

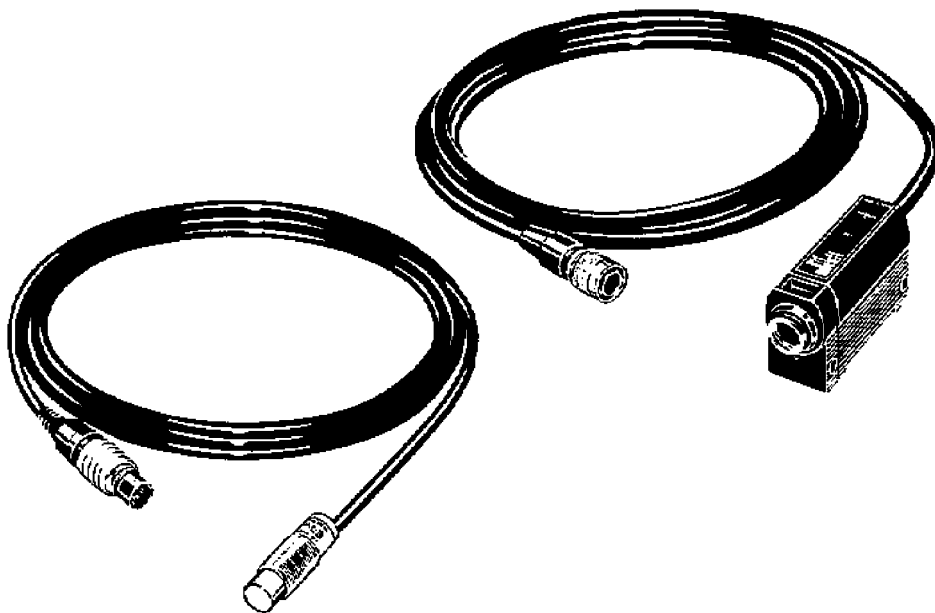
# V600 FA ID System

V600-HS51/HS61/HA51/D23P53/D23P54

R/W Heads and EEPROM Data Carriers

## Supplement

*Produced October 1993*



## **Notice:**

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to the product.

**DANGER!** Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

**WARNING** Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

**Caution** Indicates information that, if not heeded, could result in relative serious or minor injury, damage to the product, or faulty operation.

## **OMRON Product References**

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

## **Visual Aids**

The following headings appear in the left column of the manual to help you locate different types of information.

**Note** Indicates information of particular interest for efficient and convenient operation of the product.

**1, 2, 3...** 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

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## ***About this Manual:***

This supplement provides additional information for the installation and operation of the V600-D23P53/D23P54 Data Carrier and V600-HS51/HS61/HA51 Read/Write Head, 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 V600-D23P53/D23P54 Data Carrier and V600-HS51/HS61/HA51 Read/Write Head.

**Section 1** provides information on the system configuration which includes the V600-D23P53/D23P54 Data Carrier and V600-HS51/HS61/HA51 Read/Write Head.

**Section 2** provides information on data transmission between the R/W Head and Data Carrier.

**Section 3** describes the recommended method of R/W Head and Data Carrier installation.

The three **Appendices** provide information relating to standard models, dimensions, and specifications.

<p><b>WARNING</b> 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.</p>
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# SECTION 1

## System Configuration

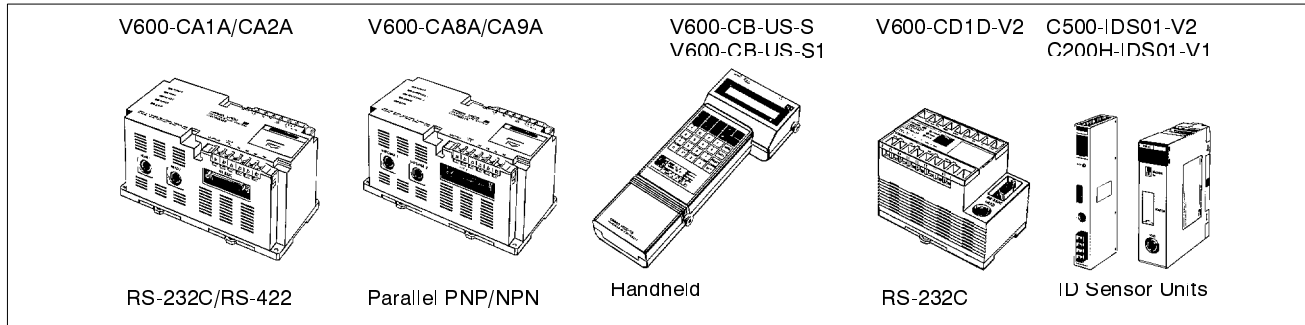
This section provides information on the system configuration which includes the V600-D23P53/D23P54 Data Carrier and V600-HS51/HS61/HA51 Read/Write Head.

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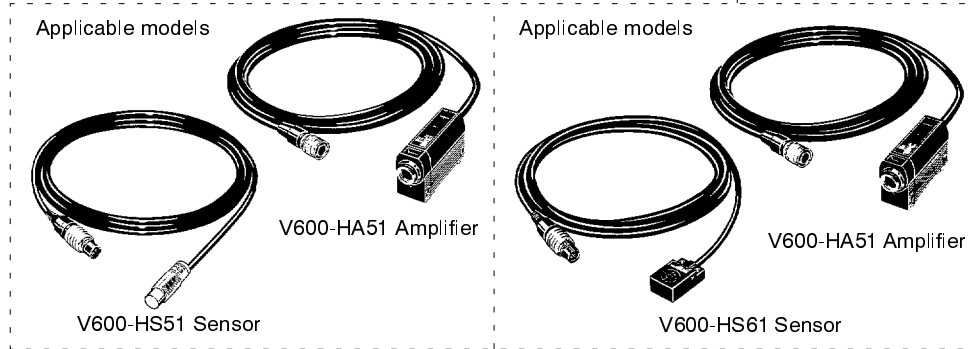
# System Configuration

The V600 ID System consists of an ID Controller, R/W Head, and Data Carrier. Select the most suitable ID Controller, R/W Head, and Data Carrier according to the application.

## ID Controllers



## R/W Heads



## Data Carriers



V600-D23P53



V600-D23P54

- Note**
1. OMRON's ID Controllers can be used with any V600-series Data Carrier. However, certain restrictions apply as mentioned in note 2 below.
  2. The following ID Controllers and ID Sensor Units can be used with EEPROM Data Carriers:
    - V600-CA1A with software version 5.0 or newer
    - V600-CD1D with software version 2.0 or newer (CD1D-V2)
    - V600-CB-S with software version 2.0
    - C200H-IDS01-V1 and C500-IDS01-V2 ID Sensor Units

# SECTION 2

## Communications

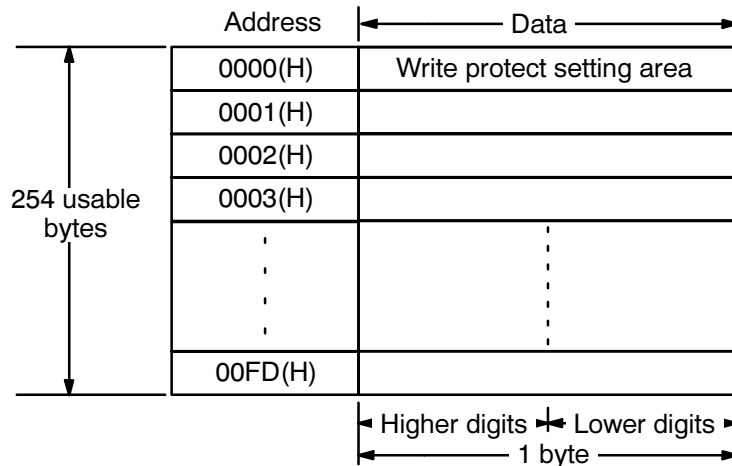
This section provides information on data transmission between the R/W Head and Data Carrier.

- 2-1 Data Carrier Memory ..... 4
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## 2-1 Data Carrier Memory

### 2-1-1 Memory Map

The Data Carrier (DC) has an EEPROM memory that can contain up to 254 bytes of information, including 0000(H), the write protect setting area. The memory has a life expectancy of 100,000 cycles, i.e., each address can be overwritten 100,000 times before errors begin to occur. EEPROM errors include failure to overwrite data and failure to retain data.



### 2-1-2 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 inadvertent write access. With this function, the data up to a specified memory address can be protected. It is recommended that important data be write-protected as follows:

#### Setting Write Protect Function

The write protect function is set in address 0000 of the Data Carrier's memory. The most significant bit of address 0000 determines whether or not the write protect function is in effect.

Address	Bit							
	7	6	5	4	3	2	1	0
0000	YES/ NO	Last 2 digits of end address						

Write protect execution bit (most significant bit of address 0000)

1: Write-protected

0: Not write-protected

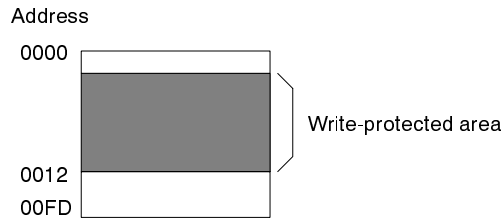
The end address can be set between 00 and 7F. Setting the address to 00 protects all bytes from 0001 through 00FD. Setting the address to a value from 01 to 7F protects all bytes from 0001 through the specified address. It is not possible to specify an end address between 0080 and 00FF.

- Note**
1. Address 0000 cannot be write-protected.
  2. Address 0001 is always the starting address of the write-protect area. Important data that needs to be protected should be input from 0001 on.



**Example 1**

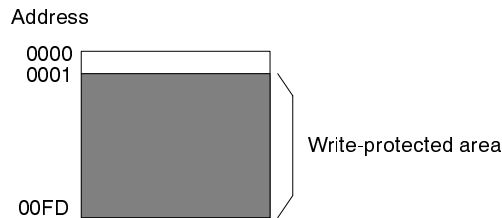
To protect addresses 0001 through 0012:



Address	Higher digits				Lower digits			
0000	1	0	0	1	0	0	1	0
	9				2			

**Example 2**

All bytes from 0001 through 00FD will be write-protected when bit 7 is ON and the end address is set to 00.



Address	Higher digits				Lower digits			
0000	1	0	0	0	0	0	0	0
	8				0			

**Canceling Write Protection**

To cancel write protection, clear the most significant bit of address 0000 to 0. The write protection will be cancelled and the end address specified in 0000 will be invalid.

**2-2 Transmission Range**

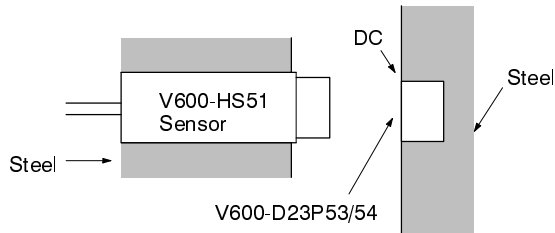
The following table shows the transmission ranges for V600-series DCs when reading or writing data.

Combination of Data Carrier and R/W Head			ID Controller Mode	Axial Offset (±2)	Axial Offset (±1)
V600-D23P53, V600-HS51	Stationary	Read	Transmission range priority	0.5 to 4.0	0.5 to 4.5
			Transmission time priority	0.5 to 3.0	0.5 to 3.5
		Write	Transmission range/time priority	0.5 to 3.0	0.5 to 3.5
V600-D23P54, V600-HS51	Stationary	Read	Transmission range priority	0.5 to 6.0	0.5 to 6.5
			Transmission time priority	0.5 to 5.5	0.5 to 6.0
		Write	Transmission range/time priority	0.5 to 5.0	0.5 to 5.5
V600-D23P53, V600-HS61	Stationary	Read	Transmission range priority	0.5 to 4.0	0.5 to 4.5
			Transmission time priority	0.5 to 3.0	0.5 to 3.5
		Write	Transmission range/time priority	0.5 to 3.0	0.5 to 3.5
V600-D23P54, V600-HS61	Stationary	Read	Transmission range priority	0.5 to 6.5	0.5 to 7.0
			Transmission time priority	0.5 to 5.5	0.5 to 6.0
		Write	Transmission range/time priority	0.5 to 5.5	0.5 to 6.0

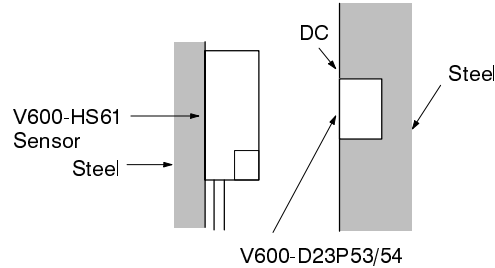
**Note** 1. The ID Controller mode can be set with a DIP switch on Serial Interface ID Controllers and ID Sensor Units only.

2. For Parallel Interface ID Controllers, use the transmission range values given for the transmission range priority mode settings.
3. The measurements listed in the preceding table take the ambient temperature and product variation into account. The measurement configuration is shown below. (The transmission range can vary greatly depending on where and how the R/W Head and DC are installed.)

The Sensor and DC are flush-mounted in a steel surface.



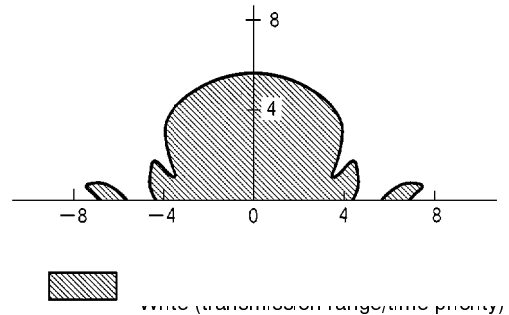
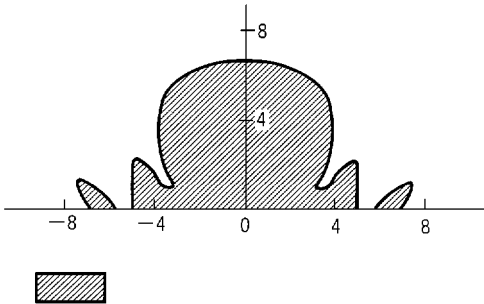
DC is flush-mounted in a steel surface and the Sensor is mounted on a steel surface.



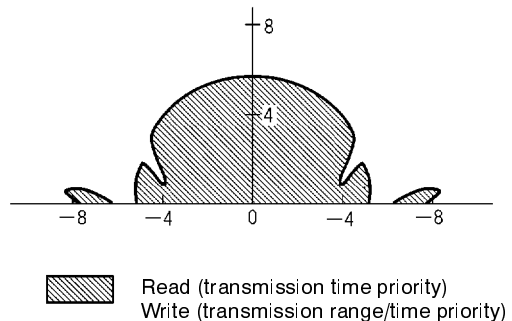
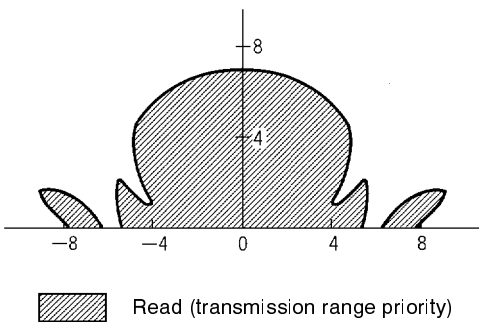
**Note** Actual transmission ranges vary with the mounting environments and mounting methods of the Data Carriers and R/W Heads.

## 2-3 Transmission Range Chart

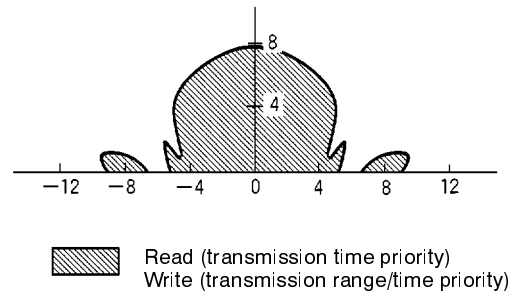
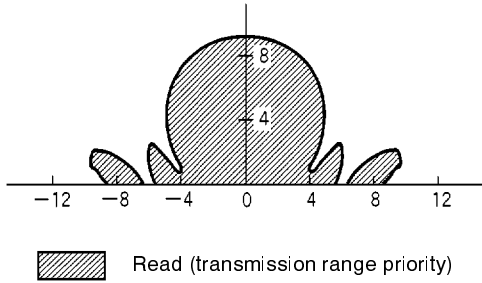
### V600-D23P53 & V600-HS51



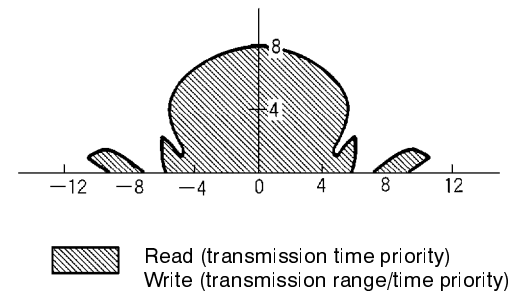
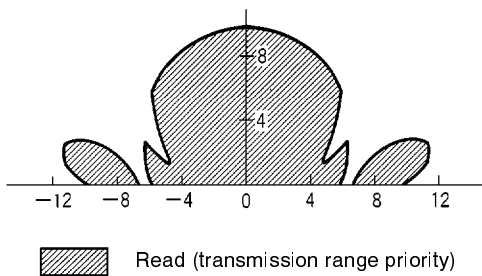
### V600-D23P53 & V600-HS61



V600-D23P54 & V600-HS51



V600-D23P54 & V600-HS61



## 2-4 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.

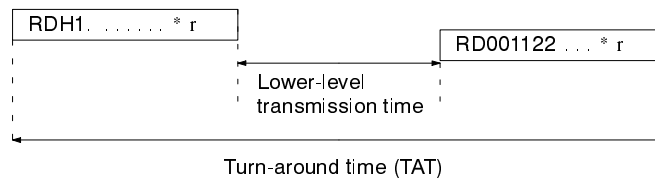
### Turn-around Time

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.

### Lower-level Transmission Time

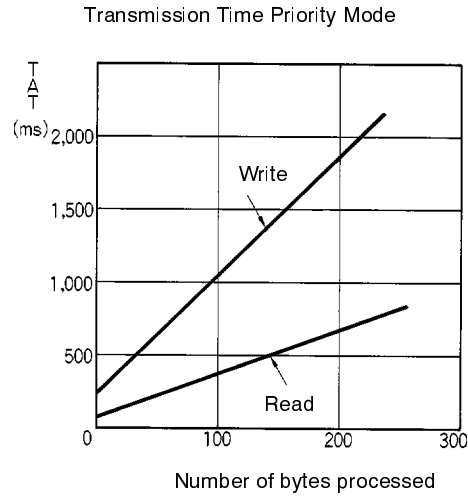
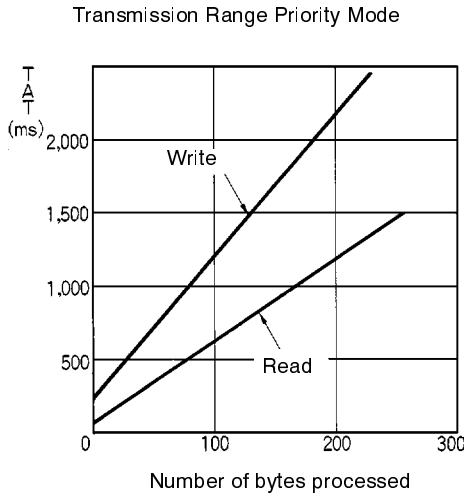
The lower-level transmission time is the time required for transmission of data between the R/W Head and DC.

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



### 2-4-1 Turn-around Time

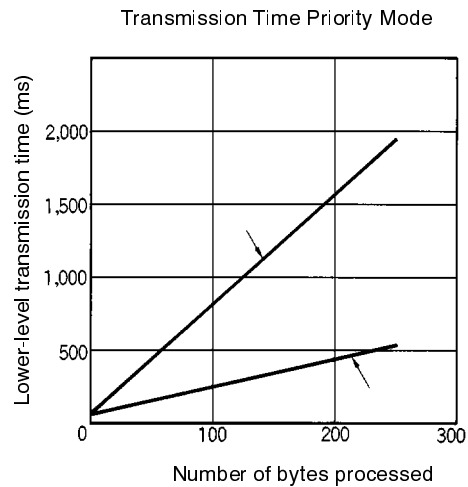
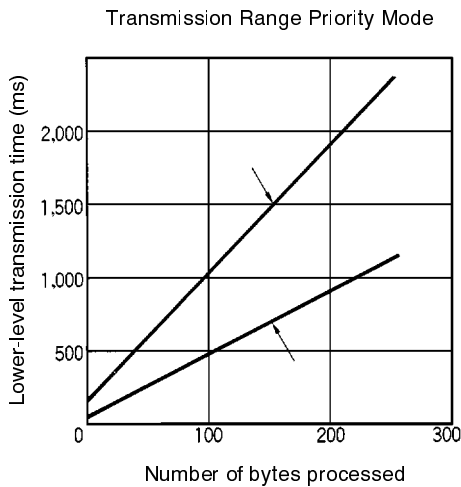
The following diagrams show the TAT for Serial Interface ID Controllers V600-CA1A/CA2A and V600-CD1D. (The TAT for Parallel Interface ID Controllers and ID Sensor Units varies with the host’s software.)



- Note**
1. The TAT data was measured with a V600-CA1A ID Controller. Communications between the ID Controller and host computer were set for 9,600 bps, 8 data bits, 1 stop bit, and odd parity. Data was transmitted continuously in this example; there were no spaces between characters.
  2. The number of bytes was for ASCII code specification. Refer to the *Operation Manual* for details.

### 2-4-2 Lower-level Transmission Time

The following diagrams show the lower-level transmission time.



The lower-level transmission time can also be calculated using the equations in the table below. (The term N represents the number of bytes being processed.)

ID Controller Mode	Transmission	Transmission Time (ms)
Transmission range priority	Read	$t = 4.3N + 64.6$
	Write	$t = 8.7N + 167.1$
Transmission time priority	Read	$t = 1.8N + 79.0$
	Write	$t = 7.1N + 180.4$

- Note** The ID Controller mode (transmission range/time priority mode) is determined by the DIP switch settings on Serial Interface ID Controllers (V600-CA1A/CA2A/CD1D) and ID Sensor Units. Refer to the *Operation Manual* for details.

# SECTION 3

## Installation

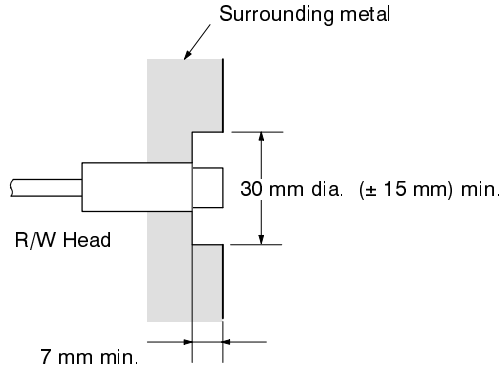
This section describes the recommended method of R/W Head and Data Carrier installation.

- 3-1 R/W Head Installation ..... 10
  - 3-1-1 V600-HS51 ..... 10
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### 3-1 R/W Head Installation

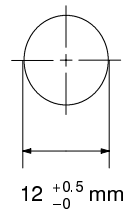
#### 3-1-1 V600-HS51

The V600-HS51 is M12 in diameter. When installing a R/W Head in metal, provide a 15-mm clearance between the V600-HS51 R/W Head's coil tip and the metal surface. Make sure that the metal surface does not extend beyond the tip of the R/W Head.

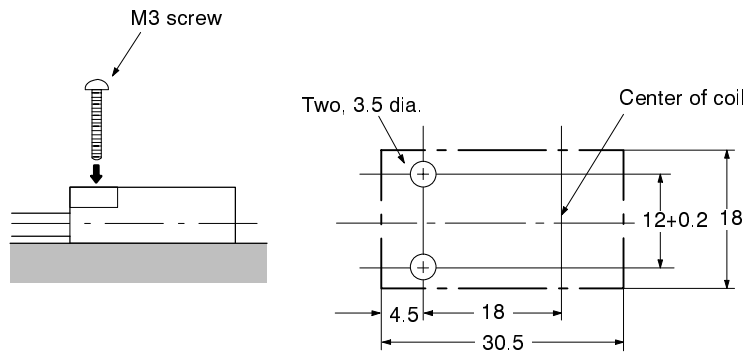


#### Mounting Bracket

Use the nuts and lock washers provided with the V600-HS51 to attach the R/W Head to the mounting bracket so that the V600-HS51 can be seized by the mounting bracket. Then torque the nuts to 5.9 N-m (60 kgf • cm).



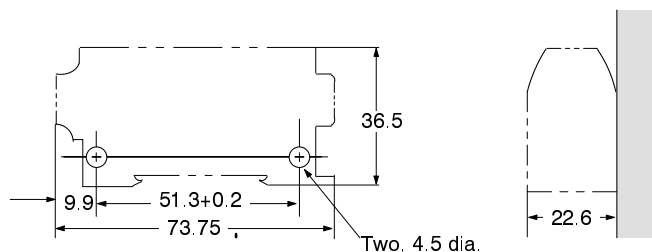
#### 3-1-2 V600-HS61



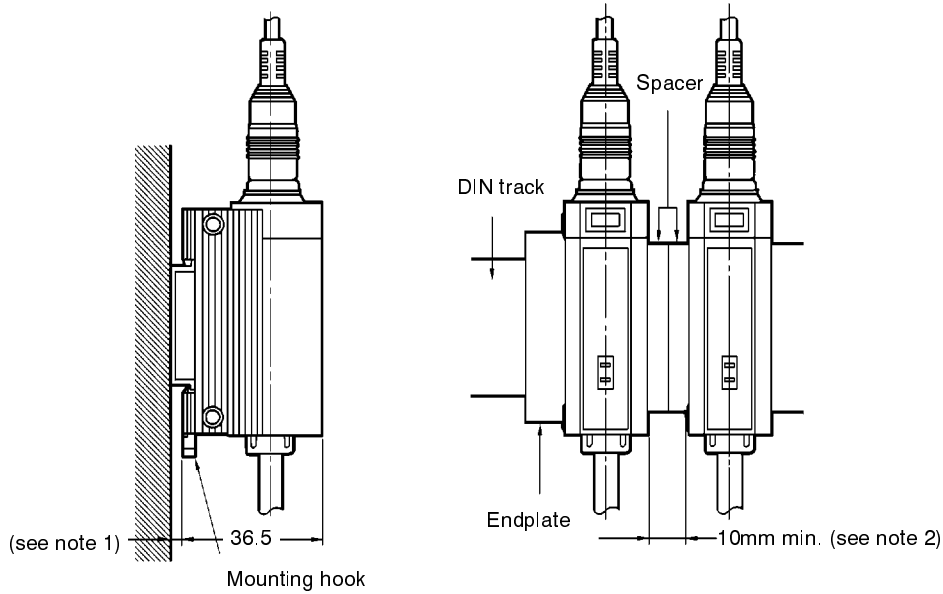
#### 3-1-3 V600-HA51

#### Panel Mounting

Use M4 screws to mount the V600-HA51 to a panel.

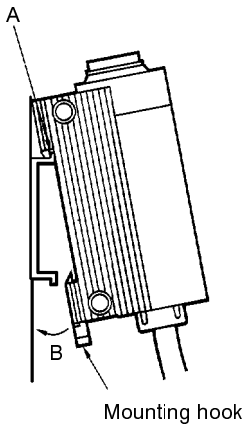


DIN-track Mounting



- Note**
1. When mounting the V600-HA51 to a DIN track, take the height of the DIN track into consideration.
  2. When mounting more than one V600-HA51 side by side, provide a space of 10 mm minimum between the R/W Heads next to each other by inserting at least two spacers between the R/W Heads.

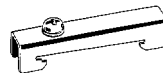
To mount the V600-HA51 to a DIN track, hook part A first. Then push the V600-HA51 in the B direction as shown in the following illustration. To dismount the V600-HA51 from a DIN track, pull the mounting hook.



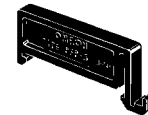
PFP-100N2 Mounting Rail



PFP-M Endplate



PFP-S Spacer

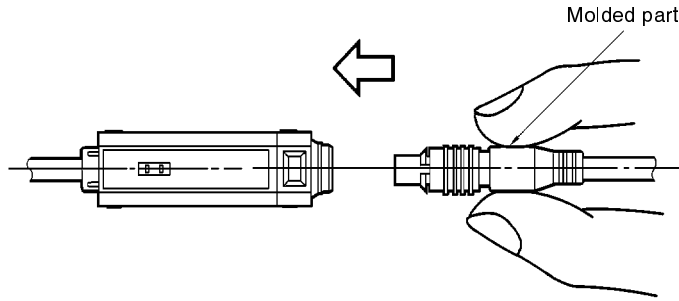


### 3-1-4 Connectors between V600-HA51 and V600-HS51 or V600-HS61

**Connection**

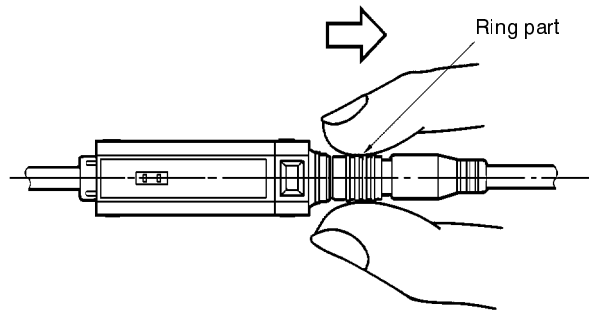
To insert a connector into a R/W Head, hold the molded part of the connector and insert the connector into the R/W Head so that the protruding part of the connector and the groove of the female connector of the R/W Head will mate with each

other. Then press the connector until it is locked. Do not hold the ring part of the connector when inserting, otherwise the connector will not be locked.



**Disconnection**

To disconnect a connector from a R/W Head, hold the ring part of the connector and pull the connector straight. Do not hold the molded part to disconnect the connector, otherwise the connector may be damaged or cable disconnection may result.

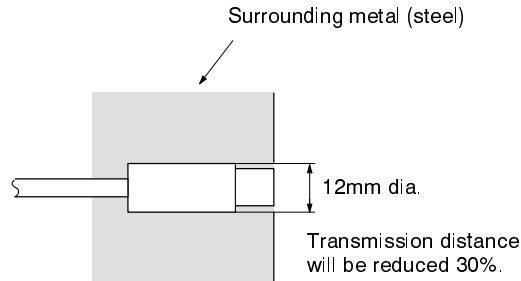


**3-1-5 Effect of Surrounding Metals**

Instead of surface-mounting, the R/W Head can be flush-mounted to prevent impact from moving pallets, etc.

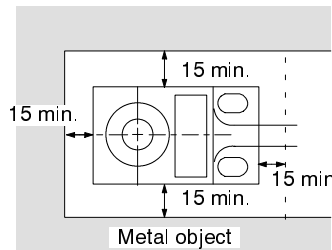
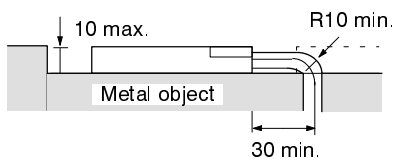
**V600-HS51**

If the V600-HS51 is flush-mounted, the transmission distance will be reduced 30% unless there is enough distance between the sides of the V600-HS51 and the metal in which it is mounted.



**V600-HS61**

Allow at least 15 mm between the sides of the V600-HS61 and the metal when flush-mounting the V600-H07 in metal, and do not mount the V600-HS61 below the metal surface.





- Note**
1. Do not bend the R/W Head's cable in a curve tighter than 10 mm in radius.
  2. The read/write transmission range will be reduced significantly if space between the R/W Head and any side of the metal object is 15 mm or less.

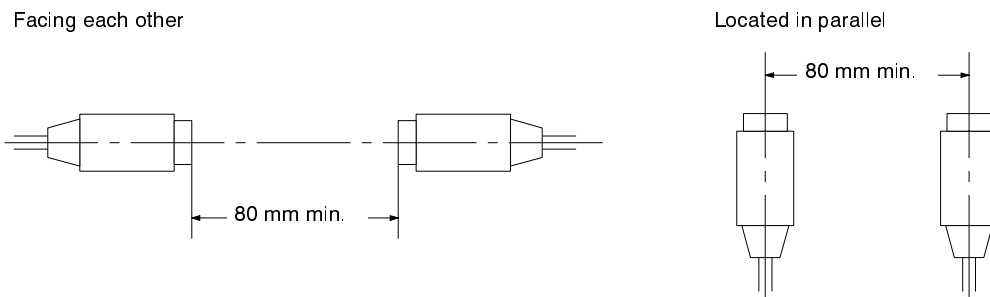
### 3-1-6 Interference between R/W Heads

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.

If the R/W Heads do not transmit or receive data at the same time, there is no risk of interference and the R/W Heads can be installed nearby, at which time the R/W Heads oscillate with the command that the R/W Heads receive.

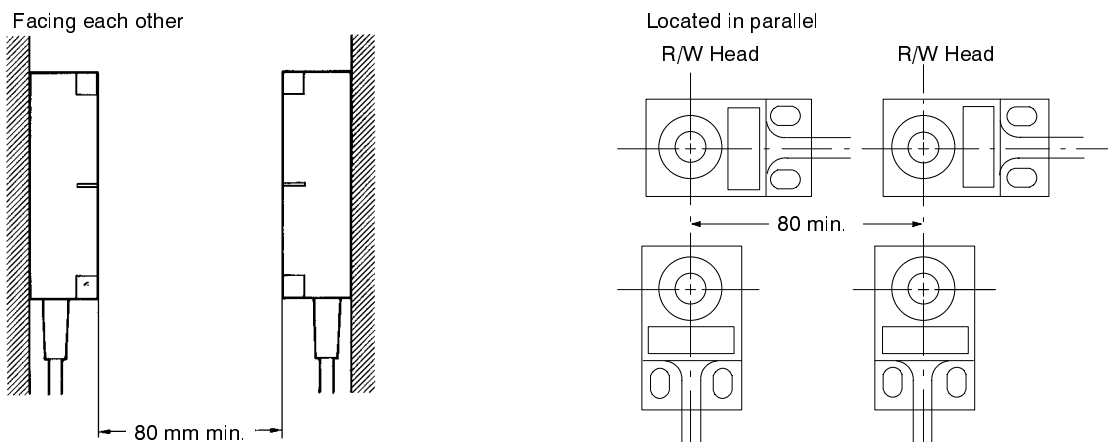
#### V600-HS51

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



#### V600-HS61

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



### 3-1-7 Interference with Proximity Switches

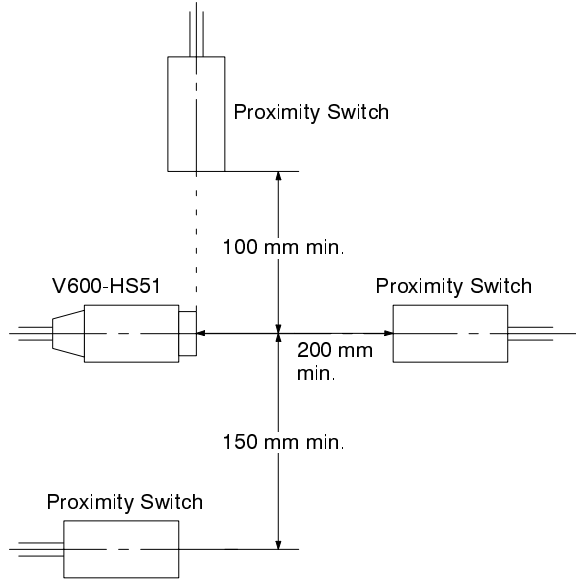
V600-series R/W Heads transmit at 530 kHz. Proximity switches or other sensors that receive in the 400 to 600 kHz range might not operate properly when used near V600-series R/W Heads.

The minimum distances given in the following diagrams are meant as a guide for OMRON Proximity Switches. Test the system under actual operating conditions to be sure that there is no interference.

#### V600-HS51

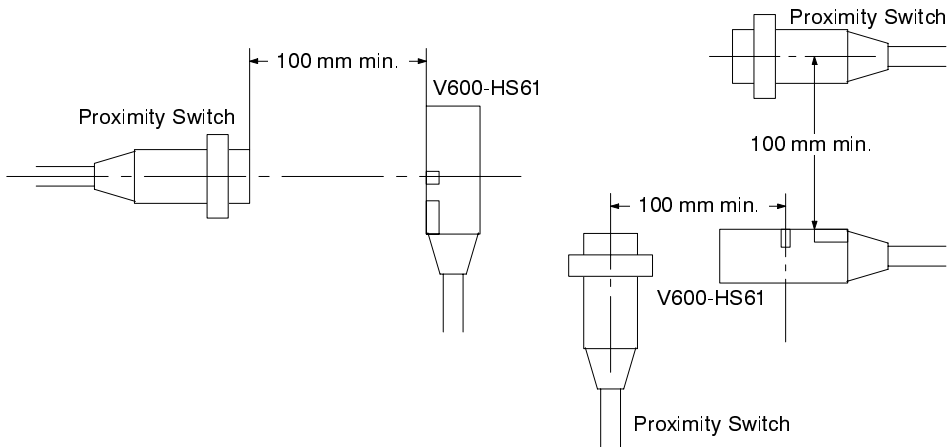
The V600-HS51 should be at least 150 mm (center to center) from an OMRON-made proximity switch when the two are facing the same direction, and at least

200 mm apart when facing each other. When the two are perpendicular, they should be at least 100 mm apart.



**V600-HS61**

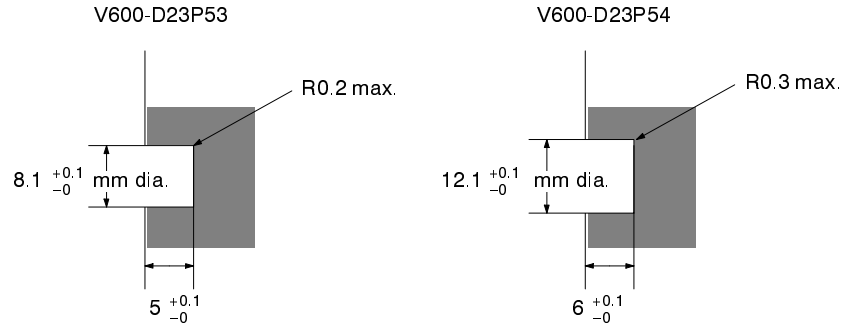
A V600-HS61 should be at least 100 mm (center to center) from an OMRON-made proximity switch when the two are facing the same direction, and at least 100 mm apart when facing each other. When the two are perpendicular, they should be at least 100 mm apart.



### 3-2 Data Carrier Installation

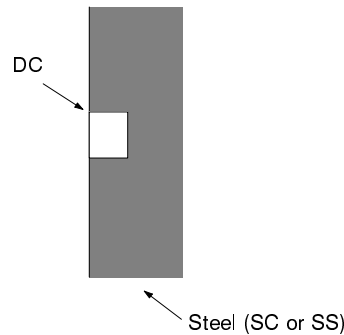
#### 3-2-1 Recommended V600-D23P53/54 Installation

To install a V600-D23P53/54 DC, first prepare a mounting hole according to the dimensions shown in the diagram below, and then attach the DC using a 2-part epoxy adhesive.



#### 3-2-2 Effect of Surrounding Metals

The specifications given in this manual for the V600-D23P53/54 were measured with DCs flush-mounted in steel. The transmission range will be increased if the DC is installed without metal nearby.



The specifications given in this manual for the V600-D23P61 were measured with surface-mounted DCs.

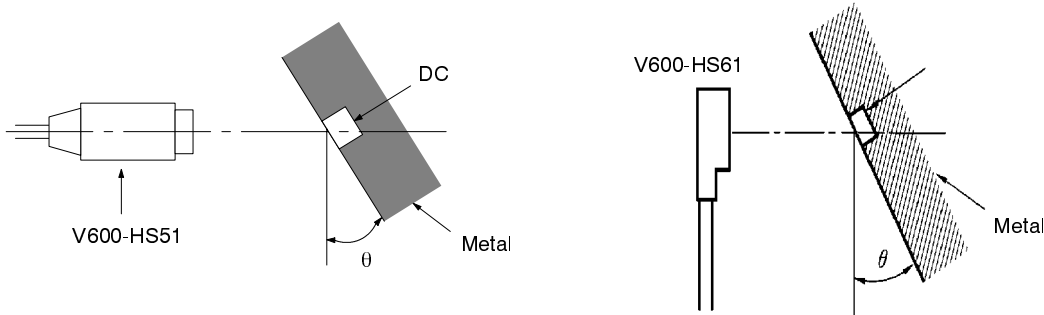
#### Effects of Other Metals

The transmission range is reduced more significantly by metals other than iron and steel, as shown in the table below.

DC Model	Iron/steel	SUS	Brass	Aluminum	Installation
V600-D23P53	100%	70 to 80%	55 to 70%	55 to 70%	Flush-mount
V600-D23P54	100%	85 to 90%	80 to 85%	80 to 85%	Flush-mount

### 3-2-3 Effect of Misalignment

The transmission range will be reduced if the R/W Head is not perpendicular to the DC when data is transmitted. The table below shows the reduction in the transmission range due to the misalignment of the DC.



#### Effects of Other Metals

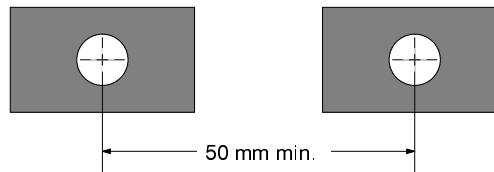
The transmission range is reduced more significantly by metals other than iron and steel, as shown in the table below.

Angle of Data Carrier ( $\theta$ )	Transmission Range Reduction	
	V600-D23P53	V600-D23P54
0°	0%	0%
10°	8%	4%
20°	16%	8%
30°	30%	16%
40°	60%	30%

### 3-2-4 Interference Between Data Carriers

When DCs pass the R/W Head, be sure that they are not closer than the distances given in the diagram below so that two DCs cannot be in the R/W Head's transmission range at the same time.

#### V600-D23P53/V600-D23P54 and V600-HS51/V600-HS61




# Appendix A

## Standard Models

The following products can be used together.

Name	Specifications	Model
Read/Write Head (amplifier) 	2 m cable	V600-HA51 (2 m)
	5 m cable	V600-HA51 (5 m)
	10 m cable	V600-HA51 (10 m)
Read/Write Head (sensor) 	2 m cable	V600-HS51
Read/Write Head (sensor) 	2 m cable	V600-HS61
Data Carrier 	Memory capacity: 256 bytes (254 usable) Memory type: EEPROM, can be overwritten 100,000 times	V600-D23P54
Data Carrier 		V600-D23P53

The following products are accessories. Robotic cables are also available.

Name	Specifications	Model
R/W Head Extension Cable 	3 m cable	V600-A45
	5 m cable	V600-A44
	10 m cable	V600-A40
	20 m cable	V600-A41
	30 m cable	V600-A42

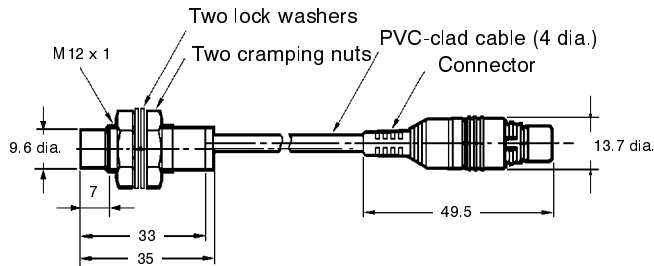
# Appendix B

## Dimensions

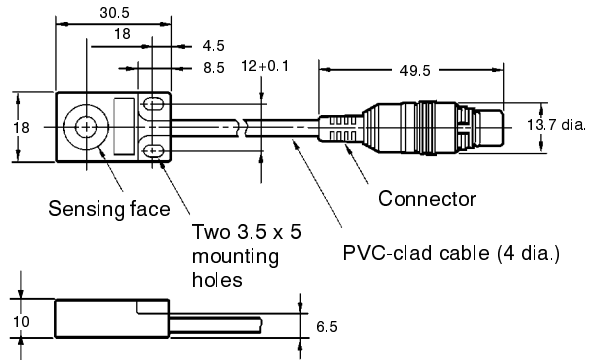
All dimensions are in millimeters unless otherwise specified.

### Read/Write Heads

#### V600-HS51

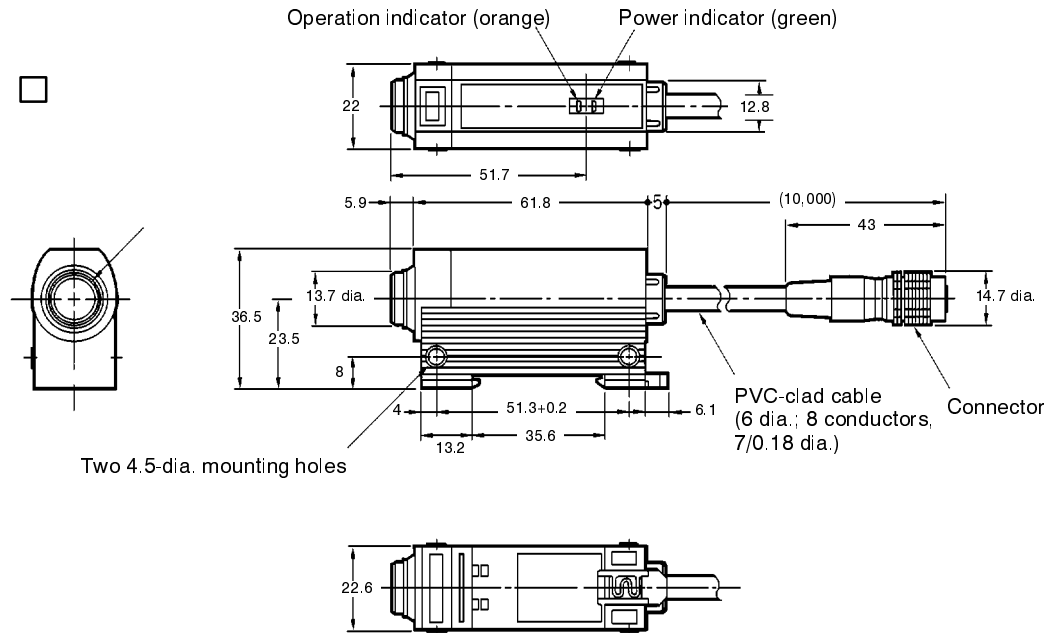


#### V600-HS61



- Note**
1. The V600-HS51 is made of brass filled with epoxy resin. The cable is made of oil-resistant PVC and communications face is made of ABS resin.
  2. The V600-HS61 is made of ABS resin filled with epoxy resin. The cable is made of oil-resistance PVC.

#### V600-HA51

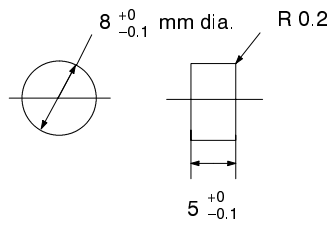


**Note** The V600-HA511 is made of ABS resin filled with epoxy resin. The cable is made of oil-resistance PVC.

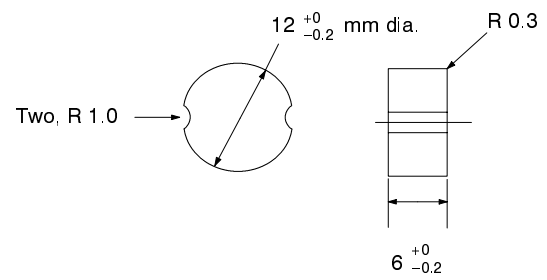
### Data Carriers

Data Carrier cases are made of ABS resin and filled with epoxy resin.

#### V600-D23P53



#### V600-D23P54



# Appendix C Specifications

## R/W Heads

Item		Sensor		Amplifier
		V600-HS51	V600-HS61	V600-HA51
<b>Operating frequency</b>		530 kHz		---
<b>Operating temperature</b>		-10°C to 60°C		-10°C to 60°C (see note 1)
<b>Storage temperature</b>		-25°C to 75°C		
<b>Storage humidity</b>		35% to 95%		
<b>Insulation resistance</b>		50 MΩ between cable terminals and case (at 500 VDC)		
<b>Dielectric strength</b>		1,000 VAC 50/60 Hz for 1 minute between cable terminals and case		
<b>Enclosure rating</b>		IEC IP67		IEC IP66
<b>Vibration resistance</b>		10 to 2,000 Hz, 1.5-mm single amplitude in X, Y, and Z directions, 2 times for 15 minutes each time.		Panel mounting: 10 to 2,000 Hz, single amplitude in X, Y, and Z directions, 2 times for 15 minutes each time. DIN-track mounting: 10 to 500 Hz, single amplitude in X, Y, and Z directions, 3 times for 11 minutes each time.
<b>Shock resistance</b>		981 m/s <sup>2</sup> (approximately 100G) three times each in X, Y, and Z directions, 18 times in total.		490 m/s <sup>2</sup> (approximately 50G) three times each in X, Y, and Z directions, 18 times in total.
<b>Cable length</b>	<b>Between sensor and amplifier</b>	2 m (fixed)		---
	<b>Between amplifier and controller</b>	---		Standard lengths of 2, 5, and 10 m (see note 2)
<b>Local communication error detection</b>		16-bit CRC (Cyclic Redundancy Check) is used in both directions of transmission.		
<b>Indicators</b>		---		Power indicator: green Transmission indicator: orange
<b>Weight</b>		Approximately 70 g		Approximately 650 g (including 10-m cable)

- Note**
1. Refer to 3-1-3 if V600-HA51 Amplifiers are mounted side by side.
  2. Extension cables of various lengths are also available (max. total cable length is 50.0 m). Refer to *Appendix A*.



**Data Carriers (V600-D23P53/54)**

<b>Memory capacity</b>	256 bytes (254 usable for data)
<b>Memory type</b>	EEPROM
<b>Data storage</b>	10 years max.
<b>Memory life</b>	100,000 times (each address can be overwritten 100,000 times)
<b>Error detection</b>	16-bit CRC error detection is used in both directions of transmission.
<b>Operating temperature</b>	-25°C to 70°C
<b>Storage temperature</b>	-40°C to 85°C
<b>Operating humidity</b>	35% to 95% RH
<b>Construction</b>	IEC IP67
<b>Vibration</b>	10 to 2000 Hz, 1.5 mm in each direction, 2 times for 15 minutes each time.
<b>Shock</b>	981 m/s <sup>2</sup> (about 100 G) three times in each direction, 18 times total.
<b>Weight (approximate)</b>	V600-D23P53: 0.4 g V600-D23P54: 1.0 g

## Revision History

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

Cat. No. Z101-E1-1

↑  
Revision code

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
1	October 1993	Original production