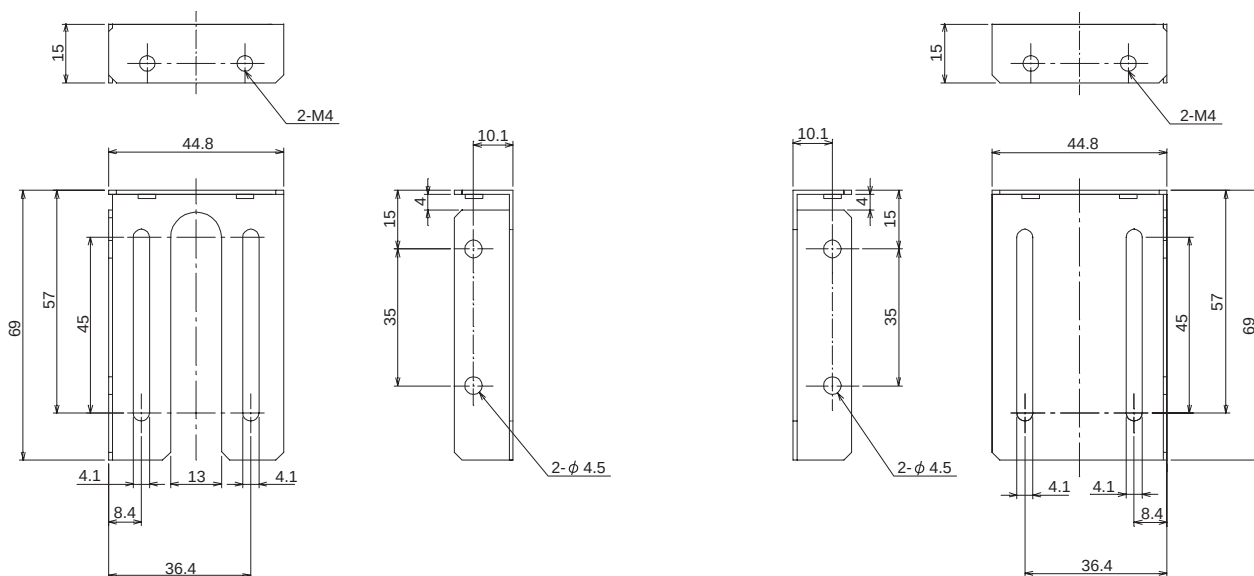
● IDR/W head with mounting brackets installed



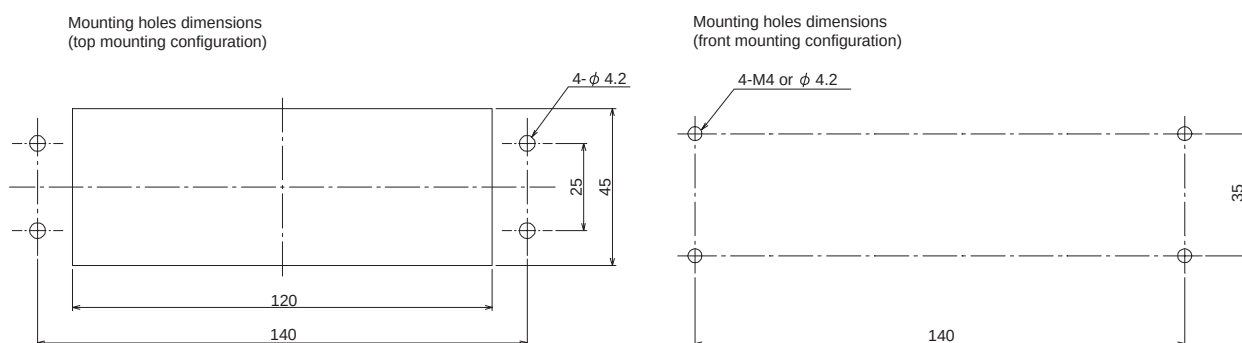
● IDR/W head proper



● Mounting brackets



■ Mounting hole drawing



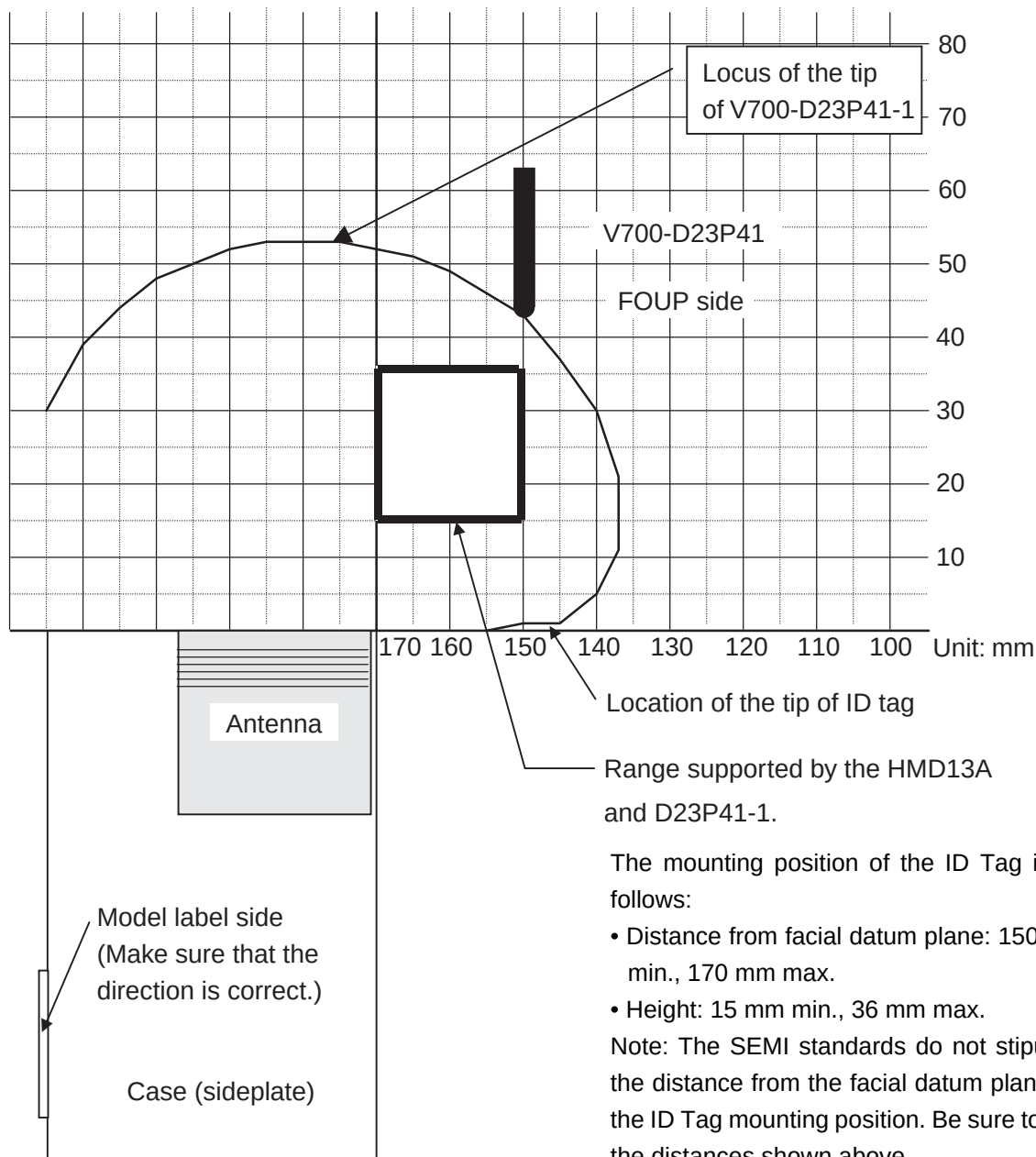
* Be sure to limit the tightening torque for the M4 screws and bracket mounting screws to 1.2 N-m or less.



In the installation work, do not exert an excessively strong force to the case or deform the case. Otherwise, the IDR/W head may fail to perform as designed.

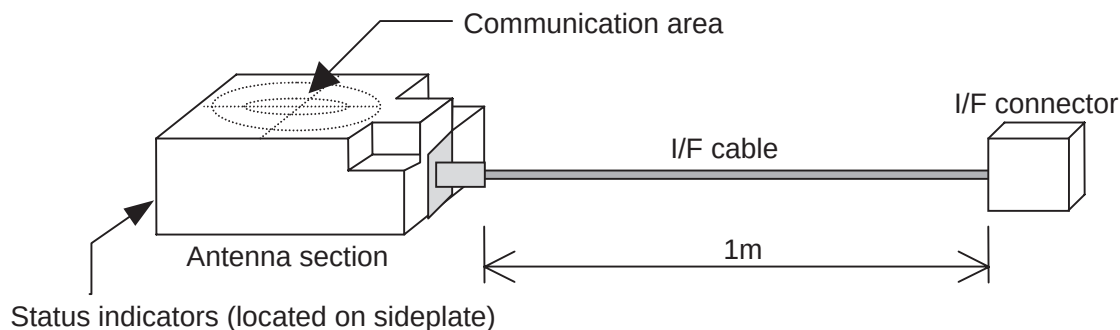
2.1.4 Communication performance (information only)

Communication area (Model V700-HMD13□ vs. Mode V700-D23P41-1)



2.2 IDR/W head: Model V700-HMD11-1

2.2.1 Names and functions of various components/specifications



● Antenna section

This section reads or writes data from or into an ID tag.

● I/F connector

This interface connector supplies power to IDR/W head, and permits data transmission with an upstream controller.

● Status indicators

Green	Remains lit during data transaction with an ID tag.
Red	Lights if data transaction with an ID tag has failed to complete normally.

■ General specifications

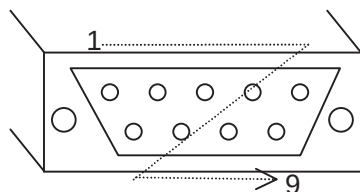
Characteristic	Specification	Comment
Supply voltage	5 VDC $\pm$ 5%	Supplied from the I/F connector
Current consumption	250 mA max.	When 5 VDC is input: approx. 4 A max. with rush current
Dimensions	40 × 53 × 23 mm	Except for cable
Cable length	1 m (dia. 6 mm)	Can be extended to 4 m in conjunction with Model V700-L11
Protection rating	IP67 (per IEC 60529) IP67G (per JEM 1030)	The connector is not resistant to water or oil.
Operating ambient temperature	−10 to +55°C	No freezing
Operating ambient humidity	25 to 85%RH	No dew condensation
Storage ambient temperature	−25 to +65°C	No freezing
Storage ambient humidity	25 to 95%RH	No dew condensation
Mounting system	Screwed down at two points with M4.	Capable of mounting to sheet metal*

* Be sure to ground the sheet metal that accepts the IDR/W head by class D earth work (grounding resistance of 100 Ω or less, diameter of grounding conductor of 1.6 mm or greater).

2.2.2 Interface specifications (same as with Model V700-HMD13□)

Characteristic		Specification				
Connector specification		9-pin D-SUB connector plug, with M2.6 lock screws				
Power supply section	Power supply	5 VDC $\pm$ 5%				
Communications section	Communication standard	RS-232C				
	Synchronization	Asynchronous mode, start-stop synchronization				
	Communications control standard	OMRON original 1:1 protocol				
	Baud rate (fixed)	9,600 bps				
	Character format (fixed)	Start bit	Data bit	Parity bit	Stop bit	Total
		1	8	Even	1	11
	Error control	Even parity				

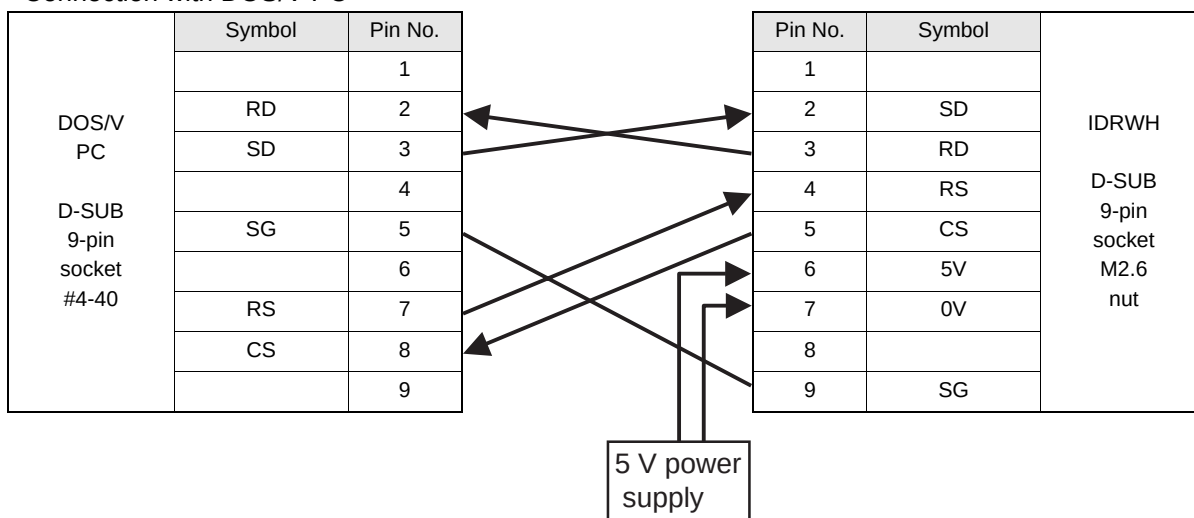
(Pin arrangement)



Pin No.	Signal name	Symbol	Direction	Comment
1				
2	Send data	SD	Input	
3	Receive data	RD	Output	
4	Request send	RS	Input	
5	Clear to send	CS	Output	Normally ON
6	+5 V input	5V	Input	5 VDC $\pm$ 5%
7	0 V input	0V	Input	Internally connected to SG
8				
9	Signal ground	SG	---	Internally connected to 0V

■ Cable connection example

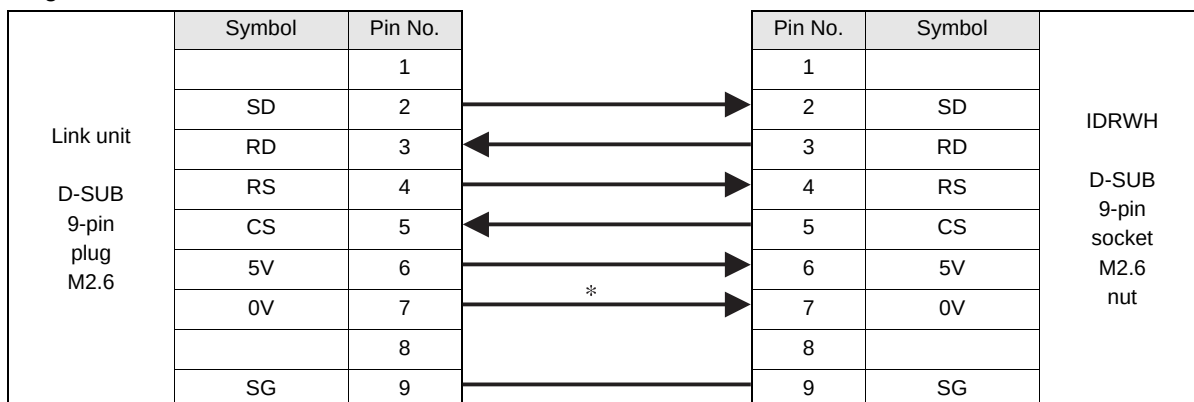
<Connection with DOS/V PC>



- Recommended cable : CO-MA-VV-SB 5PX28AWG (Hitachi Cable, Ltd.)
- Recommended connector : <IDRWH side> socket-Model XM2D-0901 (OMRON),
hood-Model XM2S-0911 (OMRON),
lock-Model XM2Z-0001 (OMRON)
: <DOS/V PC side> socket-Model XM2D-0901 (OMRON),
hood-Model XM2S-0911(OMRON)
- Recommended 5 V power supply : <for AC input> Model S82S-0705 (OMRON),
<for DC input> Model S82S-7705 (OMRON)

<Connection with link unit>

The IDR/W head can be directly connected to the ID connection port on the link unit. When considering extending the cable, use the cable whose configuration is specified below. Limit the whole cable length to 4 m.



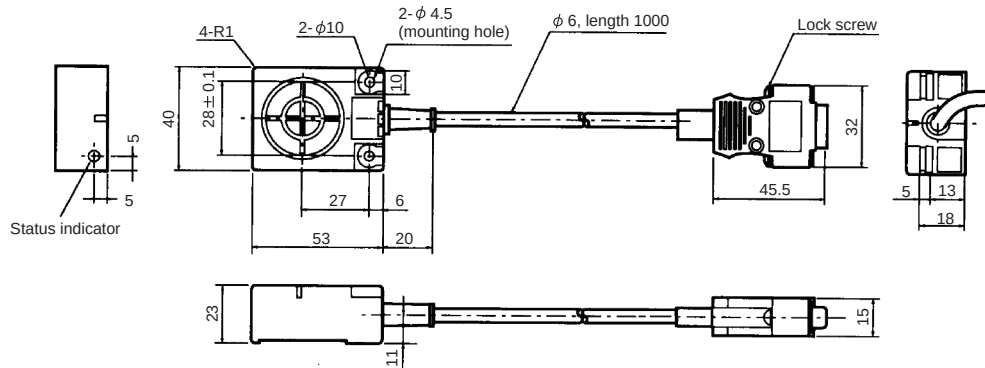
- * For the 5 V/0 V power line, use a cable whose conductor size is AWG22 or greater.
- Recommended cable : OTSC-8PVB-2 No. 22AWG (Onamba)
- Recommended connector : <IDRWH side> socket-Model XM2D-0901 (OMRON),
hood-Model XM2S-0911 (OMRON),
lock-Model XM2Z-0001 (OMRON)
: <Link unit side> plug-Model XM2A-0901 (OMRON),
hood-Model XM2S-0911(OMRON)



Wrong wiring connection can lead to a malfunction of the equipment. Be fully sure of the correct wiring connections.

2.2.3 Dimensional drawing and mounting method

Model V700-HMD11-1

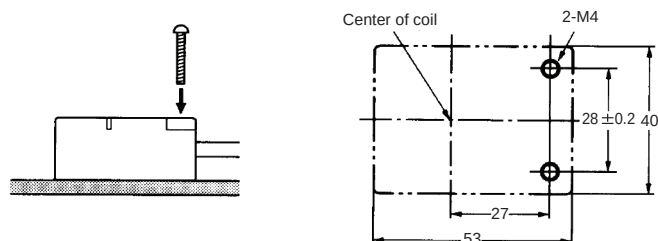


Case material	ABS resin
Filler resin	Epoxy resin
Cable	PVC (oil-resistant)

(Unit: mm)

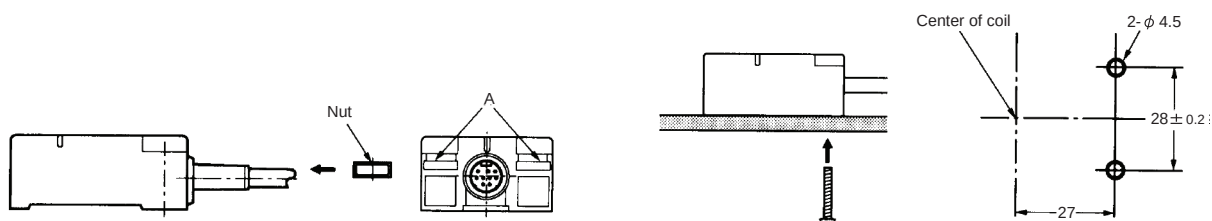
■ Mounting method

(1) Front mounting



(2) Back mounting

Insert the enclosed nuts into areas A, and mount the head.

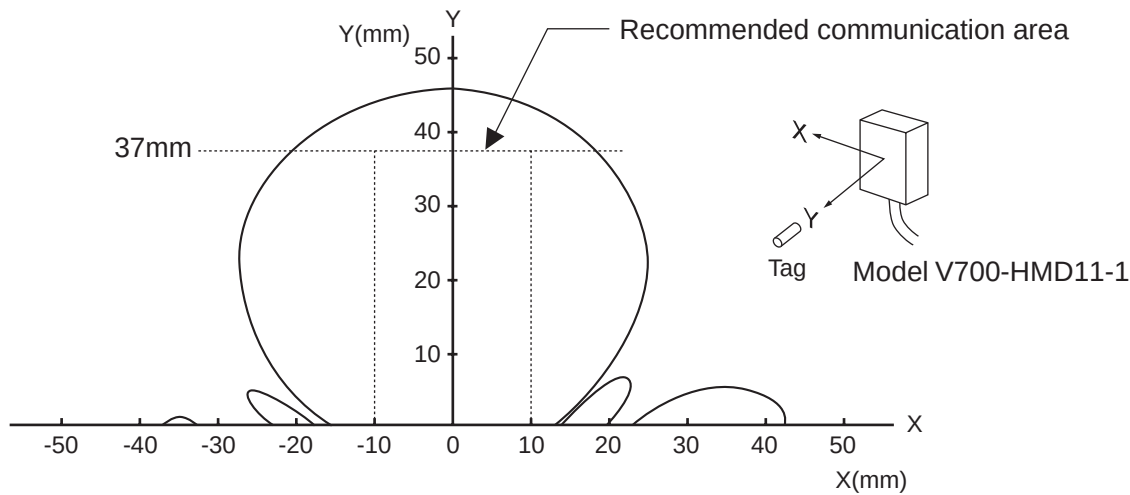


* Be sure to limit the tightening torque for the M4 screws to 1.2 N-m or less.

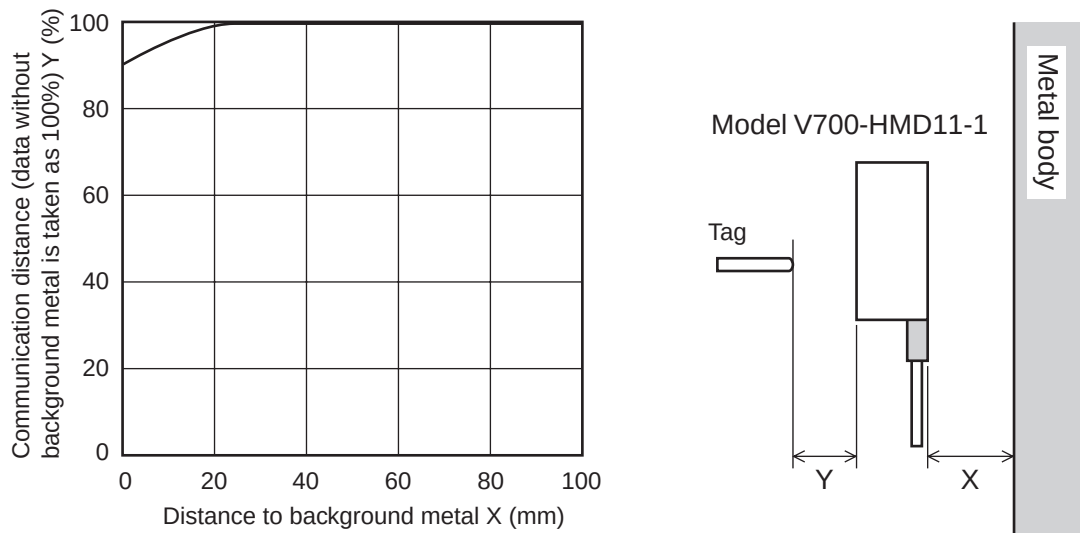
* Do not apply an organic solvent such as thread glue to the threads. Otherwise, cracking can occur on the case.

2.2.4 Communication performance (information only)

● Communication area (Model V700-HMD11-1 vs. Mode V700-D23P41)

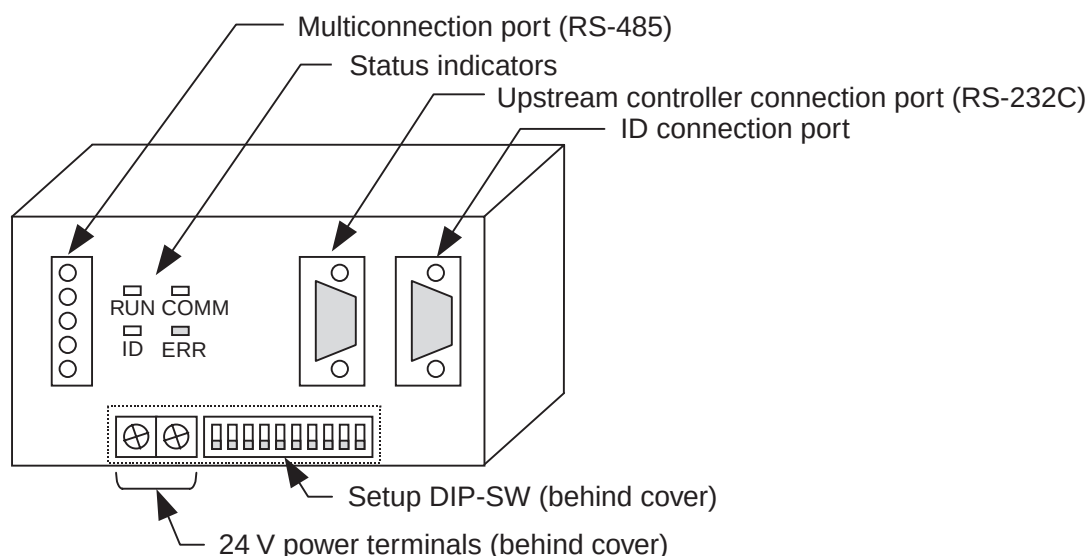


● Effect of background metal (Model V700-HMD11-1 vs. Mode V700-D23P41)



2.3 ID link unit: Model V700-L11

2.3.1 Names and functions of various components/specifications



● Upstream controller connection port (RS-232C)

This port is for connection to the CIDRW controller according to RS-232C interface standard, and a dust cover has been factory-installed to it. Remove the cover before operating the link unit.

● Multiconnection port

If two or more IDRW heads are connected to one RS-232C port of an upstream controller, this multiconnection port is connected to a multiconnection port on another link unit. An RS-485 port (if any) on the upstream controller is connected to this port, then this port functions as an upstream controller connection port. If the multiconnection port is used as an upstream controller connection port, the upstream controller connection port (RS-232C) on this link unit is inoperative. This multiconnection port also contains a GR (frame ground) terminal.

● ID connection port

A port dedicated to connection of an IDRW head-either Model V700-HMD13□ or Model V700-HMD11-1.

● Setup DIP-SW

This switch array allows the operator to assign ID Nos. to IDRW heads and define various operating conditions.

● Status indicators

Four indicator lamps (RUN, COMM, ID, ERR) indicate the current operating status of the link unit.

RUN	Remains stably lit as long as the link unit is operating normally.
COMM	Remains lit during data transaction with an upstream controller.
ID	Remains lit during data transaction with an IDRW head.
ERR	Lights when a fault is detected during data transaction with an upstream controller or IDRW head.

⚠ CAUTION



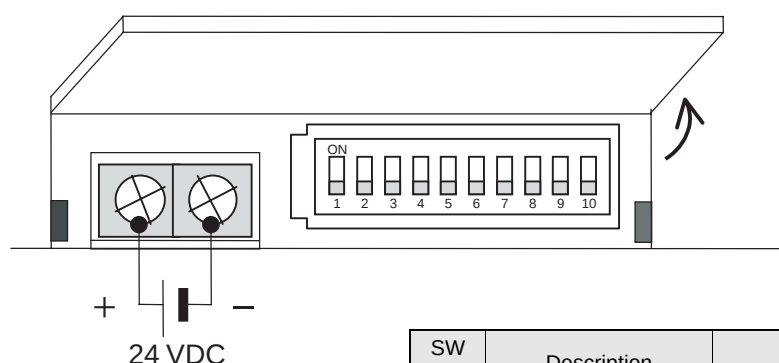
Regardless of whether or not the multiconnection port is used, be sure to ground the GR (frame ground) by class D earth work (grounding resistance of 100 Ω or less, diameter of grounding conductor of 1.6 mm or greater). Otherwise, the link unit may fail to perform as designed.

General specifications

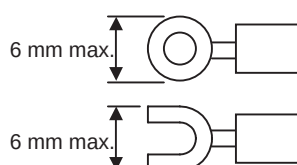
Characteristic	Specification	Comment
Supply voltage	24 VDC, +10%, -15%	Supplied from the power terminals
Current consumption	250 mA max.	Approx. 10 A max. with rush current
Dimensions	110 × 65 × 64 mm	Except for mounting hook
Protection rating (IEC 60529)	IP20	
Operating ambient temperature	0 to +40°C	No freezing
Operating ambient humidity	35 to 85%RH	No dew condensation
Storage ambient temperature	-15 to +50°C	No freezing
Storage ambient humidity	35 to 85%RH	No dew condensation
Mounting system	Secured with two M4 screws.	

24 V power terminals/setup DIP-SW

Open the cover to access 24 V power terminals and setup DIP-SW.



- For wiring connections, use compression rings.
- Use the M3 compression rings illustrated below.



SW No.	Description	Meaning (Content within a box ☐ represents factory-setting)
1	Node No. 1	☐ 1 to 31 No. 1 is LSB, and No. 5 is MSB. (For correspondence between DIP-SW settings and node Nos., see the table in the next page.)
2	Node No. 2	
3	Node No. 3	
4	Node No. 4	
5	Node No. 5	
6	Baud rate setting 1	38400/ 9200/ ☐ 9600/4800bps
7	Baud rate setting 2	[ON,ON] [ON,OFF] [OFF,OFF] [OFF,ON] :[No7,No6]
8	Reserved	Always leave in OFF position.
9	Reserved	Always leave in OFF position.
10	RS-485 terminator	ON/ ☐ OFF

- Recommended 24 V power supply: Model S82K-03024 (OMRON)
- Set the RS-485 terminator setting to ON for the link units on both ends of multidrop, and to OFF for other units. If only one link unit is operated, set the terminator setting to ON.



Wrong wiring connection can lead to a malfunction of the equipment. Be fully sure of the correct wiring connections.

- Assign a unique node No. to an IDRW head within a given subsystem.

[DIP-SW setting vs. Node No. correspondence table]

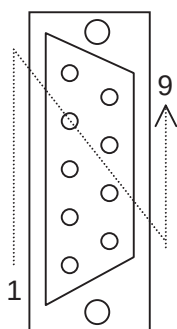
Switch No. in setup DIP-SW					Node No.
1	2	3	4	5	
OFF	OFF	OFF	OFF	OFF	01
ON	OFF	OFF	OFF	OFF	02
OFF	ON	OFF	OFF	OFF	03
ON	ON	OFF	OFF	OFF	04
OFF	OFF	ON	OFF	OFF	05
ON	OFF	ON	OFF	OFF	06
OFF	ON	ON	OFF	OFF	07
ON	ON	ON	OFF	OFF	08
OFF	OFF	OFF	ON	OFF	09
ON	OFF	OFF	ON	OFF	10
OFF	ON	OFF	ON	OFF	11
ON	ON	OFF	ON	OFF	12
OFF	OFF	ON	ON	OFF	13
ON	OFF	ON	ON	OFF	14
OFF	ON	ON	ON	OFF	15
ON	ON	ON	ON	OFF	16
OFF	OFF	OFF	OFF	ON	17
ON	OFF	OFF	OFF	ON	18
OFF	ON	OFF	OFF	ON	19
ON	ON	OFF	OFF	ON	20
OFF	OFF	ON	OFF	ON	21
ON	OFF	ON	OFF	ON	22
OFF	ON	ON	OFF	ON	23
ON	ON	ON	OFF	ON	24
OFF	OFF	OFF	ON	ON	25
ON	OFF	OFF	ON	ON	26
OFF	ON	OFF	ON	ON	27
ON	ON	OFF	ON	ON	28
OFF	OFF	ON	ON	ON	29
ON	OFF	ON	ON	ON	30
OFF	ON	ON	ON	ON	31
ON	ON	ON	ON	ON	Prohibited

2.3.2 Interface specifications

(1) Upstream connector connection port

Characteristic	Specification				
Connector specification	9-pin D-SUB connector plug, with #4-40UNC lock screws				
Communication standard	RS-232C				
Synchronization	Asynchronous mode, start-stop synchronization				
Communications control standard	OMRON original 1:N protocol				
Baud rate	38400, 19200, 9600, 4800 bps (selectable with DIP-SW)				
Character format	Start bit	Data bit	Parity bit	Stop bit	Total
	1	8	None	1	10
Error control	FCS (Frame Check Sequence), vertical parity				
Total cable length	15 m max.				

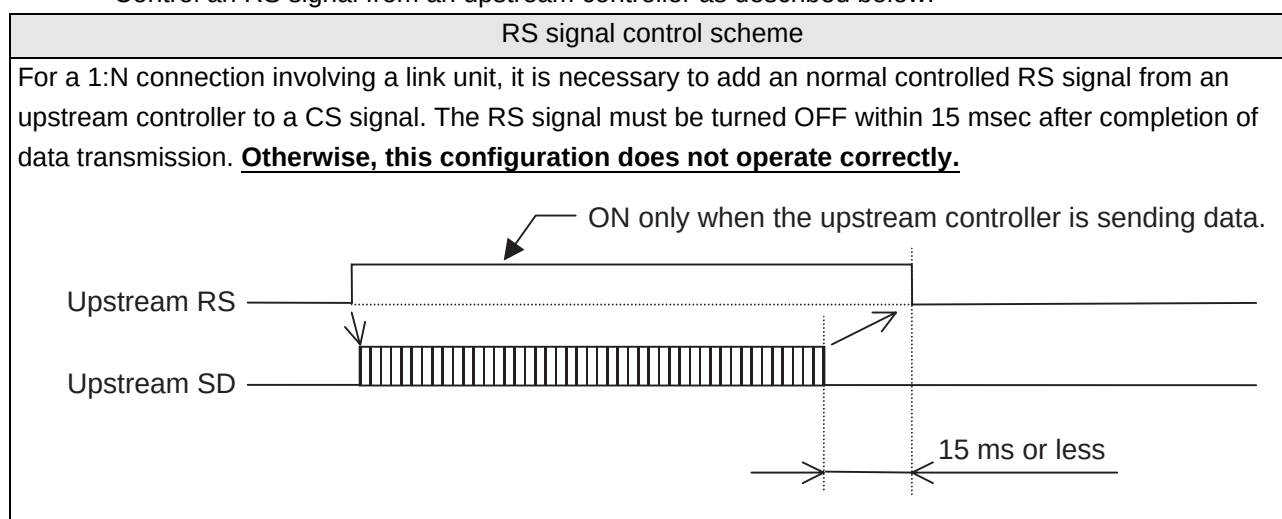
(Pin arrangement)



Pin No.	Signal name	Symbol	Direction	Comment
1				
2	Receive data	RD	Input	
3	Send data	SD	Output	
4	---	---	---	
5	Signal ground	SG	---	
6				
7	Request send	RS	Output	Normally OPEN during service
8	Clear to send	CS*	Input	
9	---	---	---	

NOTE: The base of connector does not continue to the GR (frame ground).

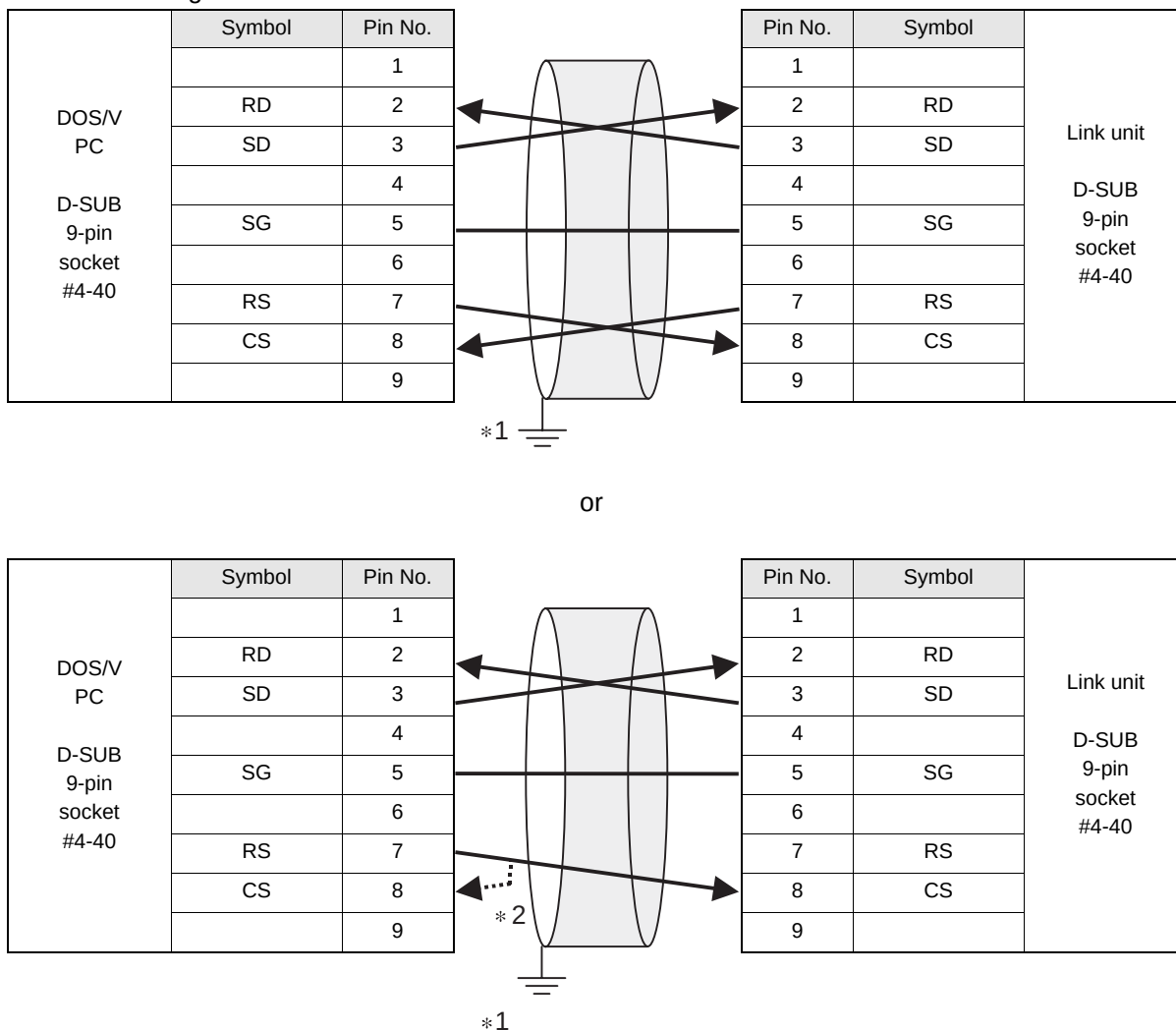
* Control an RS signal from an upstream controller as described below.



■ Cable connection example

<Connection with DOS/V PC>

Connect the link unit to the DOS/V PC using the cable whose configuration is specified below. Limit the whole cable length to 15 m.



*1 Ground the shielded cable either on DOS/V PC side or link unit side.

*2 If CS function is used on the DOS/V PC side, a loop-back line is necessary.

- Recommended cable: CO-MA-VV-SB 5PX28AWG (Hitachi Cable, Ltd.)
- Recommended connector: socket-Model XM2D-0901 (OMRON), hood-Model XM2S-0913 (OMRON)

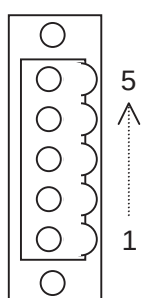


Wrong wiring connection can lead to a malfunction of the equipment. Be fully sure of the correct wiring connections.

(2) Multiconnection port

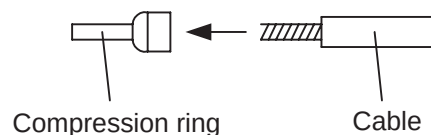
Characteristic	Specification				
Connector	Special 5-pin connector (included in link unit)				
Communication standard	RS-485				
Synchronization	Asynchronous mode, start-stop synchronization				
Communications control standard	OMRON original 1:N protocol				
Baud rate	38400, 19200, 9600, 4800 bps (selectable with DIP-SW)				
Character format	Start bit	Data bit	Parity bit	Stop bit	Total
	1	8	None	1	10
Error control	FCS				
Cable length	Max. total length 50 m				

(Pin arrangement)



Pin No.	Name	Comment
5	–	Internally connected to pin 2.
4	+	Internally connected to pin 1.
3	GR	Frame ground
2	–	Internally connected to pin 5.
1	+	Internally connected to pin 4.

- Recommended cable
RS-485 signal line: Tatei Densen MVVS 2CX0.5SQ
Frame ground line: Cable rated at AWG 22 to 20
- Recommended compression ring
Phoenix Contact AI0.5-8WH



Insert the cable and crimp.

- * The following product is recommended as a compression ring for connecting two cables to one terminal.

Phoenix Contact AI-TWIN2×0.5-8WH

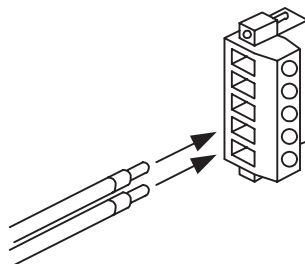
Use the product below as a crimping tool for crimping the compression ring.

Phoenix Contact CRIMPFOX UD6

■ How to connect cables

- ① Fit a compression ring to the stripped section of each cable.

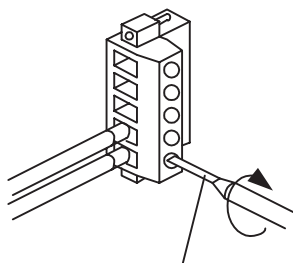
Next, being sure of the connector orientation, insert each cable into a corresponding hole on the connector.



- ② Securely fasten each cable using the cable locking screw on the connector.

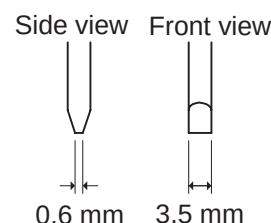
An ordinary screwdriver whose shank is tapered at the tip does not go all the way into the hole. Use a miniature flat-blade screwdriver with a straight shank.

Tighten the cable locking screws at an appropriated tightening torque (approx. 0.5 N-m).



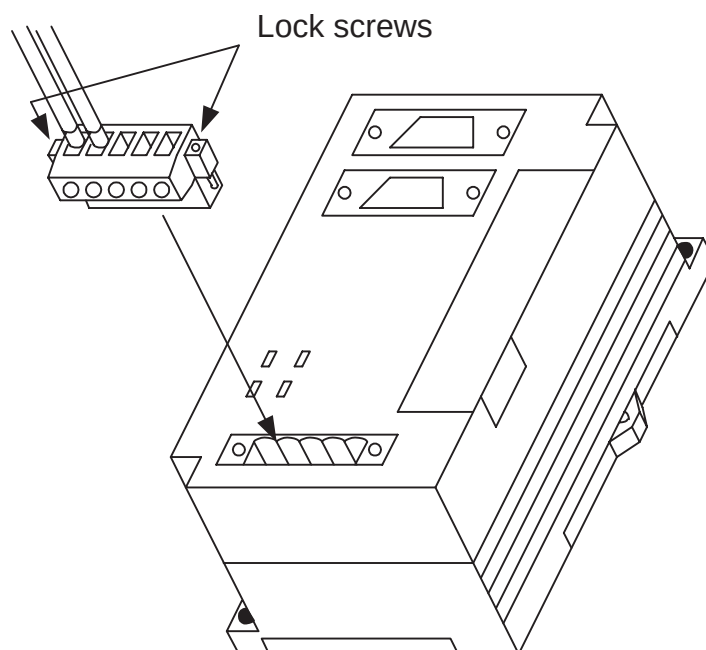
Miniature flat-blade screwdriver with straight shank

The following purpose-built screwdriver is available:
OMRON: Model XW4Z-00C
Form of tip



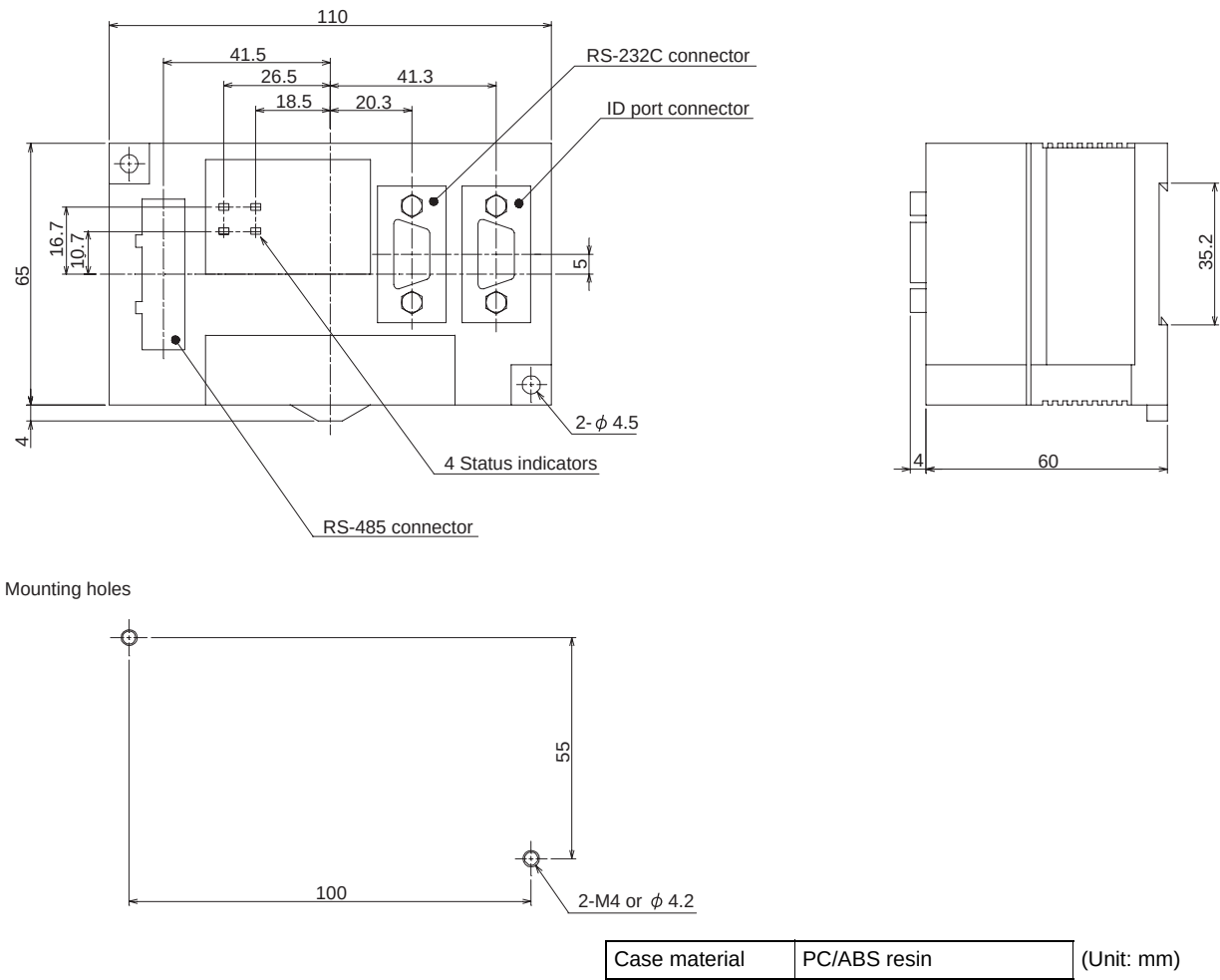
- ③ Connect the connector to the link unit together with the cables.

Match the orientation of link unit side connector with that of cable side connector, insert the cable side connector all the way, and then tighten the connector lock screws.



- ④ When removing the connector, fully loosen the two lock screws and draw out it straight by holding the protrusions on connector. If the connector does not easily come loose, draw it out while holding down the link unit proper.

2.3.3 Dimensional drawing and mounting method



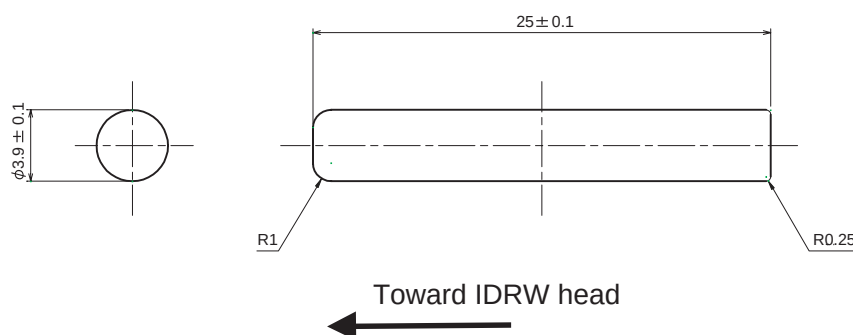
- * Be sure to limit the tightening torque for the M4 screws to 1.2 N-m or less.
- * Do not apply an organic solvent such as thread glue to the threads. Otherwise, cracking can occur on the case.

2.4 ID tag: Model V700-D23P41-1

■ General specifications

Characteristic	Specification
Memory capacity	240 bytes (user area)
Memory type	EEP-ROM
Data retention time	10 years after data writing
Number of overwrites	100,000 times per address
Operating ambient temperature	–25 to +70°C (no freezing)
Operating ambient temperature	–40 to +110°C (no freezing)
Storage ambient temperature	–40 to +110°C (no freezing)
Operating ambient humidity	35 to 95%RH (no dew condensation)
Protection rating	IP67 (IEC 60529)
Vibration resistance	Endurance 10 to 2000 Hz, single amplitude 0.75 mm Acceleration of 150 m/s ² is applied in each of X, Y and Z directions each for 15 minutes, and this sequence is repeated 10 times, thereby the ID tag must not develop any irregularity.
Shock resistance	An impact, that is, acceleration of 500 m/s ² , is applied three times in each of X, Y and Z directions, and this sequence is repeated 18 times, thereby the ID tag must not develop any irregularity.
Materials	Case: PBT resin, filler: epoxy resin
Mass	Approx. 1 g

■ Dimensional drawing



The ID tag Model V700-D32P41-1 has directionality, and its communication performance varies depending on how it is oriented. Therefore, be sure to use it in correct orientation.

MEMO

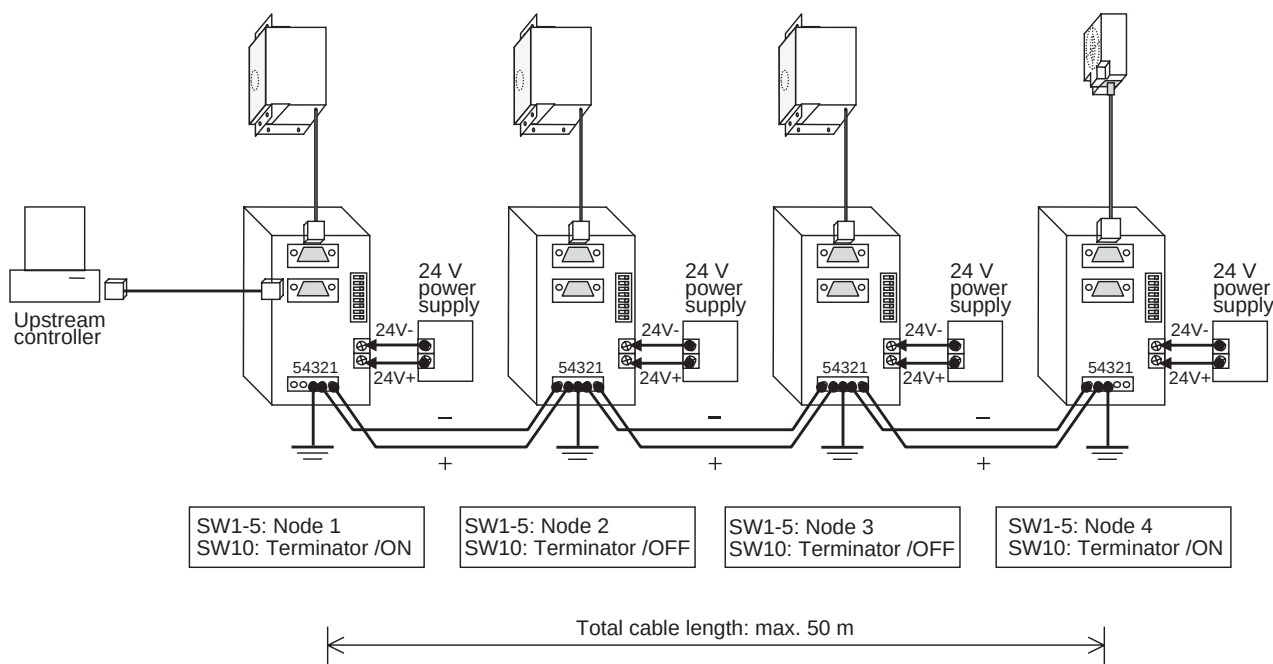
Section 3

System Configuration Examples

3.1 Configuration based on upstream controller and RS-232C 34

3.2 Configuration based on upstream controller and RS-485 35

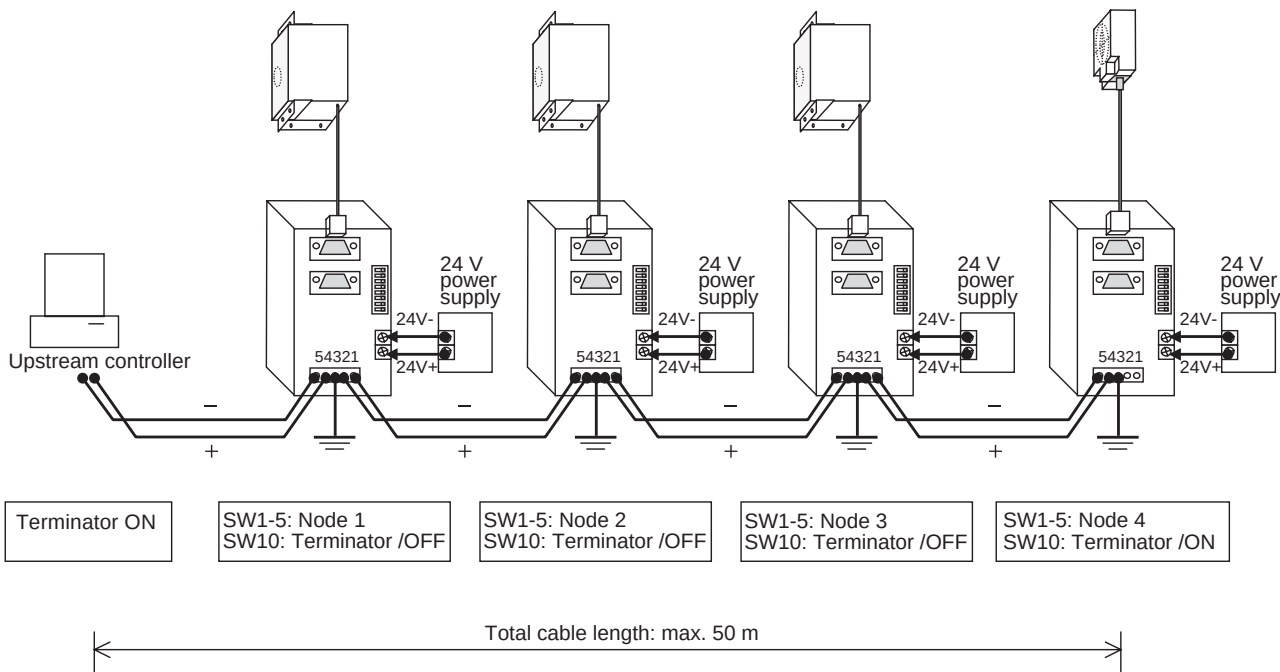
3.1 Configuration based on upstream controller and RS-232C



Precautions for trouble-free operation

For a 1:N connection involving a link unit, it is necessary to add an normal controlled RS signal from an upstream controller to a CS signal. The RS signal must be turned OFF within 15 msec after completion of data transmission. **Otherwise, this configuration does not operate correctly.**

3.2 Configuration based on upstream controller and RS-485



Precautions for trouble-free operation
The upstream controller must be able to be ready to receive data within 15 ms after data transmission. <u>Without this control scheme, the whole system fails to operate correctly.</u>

MEMO

Section 4

Data Read/Write with ID Tag

4.1 Operating principle	38
4.2 Command/response frame structure	39
4.3 Response code list	41
4.4 Command types and response <applicable to OMRON original 1:1 protocol>	42
 4.4.1 Read	42
 4.4.2 Write	43
 4.4.3 Same write	44
 4.4.4 Byte write	45
 4.4.5 Test	46

4.1 Operating principle

A memory space of 240 bytes is assigned to an ID tag user. With this memory space, an 8-byte area (such as 00h-07h, 08h-0Fh...) is handled as one page.

The IDRW head can interact with the ID tag memory as described below.

① Data read

In this operation, data is read from the memory in ID tag. The operator can specify up to 16 arbitrary pages as a read area.

② Data write

In this operation, data is written into the memory in ID tag. The operator can specify up to 16 arbitrary pages as a write area. When intending to write same data to all the pages (same write), there is no limitation about the number of target pages. It is also possible to write a given block of data in steps of bytes (byte write).

■ Memory map (00h-EFh represent addresses)

Page	8 bytes/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	58h	59h		...	...			5Fh
13	60h	61h		...	...			67h
14	68h	69h		...	...			6Fh
15	70h	71h		...	...			77h
16	78h	79h		...	...			7Fh
*	:	:						:
	:	:						:
29	E0h	E1h						E7h
30	E8h	E9h	EAh	EBh	ECh	EDh	EEh	EFh

* When the Model V700-HMD13 is used in the system, the data segments assigned to pages 13 through 30 have operational limitations. For further information, refer to "Limitations about Model V700-HMD13" in the earlier part of this manual. The Model V700-HMD13A does not have such limitations.

4.2 Command/response frame structure

① Direct connection to IDRW head-OMRON original 1:1 protocol

■ Command frame structure

Command code	Parameter 1	...	Parameter n	CR
:	:	:	:	ODh

* Arrange data transmission so that an inter-character spacing is less than 2 seconds. A spacing in excess of 2 seconds will trigger a command error.

● Command code

A command code determines the action taken by an IDRW head. The available command codes are as follows:

Name	No.	Description
Read	"0100"	Once receiving this command, the IDRW head communicates with an ID tag and reads the data of a specified page. It is possible to select up to 16 arbitrary pages.
Write	"0200"	Once receiving this command, the IDRW head communicates with an ID tag and writes the data into a specified page. It is possible to select up to 16 arbitrary pages.
Same write	"0300"	Once receiving this command, the IDRW head communicates with an ID tag and writes same data page by page into specified pages.
Byte write	"0400"	Once receiving this command, the IDRW head communicates with an ID tag and writes the data into an area that is defined by a starting address and number of bytes. The maximum allowable bytes are 128 bytes.
Test	"10"	The IDRW head transmits received data to the upstream controller without modifying it. (NOTE) A test command is composed of two characters.

● Parameter

A parameter defines details of an action being taken. Necessary parameter varies from command to command.

Name	Description
Read	Read page
Write	Write page, write data
Same write	Write pages, write data
Byte write	Write start address, write data
Test	Test data

■ Response frame structure

Response code	Parameter 1	...	Parameter n	CR
:	:	:	:	\$0D

● Response code

A response code represents the run result of an executed command. The normally completed run is indicated as "00". When an error has occurred, an error code is returned.

● Parameter

A run result is returned. A parameter being returned varies from command to command.

Name	Description
Read	Read pare
Write	None
Same write	None
Byte write	None
Test	Test data received based on the command

When intending to operate a link unit, OMRON original 1:1 protocol format is prefixed with [SOH] and Node No. and suffixed with a check code.

[illegible]

● Node No.

- Check code

Check code = "05"

30h (ExOR) 31h (ExOR) 30h (ExOR) 32h (ExOR) 30h (ExOR) 30h (ExOR) 30h (ExOR) 30h
(ExOR) 30h (ExOR) 30h (ExOR) 30h (ExOR) 36h (ExOR) 30h (ExOR) 30h = 05h
(ASCII conversion) ↓
"0"(30h)"5"(35h)

SOH	Node No.	Command	Parameter 1	...	Parameter n	Check code	CR
\$01	:	:	:	:	:	:	\$0D

①A case where the data in page 1 is read out, with IDRWH directly connected to upstream controller

Response : 0 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 [CR]
 Response Read data
 code

②A case where the data in page 1 is written, with IDRWH connected to upstream controller via link unit

Response : [SOH] 0 1 0 0 0 1 [CR]
Node No. | Check code
 Response code

4.3 Response code list

Type	Response code	Name	Description
Normal completion	00	Normal completion	• No error occurred and command execution completed normally.
Error in communication to IDRWH	10	Parity error	• A parity error has occurred with any character in the command.
	11	Framing error	• A framing error has occurred with any character in the command.
	12	Overrun error	• An overrun error has occurred with any character in the command.
	14	Format error	• The command format is not as specified. ex) A command has not yet been defined, page/address is incorrect, etc.
	18	Frame length error	• The command length has exceeded 273 characters. • Interval between received characters has exceeded 2 sec.
Error in communication between IDRWH and ID tag	70	Communications error	• A fault such as noise interference has occurred during data transaction with ID tag, and the communication operation has failed to complete correctly.
	71	Verify error	• Correct data cannot be written into the ID tag.
	72	No ID tag error	• No ID tag is present in front of the antenna.
	7A	Address error	• Wrong page was specified.
	7B	Not write area error	• ID tag is present in a zone where read operation is possible but write operation is impossible.
	7E	ID system error (1)	• ID tag cannot execute an instructed command.
Hardware fault on IDRWH	7F	ID system error (2)	• Non-supported ID tag was used.
	7C	Antenna hardware error	• Failed hardware of antenna section on IDRWH head
Error on link unit	93	IDRWH communications error	• Illegal data from IDRWH head was received.
	9A	IDRWH error	• IDRWH head is not connected. • IDRWH head is not functioning correctly.

* If a communication error (framing fault, format error, FCS fault, wrong frame length, etc.) occurs between the upstream controller and the link unit, or if mismatch of Node No. occurs, the link unit does not return a response.

4.4 Command types and response <applicable to OMRON original 1:1 protocol>

4.4.1 Read

This command is used to read data from an ID tag. It is possible to read data of arbitrary pages on a page by page basis. Up to 16 pages can be handled in this operation.

■ Command frame structure

As a parameter for a command, a page designation for a page from which data is read is transmitted. A particular page is designated by setting a bit for representing a read page to 1 and other bits to 0. This binary coded number converted into a hexadecimal notation is transmitted as a command. It is also possible to designate an arbitrary page.

Command					Page designation (8 characters)												CR				
"0"	"1"	"0"	"0"													\$0D					
Bit	7	6	~	1	0	7	6	~	1	0	7	6	~	1	0	7	6	~	2	1	0
Page	30	29	~	24	23	22	21	~	16	15	14	13	~	8	7	6	5	~	1	Sys	Sys
Designation	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0*	0*
Value	"00" ~ "FF"					"00" ~ "FF"					"00" ~ "FF"					"00" ~ "FC"					

* These bits data are preassigned for the system. Be sure to set them to 0. A 1-setting will trigger an error (error code: "14").

■ Response frame structure

The response code (normal completion "00") and data read are returned. The read data blocks are returned in the order of designated page sequence. If an error should occur, a corresponding error code is returned as a responses code.

Response code		Read data*				CR
"0"	"0"	(Data 1)	...	(Data n)		\$0D

* Number of data blocks n = number of designated pages × 8 (in units of 2 characters)

<Example of command execution>

A case where the data in all of six pages 1, 3, 5 through 8 are read

→ 0100 000003D4 [CR]

(00000000 00000000 00000011 11010100 : binary notation)

← 00 1234567890123456 1122334455667788 (page 5)(page 6).....(page 8)[CR]

Data in page 1

Data in page 3

4.4.2 Write

This command is used to write data into an ID tag page by page. It is possible to write data into arbitrary pages. At a time, data can be written into up to 16 pages.

■ Command frame structure

As parameters associated to this command, a data write page(s) and data being written into each page are transmitted. A particular page is designated by setting a bit for representing a write page to 1 and other bits to 0. This binary coded number converted into a hexadecimal notation is transmitted as a command. The write data are designated in the order of designated pages.

Command				Page designation (8 characters)								Write data*								CR	
"0"	"2"	"0"	"0"									(Data1)	...	(Data n)		\$0D					
Bit	7	6	~	1	0	7	6	~	1	0	7	6	~	1	0	7	6	~	2	1	0
Page	30	29	~	24	23	22	21	~	16	15	14	13	~	8	7	6	5	~	1	Sys	Sys
Designation	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0*	0*
Value	"00" ~ "FF"					"00" ~ "FF"					"00" ~ "FF"					"00" ~ "FC"					

* These bits data are preassigned for the system. Be sure to set them to 0. A 1-setting will trigger an error (error code: "14").

* Number of data blocks n = number of designated pages × 8 (in units of 2 characters)

■ Response frame structure

The response code (normal completion "00") is returned.

Response code	CR
"0" : "0"	\$0D

<Example of command execution>

A case where the data is written in two pages-pages 8 and 10

→ 0200 00000600 1122334455667788 0123456789ABCDEF [CR]

Data for page 8

Data for page 10

(00000000 00000000 00000110 00000000: binary notation)

← 00 [CR]

After normal completion of writing operation, the data on ID tag will be as summarized below:

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

4.4.3 Same write

This command is used to write a same data set into an ID tag page by page. It is possible to write a data set into arbitrary pages.

■ Command frame structure

As parameters associated to this command, a data write page and data (identical to each page) for respective pages are transmitted. A particular page is designated by setting a bit for representing a write page to 1 and other bits to 0. This binary coded number converted into a hexadecimal notation is transmitted as a command.

Command				Page designation								Write data*								CR
"0"	"3"	"0"	"0"									(Data1)	⋮	(Data n)						\$0D

Bit	7	6	~	1	0	7	6	~	1	0	7	6	~	1	0	7	6	~	2	1	0
Page	30	29	~	24	23	22	21	~	16	15	14	13	~	8	7	6	5	~	1	Sys	Sys
Designation	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0/1	0/1	0/1	...	0/1	0*	0*
Value	"00" ~ "FF"					"00" ~ "FF"					"00" ~ "FF"					"00" ~ "FC"					

* These bits data are preassigned for the system. Be sure to set them to 0. A 1-setting will trigger an error (error code: "14").

* Number of data blocks n = 8 (in units of 2 characters)

■ Response frame structure

The response code (normal completion "00") is returned.

Response code	CR
"0" ⋮ "0"	\$0D

<Example of command execution>

A case where pages 1 through 30 are cleared to zero.

→ 0300 FFFFFFFFC 0000000000000000 [CR]

Write data

(11111111 11111111 11111111 11111100 : binary notation)

← 00 [CR]

All the data on ID tag will be reset to 00h.

4.4.4 Byte write

This command is used to write a block of data of a given number of bytes (up to 128 bytes) in an area beginning with a specified address in an ID tag. It is possible to define an area that spans a plurality of pages. At a time, data can be written into up to 16 pages.

■ Command frame structure

As parameters associated to this command, a start address of write area and data being written are transmitted. The selectable addresses range from 00h to EFh. The write data are designated in the ascending order beginning with the specified start address.

Command				Address designation	Write data*				CR
"0"	"4"	"0"	"0"		(Data1)		⋮	(Data n)	\$0D

* Number of data blocks n =number of write bytes (in units of 2 characters)

■ Response frame structure

The response code (normal completion "00") is returned.

Response code	CR
"0" ⋮ "0"	\$0D

<Example of command execution>

A case where the data is written into a 2 byte area beginning with address \$05.

→ 0400 05 1234 [CR]
(Start address) (Write data)

← 00 [CR]

After normal completion of writing operation, the data on ID tag will be as summarized below:

Page 1						12h	34h	
Page 2								
:								

4.4.5 Test

This command is for verifying loop back communications performance between the upstream controller and IDRW head. Upon receiving this command, the IDRW head returns the response code and test data of command as a response to the upstream controller.

This command can be conveniently used to verify communications reliability during system designing, or to find a cause of problem during troubleshooting.

■ Command frame structure

Unlike the read, write, same write and byte write commands, this command consists of two characters. A test data is input as a parameter.

Command	Test data			CR
"1" : "0"	(Data1)	...	(Data n)	\$0D

■ Response frame structure

The response code (normal completion "00") as well as the test data received with the command are returned. If an error should occur, an error code is returned as a response code.

Response code	Test data			CR
"0" : "0"	(Data1)	...	(Data n)	\$0D

<Example of command execution>

Command : 1 0 1 2 3 4 5 6 7 8 [CR]
 Test command Test data

Response : 0 0 1 2 3 4 5 6 7 8 [CR]
 Response code Test data

Section 5

Data Transaction Time (information only)

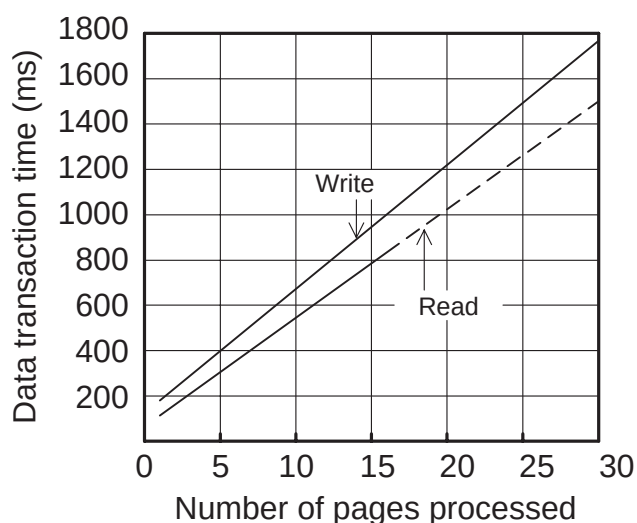
5.1 Data transaction time	48
5.2 TAT (Turn Around Time)	49

The communication time with this RFID system can be categorized into two types-data transaction time and TAT (Turn Around Time).

5.1 Data transaction time

This is a time span needed for data transaction between the IDRW head and ID tag, and will vary depending on the number of pages subjected to data reading or writing. The actual data transaction time can be determined from the graphical plotting below and a calculation formula. The number of pages processed N is a sum of pages defined by a page designation in a command. (In the case of byte write command, the number of pages covered by a byte write area.)

The maximum allowable pages processed with one command execution is 16 pages for the read, write and byte write commands and 30 pages for the same write command.



Data transaction time calculation formula

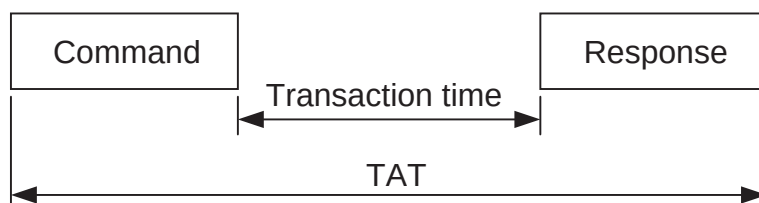
	Data transaction time (msec)
Read	$T=48N+66$
Write	$T=55N+120$

N: number of pages processed

5.2 TAT (Turn Around Time)

This is a time span needed for the upstream controller to send a command and receive a response, and is governed by the transaction time and number of characters of command/response.

① IDRW head is directly connected-OMRON original 1:1 protocol



TAT = command transmission time + transaction time + response transmission time

When the number of characters in command is A, and that in response is B, then

$$\text{Command transmission time} = \underbrace{\frac{1}{9600}(\text{sec})}_{\text{Bit time}} \times \underbrace{11(\text{bits})}_{\text{Bit number per character}} \times \underbrace{A(\text{characters})}_{\text{Number of characters in command}}$$

$$\text{Response transmission time} = \underbrace{\frac{1}{9600}(\text{sec})}_{\text{Bit time}} \times \underbrace{11(\text{bits})}_{\text{Bit number per character}} \times \underbrace{B(\text{characters})}_{\text{Number of characters in response}}$$

$$\text{TAT} = \frac{11 \{ A+B \}}{9600} + \{ \text{transaction time} \}(\text{sec})$$

* The above expressions are based on an assumption that the upstream controller continuously sends data without inter-character spacing in command.

<Example of TAT calculation>

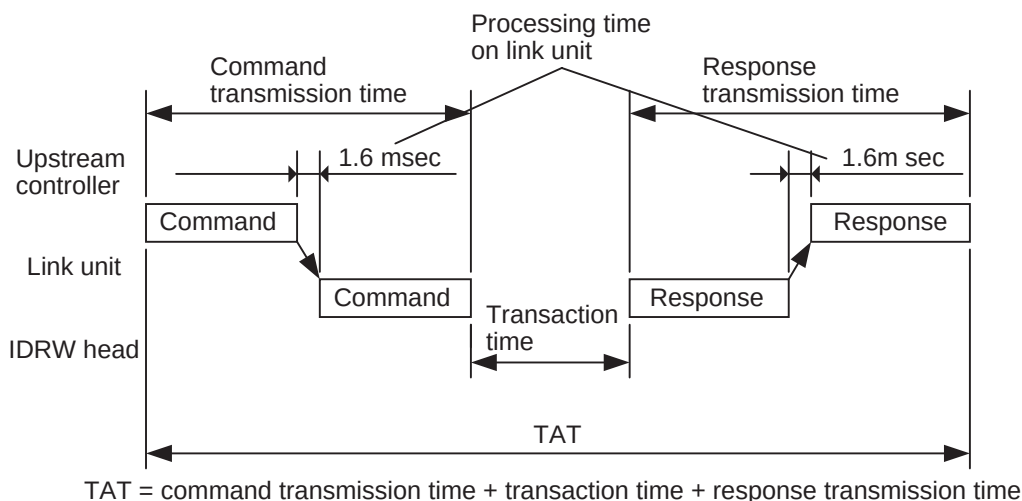
For an operation for reading a data for one page, the TAT can be calculated as follows:



A=13, B=19, and the transaction time is 0.114 (sec) from the calculation formula, then:

$$\text{TAT} = \frac{11\{13+19\}}{9600} + 0.114 = \frac{352}{9600} + 0.114 = 0.151(\text{sec})$$

② IDRW head is connected via link unit-OMRON original 1:N protocol



When the Baud rate for communication between the upstream controller and link unit is A, the number of characters in command is B, and that in response is C, then

$$\text{Command transmission time} = \underbrace{\frac{1}{A}}_{\text{Bit time}} (\text{sec}) \times \underbrace{10(\text{bits})}_{\text{Bit number per character}} \times \underbrace{B(\text{characters})}_{\text{Number of characters in command}} + \frac{11\{B-5\}}{9600} + 0.0016(\text{sec})$$

$$\text{Response transmission time} = \underbrace{\frac{1}{A}}_{\text{Bit time}} (\text{sec}) \times \underbrace{10(\text{bits})}_{\text{Bit number per character}} \times \underbrace{C(\text{characters})}_{\text{Number of characters in response}} + \frac{11\{C-5\}}{9600} + 0.0016(\text{sec})$$

$$\text{TAT} = \frac{10\{B+C\}}{A} + \frac{11\{B+C-10\}}{9600} + \{\text{transaction time}\} + 0.032(\text{sec})$$

* The above expressions are based on an assumption that the upstream controller continuously sends data without inter-character spacing in command.

<Example of TAT calculation>

For an operation for reading a data for one page, where the Baud rate for communication with the upstream controller is 38,400 (bps), the TAT can be calculated as follows:

Command: [SOH]01010000000004(check code) [CR] Responses: [SOH]0100123456789ABCDEF (check code) [CR]

A=38400, B=18, C=24, and the transaction time is 0.114 (sec) from the calculation formula, then:

$$\text{TAT} = \frac{10\{18+24\}}{38400} + \frac{11\{18+24-10\}}{9600} + 0.114 + 0.032 = \frac{420}{38400} + \frac{352}{9600} + 0.1172 = 0.165(\text{sec})$$

Section 6

Performance Data Based on Operating Conditions (information only)

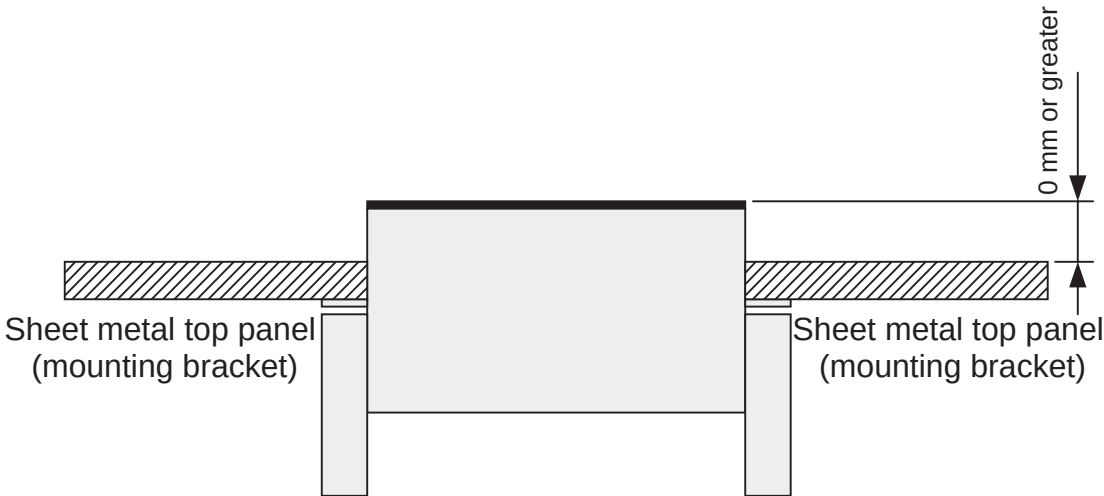
6.1 Effect of nearby metal object onto IDRW head	52
6.2 Spacing for installing IDRW heads	53
6.3 Effect of inclination of ID tag	54

The maximum effective communication distance of an IDRW head varies depending on the operating conditions (presence/absence of a nearby metal object, number of the IDRW heads, etc.). This section describes the effect of varying operating conditions on the effective communication distance. Before operating the IDRW heads, study the information in this section. The values mentioned here are given only as a guideline.

6.1 Effect of nearby metal object onto IDRW head

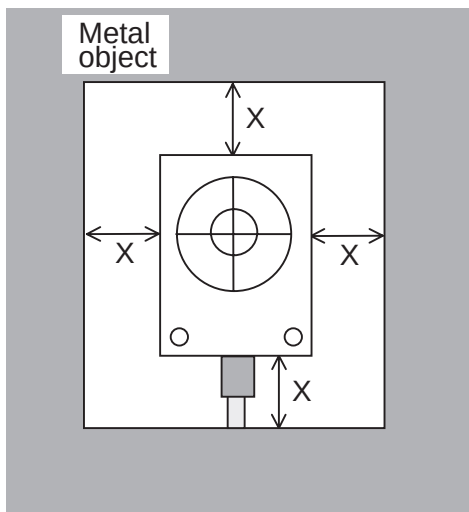
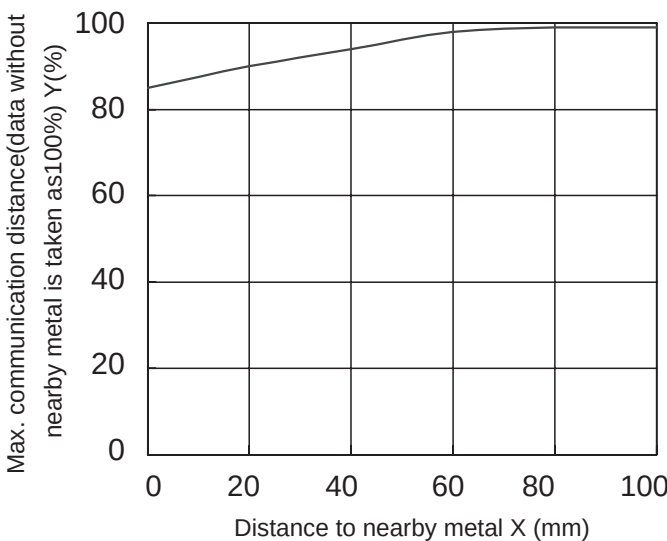
■ Model V700-HMD13□

When mounting the Model V700-HMD13□, make sure that the communication surface of IDRW head is not below the top surface of sheet metal top panel (mounting bracket). Otherwise, the effective communication distance will decrease.



■ Model V700-HMD11-1

A metal object located in the vicinity of the Model V700-HMD11-1 decreases the effective communication distance of the IDRW head. The correlation between the distance between iron object and IDRW head and the effective communication distance (read/write, misalignment of ± 0 mm) is plotted below.



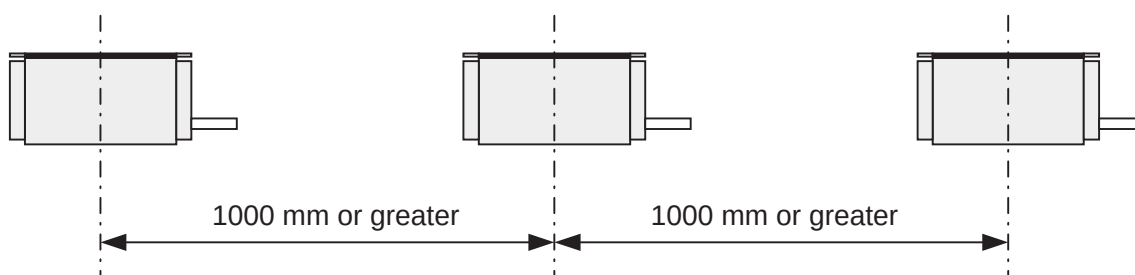
6.2 Spacing for installing IDRW heads

When two or more IDRW heads are connected via link unit, there is no limitation on the spacing of antenna sections since all the IDRW heads do not handle a command simultaneously.

If IDRW heads are connected to an individual upstream controller, and when these IDRW heads situated in close vicinity are simultaneously processing a command, mutual interference can occur across the IDRW heads, possibly leading to total inability of communication or loss in effective communication distance despite presence of tags. To avoid such a problem, be sure to install the antenna sections at the intervals specified below.

■ Model V700-HMD13□

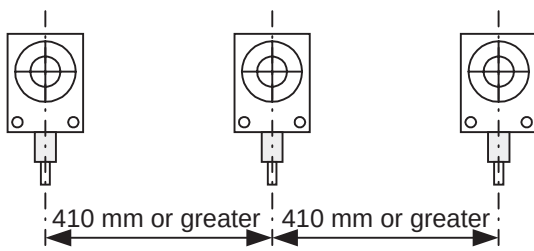
1000 mm or greater



■ Model V700-HMD11-1

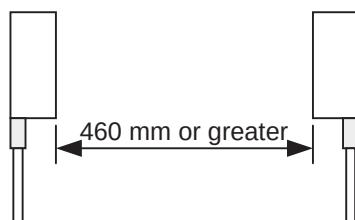
① Side-by-side configuration

410 mm or greater



② Face-to-face configuration

460 mm or greater

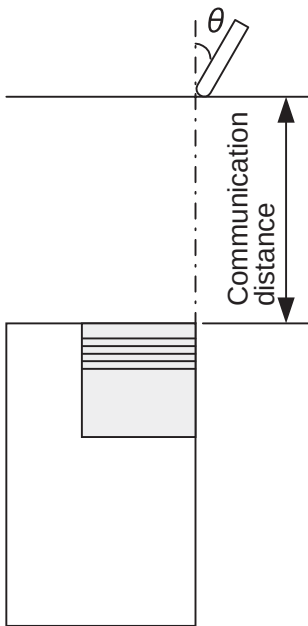


6.3 Effect of inclination of ID tag

Mount the IDRW head and ID tag as vertical as possible. The IDRW head or ID tag remains capable of communication even if installed inclined. However, in this situation, a shorter communication distance will result. The correlation between inclination and effective communication distance is summarized below.

■ Model V700-HMD13□

ID tag: V700-D23P41



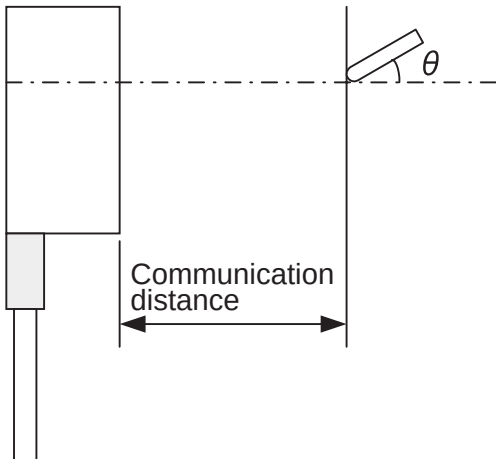
Communication distance

(value with zero inclination is taken as 100%)

	Inclination of ID tag θ (degrees)				
	0	15	30	45	60
Communica- tion distance	100%	95%	90%	85%	80%

■ Model V700-HMD11-1

ID tag: V700-D23P41



Communication distance

(value with zero inclination is taken as 100%)

	Inclination of ID tag θ (degrees)			
	0	20	40	60
Communica- tion distance	100%	96%	91%	85%

Section 7

Troubleshooting

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If a fault should occur, first thoroughly study the symptom in order to be able to correctly judge the reproducibility of a problem, and interaction with other associated equipment. Thus, find an appropriate remedy.

7.1 IDRW head is directly connected to upstream controller

7.1.1 No response (response not yet received), or, occurrence of illegal characters

Check the following points.

Typical checkpoint
Supply voltage (5 VDC $\pm$ 5% on connector)
Cable connection (pin arrangement on the upstream controller side, wiring connection/disconnection of connection cable, etc.)
Communications protocol settings on upstream controller (Baud rate, data format)

7.1.2 Response is available (response code is other than "00")

According to the response code in response data, check the following points.

■ Error in communication with upstream controller side

Response code	Name	Typical checkpoint
"10"	Parity error	- Communication protocol settings on upstream controller (data format) - Routing of RS-232C cable (adverse effect by external noise interference) - Noise environment on power line of IDRW head
"11"	Framing error	
"12"	Overrun error	
"14"	Format error	Command format (type and number of characters, number of pages, inter-command spacing, etc.)
"18"	Frame length error	

■ Communications error

Response code	Name	Typical checkpoint
"70"	Communications error	- Mounting distance between ID tag and IDRW head(s) - Noise environment around IDRW head (correct the location of head) - Spacing to another IDRW head
"71"	Verify error	Life of ID tag in terms of number of rewrite operations (100,000 cycles)
"72"	ID tag missing error	- Mounting distance between ID tag and IDRW head(s) - Spacing to another IDRW head
"7A"	Address designation error	Wrong page, or address/number of bytes with executed command
"7B"	Out of write area error	Mounting distance between ID tag and IDRW head(s)
"7E"	ID system error (1)	- Operating environment of tag (damaged ID tag by misoperation or misuse) - Model and specifications of ID tag used
"7F"	ID system error (2)	

■ System error

Response code	Name	Typical checkpoint
"7C"	Antenna hardware error	(The equipment may have been damaged.)

7.2 Configuration using link unit

7.2.1 No response (response not yet received), or occurrence of illegal characters

In normal communication status, the STATUS indicators will appear as follows:

RUN	COMM	ID	ERR
Normally lit	Lit during communication service	Lit during communication with IDRW	Normally unlit

Check the following points based on the states of STATUS indicators on a link unit that has failed to communicate.

■ Inability to communicate with any link unit

State of indicators (○: lit, ●: unlit)				Typical checkpoint
RUN	COMM	ID	ERR	
○	●	●	●	- Wiring connections of RS-232C cable (wrong connection) - Command format (availability of [SOH])
○	●	●	○	- Mismatching of communication protocol (Baud rate, etc) on upstream controller with that of link unit - Routing of RS-232C cable (adverse effect by external noise interference)
○	○	●	●	Mismatching of node No. specified by a command, with that of a link unit
○	○	●	○	- Command format ([CR], calculation of FCS, inter-command character spacing, etc.) - Wiring connections of RS-232C cable (adverse effect by external noise interference)
○	○*1	●	○*1	Same node No. has been assigned to two or more link units within a same RFID system.
○	○	○	●	- Wiring connections of RS-232C cable (wrong connection) - Switching timing (duration) for send/receive on the upstream controller that is connected via. RS-485
●	●	●	●	Check 24 VDC power supply.

*1 A situation where the STATUS indicator intermittently lights and turns off though no command is currently being transmitted.

■ Inability to communicate with particular link unit (communication service is still possible with certain link unit)

State of indicators (○: lit, ●: unlit)				Typical checkpoint
RUN	COMM	ID	ERR	
○	●	●	●	- Wiring connections of RS-485 cable (wrong connection) - Wiring connections of RS-232C cable (wrong connection) - RS signal control on upstream controller (RS signal is normally OFF; or turns OFF with a delay after a command was sent) *2
○	●	●	○	- Mismatching of communication protocol (Baud rate, etc) on upstream controller with that of link unit - Routing of RS-485 cable (adverse effect by external noise interference)
○	○	●	●	Mismatching of communication protocol (Baud rate, etc) on upstream controller with that of link unit
○	○	●	○	RS signal control on upstream controller (OFF before command has been successfully transmitted)*2
○	○	○	●	RS signal control on upstream controller (RS signal is normally ON) *2
●	●	●	●	Check 24 VDC power supply.

*2 For further details, see Sec. 2.3.2(1) Upstream controller connection port specifications.

7.2.2 Response is available (response code is other than "00")

According to the response code in response data, check the following points.

■ Error in communication with upstream controller side

Response code	Name	Typical checkpoint
"14"	Format error	Command format (type and number of characters, number of pages, etc.)
"18"	Frame length error	

■ Communications error with IDRW head

Response code	Name	Typical checkpoint
"10"	Parity error	- Routing of IDRW head cable (adverse effect by external noise interference) - Noise environment on power line of link unit
"11"	Framing error	
"12"	Overrun error	
"93"	IDRWH communication error	
"9A"	IDRWH fault	- IDRW head not connected. - Wrong connection of IDRW head extension cable (CS signal 0V, 5 V)

■ Communications error with IDRW head

Response code	Name	Typical checkpoint
"70"	Communications error	- Mounting distance between ID tag and IDRW head(s) - Noise environment around IDRW head cable (correct the location of head) - Spacing to another IDRW head
"71"	Verify error	Life of ID tag in terms of number of rewrite operations (100,000 cycles)
"72"	ID tag missing error	- Mounting distance between ID tag and IDRW head(s) - Spacing to another IDRW head
"7A"	Address designation error	Wrong page, or address/number of bytes with executed command
"7B"	Out of write area error	Mounting distance between ID tag and IDRW head(s)
"7E"	ID system error (1)	- Operating environment of tag (damaged ID tag by misoperation or misuse) - Model and specifications of ID tag used
"7F"	ID system error (2)	

■ System error with IDRW head

Response code	Name	Typical checkpoint
"7C"	IDRW head fault	(The equipment may have been damaged.)

[Reference]

<Memory assignment with SEMI E99-conforming system (with Model V700-L21)>

■ Memory map in ID tag (00h through EFh correspond with addresses)

Page	8 bytes/page									
1	00h	01h	02h	03h	04h	05h	06h	07h	Carrier ID (16 bytes)	16
2	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh		
3	10h	11h	12h	13h	14h	15h	16h	17h	"S01"	8
4	18h	19h	1Ah	1Bh	1Ch	1Dh	1Eh	1Fh	"S02"	8
5	20h	21h		...	...			27h	"S03"	8
6	28h	29h		...	...			2Fh	"S04"	8
7	30h	31h		...	...			37h	"S05"	8
8									"S06"	8
9	:	:						:	"S07"	8
10	:	:						:	"S08"	8
11									"S09"	8
12	58h	59h		...	...			5Fh	"S10"	8
13	60h	61h		...	...			67h	"S11"	8
14	68h	69h		...	...			6Fh	"S12"	8
15	70h	71h		...	...			77h	"S13"	8
16	78h	79h		...	...			7Fh	"S14"	8
:	:	:						:	:	:
:	:	:						:	:	:
27	D0h	D1h		...	...			D8h	"S25"	8
28	D8h	D9h		...	...			DFh	"S26"	8
29	E0h	E1h		...	...			E7h	"S27"	8
30	E8h	E9h	EAh	EBh	ECh	EDh	EEh	EFh	"S28"	8
									DATASEG	LENGTH

Data area (total 224 bytes)

Revision History

A manual revision code is suffixed to the manual ID located to the bottom right corner of front cover and to the bottom left corner of back cover.

Catalog No. Z213-E1-01B

↑
Revision code

Revision note	Date	Revised contents
A	August 2000	1 st version
B	February 2005	Warranty and liability information added to beginning of manual, signal word and alert symbols modified, and style of safety information in the body of the manual changed.

This document provides information mainly for selecting suitable models. Please read the Instruction Sheet carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

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