Cat. No. Z128-E1-01B

V600 RFID System

R/W Heads and EEPROM Data Carriers

OPERATION MANUAL

OMRON

V600 RFID System

R/W Heads and EEPROM Data Carriers

Operation Manual

Revised February 2005

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.

WARRANTY

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.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

SUITABILITY FOR USE

THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

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

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

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Precautions for Safe Use

To ensure safety, be sure to follow the following precautions:

1. Do not operate this device in any flammable, explosive, or corrosive gas environment.
2. Do not disassemble, repair, or remodel this device.
3. Tighten the base lock screws and terminal block screws completely.
4. Be sure to use wiring crimp terminals of the specified size.
5. If any cable has a locking mechanism, be sure to check that it has been locked before using it.
6. The power supply must be within the specified rating.
7. Be sure to follow any other warnings, cautions, and notices given in this manual.
8. In the event that the system gives out a foul smell, is heated abnormally in the main body portion, emits smoke, or exhibits any other abnormal condition, immediately stop using the system and turn off the power.
9. Dispose of this product as industrial waste.

Precautions for Correct Use

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

Installation Site

Install the product at a location where:

- It is not exposed to corrosive gases, dust, metal chips, or salt.
- The working temperature is within the range stipulated in the specifications.
- There are no sudden variations in temperature (no condensation).
- The relative humidity is within the range stipulated in the specifications.
- No vibration or shock exceeding the values stipulated in the specifications is transmitted directly to the body of the product.
- It is not subject to splashing water, oil, or chemical substances.

Installation

- 530 kHz frequency band to communicate with ID Tags. Some devices, such assome transceivers, motors, inverters, switchingpower supplies, and monitoring devices, generate electromagnetic waves (i.e., noise) that can affect communications with ID Tags. If any of these devices are nearby, communications with Data Carriers may be affected or Data Carriers may be destroyed. If the product is to be used near such devices, check the effects on communications before using the product.
- To minimize the general influence of noise, follow the following precautions:
  (1) Ground any metallic material located around this device to 100 Ω or less.
  (2) Wire this device keeping the wiring away from high voltage and heavy current.
- Connectors are not waterproof. Do not use the product in a humid environment.
- Do not use any chemical that may affect the materials of the product.

Cleaning

- Do not use any thinner. Resin material and case paint are dissolved by thinner.

Standard Conformity

1. FCC Rules (Federal Communications Commission)

This product complies with Part 15 Subpart C of the FCC rules.

<V600-H07, V600-H11>
FCC ID: E4E6CYSIDV6000190

<V600-H51, V600-H52, V600-HA51, V600-HS51, V600-HS61>
FCC ID: E4E6CYSIDV6000292

FCC NOTICE

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

(1) This device may not cause harmful interference.

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

FCC WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Properly shielded ground cables and connectors must be used for connection to host computer and/or peripherals in order to meet FCC emission limits.

2. EC Declaration of Conformity

Hereby, OMRON Corporation declares that this RFID System, Antenna V600-H series, Amplifier V600-HA51 and Sensor V600-HS series are in compliance with essential requirements and other relevant provisions of Directive 1995/5/EC, and satisfy tests for the appropriate requirements of the following relevant standards,

<V600-H07, V600-H11, V600-H52, V600-H51>

Radio:	EN 300 330 (05-1999)
EMC:	EN 301 489-3 V1.4.1(08–2002) EN 301 489-1 V1.4.1(08-2002)
Safety:	EN 60950(IEC 950: 1992+A1: 1993+A2: 1993+A3: 1995+A4: 1997+A11: 1997 modified)

Countries of intended use:
Finland, Germany (Except V600-H07), Sweden

CE0678 (!)

<V600-HA51, V600-HS51, V600-HS61>

Radio: EN 300 330 V1.3.2(12-2002)
EMC: EN 301 489-3 V1.4.1(08–2002) EN 301 489-1 V1.4.1(08-2002)
Safety: EN 61010-1(2001)
Limitation of human exposure to electromagnetic fields
EN 50364(05-2002)

Countries of intended use:
Finland, Germany (Except V600-HS67), Iceland (Except V600-HS67), Sweden

CE0678 (!)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Properly shielded ground cables and connectors must be used for connection to host computer and/or peripherals in order to meet FCC emission limits.

TABLE OF CONTENTS

About this Manual:

This manual describes the installation and operation of the V600-series R/W Heads and EEPROM Data Carriers, and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to**:** install and operate the R/W Heads and Data Carriers. Keep this manual in a convenient location where it can continue to be used for reference and guidance.

Section 1 provides general information on features and system configuration.

Section 2 provides specifications for the R/W Heads and Data Carriers.

Section 3 provides communications specifications.

Section 4 explains how to install the R/W Heads and Data Carriers.

Section 5 provides information on specific chemicals that affect the R/W Heads and Data Carriers.

Appendix A provides information on accessories that can be purchased separately.

⚠WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

SECTION 1
Features and System Configuration

This section provides a general introduction to the V600 RFID System, including the V600-series Read/Write (R/W) Heads and Data Carriers. The V600 RFID System utilizes non-contact (contactless) data transfer in which data is transmitted electromagnetically without physical contact between the devices.

1-1 Features

The V600 RFID System offers powerful support to the automation of large-scale distributed control systems and multi-model small-scale production systems by means of contactless data communication.

Contactless Data Transfer

Data is transmitted between the Data Carrier (DC) and Read/Write (R/W) Head electromagnetically in both directions, without physical contact between the two devices.

EEPROM Memory

EEPROM (electrically erasable programmable random access memory) is used for the DC's memory. There is no need for a backup battery, eliminating the need to worry about battery life.

CRC Error Detection

A 16-bit CRC (Cyclic Redundancy Check) has been added to detect data transmission errors in both directions between the ID Controller and R/W Head, and the R/W Head and DC. This feature also helps to ensure superior transmission reliability even in environments where noise tends to occur.

254-byte Memory

The DCs have an 254-byte memory. In addition to essential identification data, information on models and test results can be entered on-site.

Data Write Capacity

The EEPROM can be written up to 300,000 times (per byte) between the lower limit of the operating temperature range and 40°C. (The write capacity is 100,000 times between the lower and upper limits of the operating temperature range.)

Superior Durability and High Reliability

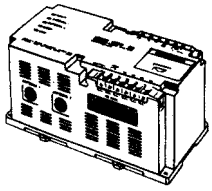
The R/W Head and DC offer superior resistance to environmental factors such as vibration, oil, water, and so on.

1-2 System Configuration

A V600 RFID System is made up of ID Controllers, R/W Heads, and DCs. A system can be assembled to suit almost any situation with different arrangements of these components.

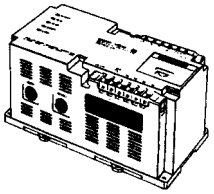
ID Controllers

V600-CA1A/CA2A-V□



100 to 240 VAC
Host: RS-232C/RS-422

V600-CA8A/CA9A-V□

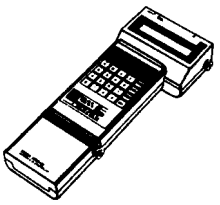


100 to 240 VAC
Host: Parallel PNP/NPN

V600-CF1A

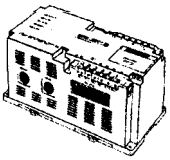
100 to 240 VAC
Host: RS-232C

V600-CB-S



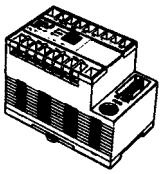
Hand-held Model

V600-CD1A-F-V□



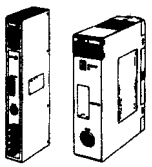
100 to 240 VAC
Host: FANUC protocol

V600-CD1D-V□



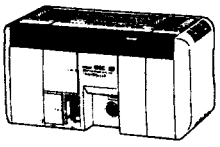
24 VDC
Host: RS-232C

C500-IDS01-V2
C200H-IDS01-V1



PLC, ID Sensor Units

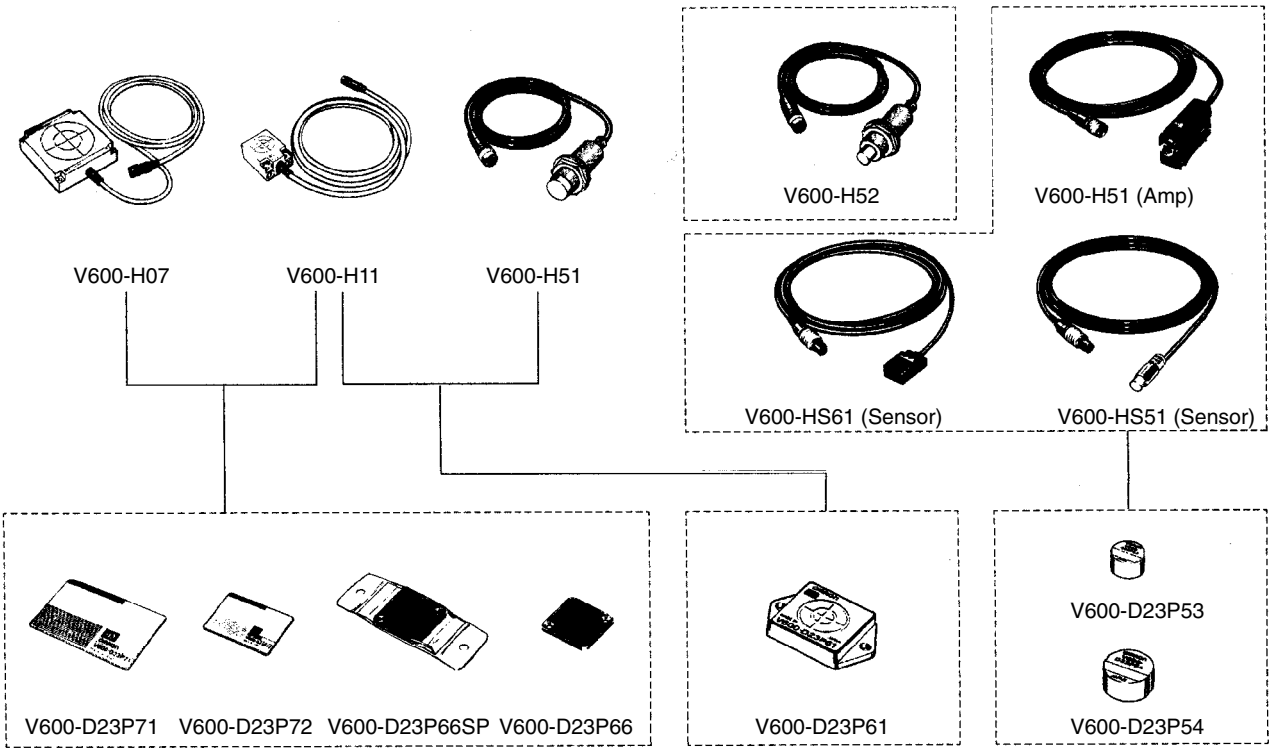
IDSC-C1DR-A
IDSC-C1DT-A



ID Controllers

Note Applicable software versions are as follows:
CA1A/CA2A: Ver. 5.0 or later
CD1D: Ver. 2.0 or later
CB: Ver. 2.0 or later
IC Sensor Unit: C200H-IDS01-V1, C500-IDS01-V2, C500-IDS02-V1

R/W Heads and Data Carriers



SECTION 2
Specifications

This section provides Read/Write (R/W) Head and Data Carrier (DC) specifications.

2-1 R/W Heads

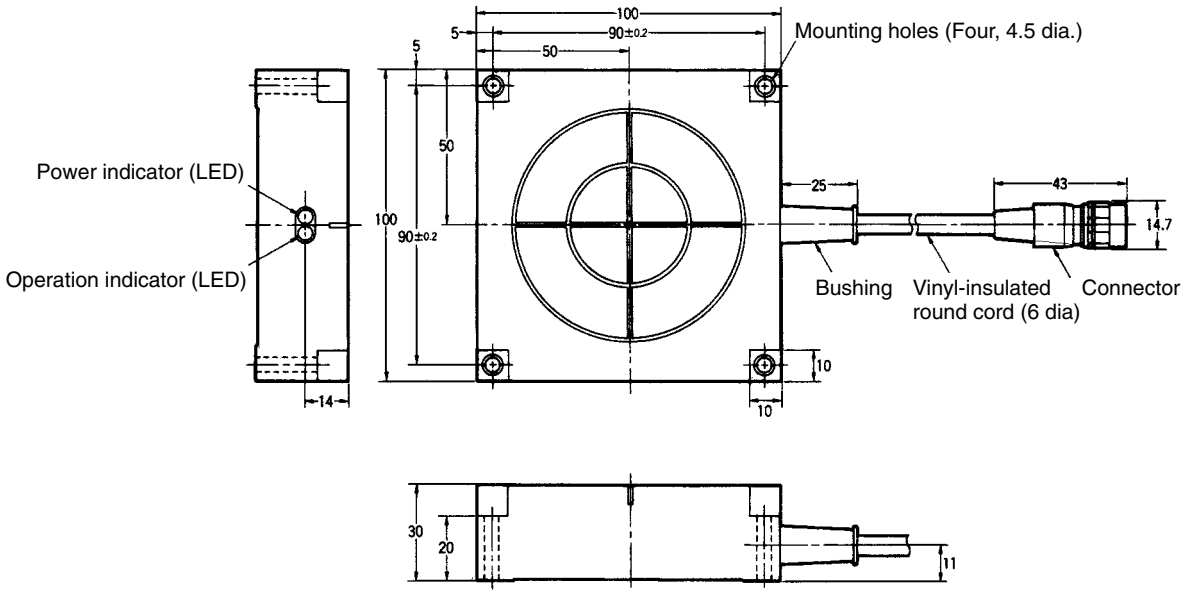
2-1-1 Specifications and Outer Dimensions

V600-H07/V600-H11

Item	Model	
	V600-H07	V600-H11
Operating frequency	530 kHz	
Operating temperature	–25°C to 70°C	–10°C to 60°C
Storage temperature	–40°C to 85°C	–25°C to 75°C
Operating humidity	35% to 95% RH	
Insulation resistance	50 MΩ min. between cable terminals and case (at 500 VDC)	
Dielectric strength	1,000 VAC 50/60 Hz for 1 minute between cable terminals and case.	
Protection rating (See note.)	Meets or exceeds IEC60529 IP67 and JEM IP67G standards.	
Vibration resistance	10 to 500 Hz, 1.0 mm in each direction; acceleration: 150 m/s^2 (about 15 G); one sweep in each of three axis directions, three sweeps in 11 minutes	
Shock resistance	500 m/s^2 (about 50 G) three times each in X, Y, Z directions, total 18 times	
Error detection	16-bit CRC (Cyclic Redundancy Check) is used in both directions of transmission.	
LED indicators	Power supply: green; communications: orange	
Cable length	Standard lengths of 0.5, 2, 5, and 10 m.	
Max. cable length	30.5 m	50.5 m
Weight (approximate)	1 kg (with 10 m cable)	650 g (with 10 m cable)

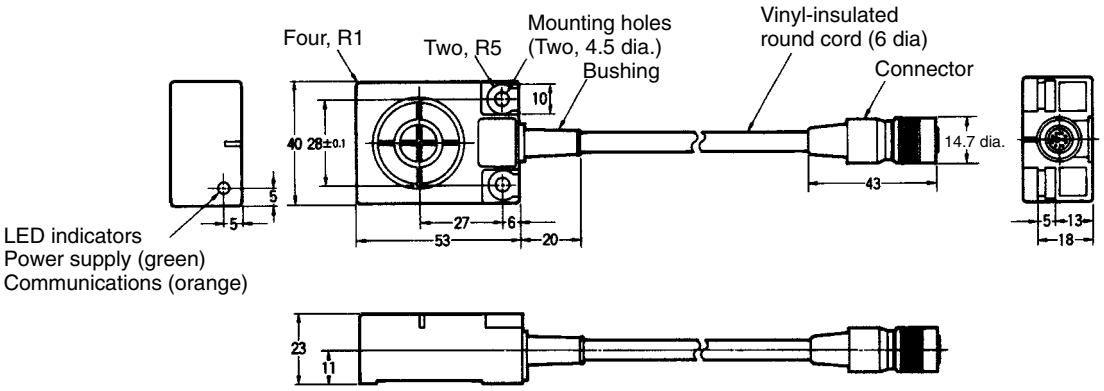
Note The connectors are not waterproof.

V600-H07



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (oil resistant)

V600-H11



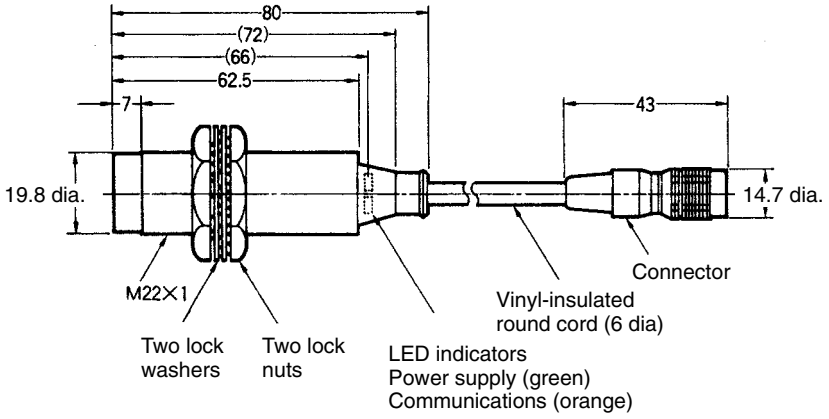
Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (oil resistant)

V600-H51/V600-H52

Item	Model	
	V600-H51	V600-H52
Operating frequency	530 kHz	
Operating temperature	–10°C to 60°C	
Storage temperature	–25°C to 75°C	
Operating humidity	35% to 95% RH	
Insulation resistance	50 MΩ min. between cable terminals and case (at 500 VDC)	
Dielectric strength	1,000 VAC 50/60 Hz for 1 minute between cable terminals and case.	
Protection rating (See note.)	Meets or exceeds IEC60529 IP67 and JEM IP67G standards.	
Vibration resistance	10 to 500 Hz, 1.0 mm in each direction; acceleration: 150 m/s^2 (about 15 G); one sweep in each of three axis directions, three sweeps in 11 minutes	
Shock resistance	500 m/s^2 (about 50 G) three times each in X, Y, Z directions, total 18 times	
Error detection	16-bit CRC (Cyclic Redundancy Check) is used in both directions of transmission.	
LED indicators	Power supply: green; communications: orange	
Cable length	Standard lengths of 0.5, 2, 5, and 10 m.	
Max. cable length	50.5 m	
Weight (approximate)	650 g (with 10 m cable)	

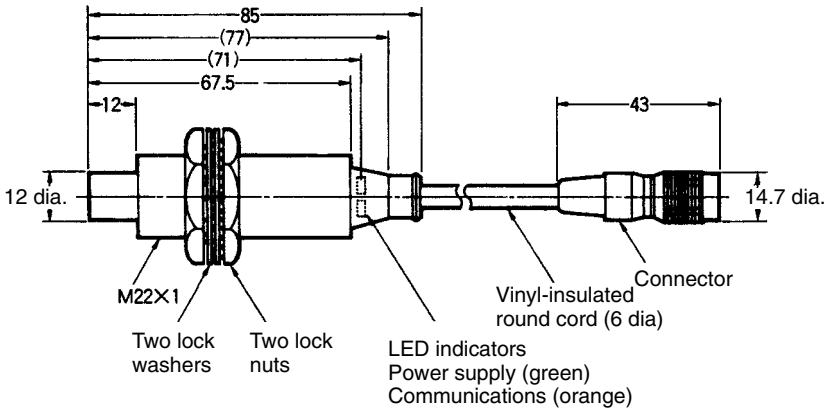
Note The connectors are not waterproof.

V600-H51



Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (oil resistant)

V600-H52



Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (oil resistant)

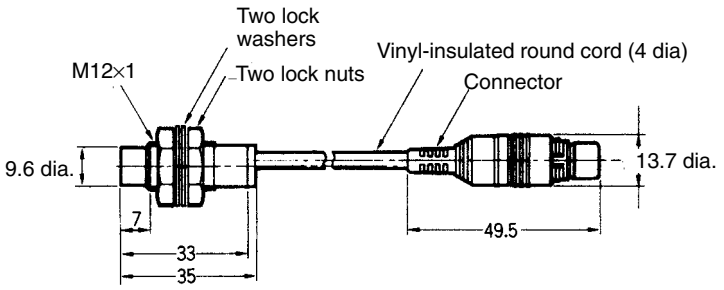
V600-HS51/V600-HS61/V600-HA51

Item		Sensor		Amp
		V600-HS51	V600-HS61	V600-HA51
Operating frequency		530 kHz		---
Operating temperature		–10°C to 60°C		–10°C to 60°C (See note 1.)
Storage temperature		–25°C to 75°C		
Operating humidity		35% to 95% RH		
Insulation resistance		50 MΩ min. between cable terminals and case (at 500 VDC)		
Dielectric strength		1,000 VAC 50/60 Hz for 1 minute between cable terminals and case.		
Protection rating (See note 2.)		Meets or exceeds IEC60529 IP67 and JEM IP67G standards.		Meets or exceeds IEC60529 IP66.
Vibration resistance		10 to 2,000 Hz, 1.5 mm in each direction; acceleration: 300 m/s^2 (about 30 G); one sweep in each of three axis directions, two sweeps in 15 minutes		Direct Panel Mounting: 10 to 2,000 Hz, 1.5 mm in each direction; acceleration: 150 m/s^2 (about 15 G); one sweep in each of three axis directions, two sweeps in 15 minutes Mounting on DIN Track: 10 to 500 Hz, 1.0 mm in each direction; acceleration: 300 m/s^2 (about 30 G); one sweep in each of three axis directions, three sweeps in 11 minutes
Shock resistance		1,000 m/s^2 (about 100 G) three times each in X, Y, Z directions, total 18 times		500 m/s^2 (about 50 G) three times each in X, Y, Z directions, total 18 times
Error detection		16-bit CRC (Cyclic Redundancy Check) is used in both directions of transmission.		
LED indicators		---		Power supply: green; communications: orange
Cable lengths	Sensor to Amp	2 m (fixed)		---
	Amp to Controller	---		Standard lengths of 2, 5, and 10 m.
Weight (approximate)		70 g		650 g (with 10 m cable)

Note 1. When only one is used. Refer to *4-1-1 Installation Method* when using multiple Amps.

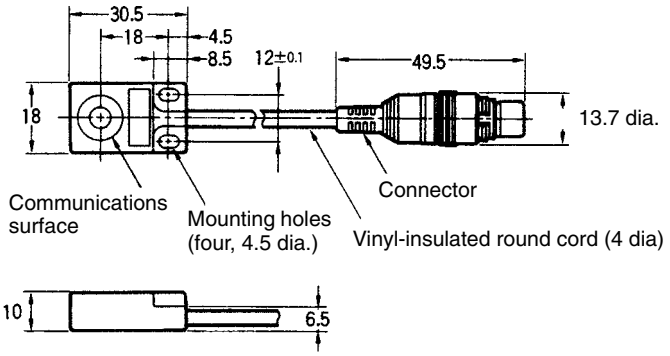
2. The connectors are not waterproof.

V600-HS51



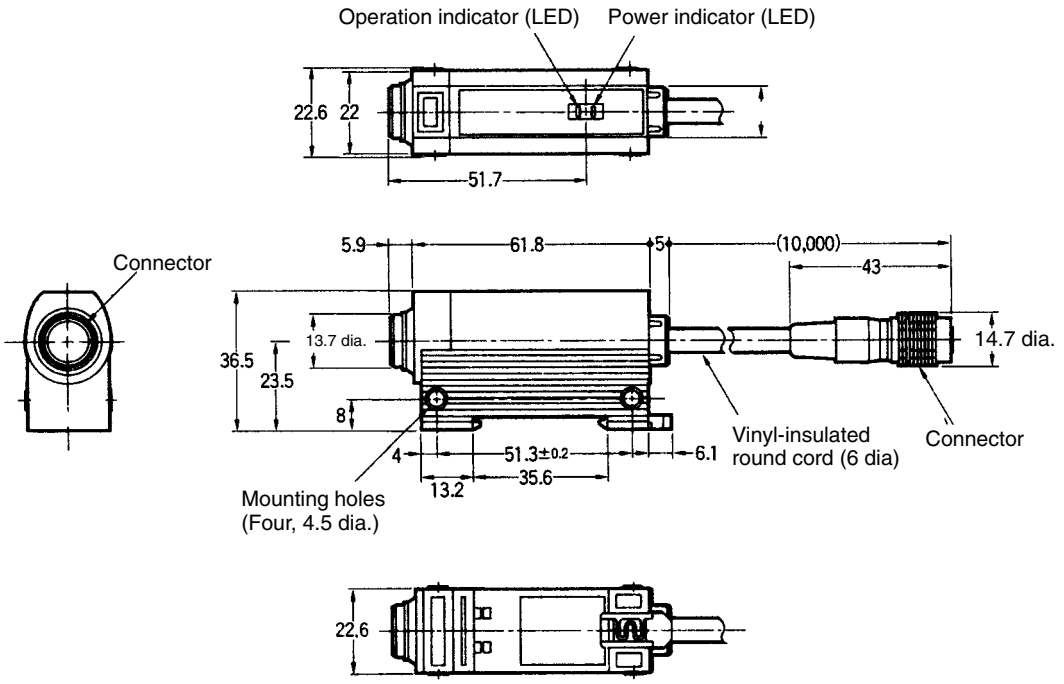
Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (oil resistant)

V600-HS61



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (oil resistant)

V600-HA51



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (oil resistant)

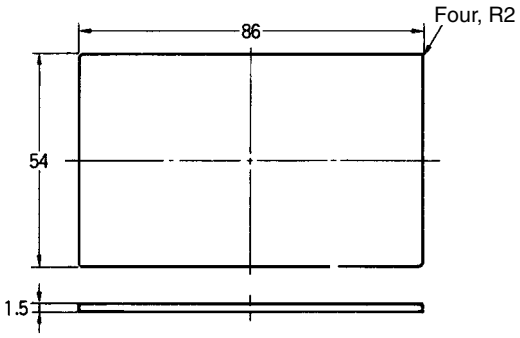
2-2 Data Carriers

2-2-1 Specifications and Outer Dimensions

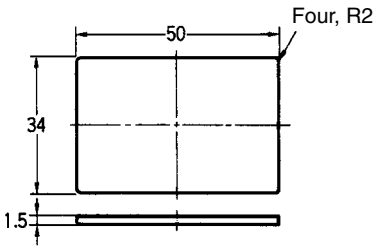
V600-D23P71/V600-D23P72

Item	Model	
	V600-D23P71	V600-D23P72
Memory capacity	254 bytes	
Memory type	EEPROM (electrically erasable programmable random access memory)	
Data hold time	10 years (Data will be maintained for 10 years after it is written.)	
Data write capacity	–10 to 40 °C: 300,000 times per address –10 to 70 °C: 100,000 times per address	
Error detection	16-bit CRC error detection is used in both directions of transmission.	
Operating temperature	Data retention: –20°C to 110°C; read/write: –10°C to 70°C	
Storage temperature	–20°C to 110°C	
Operating humidity	35% to 95% RH	
Protection rating	Meets or exceeds IEC60529 IP66 standards.	
Vibration resistance	10 to 2,000 Hz, 1.5 mm in each direction; acceleration: 300 m/s^2 (about 30 G); 30 minutes each in three axis directions, 90 minutes total	
Shock resistance	1,000 m/s^2 (about 100 G) three times each in X, Y, Z directions, total 18 times	
Weight (approximate)	15 g	5 g

V600-D23P71

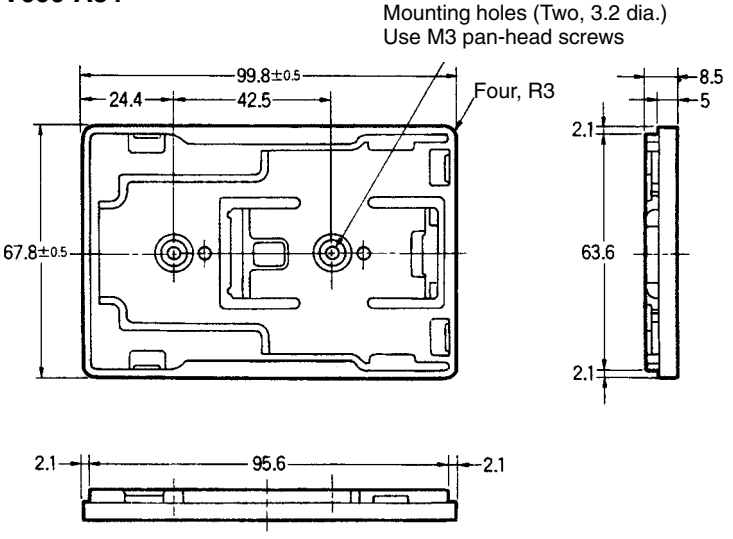


V600-D23P72



Material	Glass epoxy resin
Exterior	Polyeurethane resin

V600-A84

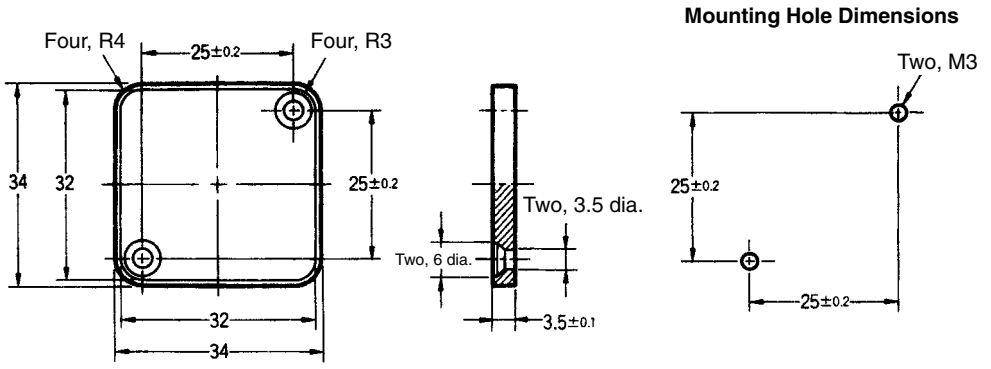


V600-D23P66N

Item	V600-D23P66N
Memory capacity	254 bytes
Memory type	EEPROM (non–volatile memory)
Data hold time	10 years (–40 to 110°C) 1 year (–40 to 150°C)
Data write capacity	–20 to 85°C: 100,000 times per address –20 to 60°C: 300,000 times per address –20 to 25°C: 400,000 times per address –20 to 0°C: 800,000 times per address
Error detection	16-bit CRC error detection is used in both directions of transmission.
Operating temperature	Not reading/writing: –40°C to 150°C; reading/writing: –20°C to 85°C (See note.)
Storage temperature	–40°C to 150°C (See note.)
Operating humidity	35% to 95% RH
Protection rating	IP68 (IEC 60529 standard)
Vibration resistance	Destruction: Vibration of 10 to 2,000 Hz, 1.5-mm double amplitude for 15 minutes each in X, Y, Z directions, 10 sweeps
Shock resistance	Shock of 500 m/s^2 (about 50 G) three times each in X, Y, Z directions, total 18 times
Weight	Approx. 6.5 g

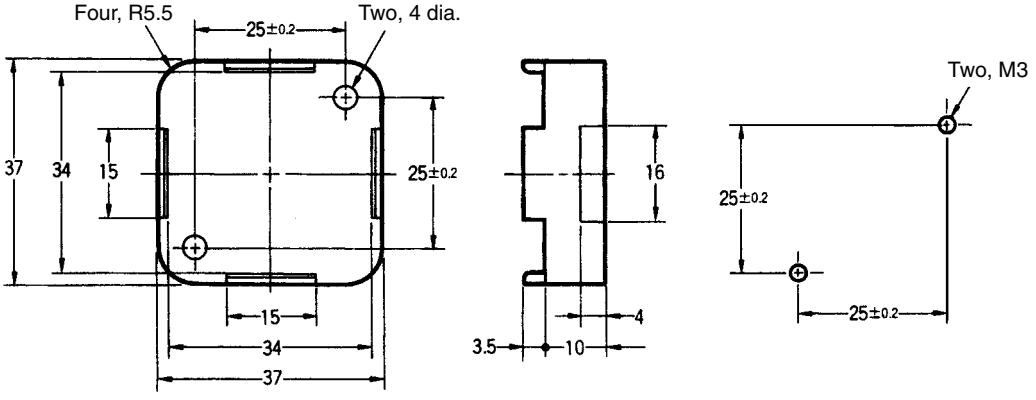
Note For heat resistance at 150°C, Data Carriers were left standing at 150°C for 1,000 hours and also subjected to thermal shock for 1,000 cycles of 30 minutes each at –10°C and 150°C. (There were no failures in 22 samples.)

V600-D23P66N



Case material: PPS resin

V600-A86 (Attachment)

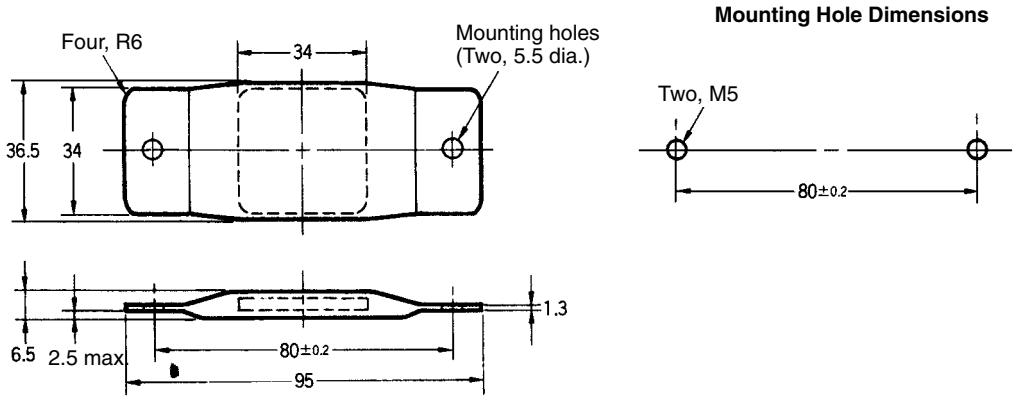


Case material: PPS resin

V600-D23P66SP

Item	V600-D23P66SP
Memory capacity	254 bytes
Memory type	EEPROM (electrically erasable programmable random access memory)
Data hold time	10 years (Data will be maintained for 10 years after it is written.)
Data write capacity	–20 to 40 °C: 300,000 times per address –20 to 70 °C: 100,000 times per address
Error detection	16-bit CRC error detection is used in both directions of transmission.
Operating temperature	Data retention: –40°C to 110°C; read/write: –20°C to 70°C
Storage temperature	–40°C to 110°C
Operating humidity	35% to 95% RH
Protection rating	Meets or exceeds IEC60529 IP67 and JEM IP67G standards.
Vibration resistance	10 to 2,000 Hz, 1.5 mm in each direction; acceleration: 300 m/s^2 (about 30 G); 30 minutes each in three axis directions, 90 minutes total
Shock resistance	1,000 m/s^2 (about 100 G) three times each in X, Y, Z directions, total 18 times
Weight (approximate)	19 g

V600-D23P66SP

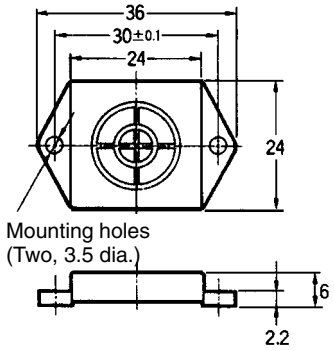


Case material: PFA resin

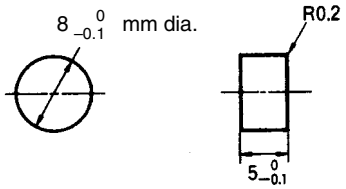
V600-D23P61/V600-D23P53/V600-D23P54

Item	Model		
	V600-D23P61	V600-D23P53	V600-D23P54
Memory capacity	254 bytes		
Memory type	EEPROM (electrically erasable programmable random access memory)		
Data hold time	10 years (Data will be maintained for 10 years after it is written.)		
Data write capacity	–20 to 40 °C: 300,000 times per address –20 to 70 °C: 100,000 times per address		
Error detection	16-bit CRC error detection is used in both directions of transmission.		
Operating temperature	Data retention: –40°C to 85°C; read/write: –20°C to 70°C		
Storage temperature	–40°C to 85°C		
Operating humidity	35% to 95% RH		
Protection rating	Meets or exceeds IEC60529 IP67 and JEM IP67G standards.		
Vibration resistance	10 to 2,000 Hz, 1.5 mm in each direction; acceleration: 300 m/s^2 (about 30 G); 30 minutes each in three axis directions, 90 minutes total		
Shock resistance	1,000 m/s^2 (about 100 G) three times each in X, Y, Z directions, total 18 times		
Weight (approximate)	5.8 g	0.4 g	1.0 g

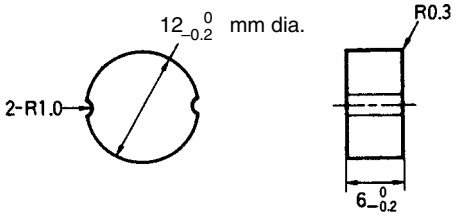
V600-D23P61



V600-D23P53

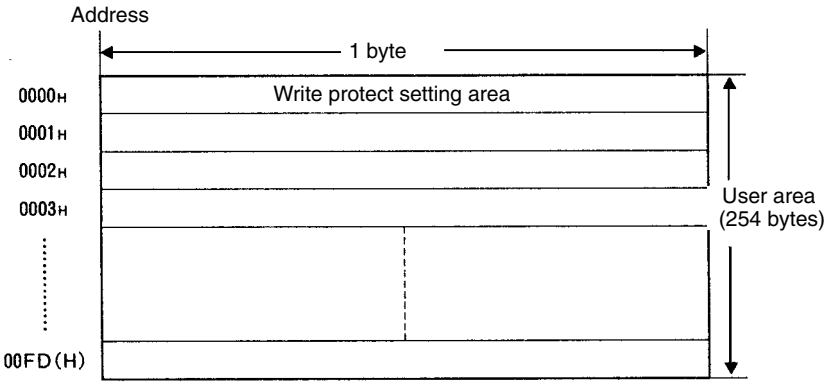


V600-D23P54



Case material	ABS resin
Fill resin	Epoxy resin

2-2-2 Memory Map



The memory is EEPROM, so there is no limit on the number of times that data can be read or overwritten.

The memory capacity is 254 bytes, including the write protect setting area address, 0000_H.

2-2-3 Write Protect Function

The write protect function protects important data stored in the memory of the Data Carrier, such as product number and model, from being overwritten inadvertently. With this function, the data in a specified memory area can be protected. It is recommended that important data be write-protected as follows:

Setting the Write Protect Function

The write protect function is set by writing the final address to be protected in address 0000_H of the Data Carrier's memory. The status of the leftmost bit of address 0000_H determines whether or not the write protect function is in effect.

Address	Bit							
	7	6	5	4	3	2	1	0
0000_H	YES/NO	Ending address						

The region specified by the ending addresses will be protected when the write protect control bit (leftmost bit of address 0000_H) is ON, as shown in the following table.

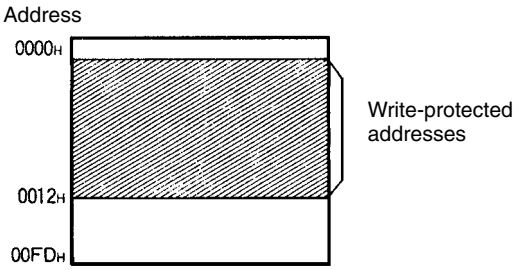
Leftmost bit of 0000_H	Write Protect Function
ON	Data is write-protected.
OFF	Data is not write-protected.

The following addresses can be set for the ending address:
Ending address: 00_H, 01_H to $7F_H$
Address 0080_H to $00FD_H$ can therefore not be set as the ending address. If the ending address is set to 00_H, however, all addresses from 0001_H to $00FD_H$ will be protected.

Examples

1, 2, 3... 1. The following settings would write-protect addresses 0001_H through 0012_H:

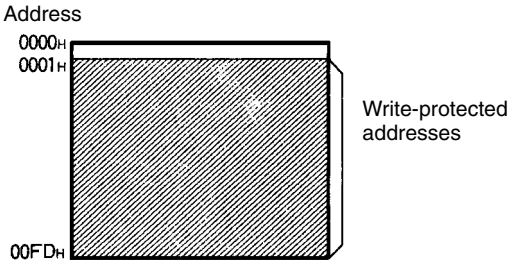
Address	Bit							
	7	6	5	4	3	2	1	0
0000_H	1	0	0	1	0	0	1	0
	9				2			



2. The entire memory except address 0000_H is write-protected by setting the ending address to 00_H, as shown below.

Address	Bit							
	7	6	5	4	3	2	1	0
0000_H	1	0	0	0	0	0	0	0
	8				0			

(Ending address set to 00_H.)



Canceling Write Protection

To cancel write protection, turn OFF the leftmost bit of address 0000_H. The write protection will be cancelled, and the address are set in 0000_H will be ignored.

Note 1. Address 0000_H cannot be write-protected.

2. The first address that is write-protected is always 0001_H. Always structure your data so that any data that needs to be write protected is written at addresses from 0001_H on.

SECTION 3
Communications Specifications

This section provides specifications for communications.

3-1 Transmission Ranges

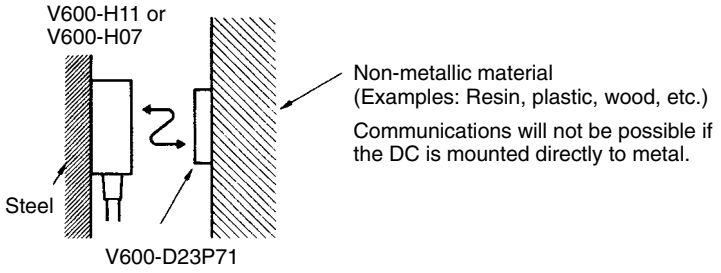
3-1-1 V600-D23P71 Data Carrier

Transmission Range Specifications (Certified Performance)

R/W Head	Setting conditions			Transmission range (unit: mm, axis slip: ±10 mm)
	Condition	Read/Write	Controller communications mode	
V600-H07	Stationary	Read	Any	10 to 70
		Write		10 to 70
	Moving	Read	Any	30 to 60
		Write		30 to 60
V600-H11	Stationary	Read	Any	5 to 40
		Write		5 to 40
	Moving	Read	Any	15 to 40
		Write		15 to 40

Note

1. The Communications Distance Priority Mode or Communications Time Priority Mode can be set on the Serial Interface ID Controller or ID Sensor Unit via the communications mode DIP switch.
2. The Communications Distance Priority Mode is always used for Parallel Interface ID Controllers.
3. These specifications are the certified performance when taking into consideration variations in ambient temperatures and products.
4. The Data Carrier and Read/Write Head installation conditions are as follows:

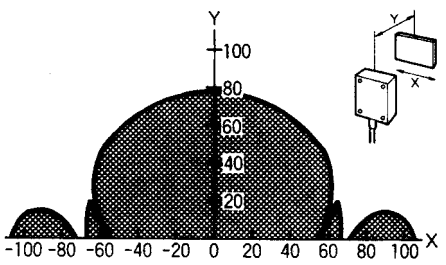


For details regarding R/W Head and DC installation, refer to *Section 4 Installation*.

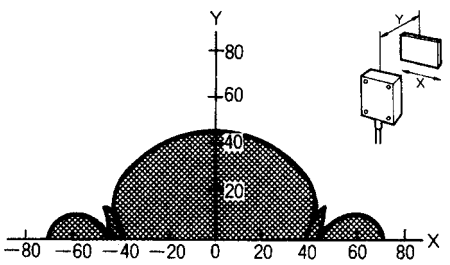
Communications Areas

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

V600-D23P71 and V600-H07



V600-D23P71 and V600-H11



The communications areas are not affected by the Controller's communications mode.

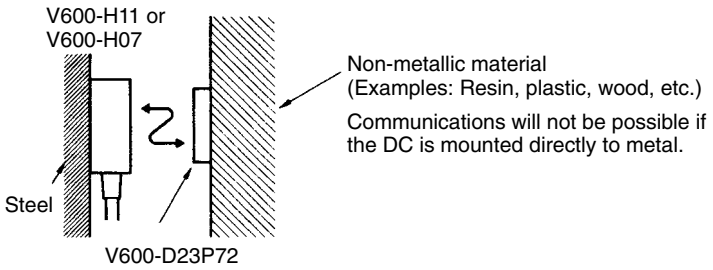
3-1-2 V600-D23P72 Data Carrier

Transmission Range Specifications (Certified Performance)

R/W Head	Setting conditions			Transmission range (unit: mm)
	Condition	Read/Write	Controller communications mode	
V600-H07	Stationary	Read	Any	10 to 50 (axis slip: ±10 mm)
		Write		10 to 50 (axis slip: ±10 mm)
	Moving	Read	Any	30 to 40 (axis slip: ±10 mm)
		Write		30 to 40 (axis slip: ±10 mm)
V600-H11	Stationary	Read	Any	5 to 30 (axis slip: ±10 mm)
		Write		5 to 30 (axis slip: ±10 mm)
	Moving	Read	Any	15 to 30 (axis slip: ±10 mm)
		Write		15 to 30 (axis slip: ±10 mm)

Note

1. The Communications Distance Priority Mode or Communications Time Priority Mode can be set on the Serial Interface ID Controller or ID Sensor Unit via the communications mode DIP switch.
2. The Communications Distance Priority Mode is always used for Parallel Interface ID Controllers.
3. These specifications are the certified performance when taking into consideration variations in ambient temperatures and products.
4. The Data Carrier and Read/Write Head installation conditions are as follows:

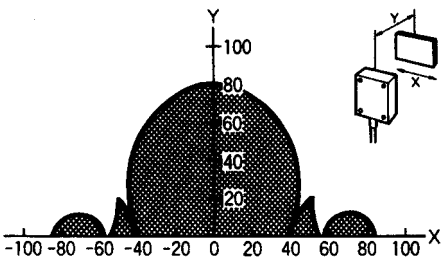


For details regarding R/W Head and DC installation, refer to *Section 4 Installation*.

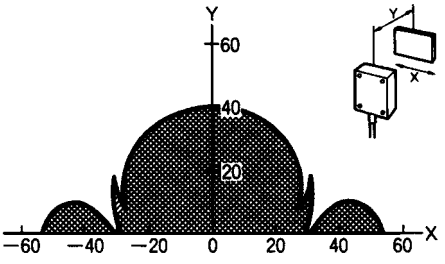
Communications Areas

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

V600-D23P72 and V600-H07



V600-D23P72 and V600-H11



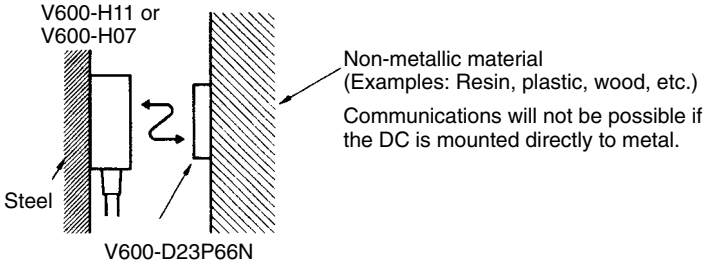
The communications areas are not affected by the Controller's communications mode.

3-1-3 V600-D23P66N Data Carrier

Transmission Range Specifications (Certified Performance)

R/W Head	Setting conditions			Transmission range (unit: mm)
	Condition	Read/Write	Controller communications mode	
V600-H07	Stationary	Read	Distance Priority	5 to 45 (axis slip: ±10 mm)
			Time Priority	5 to 35 (axis slip: ±10 mm)
		Write	Any	5 to 35 (axis slip: ±10 mm)
	Moving	Read	Distance Priority	25 to 40 (axis slip: ±10 mm)
			Time Priority	25 to 30 (axis slip: ±10 mm)
		Write	Any	25 to 30 (axis slip: ±10 mm)
V600-H11	Stationary	Read	Distance Priority	5 to 30 (axis slip: ±10 mm)
			Time Priority	5 to 25 (axis slip: ±10 mm)
		Write	Any	5 to 25 (axis slip: ±10 mm)
	Moving	Read	Distance Priority	15 to 25 (axis slip: ±10 mm)
			Time Priority	15 to 20 (axis slip: ±10 mm)
		Write	Any	15 to 20 (axis slip: ±10 mm)

Note
1. The Communications Distance Priority Mode or Communications Time Priority Mode can be set on the Serial Interface ID Controller or ID Sensor Unit via the communications mode DIP switch.
2. The Communications Distance Priority Mode is always used for Parallel Interface ID Controllers.
3. These specifications are the certified performance when taking into consideration variations in ambient temperatures and products.
4. The Data Carrier and Read/Write Head installation conditions are as follows:

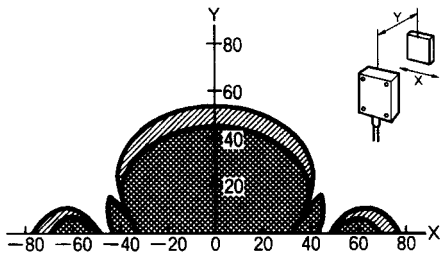


For details regarding R/W Head and DC installation, refer to *Section 4 Installation*.

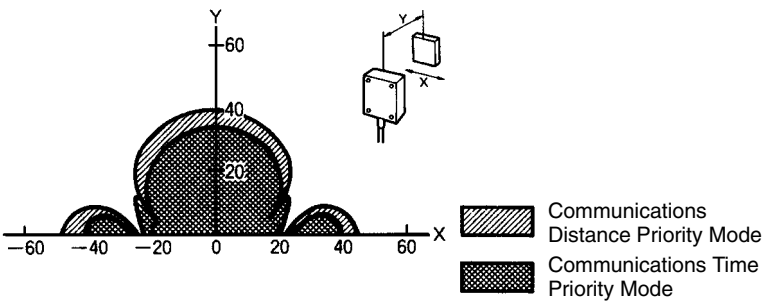
Communications Areas

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

V600-D23P66 and V600-H07



V600-D23P66 and V600-H11

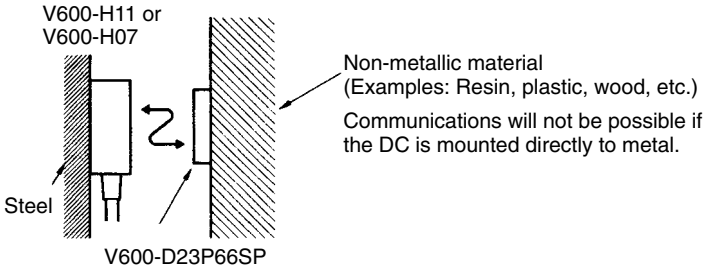


3-1-4 V600-D23P66SP Data Carrier

Transmission Range Specifications

R/W Head	Setting conditions			Transmission range (unit: mm)
	Condition	Read/Write	Controller transmission mode	
V600-H07	Stationary	Read	Distance Priority	5 to 40 (axis slip: ±10 mm)
			Time Priority	5 to 30 (axis slip: ±10 mm)
		Write	Any	5 to 30 (axis slip: ±10 mm)
	Moving	Read	Distance Priority	20 to 40 (axis slip: ±10 mm)
			Time Priority	20 to 30 (axis slip: ±10 mm)
		Write	Any	20 to 30 (axis slip: ±10 mm)
V600-H11	Stationary	Read	Distance Priority	5 to 25 (axis slip: ±10 mm)
			Time Priority	5 to 20 (axis slip: ±10 mm)
		Write	Any	5 to 20 (axis slip: ±10 mm)
	Moving	Read	Distance Priority	10 to 25 (axis slip: ±10 mm)
			Time Priority	10 to 20 (axis slip: ±10 mm)
		Write	Any	10 to 20 (axis slip: ±10 mm)

Note
1. The Communications Distance Priority Mode or Communications Time Priority Mode can be set on the Serial Interface ID Controller or ID Sensor Unit via the communications mode DIP switch.
2. The Communications Distance Priority Mode is always used for Parallel Interface ID Controllers.
3. These specifications are the certified performance when taking into consideration variations in ambient temperatures and products.
4. The Data Carrier and Read/Write Head installation conditions are as follows:

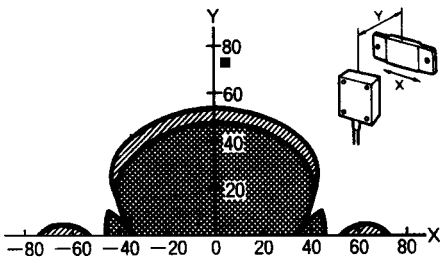


For details regarding R/W Head and DC installation, refer to *Section 4 Installation*.

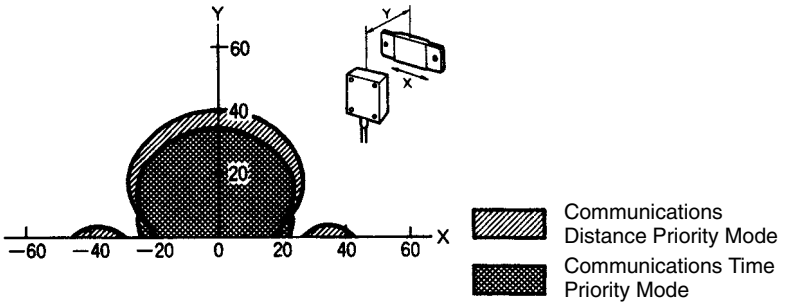
Communications Areas

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

V600-D23P66 and V600-H07



V600-D23P66 and V600-H11



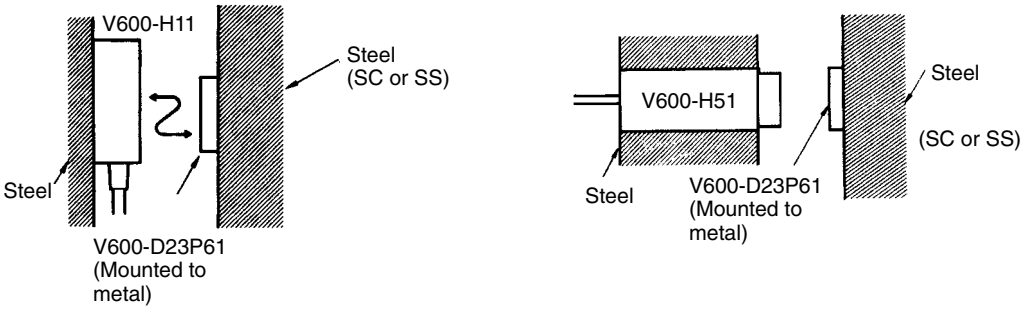
3-1-5 V600-D23P61 Data Carrier

Transmission Range Specifications (Certified Performance)

R/W Head	Setting conditions			Transmission range (unit: mm)
	Condition	Read/Write	Controller communications mode	
V600-H07	Stationary	Read	Distance Priority	2 to 19 (axis slip: ±10 mm)
			Time Priority	2 to 16 (axis slip: ±10 mm)
		Write	Any	2 to 16 (axis slip: ±10 mm)
	Moving	Read	Distance Priority	12 to 19 (axis slip: ±10 mm)
			Time Priority	12 to 16 (axis slip: ±10 mm)
		Write	Any	12 to 16 (axis slip: ±10 mm)
V600-H11	Stationary	Read	Distance Priority	1 to 16 (axis slip: ±2 mm)
			Time Priority	1 to 14 (axis slip: ±2 mm)
		Write	Any	1 to 14 (axis slip: ±2 mm)
	Moving	Read	Distance Priority	7 to 16 (axis slip: ±2 mm)
			Time Priority	7 to 14 (axis slip: ±2 mm)
		Write	Any	7 to 14 (axis slip: ±2 mm)

Note

1. The Communications Distance Priority Mode or Communications Time Priority Mode can be set on the Serial Interface ID Controller or ID Sensor Unit via the communications mode DIP switch.
2. The Communications Distance Priority Mode is always used for Parallel Interface ID Controllers.
3. These specifications are the certified performance when taking into consideration variations in ambient temperatures and products.
4. The Data Carrier and Read/Write Head installation conditions are as follows:

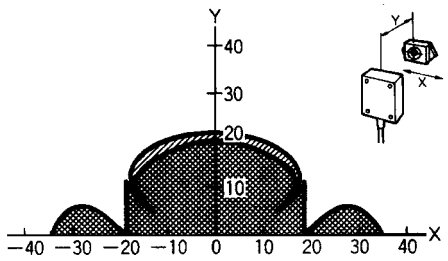


For details regarding R/W Head and DC installation, refer to *Section 4 Installation*.

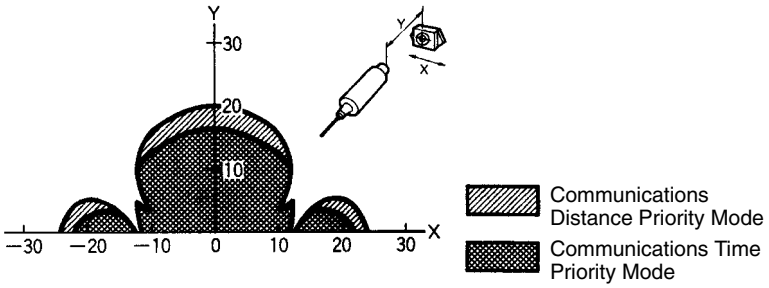
Communications Areas

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

V600-D23P61 and V600-H11



V600-D23P61 and V600-H51



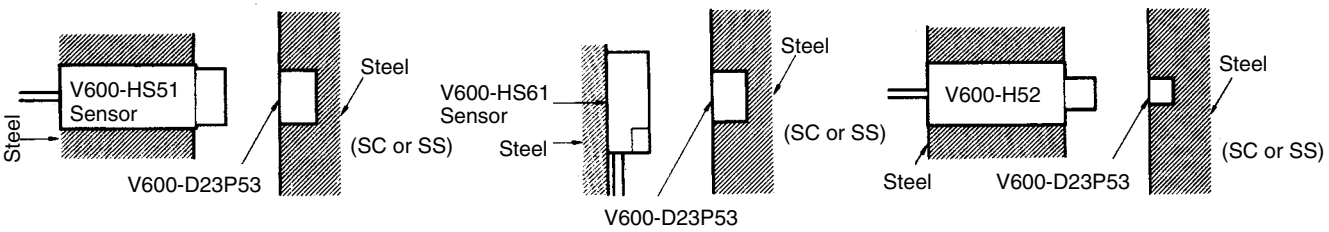
3-1-6 V600-D23P53 Data Carrier

Transmission Range Specifications (Certified Performance)

R/W Head	Setting conditions			Transmission range (unit: mm)	
	Condition	Read/Write	Controller communications mode		
V600-HS51	Stationary	Read	Distance Priority	0.5 to 4.0 (axis slip: ±2 mm)	0.5 to 4.5 (axis slip: ±1 mm)
			Time Priority	0.5 to 3.0 (axis slip: ±2 mm)	0.5 to 3.5 (axis slip: ±1 mm)
		Write	Any	0.5 to 3.0 (axis slip: ±2 mm)	0.5 to 3.5 (axis slip: ±1 mm)
V600-HS61	Stationary	Read	Distance Priority	0.5 to 4.0 (axis slip: ±2 mm)	0.5 to 4.5 (axis slip: ±1 mm)
			Time Priority	0.5 to 3.0 (axis slip: ±2 mm)	0.5 to 3.5 (axis slip: ±1 mm)
		Write	Any	0.5 to 3.0 (axis slip: ±2 mm)	0.5 to 3.5 (axis slip: ±1 mm)
V600-H52	Stationary	Read	Distance Priority	0.5 to 4.0 (axis slip: ±2 mm)	0.5 to 4.5 (axis slip: ±1 mm)
			Time Priority	0.5 to 3.0 (axis slip: ±2 mm)	0.5 to 3.5 (axis slip: ±1 mm)
		Write	Any	0.5 to 3.0 (axis slip: ±2 mm)	0.5 to 3.5 (axis slip: ±1 mm)

Note

1. The Communications Distance Priority Mode or Communications Time Priority Mode can be set on the Serial Interface ID Controller or ID Sensor Unit via the communications mode DIP switch.
2. The Communications Distance Priority Mode is always used for Parallel Interface ID Controllers.
3. These specifications are the certified performance when taking into consideration variations in ambient temperatures and products.
4. The Data Carrier and Read/Write Head installation conditions are as follows:

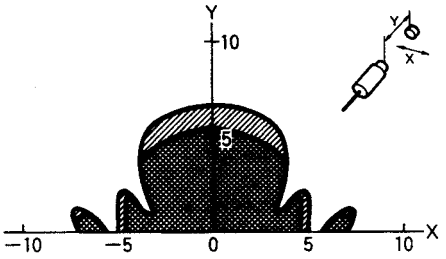


For details regarding R/W Head and DC installation, refer to *Section 4 Installation*.

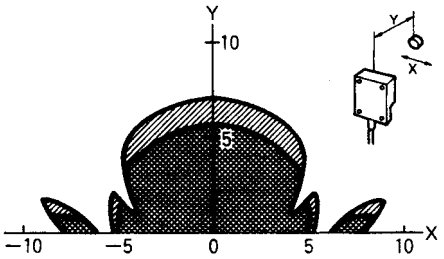
Communications Areas

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

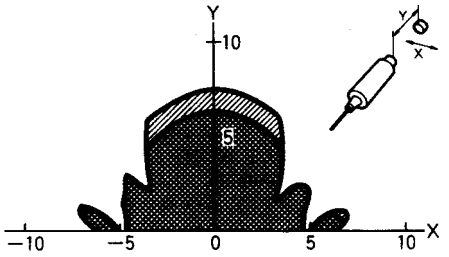
V600-D23P53 and V600-HS51

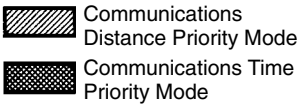


V600-D23P53 and V600-HS61



V600-D23P53 and V600-H52





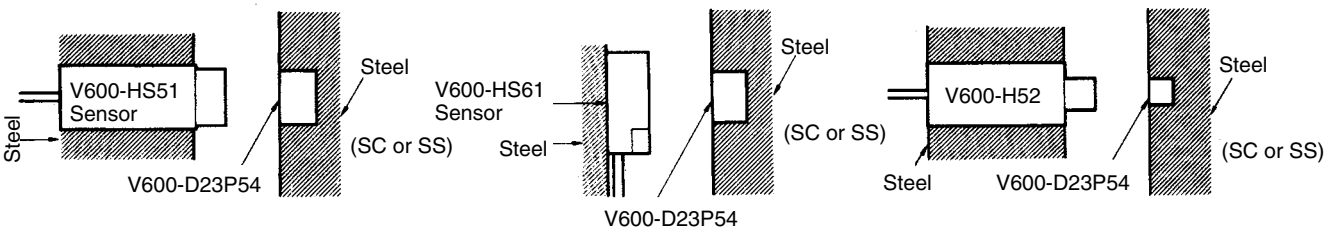
3-1-7 V600-D23P54 Data Carrier

Transmission Range Specifications (Certified Performance)

R/W Head	Setting conditions			Transmission range (unit: mm)	
	Condition	Read/Write	Controller communications mode		
V600-HS51	Stationary	Read	Distance Priority	0.5 to 6.0 (axis slip: ±2 mm)	0.5 to 6.5 (axis slip: ±1 mm)
			Time Priority	0.5 to 5.5 (axis slip: ±2 mm)	0.5 to 6.0 (axis slip: ±1 mm)
		Write	Any	0.5 to 5.0 (axis slip: ±2 mm)	0.5 to 5.5 (axis slip: ±1 mm)
V600-HS61	Stationary	Read	Distance Priority	0.5 to 6.5 (axis slip: ±2 mm)	0.5 to 7.0 (axis slip: ±1 mm)
			Time Priority	0.5 to 5.5 (axis slip: ±2 mm)	0.5 to 6.0 (axis slip: ±1 mm)
		Write	Any	0.5 to 5.5 (axis slip: ±2 mm)	0.5 to 6.0 (axis slip: ±1 mm)
V600-H52	Stationary	Read	Distance Priority	0.5 to 6.5 (axis slip: ±2 mm)	0.5 to 7.0 (axis slip: ±1 mm)
			Time Priority	0.5 to 5.5 (axis slip: ±2 mm)	0.5 to 6.0 (axis slip: ±1 mm)
		Write	Any	0.5 to 5.5 (axis slip: ±2 mm)	0.5 to 6.0 (axis slip: ±1 mm)

Note
1. The Communications Distance Priority Mode or Communications Time Priority Mode can be set on the Serial Interface ID Controller or ID Sensor Unit via the communications mode DIP switch.
2. The Communications Distance Priority Mode is always used for Parallel Interface ID Controllers.

3. These specifications are the certified performance when taking into consideration variations in ambient temperatures and products.
4. The Data Carrier and Read/Write Head installation conditions are as follows:

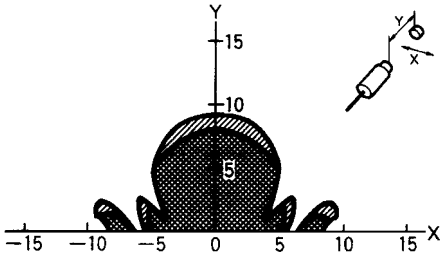


For details regarding R/W Head and DC installation, refer to *Section 4 Installation*.

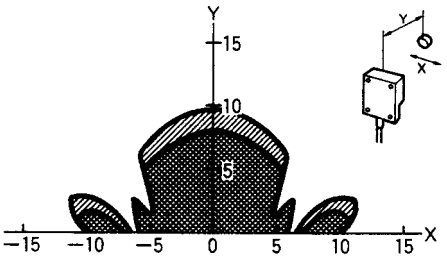
Communications Areas

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

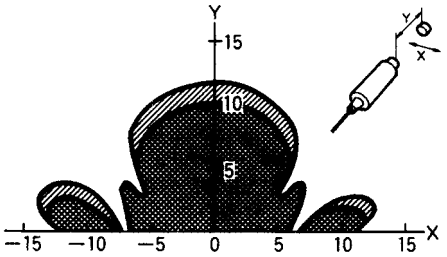
V600-D23P54 and V600-HS51

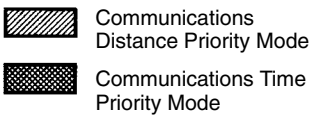


V600-D23P54 and V600-HS61



V600-D23P54 and V600-H52





3-1-8 Communications Areas on Non-metal

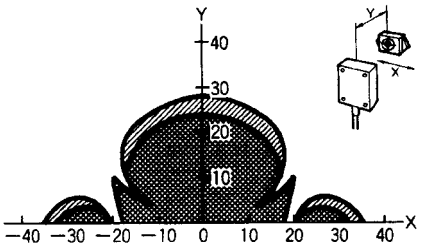
Although the V600-D23P61 is for mounting on metal surfaces and the V600-D23P53/P54 are for imbedding in metal, mounting any of these Data Carriers on non-metal will increase the communications areas.

The following diagrams show representative examples of the communications areas. All measurement units are shown in mm.

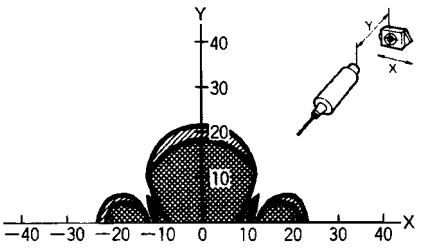
The following diagrams assume that there is no metal at the back of or surrounding the Data Carrier.

V600-D23P61 Data Carrier

V600-D23P61 and V600-H11

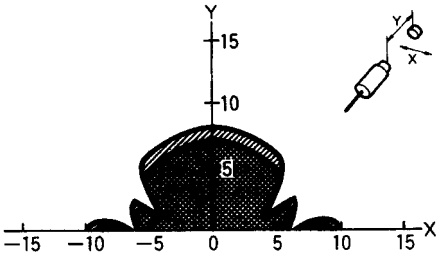


V600-D23P61 and V600-H51

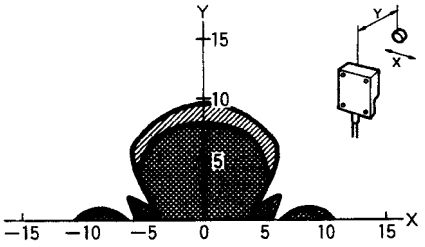


V600-D23P53 Data Carrier

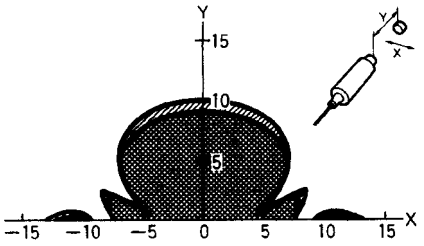
V600-D23P53 and V600-HS51



V600-D23P53 and V600-HS61

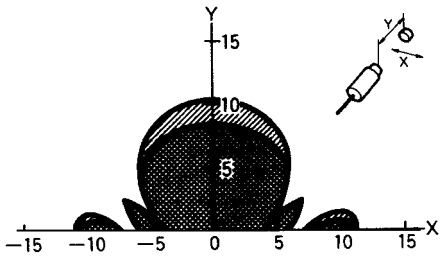


V600-D23P53 and V600-H52

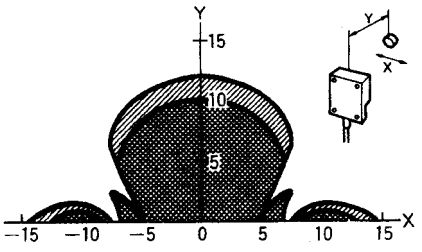


V600-D23P54 Data Carrier

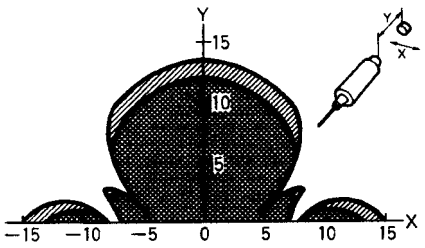
V600-D23P54 and V600-HS51

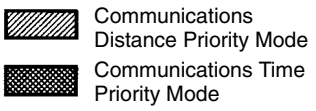


V600-D23P54 and V600-HS61



V600-D23P54 and V600-H52





3-2 Transmission Time

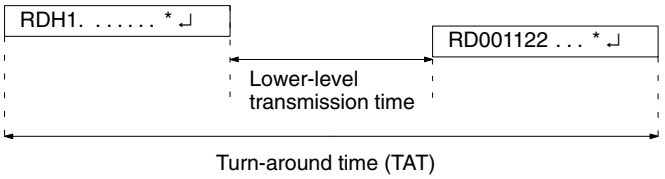
Transmission Time

Transmission times are the same for all models of R/W Heads and DCs covered in this manual, although transmission times are different for DCs that contain batteries. The term “transmission time” is used to indicate both the turn-around time (TAT) and the lower level transmission time between the R/W Head and DC.

The TAT is the total time required from the transmission of a command from a host device (such as a host computer) until the reception of a response at the host device.

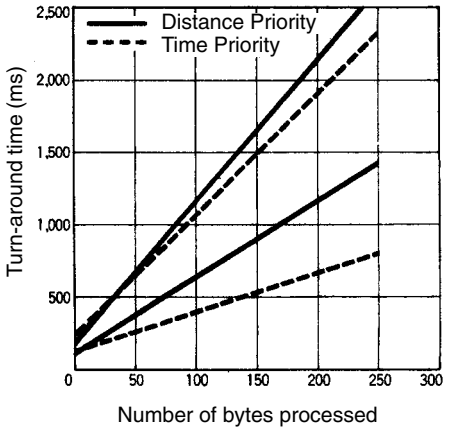
The lower-level transmission time is the time required for transmission of data between the R/W Head and DC.

The following diagram shows the TAT and lower-level transmission time for the READ command.



TAT (Reference)

The following diagrams show the TAT and lower-level transmission time for Serial Interface ID Controllers V600-CA1A-V□, V600-CA2A-V□, V600-CD1D-V□, and V600-CF1A. (The TAT for Parallel Interface ID Controllers and ID Sensor Units varies with the host’s software.)



Calculation Method (Reference) (Unit: ms)

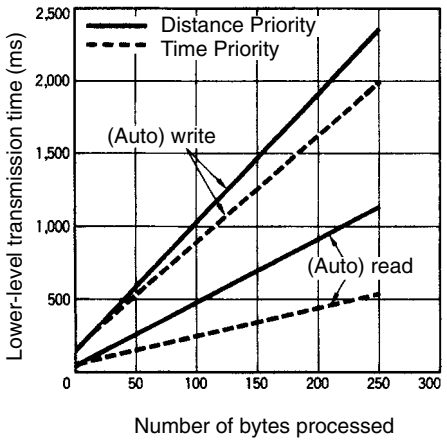
Controller communications mode	Read/Write	TAT
Communications Distance Priority Mode	Read	T = 5.4N + 85.4
	Write	T = 9.8N + 184.9
Communications Time Priority Mode	Read	T = 2.9N + 99.1
	Write	T = 8.2N + 272.9

N: Number of bytes processed

Note

1. The value given for the TAT data assumes that the communications settings for the V600-CA1A-V□ ID Controller are as follows:
   Baud rate: 9600 bps; data length: 8 bits; stop bits: 1; parity: odd.
2. The number of bytes is the number for ASCII code. (For details, refer to the *RFID System Operation Manual (Z83)*.

Transmission Time With the Data Carrier (Reference)



Calculation Method (Reference) (Unit: ms)

Controller communications mode	Read/Write	Lower-level transmission time
Communications Distance Priority Mode	Read	t = 4.3N + 64.6
	Write	t = 8.7N + 167.1
Communications Time Priority Mode	Read	t = 1.8N + 79.0
	Write	t = 7.1N + 180.4

N: Number of bytes processed

Communications Mode Setting

Either the Communications Distance Priority Mode or the Communications Time Priority Mode can be set for the communications mode for the V600-CA1A-V□, V600-CA2A-V□, V600-CD1D-V□, and V600-CF1A Serial Interface ID Controllers using the mode DIP switch. Refer to the operation manuals for the Controller for details. (The V600-CA8A-V□/CA9A-V□ Parallel Interface ID Controllers always operate in the Communications Distance Priority Mode.)

3-3 Data Carrier Speed

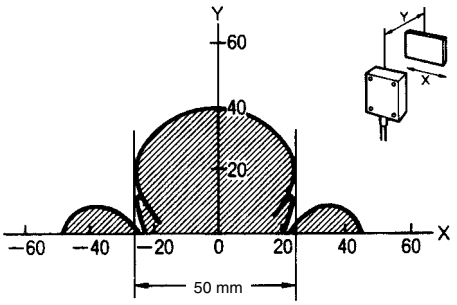
The number of bytes that can be processed using the Auto Read and Auto Write commands depends on the speed of the DC. The relationship between the number of bytes and DC speed in m/minute can be determined from the following equation.

$$\text{Max. DC Speed} = \frac{\text{Distance travelled in the transmission range (m)}}{\text{Lower-level transmission time (min)}}$$

- The “distance travelled in the transmission range (m)” is the maximum width of the transmission range (in the X direction). Refer to the diagrams in *3-1 Transmission Range*.
- The “lower-level transmission time (min)” is the time required for transmission between the DC and the R/W Head. For details regarding this calculation, refer to *3-2 Transmission Time*.

Calculation Example

In this example diagram, the V600-D23P66 and V600-H11 are combined and four bytes are read.



This diagram shows the following:

Distance travelled in transmission range, Y (transmission distance) = 50 mm
Lower-level transmission time, T = 4.3 x 4 + 64.6 = 81.8 ms.

Accordingly, the DC speed in this case will be as follows:

$$\text{Max. DC Speed} = \frac{\text{Distance travelled in the transmission range (m)}}{\text{Lower-level transmission time (min)}} = \frac{50\ (\text{mm})}{81.8\ (\text{ms})}$$

$$= 36.7\ \text{m/min}$$

Note

1. The distance travelled in the transmission time will vary depending on the read/write distance and the shaft slippage. Refer to the diagrams in *3-1 Transmission Range*.
2. The DC speed is the standard value. Before using the equipment, run a test to determine the speed under the actual operating conditions.
3. The DC speed data above do not take into account possible transmission errors in host or lower-level communications.
4. When the V600-CA8A-V□/CA9A-V□ is used, the speed will vary depending on the software at the host device.

SECTION 4
Installation

This section describes the recommended installation methods for the R/W Heads and Data Carriers (DCs).

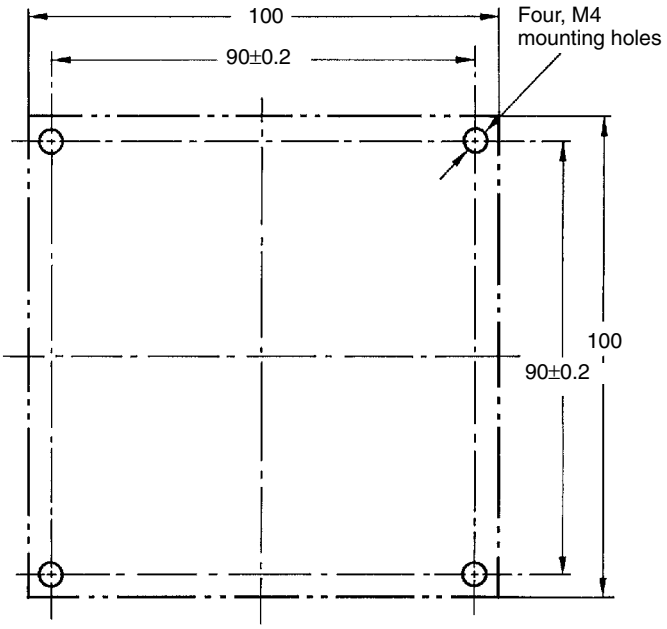
4-1 R/W Head Installation

4-1-1 Installation Method

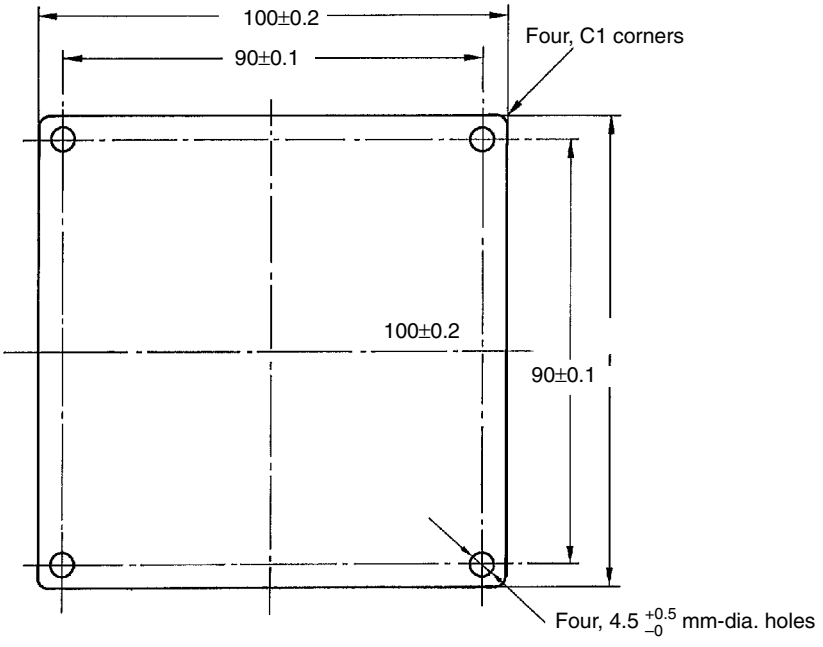
V600-H07 R/W Head

Use M4 screws and spring washers for R/W Head installation. Tighten the screws to a torque of 0.7 to 1.2 N•m (approximately 7 to 12 kgf•cm).

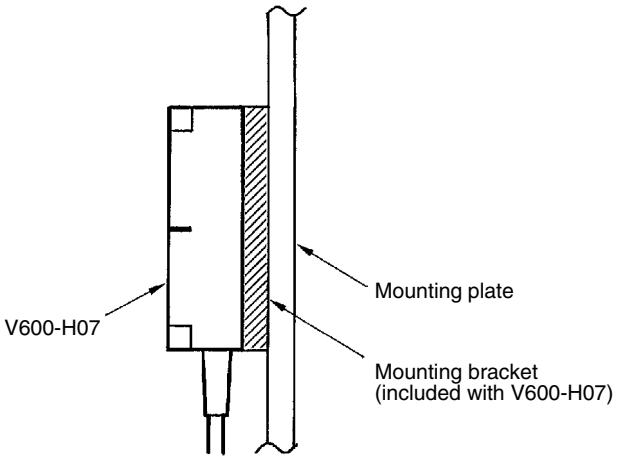
There are no restrictions on the mounting direction or the direction of access to the DC, but if the R/W Head is to be installed near a device such as a conveyance belt, make sure there is no danger of the R/W Head being accidentally struck.



Mounting Bracket Dimensions (V600-H07 Only)



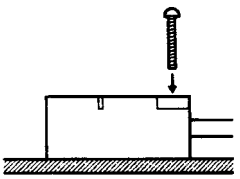
Note A mounting bracket is provided with the V600-H07. It is not necessary to use this bracket if a metal mounting plate larger than the 100×100 mm "footprint" of the R/W Head is used for installation.

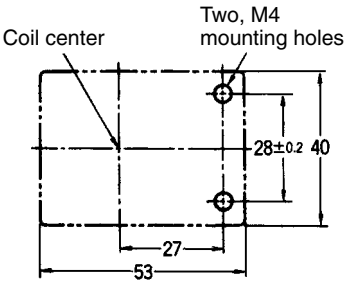


⚠ **Caution** Be sure to ground the mounting surface of the R/W Head if it is metal.

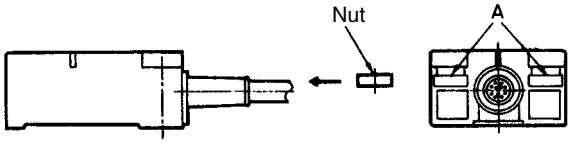
V600-H11 R/W Head

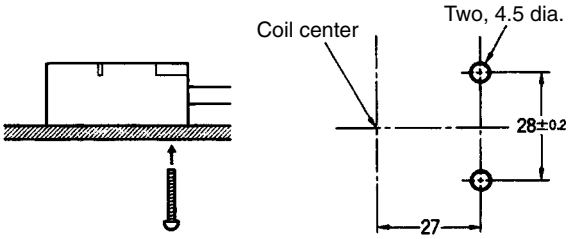
(1) Front Panel Mounting





2) Rear Panel Mounting Insert the nuts that are included with the R/W Head into the locations marked "A."



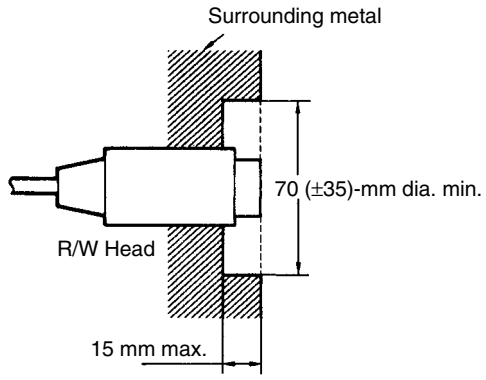


V600-H51/H52 R/W Head

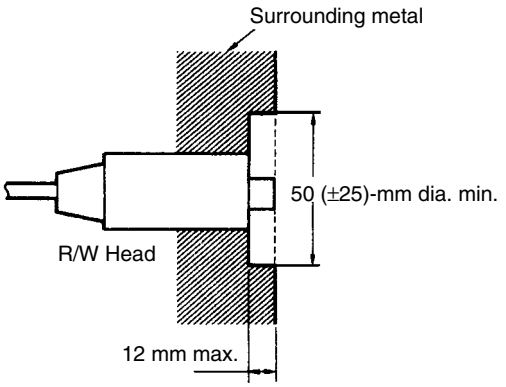
The V600-H51/H52 R/W Heads are M22. When embedding or attaching to metal, separate the communications section (coil tip) from the metal in all direc-

tions by at least 35 mm for the V600-H51 and by at least 25 mm for the V600-H52.

V600-H51

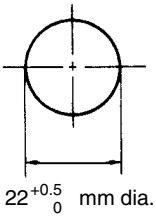


V600-H52



Note Do not let the surrounding metal extend beyond the end of the R/W Head.

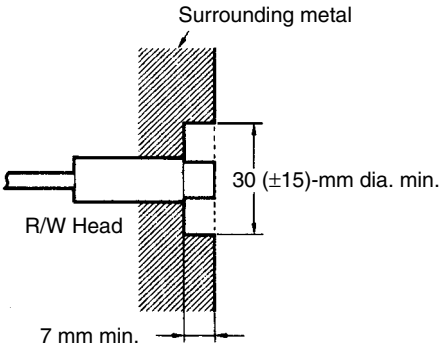
Mounting to Brackets: Mounting Hole Dimensions



Note Mount the R/W Head to the bracket so that the lock washers and nuts clamp onto the bracket. The maximum tightening torque is 40 N·m (approx. 400 kgf·cm).

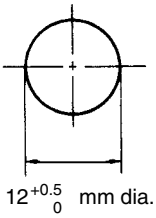
V600-HS51 R/W Head

The V600-HS51 R/W Head is M12. When embedding or attaching to metal, separate the communications section (coil tip) from the metal by at least 15 mm in all directions.



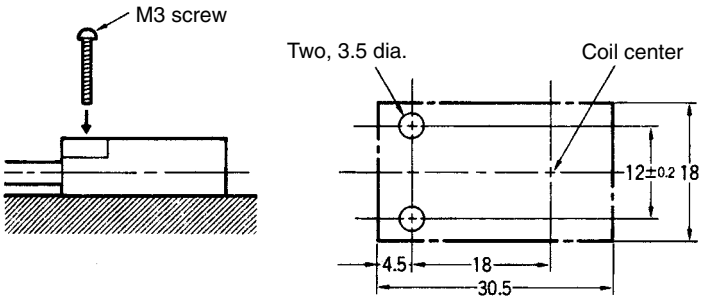
Note Do not let the surrounding metal extend beyond the end of the R/W Head.

Mounting to Brackets: Mounting Hole Dimensions



Note Mount the R/W Head to the bracket so that the lock washers and nuts clamp onto the bracket. The maximum tightening torque is 6 N·m (approx. 60 kgf·cm).

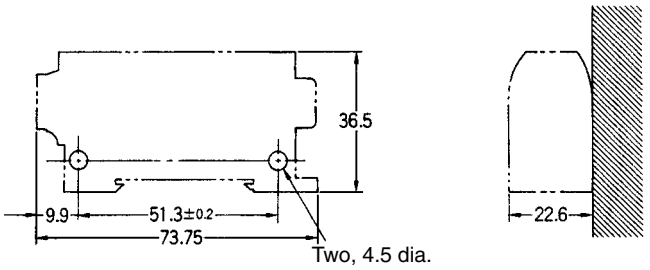
V600-HS61 R/W Head



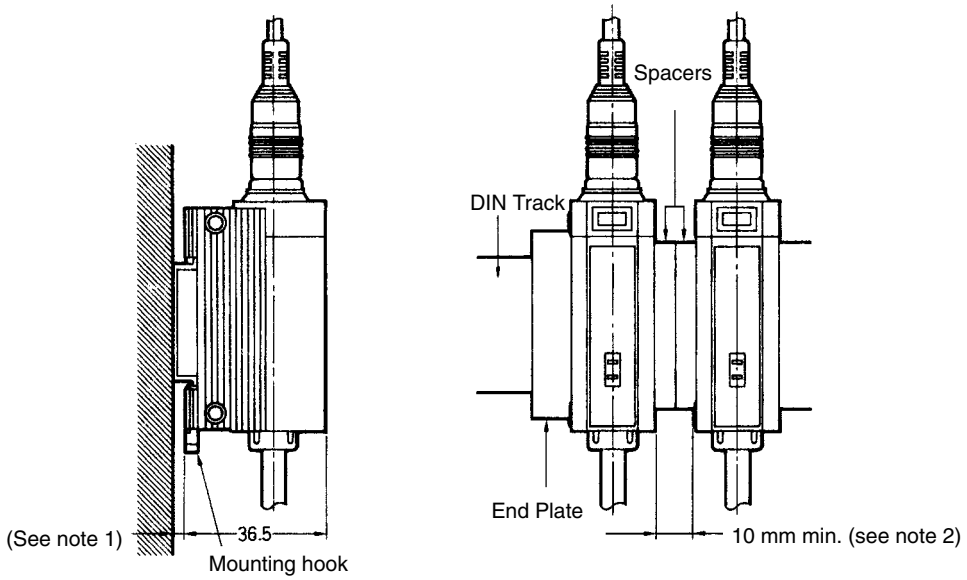
V600-HA51 R/W Head

Surface Mounting

Use M4 screws when mounting directly to surfaces inside the control panel.



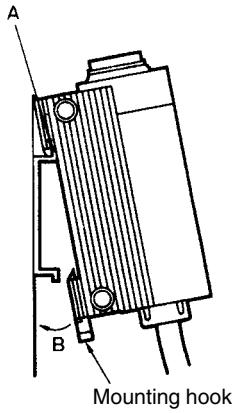
Mounting to DIN Track

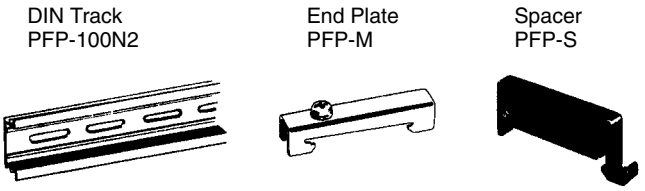


Note
1. Add the height of the DIN Track.
2. Provide a space of at least 10 mm (at least two spacers) and attach the R/W Heads securely.

1, 2, 3...
1. When connecting a R/W Head to DIN Track, hook section A first and then rotate in direction B.

2. To remove a R/W Head from DIN Track, pull out on the mounting hook.





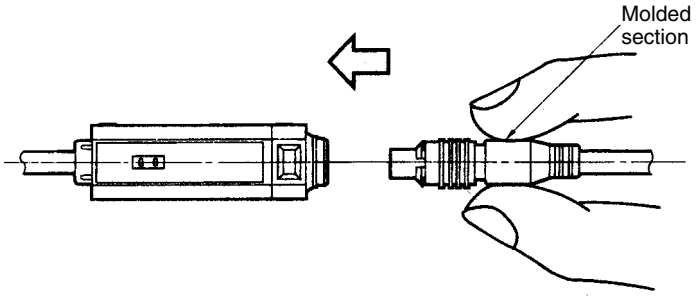
Attaching and Removing V600-HA51 and V600-HS51/HS61 Connectors

Attaching

1, 2, 3...

1. Hold the molded section of the connector, align the groove with the connector on the main unit, and press in.
2. Press the connector straight in until it locks in place.

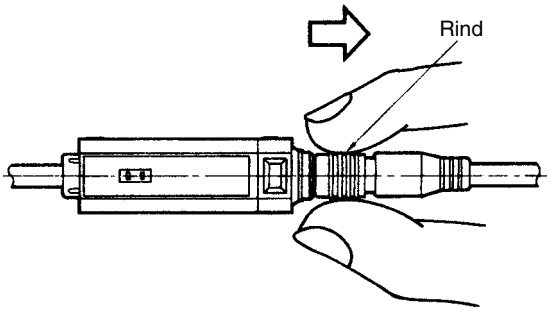
Note The connector will not lock in place if the ring is held. Always hold the molded section.



Removing

Hold the ring and pull the connector straight out.

Note The connector cannot be removed by holding onto the molded section. Never pull on the cable. Excessive force can break lines or otherwise cause damage.

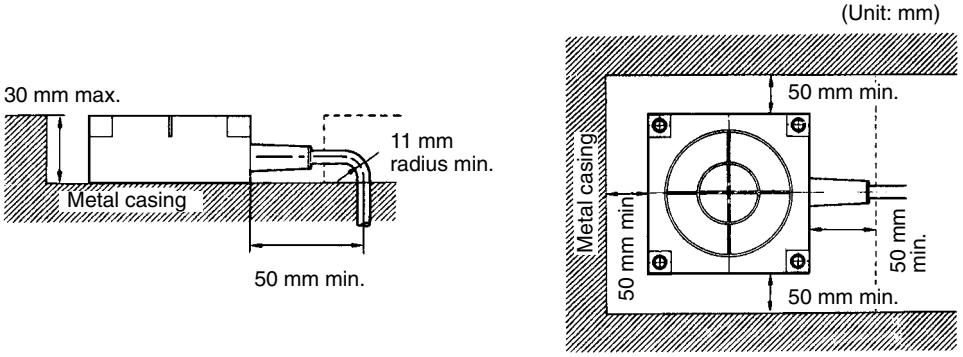


4-1-2 Effect of Surrounding Metals

V600-H07 R/W Head

In addition to surface mounting, it is also possible to flush-mount the V600-H07 within a metal casing to protect it from being struck by other objects. To prevent malfunctioning, allow at least 50 mm between the sides of the R/W Head and the metal casing, and do not mount the R/W Head below the metal surface. If the

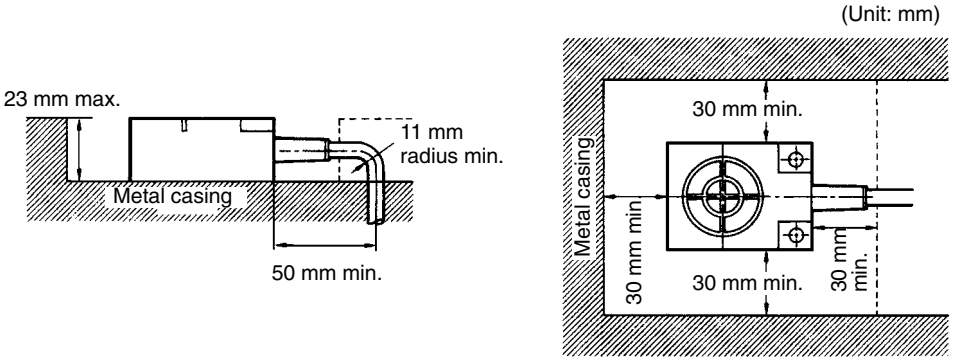
gap between sides of the R/W Head and the metal casing is less than 50 mm, the read/write transmission range will be greatly diminished.



Note
1. Do not bend the R/W Head's cable into a curve tighter than 11 mm in radius.
2. The read/write transmission range will be reduced significantly if the R/W Head is installed closer than 50 mm to metal surfaces.

V600-H11 R/W Head

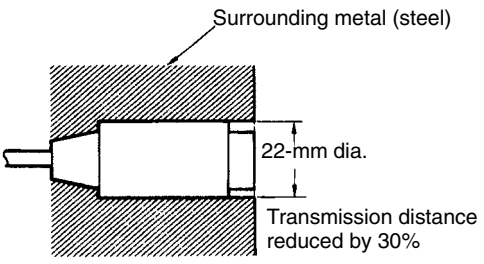
In addition to surface mounting, it is also possible to flush-mount the V600-H11 within a metal casing to protect it from being struck by other objects. To prevent malfunctioning, allow at least 30 mm between the sides of the R/W Head and the metal casing, and do not mount the R/W Head below the metal surface. If the gap between sides of the R/W Head and the metal casing is less than 30 mm, the read/write transmission range will be greatly diminished.



Note
1. Do not bend the R/W Head's cable in a curve tighter than 11 mm in radius.
2. The read/write transmission range will be reduced significantly if the R/W Head is installed closer than 30 mm to metal surfaces.

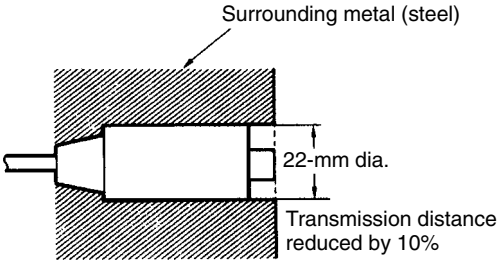
V600-H51 R/W Head

If there is metal extending to the coil surface near the R/W Head, the transmission distances will be reduced by approximately 30% from the transmission distances for installation according to the procedures in *4-1-1 Installation Method*.



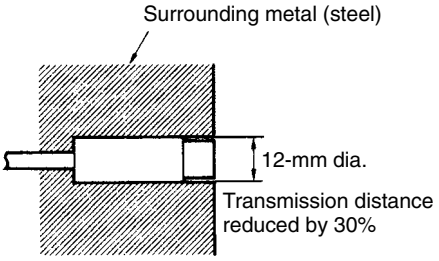
V600-H52 R/W Head

If there is metal extending to the coil surface near the R/W Head, the transmission distances will be reduced by approximately 10% from the transmission distances for installation according to the procedures in *4-1-1 Installation*



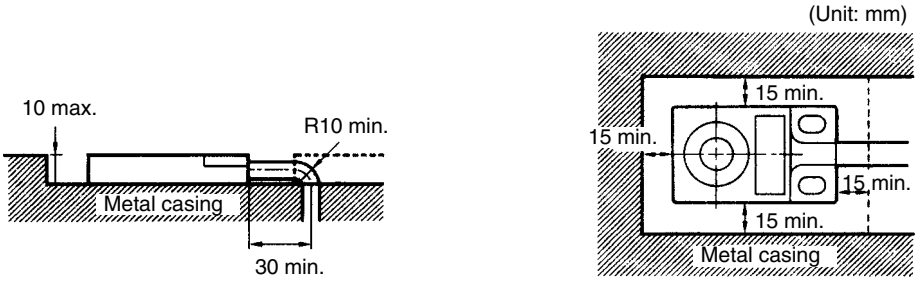
V600-HS51 R/W Head

If there is metal extending to the coil surface near the R/W Head, the transmission distances will be reduced by approximately 30% from the transmission distances for installation according to the procedures in *4-1-1 Installation*



V600-HS61 R/W Head

The V600-HS61 R/W Head can be surface-mounted, or it can be embedded in metal to protect it from colliding with other objects. When embedding the R/W Head, separate it from the metal surfaces on all sides by at least 15 mm to prevent operating errors. The height of the metal surfaces must not exceed beyond the height of the R/W Head.



Note
1. The bending radius of the cord must be at least 10 mm.
2. The transmission distance will be greatly reduced if the R/W Head is not separated from surrounding metal surfaces by at least 15 mm.

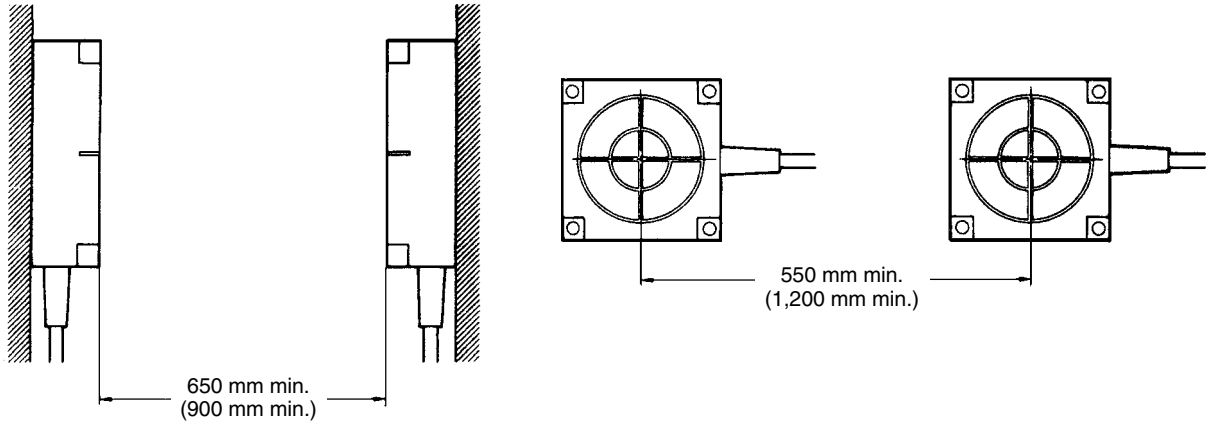
4-1-3 Interference between R/W Heads

When using two or more R/W Heads, be sure to allow enough space between the R/W Heads to avoid errors caused by mutual interference. The diagrams below show the minimum spacing required.

V600-H07 R/W Head

When facing each other, V600-H07 R/W Heads should be installed at least 650 mm apart if RD/WT commands are used, and 900 mm apart if auto commands are used.

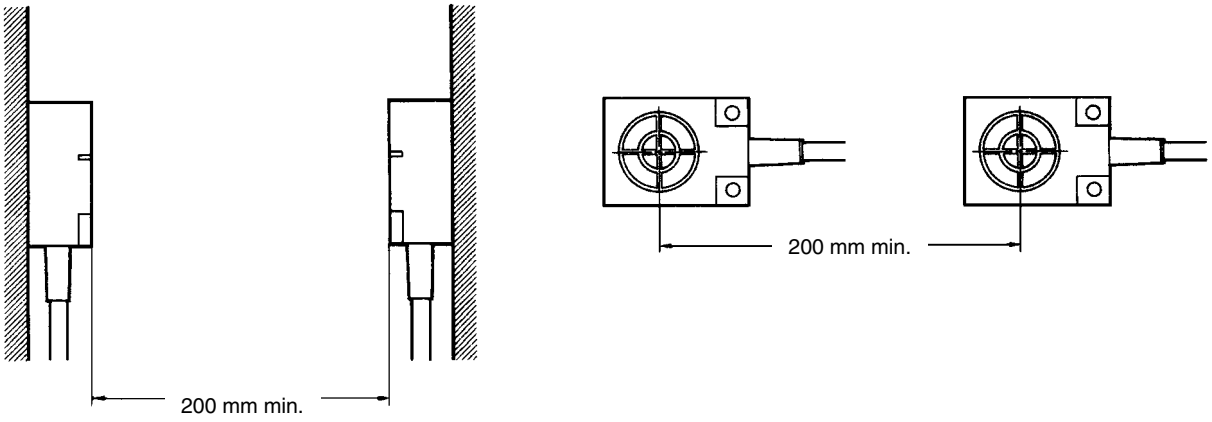
When facing the same direction, V600-H07 R/W Heads should be installed at least 550 mm apart (center to center) if RD/WT commands are used, and 1,200 mm apart (center to center) if auto commands are used.



V600-H11 R/W Head

When facing each other, V600-H07 R/W Heads should be installed at least 200 mm apart regardless of whether RD/WT commands or auto commands are used.

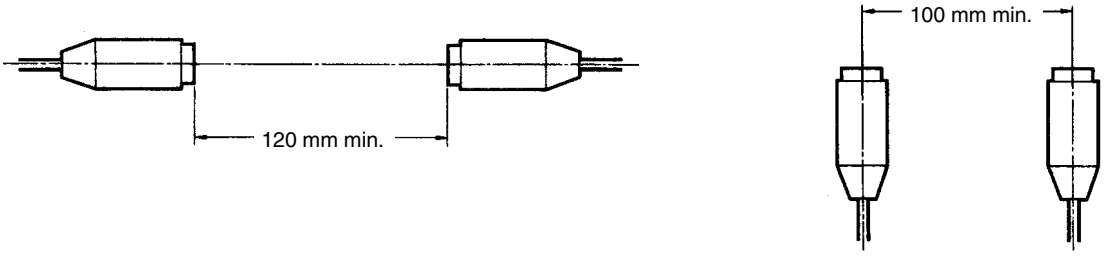
When facing the same direction, V600-H07 R/W Heads should be installed at least 200 mm apart regardless of whether RD/WT commands or auto commands are used.



Note For applications in which no two R/W Heads transmit or receive data at the same time (i.e., in which the R/W Heads read and write independently), there is no risk of mutual interference and the R/W Heads can be installed in proximity. Transmission and reception in this case refer to the R/W Heads oscillating after receiving commands.

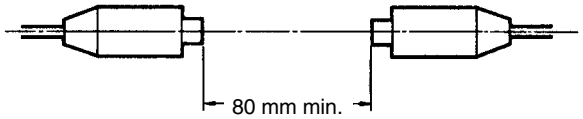
V600-H51 R/W Head

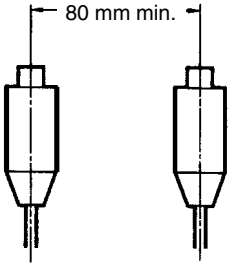
When facing each other, V600-H51 R/W Heads should be installed at least 120 mm apart. When facing the same direction, V600-H51 R/W Heads should be installed at least 100 mm apart (center to center)



V600-H52 R/W Head

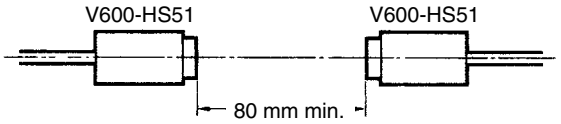
When facing each other or facing the same direction, V600-H52 R/W Heads should be installed at least 80 mm apart.

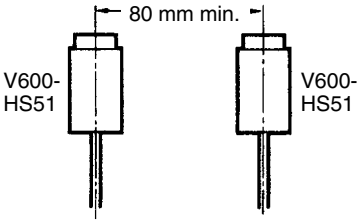




V600-HS51 R/W Head

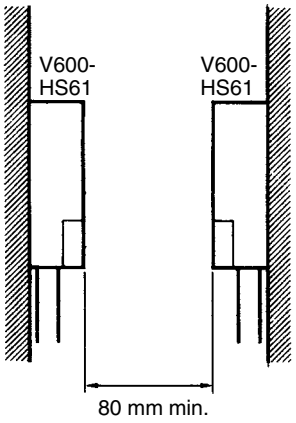
When facing each other or facing the same direction, V600-HS51 R/W Heads should be installed at least 80 mm apart.

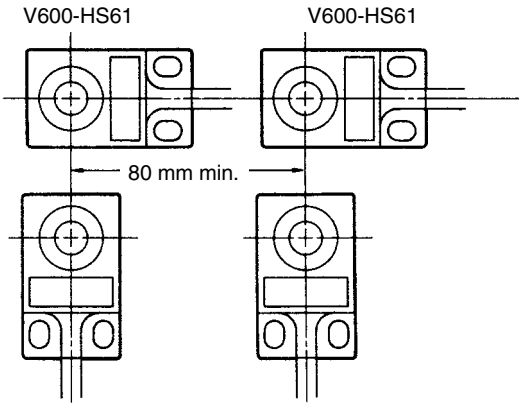




V600-HS61 R/W Head

When facing each other or facing the same direction, V600-HS61 R/W Heads should be installed at least 80 mm apart.





Note Mutual interference will not occur between R/W Heads unless they communication at the same time. R/W Heads can thus be mounted next to each other in any application where communications will never be simultaneous. Here, "communications" refers to the oscillation of the R/W Head when a command is received.

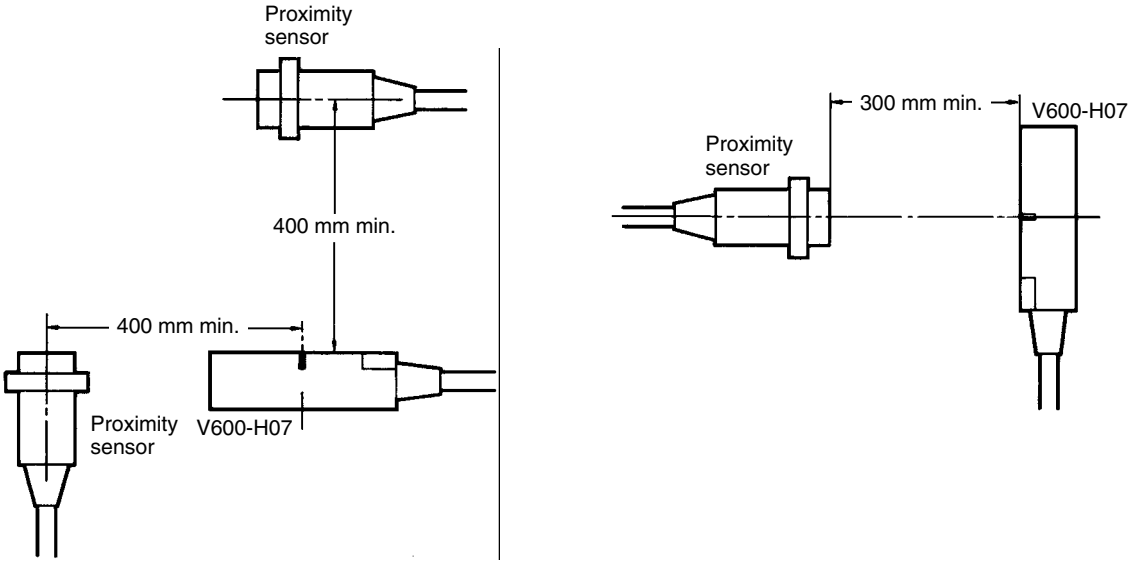
4-1-4 Interference with Proximity Sensors

V600-series R/W Heads use electromagnetic linking (frequency: 530 kHz), so, if they are installed near sensors (such as proximity sensors) with an oscillation frequency of 400 to 600 kHz, it may cause the sensors to malfunction. Before installing R/W Heads, and when selecting sensors, be sure to conduct tests to make sure that there will be no interference.

V600-H07 R/W Head

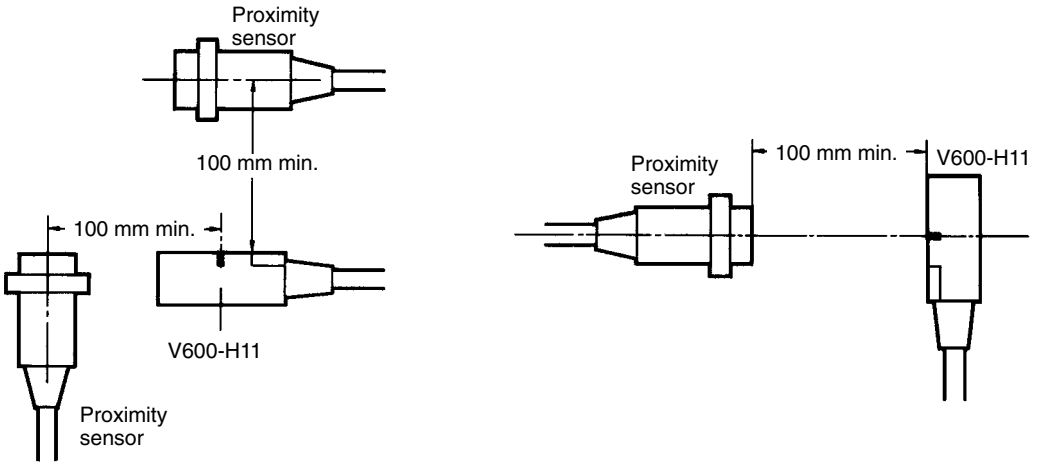
As shown in the following diagrams, a V600-H07 R/W Head should be at least 400 mm from a proximity sensor when the two are facing the same direction or

perpendicular. When the two are facing each other, they should be at least 300 mm apart.

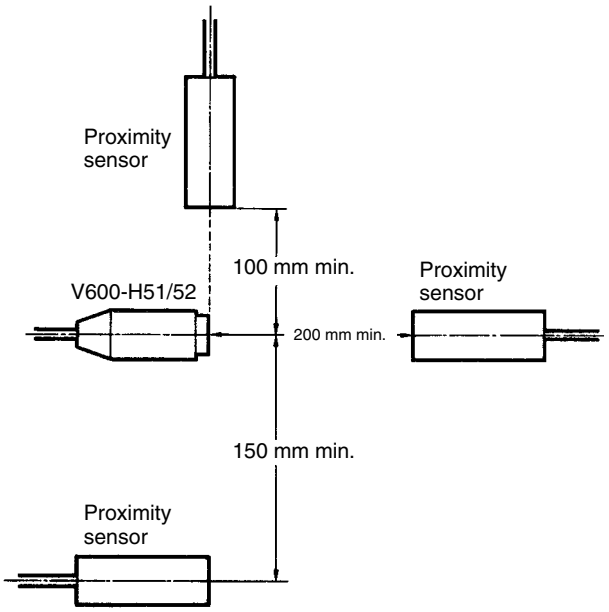


V600-H11 R/W Head

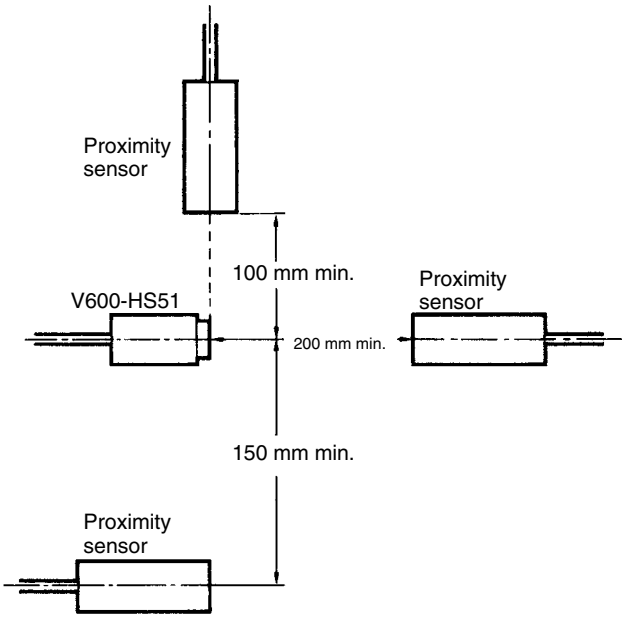
As shown in the following diagrams, a V600-H11 R/W Head should be at least 100 mm from a proximity sensor regardless of whether the two are parallel, perpendicular, or facing each other.



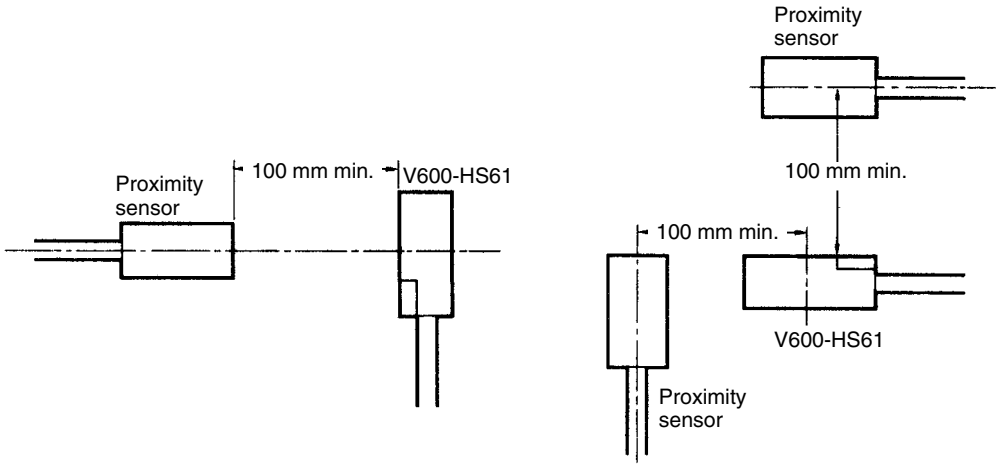
V600-H51/H52 R/W Head



V600-HS51 R/W Head



V600-HS61 R/W Head



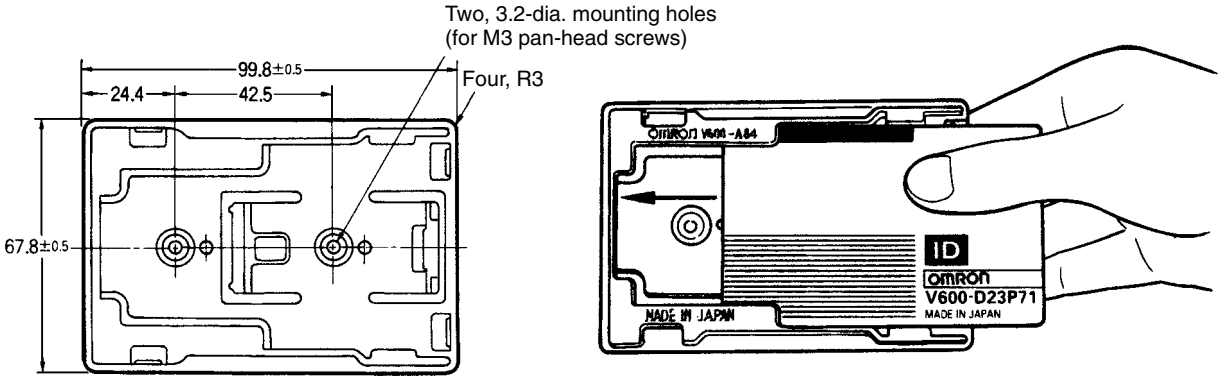
4-2 Data Carrier Installation

V600-D23P71/P72 Data Carriers

We recommend that the Data Carriers be installed using holders. You can either fabricate your own holders, or use the V600-A84 Holder (sold separately).

Installation in V600-A84 Holders

Attach the Holder using M3 pan-head screws. The tightening torque is 0.3 to 0.5 N·M (approximately 3 to 5 kgf·cm). Insert the Data Carriers after attaching the Holders. Insert a Data Carrier into the grooves on the Holder and slid it completely into place, as shown in the following diagram.

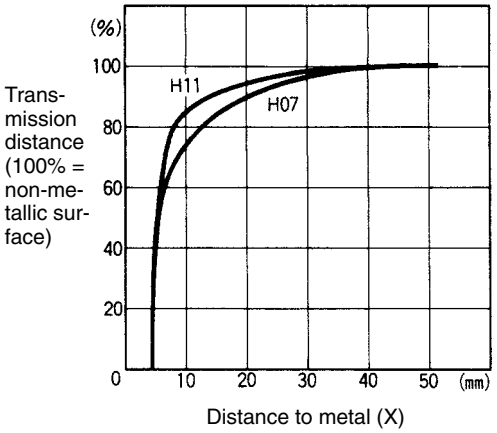


Effects of Metal

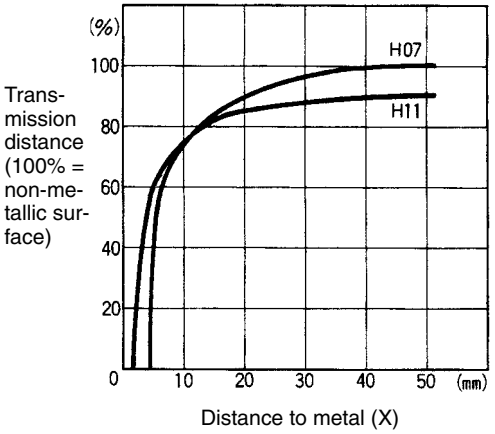
The transmission distance will be reduced if there is metal in back of a Data Carrier. When mounting on a metal surface, insert a non-metallic spacer (e.g., plastic, wood, etc.). The following diagrams show the relationship between the dis-

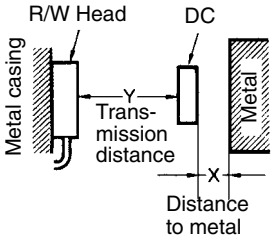
tance between a Data Carrier and a metal surface and the transmission distance.

(1) V600-D23P71

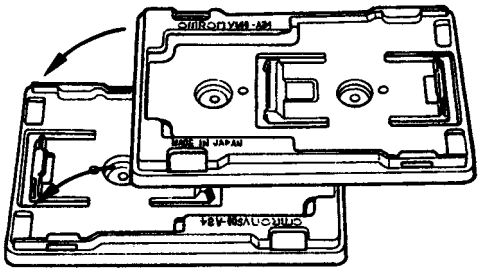


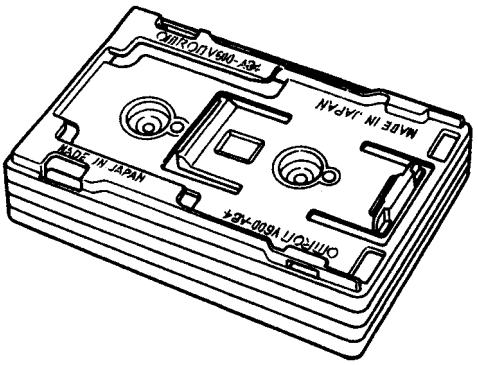
(2) V600-D23P72





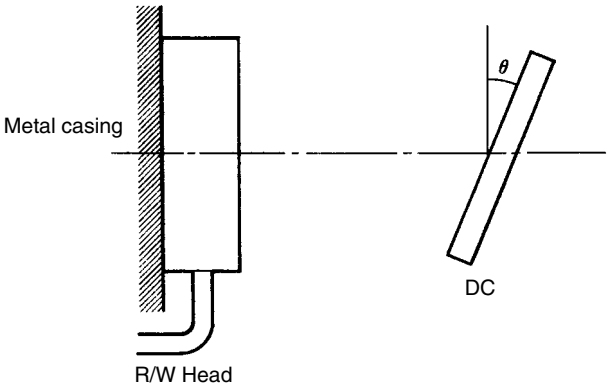
V600-A84 Holders can be used to adjust the distance between a Data Carrier and a metal surface by pilling up more than one Holder. The Holders will lock in place if they are pilled in alternating directions. Each Holder is 5 mm thick. Refer to *2-2-1 Specifications and Outer Dimensions* for details.





Effect of Misalignment

Install the R/W Heads and Data Carriers so that they are as parallel as possible to each other. Communications will be possible even if they are not perfectly parallel, but he transmission distance will be affected, as listed in the following tables.



(1) Reduction in Transmission Distance for Misalignment in V600-D23P71

R/W Head	Data Carrier misalignment (θ°)				
	0	10	20	30	40
V600-H07	0%	0%	2%	4%	6%
V600-H11	0%	1%	3%	6%	10%

(2) Reduction in Transmission Distance for Misalignment in V600-D23P72

R/W Head	Data Carrier misalignment (θ°)				
	0	10	20	30	40
V600-H07	0%	0%	4%	6%	12%
V600-H11	0%	3%	4%	5%	7%

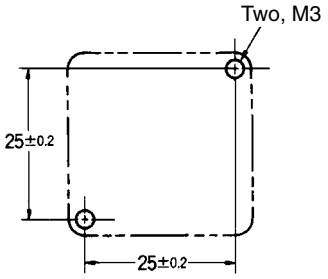
Mounting Conditions: R/W Head surface-mounted to a metal surface, Data Carrier mounted to non-metallic surface.

V600-D23P66N Data Carriers

Installation Method

Attach the Holder using M3 pan-head screws and washers. The tightening torque is 0.3 to 0.5 N·M (approximately 3 to 5 kgf·cm).

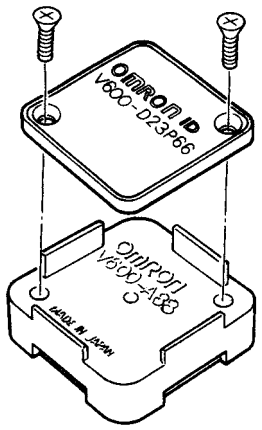
The Data Carriers can be installed in any direction in respect to movement relative to the R/W Head.



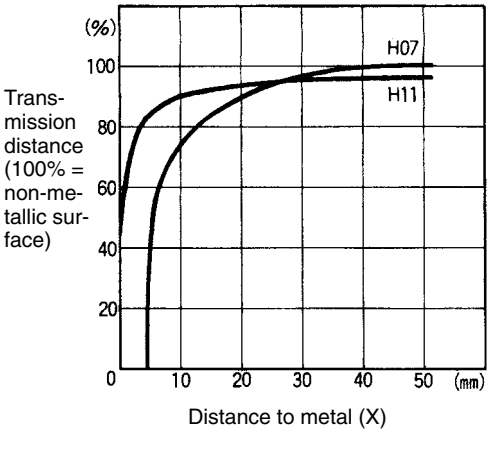
Effects of Metal

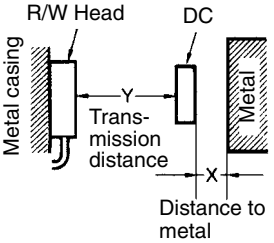
The transmission distance will be reduced if there is metal in back of a Data Carrier. When mounting on a metal surface, use the special Attachment (sold separately) or insert a non-metallic spacer (e.g., plastic, wood, etc.). The following diagrams show the relationship between the distance between a Data Carrier and a metal surface and the transmission distance. The Attachment is 10 mm thick.

Installation on an Attachment



V600-D23P66



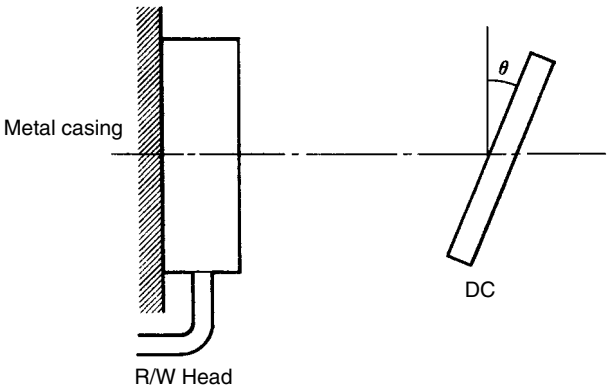


Align the Attachment and Data Carrier so that the mounting holes align.

Effect of Misalignment

Install the R/W Heads and Data Carriers so that they are as parallel as possible to each other. Communications will be possible even if they are not perfectly par-

allel, but he transmission distance will be affected, as listed in the following tables.



(1) Reduction in Transmission Distance for Misalignment in V600-D23P66

R/W Head	Data Carrier misalignment (θ°)				
	0	10	20	30	40
V600-H07	0%	1%	3%	8%	17%
V600-H11	0%	2%	2%	3%	5%

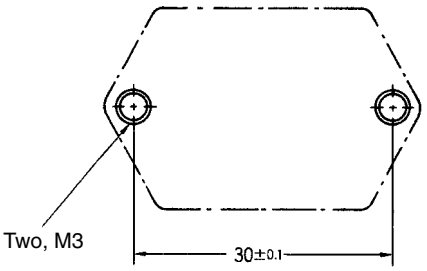
Mounting Conditions: R/W Head surface-mounted to a metal surface, Data Carrier mounted to non-metallic surface.

V600-D23P61 Data Carriers

Installation Method

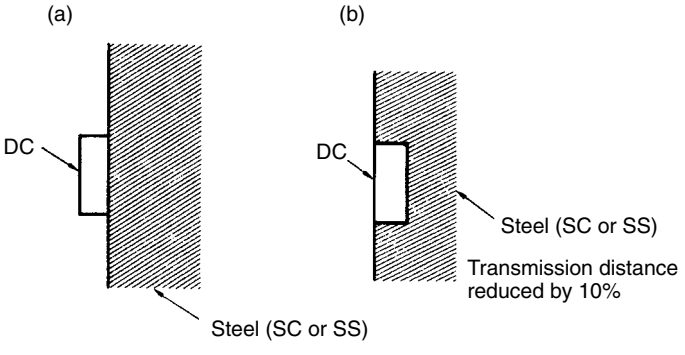
Attach the Holder using M3 pan-head screws and washers. The tightening torque is 0.3 to 0.5 N·M (approximately 3 to 5 kgf·cm).

The Data Carriers can be installed in any direction in respect to movement relative to the R/W Head.



Effects of Metal

If there is metal surrounding the Data Carrier (as shown in diagram b, below), the transmission distances will be reduced by approximately 10% over a Data Carrier mounted to a metal surface (as shown in diagram a, below).



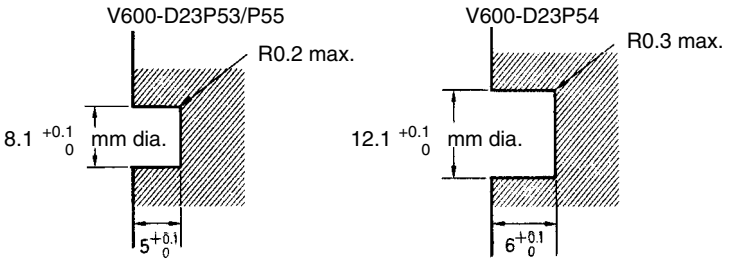
(a) Mounting to Metal Surface (b) Embedding in Metal

The transmission distances given in *3-1 Transmission Ranges* are for surface-mounted (diagram a, above).

V600-D23P53/P54/P55 Data Carriers

Installation Method

- Refer to the following dimension diagrams when mounting the Data Carriers.
- Use a 2-part epoxy adhesive to attach the Data Carriers.



The epoxy adhesives listed in the following table are recommended for the given temperature ranges.

Model	Operating temperature	Product name	Manufacturer
V600-D23P53/P54/P55	–40 to 70°C	Two-part Epoxy-compound Resin: 2001 (main agent)/ 2105C (curing agent)	Three Bond Co., Ltd.
V600-D23P55	–40 to 150°C	One-part Epoxy Resin: 2285	Three Bond Co., Ltd.

Differences in Surrounding Metals

Transmission distances are also affected by the type of metal in back of or surrounding the Data Carriers, as shown in the following table.

Data Carrier	Iron	SUS	Brass	Aluminum
V600-D23P53 (8 dia.)	100%	70 to 80 %	55 to 70%	55 to 70%
V600-D23P54 (12 dia.)	100%	85 to 90%	80 to 85%	80 to 85%
V600-D23P61 (square)	100%	95%	95%	95%

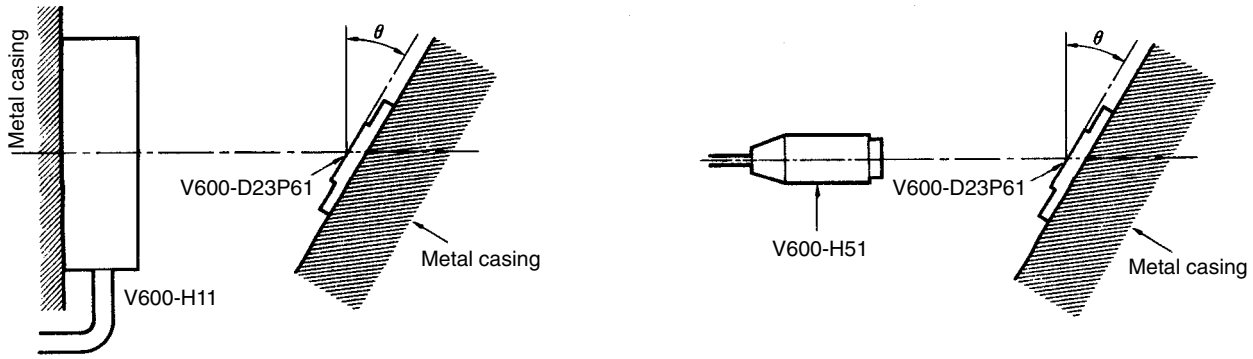
Note The values for iron are set to 100%.

Effect of Misalignment

Install the R/W Heads and Data Carriers so that they are as parallel as possible to each other. Communications will be possible even if they are not perfectly parallel, but he transmission distance will be affected, as listed in the following tables.

(1) Reduction in Transmission Distance for Misalignment in V600-D23P61

R/W Head	Data Carrier misalignment (θ°)				
	0	10	20	30	40
V600-H11	0%	5%	14%	23%	No possible
V600-H51	0%	0%	1%	5%	15%

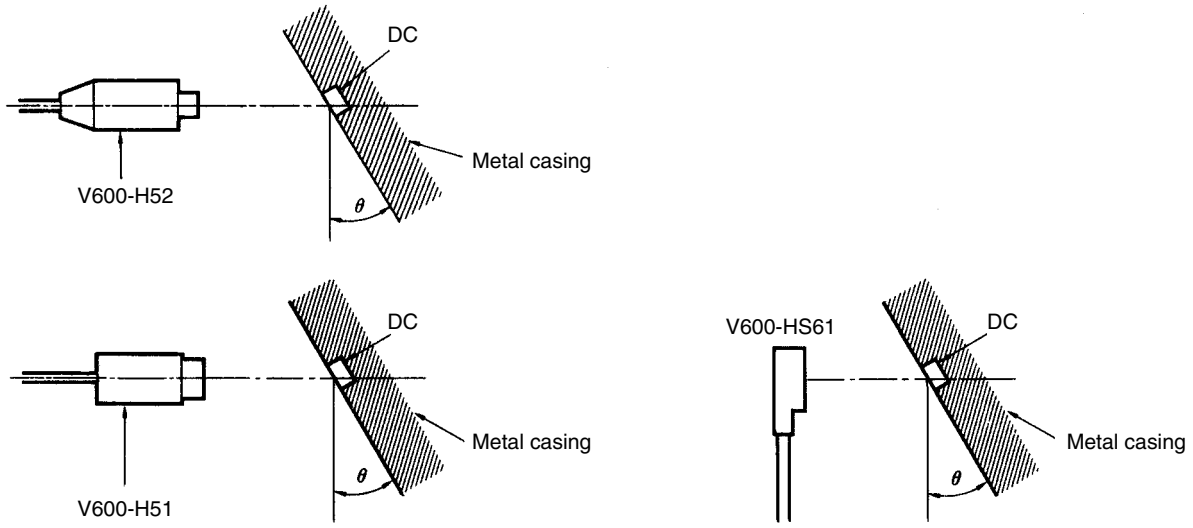


(2) Reduction in Transmission Distance for Misalignment in V600-D23P53

R/W Head	Data Carrier misalignment (θ°)				
	0	10	20	30	40
V600-H52	0%	8%	16%	30%	60%
V600-HS51/HS61	0%	8%	16%	30%	60%

(3) Reduction in Transmission Distance for Misalignment in V600-D23P54

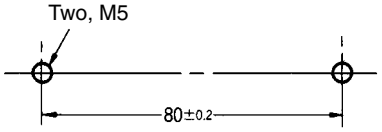
R/W Head	Data Carrier misalignment (θ°)				
	0	10	20	30	40
V600-H52	0%	4%	8%	16%	30%
V600-HS51/HS61	0%	4%	8%	16%	30%



V600-D23P66SP Data Carriers

Installation Method

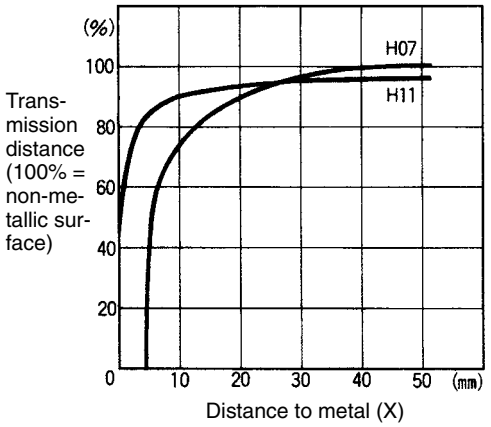
Attach the Holder using M5 pan-head screws and washers. The tightening torque is 1.2 N·M (approximately 12 kgf·cm).

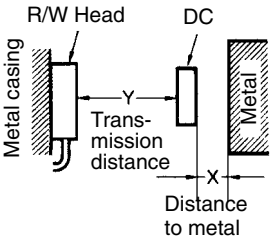


Effects of Metal

The transmission distance will be reduced if there is metal in back of a Data Carrier. When mounting on a metal surface, insert a non-metallic spacer (e.g., plastic, wood, etc.). The following diagrams show the relationship between the distance between a Data Carrier and a metal surface and the transmission distance.

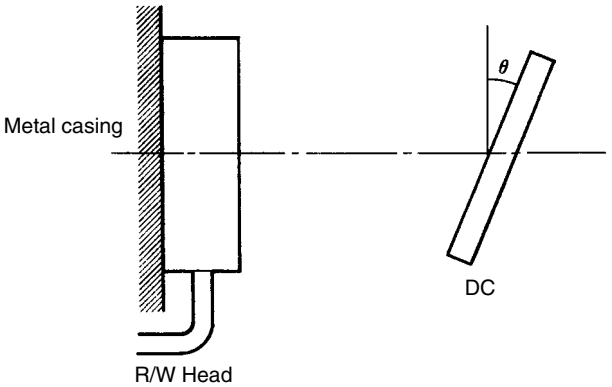
V600-D23P66SP





Effect of Misalignment

Install the R/W Heads and Data Carriers so that they are as parallel as possible to each other. Communications will be possible even if they are not perfectly parallel, but he transmission distance will be affected, as listed in the following tables.



(1) Reduction in Transmission Distance for Misalignment in V600-D23P66SP

R/W Head	Data Carrier misalignment (θ°)				
	0	10	20	30	40
V600-H07	0%	1%	3%	8%	17%
V600-H11	0%	2%	2%	3%	5%

Mounting Conditions: R/W Head surface-mounted to a metal surface, Data Carrier mounted to non-metallic surface.

SECTION 5
Chemical Resistance

This section shows the chemicals that affect R/W Heads and Data Carriers.

R/W Heads and Data Carriers are constructed using both ABS resin and epoxy resin.

Applicable Models

V600-H07	V600-H52	V600-D23P61
V600-H11	V600-HS61	V600-D23P53
V600-H51	V600-HS51	V600-D23P54

Referring to the following charts, be sure to use only those chemicals that have no effect on the ABS or epoxy resins and avoid using those chemicals that do have an effect.

Chemicals that Cause Deformation, Cracks, etc.

ABS resin	Epoxy resin
Trichlene, acetone, xylene, toluene, gasoline, creosol, methylene chloride, phenol, cyclohexane, aqua regia, chromic acid, sulfuric acid (90% RT), methyl ethyl ketone, aniline, nitrobenzine, monochlorobenzine, pyridine, nitric acid (60% RT), formic acid (80% RT)	Aqua regia, chromic acid, sulfuric acid (90% RT), nitric acid (60% RT), ammonia solution, acetone, methylene chloride, phenol

Chemicals that may Cause Discoloration, Swelling, etc.

ABS resin	Epoxy resin
Hydrochloric acid, alcohol, Freon, sodium hydroxide, hydrogen peroxide, benzine, sulfuric acid (10% RT), nitric acid (10% RT), phosphoric acid (85% RT), ammonia solution	Sulfuric acid (10% RT), nitric acid (10% RT), hydrochloric acid (30% RT), acetic acid (50% RT), oxalic acid, calcium hydroxide, benzine, creosol, alcohol, cyclohexane, toluene, xylene, benzine, grease

Chemicals that Do Not Affect ABS Resin or Epoxy Resin

ABS resin	Epoxy resin
Ammonia, kerosine, mineral oil, developer, Yushiroken S50, Chemi-Cool Z, Velocity No. 3, Yushiroken EEE-30Y, petroleum, grease acetate, oxalic acid, calcium hydroxide, phosphoric acid (30% RT), hydrochloric acid (10% RT), potassium hydroxide	Ammonia, hydrochloric acid (10% RT), potassium hydroxide, petroleum, gasoline, Yushiroken S50, Chemi-Cool Z, Velocity No. 3, Yushiroken EEE-30Y

⚠ **Caution** Tests for these chemicals were conducted at room temperature (23°C). Chemicals that do not affect ABS or epoxy resin at room temperature (23°C) may affect them at higher or lower temperatures.

Chemicals that adversely affect R/W Heads and Data Carriers are shown below.

Applicable Model: V600-D23P66

PPS resin is used as the material. Avoid using chemicals that have an adverse effect on PPS resin by referring to the tables below.

Chemical	Concentration	At room temperature	At 90°C
Hydrochloric acid	37%	A	A
	10%	A	A
Sulfuric acid	98%	A	B
	50%	A	A
	30%	A	A
	3%	A	A
Nitric acid	60%	B	C
	40%	A	B
	10%	A	A
Hydrogen fluoride solution	40%	A	A
Chromic acid	40%	A	A
Hydrogen peroxide solution	28%	A	B
	3%	A	A
Sodium hydroxide solution	60%	A	A
	10%	A	A
	1%	A	A
Ammonia solution	28%	A	B
	10%	A	B
Sodium chloride	10%	A	A
Sodium carbonate	20%	A	A
	2%	A	A
Sodium hypochlorite	---	A	A
Phenol solution	5%	A	A
Glacial acetic acid	---	A	A
Acetic acid	---	A	A
Oleic acid	---	A	A
Methyl alcohol	95%	A	A
Ethyl alcohol	95%	A	A
Ethyl acetate	---	A	A
Sebacic acid diethylhexyl	---	A	A
Acetone	---	A	A
Diethyl ether	---	A	A
n-heptane	---	A	A
2-2-4 trimethylpentane	---	A	A
Benzene	---	A	A
Toluene	---	A	A
Aniline	---	A	A
Mineral oil	---	A	A
Gasoline	---	A	A
Insulating oil	---	A	A
Dichloroethylene	---	A	A
Carbon tetrachloride	---	A	A

A: Has no adverse effect, B: May cause discoloration, swelling, etc., C: Causes deformation, cracks, etc.

Note The above tables show the extent of changes in PPS resin that is exposed to each chemical at room temperature and at 90°C. If actual chemicals, concentrations, and temperatures are different from those shown in the tables, always

conduct tests before using R/W Heads and Data Carriers under such environment.

Note The V600-D23P71/P72 have no chemical and oil resistance. Do not use them in locations exposed to spattering chemicals and oil.

V600-D23P66SP Data Carriers

Chemical Resistance of Fluoroplastic PFA (Reference)

PFA: Tetrafluorethylene-Perfluoroalkylvinyletheir Copolymer

Fluoroplastic PFA does not react with most chemicals except molten alkali metal, hot pressurized fluorine (F_2), and some halogen derivatives. The following tables show the results of tests in which PFA was soaked in or exposed to commonly used organic and inorganic chemicals. In these tests, a compression-molded test piece (1.3 mm thick) was soaked in the chemical at a specified temperature for a week (168 hours) and taken out of the chemical, then the weight change, tensile strength, and elongation of the test piece were immediately measured. If the change in the tensile strength is 15% or less, the change in the elongation is 10% or less, and the increase in the weight is less than 0.5%, the results of the test can be considered normal.

If PFA is exposed to trichloroacetic acid, tri-n-butyl phosphate, perchloroethylene, carbon tetrachloride, and other liquids (which easily make resin surfaces wet) at a high temperature, it tends to increase its weight due to absorption and reduce its tensile strength. Even when PFA absorbs chemicals and solvents, its molecular structure will not change. If, however, PFA is subject to temperature or pressure changes or mechanical damage when it has absorbed chemicals, the chemicals will repeatedly expand and contract inside PFA, causing mechanical problems such as cracks and bulging. In fact, this problem occurs with any kind of plastic.

Inorganic Chemicals

Chemical name	Test temperature (°C)	Resulting characteristics (%)		Weight increase rate (%)
		Tensile strength	Elongation	
Concentrated hydrochloric acid	120	98	100	0.0
Concentrated sulfuric acid	120	95	98	0.0
Hydrofluoric acid (60%)	23	99	99	0.0
Fuming sulfuric acid	23	95	96	0.0
Aqua regia	120	99	100	0.0
Chromic acid (50%)	120	93	97	0.0
Concentrated nitric acid	120	95	98	0.0
Fuming nitric acid	23	99	99	0.0
Concentrated ammonia solution	66	98	100	0.0
Caustic soda (50%)	120	93	99	0.4
Hydrogen peroxide solution (30%)	23	93	95	0.0
Bromine	23	99	100	0.5
Chlorine	120	92	100	0.5
Ferrous chloride (25%)	100	93	98	0.0
Zinc chloride (25%)	100	96	100	0.0
Sulfuryl chloride	69	83	100	2.7
Chlorosulfonic acid	151	91	100	0.0
Concentrated phosphoric acid	100	93	100	0.0

Organic Chemicals

Chemical name	Test temperature (°C)	Resulting characteristics (%)		Weight increase rate (%)
		Tensile strength	Elongation	
Glacial acetic acid	118	95	100	0.4
Acetic anhydride	139	91	99	0.3
Trichloroacetic acid	196	90	100	2.2
Isooctane	99	94	100	0.7
Naphtha	100	91	100	0.5
Mineral oil	180	87	95	0.0
Toluene	110	88	100	0.7
o-creosol	191	92	96	0.2
Nitrobenzene	210	90	100	0.7
Benzyl alcohol	205	93	99	0.3
Aniline	185	94	100	0.3
n-butylamine	78	86	97	0.4
Ethylenediamine	117	96	100	0.1
Tetrahydrofuran	66	88	100	0.7
Benzaldehyde	179	90	99	0.5
Cyclohexane	156	92	100	0.4
Methyl ethyl ketone	80	90	100	0.4
Acetophenone	202	90	100	0.6
Dimethylphtalate	200	98	100	0.3
n-butyl acetate	125	93	100	0.5
Tri-n-butyl phosphate	200	91	100	2.0
Methylene chloride	40	94	100	0.8
Perchloroethylene	121	86	100	2.0
Carbon tetrachloride	77	87	100	2.3
Dimethyl formamide	154	96	100	0.2
Dimethyl sulfoxide	189	95	100	0.1
Dioxane	101	92	100	0.6
Reference: *Fluoroplastics Handbook*, The Nikkan Kogyo Shimbun Ltd. (Takaomi Satogawa)				

Substances Extracted from Data Carriers (Reference)

If chemicals penetrate into a Data Carrier through PFA, ions may be extracted from the Data Carrier.

Results of Ion-exchange Chromatography

A built-in Data Carrier was soaked in hot water (100°C for 16 hours), and extracted ions were analyzed. The results are shown below.

Extracted Ions (Concentration)
$C\ell^-$: 0.5 ppm, Na^+: 10 ppm, NH_4^+: 11 ppm, K^+: 1.0 ppm

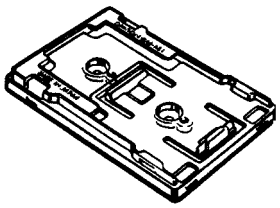
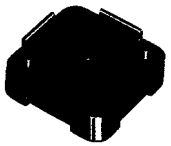
Results of ICP Emission Spectral Analysis

The V600-D23P66SP Data Carrier was soaked in concentrated hydrochloric acid (which can easily penetrate through PFA) at 80°C for 300 hours, then extracted substances were analyzed.

Extracted Substances (Concentration)
Si: 700 ng/ml, S: 1,000 ng/ml, Ca: 30 ng/ml

Note The chemical resistance and extracted substances presented here should be used for reference only. The rates of change in Data Carrier characteristics and the amounts of substances extracted will vary with temperatures and chemical concentrations. Before using Data Carriers under actual production environment, always conduct tests to check for any problems.

Appendix A
Accessories (Sold Separately)

Item	Specification	Model	Remarks
Extension cable for R/W Heads 	3 m	V600-A45	The connectors are not waterproof.
	5 m	V600-A44	
	10 m	V600-A40	
	20 m	V600-A41	
	30 m	V600-A42	
Extension cable for R/W Heads (oil-resistant) 	3 m	V600-A56	The connectors are not waterproof.
	5 m	V600-A55	
	10 m	V600-A50	
	20 m	V600-A51	
	30 m	V600-A52	
Holder 	Applicable to both V600-D23P71 AND V600-D23P71 Data Carriers	V600-A84	When attaching the Holder to plastic objects, it can either be screwed in place or ultrasonically welded. The Holders can also be pilled up to act as spacers to provide more space between the Data Carrier and the mounting surface.
Attachment 	For V600-D23P66 only	V600-A86	---

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	August 1998	Original production
01A	April 2004	**Page v:** Replaced page and added information following it. **Pages 12, 20, and 45:** Changed ”V600-D23P66” to ”V600-D23P66N.” **Page 12:** Changed table. **Page 47:** Added table.
01B	February 2005	**Page v and vi:** Pages replaced. **Page 47:** Model number added in diagram.

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