OMRON

V680 Series

User's Manual

DeviceNet ID Slave

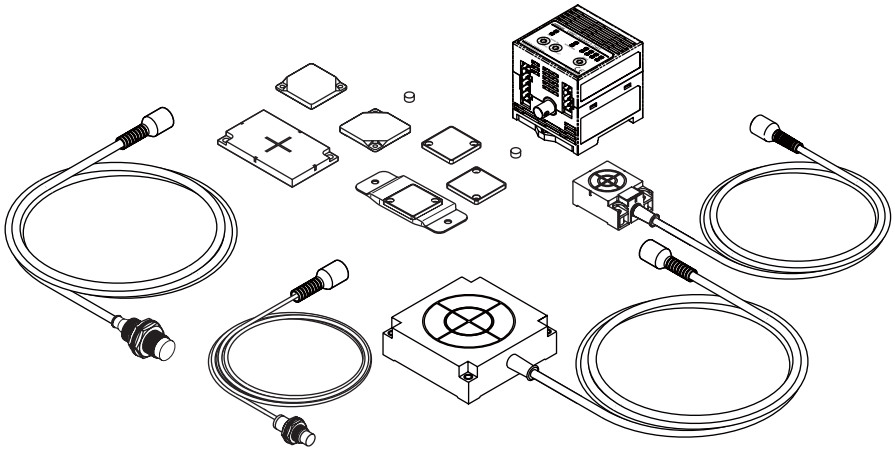
V680-HAM42-DRT

Antennas

V680-HS51
V680-HS52
V680-HS63
V680-HS65

ID Tags

V680-D1KP52MT
V680-D1KP66T/-D1KP66MT
V680-D1KP66T-SP
V680-D2KF52M
V680-D2KF67/-D2KF67M
V680-D8KF68/-D32KF68



Cat. No. NTLP

Introduction

Thank you for purchasing a V680-series RFID System. This manual describes the functions, performance, and application methods needed for optimum use of the V680-series RFID System.

Please observe the following items when using the RFID System.

- Allow the RFID System to be installed and operated only by qualified specialist with a sufficient knowledge of electrical systems.
- Read and understand this manual before attempting to use the RFID System and use the RFID System correctly.
- Keep this manual in a safe and accessible location so that it is available for reference when required.

RFID System

V680-HAM42-DRT	DeviceNet Remote ID Controller
V680-HS51	Antenna
V680-HS52	Antenna
V680-HS63	Antenna
V680-HS65	Antenna
V680-D1KP52MT	ID Tag
V680-D1KP66T/-D1KP66MT	ID Tag
V680-D1KP66T-SP	ID Tag
V680-D2KF52M	ID Tag
V680-D2KF67/-D2KF67M	ID Tag
V680-D8KF68/-D32KF68	ID Tag

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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Safety Precautions

● Alert Symbols for Safe Use

The following symbols are used in this manual to indicate precautions that must be observed to ensure safe use of the V680-HAM42-DRT, V680-series Antennas, and V680-series ID Tags.

The precautions provided here contain important safety information. Be sure to observe these precautions.

The following signal words are used in this manual.

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

● Meanings of Alert Symbols

	Indicates general prohibitions for which there is no specific symbol.

● Warning

⚠ WARNING

These Products are not designed to be used either directly or indirectly in applications that detect human presence for the purpose of maintaining safety. Do not use these Products as a sensing means for protecting human lives.

Regulations and Standards

The Products conform to the following overseas regulations and standards.

1. The United States

	DeviceNet Remote ID Controller	Antenna
FCC Part 15 Subpart C FCC ID: E4E6CYSIDV6800108	V680-HAM42-DRT	V680-HS51 V680-HS52 V680-HS63 V680-HS65

FCC NOTICE

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

(1) This device may not cause harmful interference.

(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.

Do not remove the ferrite core (TDK model ZCAT1730-0730A:V680-HS52/-HS63/-HS65, TDK model ZCAT1525-0430AP:V680-HS51) installed on the cables to suppress RF interference.

FCC Part 15 subpart B

NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2. Europe

		DeviceNet Remote ID Controller	Antenna
(Radio and Telecommunication Terminal Equipment Directive 1999/5/EC)		V680-HAM42-DRT	V680-HS51 V680-HS52 V680-HS63 V680-HS65
Radio:	EN 300 330-2V1.3.1 (04-2006)		
	EN 300 330-1V1.5.1 (04-2006)		
EMC:	EN 301 489-3V1.4.1 (08-2002)		
	EN 301 489-1V1.6.1 (09-2005)		
Safety:	EN 61010-1:2001 (2nd Edition)		

CE

English	Hereby, Omron, declares that the RFID System, V680-HS51 Series, V680-HS52 Series, V680-HS63 Series, V680-HS65 Series, and V680-HAM42-DRT Series are in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Finnish	Omron vakuuttaa täten että RFID Säännös, V680-HS51 Series,, V680-HS52 Series, V680-HS63 Series, V680-HS65 Series, V680-HAM42-DRT Series tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Dutch	Hierbij verklaart Omron dat het toestel de RFID Systeem, V680-HS51 ´Serie, V680-HS52 ´Serie, V680-HS63 ´Serie, V680-HS65 ´Serie, V680-HAM42-DRT ´Serie in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijh 1999/5/EG.
French	Par la présente Omron déclare que la RFID Système, V680-HS51 Série, V680-HS52 Série, V680-HS63 Série, V680-HS65 Série, V680-HAm42-DRT Série sont conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
Swedish	Härmed intygar Omron att den RFID System, V680-HS51 Serie, V680-HS52 Serie, V680-HS63 Serie, V680-HS65 Serie, V680-HAM42-DRT Serie stär l överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.
Danish	Undertegnede Omron erklærer herved, at følgende den RFID System, V680-HS51Serie, V680-HS52 Serie, V680-HS63 Serie, V680-HS65 Serie, 680-HAM43-DRT Serie overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
German	Hiermit erklärt Omron, die RFID System, V680-HS51 Serie, V680-HS52 Serie, V680-HS63 Serie, V680-HS65 Serie, V680-HAM42-DRT Serie in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 1999/5/EG befindet. (BMWi)

Greek	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Omron ΔΗΛΩΝΕΙ RFID ΟΥΟΓΗΜΑ, V680-HS51 OEIPA, V680-HS52 OEIPA, V680-HS63 OEIPA, V680-HS65 OEIPA, V680-HAM42-DRT OEIPA ΣΥΜΜΟΡΦΟΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
Italian	Con la presente Omron dichiara che la RFID Sistem, V680-HS51 Seriea, V680-HS52 Serie, V680-HS63 Serie, V680-HS65 Serie, V680-HAM42-DRT Serie sono conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Spanish	Por medio de la presente Omron declara que el RFID Sistema, V680-HS51 Serie, V680-HS52 Serie, V680-HS63 Serie, V680-HS65 Serie, V680-HAM42-DRT Serie esta conforme a los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Portuguese	Omron declara que a RFID Sistema, V680-HS51 Série, V680-HS52 Série, V680-HS63 Série, V680-HS65 Série, V680-HAM42-DRT Série ser conforme com os tequisitos essenciais e outras disposições da Directiva 1999/5/CE.
Romanian	Prin prezenta, Omron declară că acest V680-HS51,V680-HS52,V680-HS63,V680-HS65, V680-HAM42-DRT este conform cu cerinţele principale çi cu celelalte prevederi relevanate ale Directivei 1999/5/EC.

3. Japan

	DeviceNet Remote ID Controller	1
Equipment using high frequencies: Inductive Reading/Writing Communications Equipment Conforming standards: Inductive Reading/Writing Communications Equipment; Standard: ARIB STD-T82 EC-06019	V680-HAM42-DRT	V680-HS51 V680-HS52 V680-HS63 V680-HS65

4. Canada

	DeviceNet Remote ID Controller	2
IC ID: 850J-V6800108	V680-HAM42-DR	V680-HS51 V680-HS52 V680-HS63 V680-HS65

This device complies with RSS-Gen of IC Rules.
Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This class A digital apparatus complies with Canadian ICES-003.
Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada.

Precautions for Safe Use

Be sure to observe the following precautions to ensure safe use of the Products.

1. Do not use the Products in environments with flammable, explosive, or corrosive gasses.
2. Do not attempt to disassemble, repair, or modify any Product.
3. Because a cable has a locking mechanism, make sure that it has been locked before using the cable.
4. Make sure the power supplied by the DC power supply unit is within the rated power supply voltage (24 VDC +10%/-15%) before using the Product.
5. Do not connect the power supply in reverse.
6. Do not allow water or pieces of wire to enter from openings in the case. Doing so may cause fire or electric shock.
7. Make sure that the Controller is provided with sufficient ventilation space.
8. Do not install the Products near any equipment that generates a large amount of heat (such as heaters, transformers, and large-capacity resistors).
9. Turn OFF the Controller power supply before mounting or removing an Antenna.
10. If an error is detected in any Product, immediately stop operation and turn OFF the power supply. Consult with an OMRON representative.
11. Dispose of the Products as industrial waste.
12. Do not clean the Products with paint thinner, benzene, acetone, or kerosene.
13. If multiple Antennas are mounted near each other, communications performance may decrease due to mutual interference. Refer to *Reference Data* in *Section 6 Appendices* and check to make sure there is no mutual interference.
14. To remove the Unit, catch a tool on the hook and gently remove the Unit.
15. Do not perform wiring incorrectly or short-circuit the load. Doing so may result in rupture or damage from burning.
16. Do not use the Products in environments subject to oil.

Precautions for Correct Use

Always observe the following precautions to prevent operation failures, malfunctions, and adverse effects on performance and equipment.

1. Installation and Storage Environment

Do not use or store the Product in the following locations.

- Locations exposed to corrosive gases, dust, metallic powder, or salts
- Locations not within the specified operating temperature range
- Locations subject to rapid changes in temperature or condensation
- Locations not within the specified operating humidity range
- Locations subject to direct vibration or shock outside the specified ranges
- Locations subject to spray of water, oil, or chemicals

2. Installation

- The Products communicate with Tags using the 13.56-MHz frequency band. Some transceivers, motors, inverters, and switching power supplies generate noise that can affect communications with the Tags and cause errors. If such devices are located near the Tags, always test operation in advance to confirm whether the system will be affected.
- Observe the following precautions to minimize the effects of normal noise.
  (1)Ground all metal objects in the vicinity of the Products to 100 Ω or less.
  (2)Do not use the Products near high-voltage or high-current lines.
- Always bundle the cables connected to the power supply terminals and the ground terminal and connect the enclosed ferrite core (ZCAT2032-0930 manufactured by TDK).
- Do not pull on the cables with excessive strength.
- The Products are not waterproof. Do not use them in an environment where mist is present.
- Do not expose the Products to chemicals that adversely affect the Product materials.

3. Host Communications

Always confirm that the Controller has been started before attempting to communicate with it from the host. Also, when the Controller is started, unstable signals may be output from the host interface. When starting operation, clear the reception buffers in the host or take other suitable countermeasures.

Meanings of Symbols

Indicates particularly important points related to a function, including precautions and application advice.

Indicates page numbers containing relevant information.

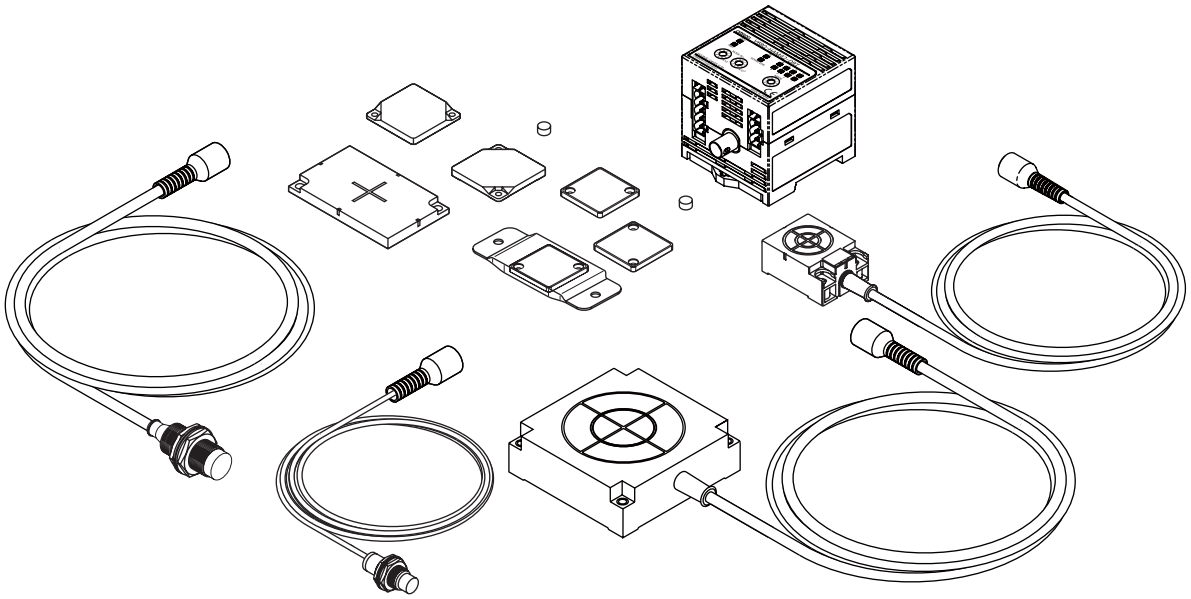
Indicates reference to helpful information and explanations for difficult terminology.

Table of Contents

Section 1
Product Overview

Features

The V680-series RFID System uses electromagnetic induction and supports the ISO/IEC 18000-3 (ISO/IEC 15693) RFID system international standards. With compliance to DeviceNet, a world standard for host interfaces, the V680 enables constructing more universal systems.



■ Highly Reliable Tag Communications

The V680 features highly reliable ID Tag communications developed through the V600-series RFID Systems, making it easy to use on-site.

■ Compatible with DeviceNet

The V680 enables constructing more universal systems with compliance to DeviceNet, a world standard.

■ Compact Design with an Internal Amplifier

With a compact size of 65 × 65 × 65 mm, the DeviceNet Remote ID Controller requires less space for installation.

■ Antennas and Tags with Superior Environmental Resistance

Fluororesin has superior environmental resistance, and is used for the external coatings of the Antenna case, Antenna cable, and the ID Tags.

■ EEPROM Memory Capacity of 1,000 Bytes

The ID Tags have 1,000 bytes of EEPROM memory capacity. They can be used to store various data, which can be rewritten up to 100,000 times per block if used at an ambient temperature not exceeding 25°C.

■ Simple Installation and No Worrying about Mechanical Life or Problems

Use long-distance communications up to 100 mm.

No need to worry about difficult positioning or mutual interference, as required with previous Sensors. Also, there are no conventional cylinders or other mechanical parts, such as there are with mechanical flags, so the user need not be concerned about service life or mechanical problems.

■ Combination with Previous RFID Systems

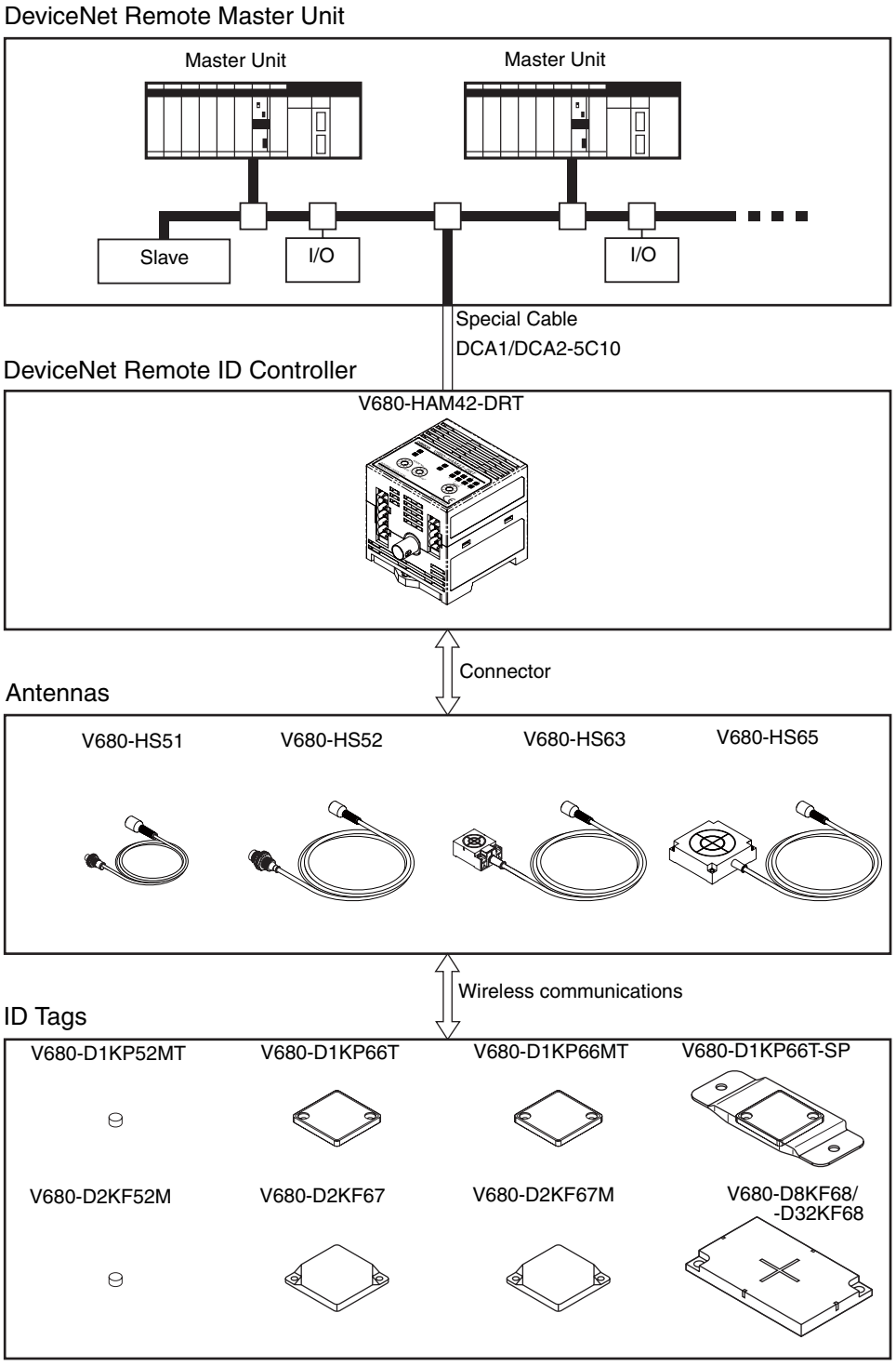
The V600-series Data Carriers can be used in both systems, so the V680 can also be used to expand existing lines.

■ Compliant with EN Standards

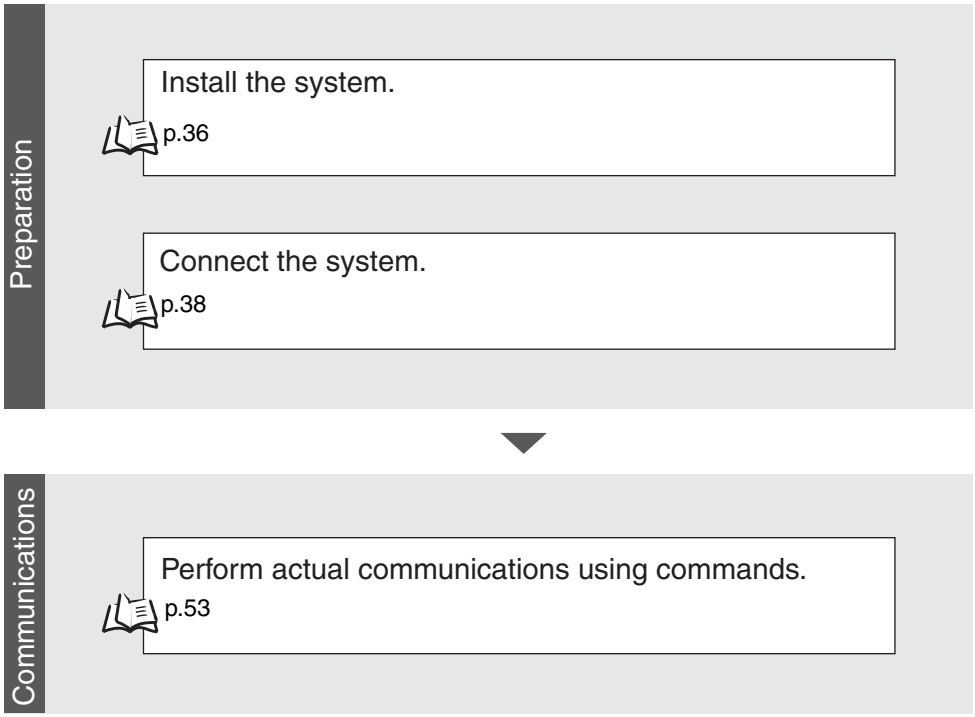
The set consisting of the Amplifier, Sensor, and ID Tags complies with EMC Directive of the EC Directives.

System Configuration

The DeviceNet Remote ID Controller conforms to the open network DeviceNet and enables simple connection for slaves using special connectors. One-touch connectors on the Amplifier and Antenna improve usability. Also, any of the V680-series ID Tags can be used.



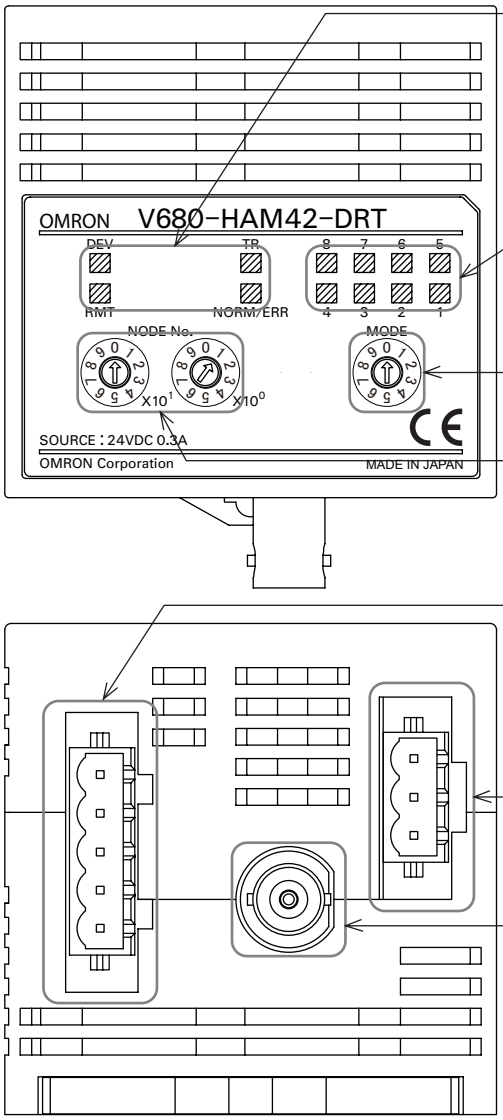
Application Flowchart



Section 2
Names and Functions of Components

ID Controller

Part Names



■ Operation Indicators

MS: Unit status

NS: Network status

TR: ID Tag communications status

NORM/ERR: Result of communications with ID Tag

■ Data/Error Code Indicators (Two-color)

Data (green)

Error code (red)

■ Mode Switch

Remote ID Controller operating mode setting switch

■ Node Address Switches

Node address switches (00 to 63)

■ DeviceNet Connector

Connects to DeviceNet Remote Master Unit.

■ Power Supply Terminals

Connect to 24-VDC power.

Recommended Power Supply: S8VS-03024

■ Antenna Connector

Connects to V680-series Antenna (V680-H□□).

Functions

■ Operation Indicators

▪ MS Indicator (Machine Status)

The MS indicator shows the Controller status.

Status		Definition
	Lit green	Normal
	Flashing green	Settings not made.
	Lit red	Fatal error
	Flashing red	Non-fatal error
	Not lit	No power

▪ NS Indicator (Network Status)

The NS indicator shows the network status.

Status		Definition
	Lit green	Communications connected.
	Flashing green	Communications not connected.
	Lit red	Fatal communications error
	Flashing red	Non-fatal communications error
	Not lit	No power

▪ TR Indicator

The TR indicator shows the ID Tag communications status.

Status		Definition
	Lit yellow	ID Tag is communicating.
	Flashing yellow	ID Tag is communicating.
	Not lit	Standby

▪ NORM/ERR Indicator

The NORM/ERR indicator shows the result of communications with ID Tags.

Status		Definition
	Lit green	Normal end
	Lit red	Error end
	Not lit	Standby

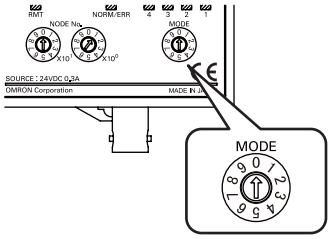
■ Data/Error Code Indicators

These indicators show the first byte of data that was read or written when communications ends normally. They also show the error code if communications end in an error.

Status		Definition
	Lit green	Data displayed.
	Lit red	Error code displayed.
	Not lit	Standby

■ Mode Switch

The mode switch sets the DeviceNet Remote ID Controller's operating mode.

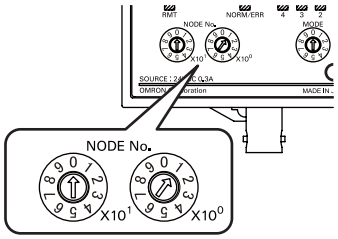


Mode	Symbol	Description
0	4CH	4-byte access mode
1	16CH	26-byte access mode
2	32CH	58-byte access mode
3	SYNC1	V600-compatible Trigger Mode, 100-ms output time
4	SYNC2	V600-compatible Trigger Mode, 500-ms output time
5	AUTO1	V600-compatible Auto Mode, 100-ms output time
6	AUTO2	V600-compatible Auto Mode, 500-ms output time
7	TEST	Test mode (checking operation alone)
8	NOISE	Noise measurement mode (measuring the noise environment around the Antenna)
9	-	Mode setting error

CHECK! Turn the power OFF before setting the mode switch. The mode that is set when the power is turned ON will be used.

■ Node Address Switches

The node address switches set the node address of the DeviceNet Remote ID Controller.



Item	Description
Setting method	Two-digit decimal number The left rotary switch sets the 10s digit, and the right rotary switch set the 1s digit.
Setting range	00 to 63 The default setting is 00.

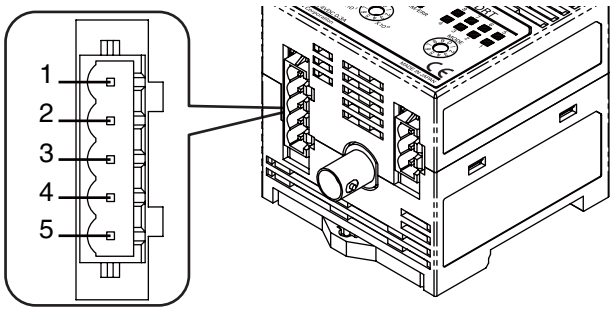
CHECK! Node addresses between 64 and 99 can be set using the Configurator. Refer to the *DeviceNet DRT2-series Slave Manual* (Cat. No. ntlp) for information on the setting procedure.

CHECK! Turn the power OFF before setting the node address switches. The node address that is set when the power is turned ON will be used.

■ DeviceNet Connector

The DeviceNet connector port connects the DeviceNet Remote ID Controller to the Master Unit. Use the enclosed connector.

Enclosed connector model: FKC2.5/5-ST-5.08-RFAUM (Phoenix Contact)

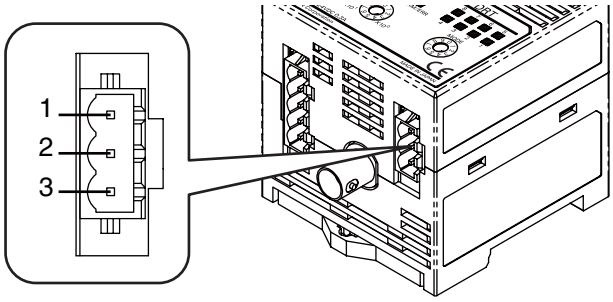


Pin No.	Name	Signal type
1	V-	Power supply negative side
2	CAN_L	Low communications data
3	Drain	Shield
4	CAN_H	High communications data
5	V+	Power supply positive side

■ Power Supply and Ground Connector

The power supply terminals supply 24-VDC power using the enclosed connector.

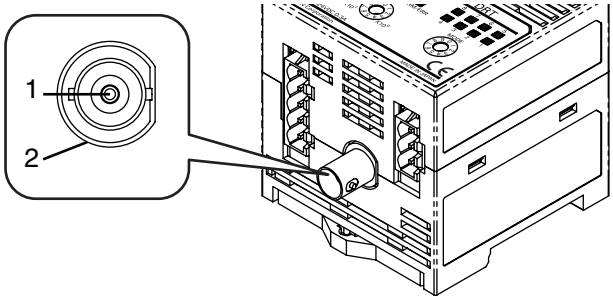
Enclosed connector model: FKC2.5/3-ST-5.08-RF (Phoenix Contact)



Pin No.	Name	Function
1	+V	24-VDC input terminals
2	-V	
3	GR	Ground terminal

■ Antenna Connector

Connect this connector to the V680-series Antenna (V680-H□□).



Pin No.	Name	Signal type
1	S	Signal line
2	GND	Analog ground

CHECK! Refer to *System Configuration* in *Section 1 Product Overview* for information on the Antennas that can be connected.

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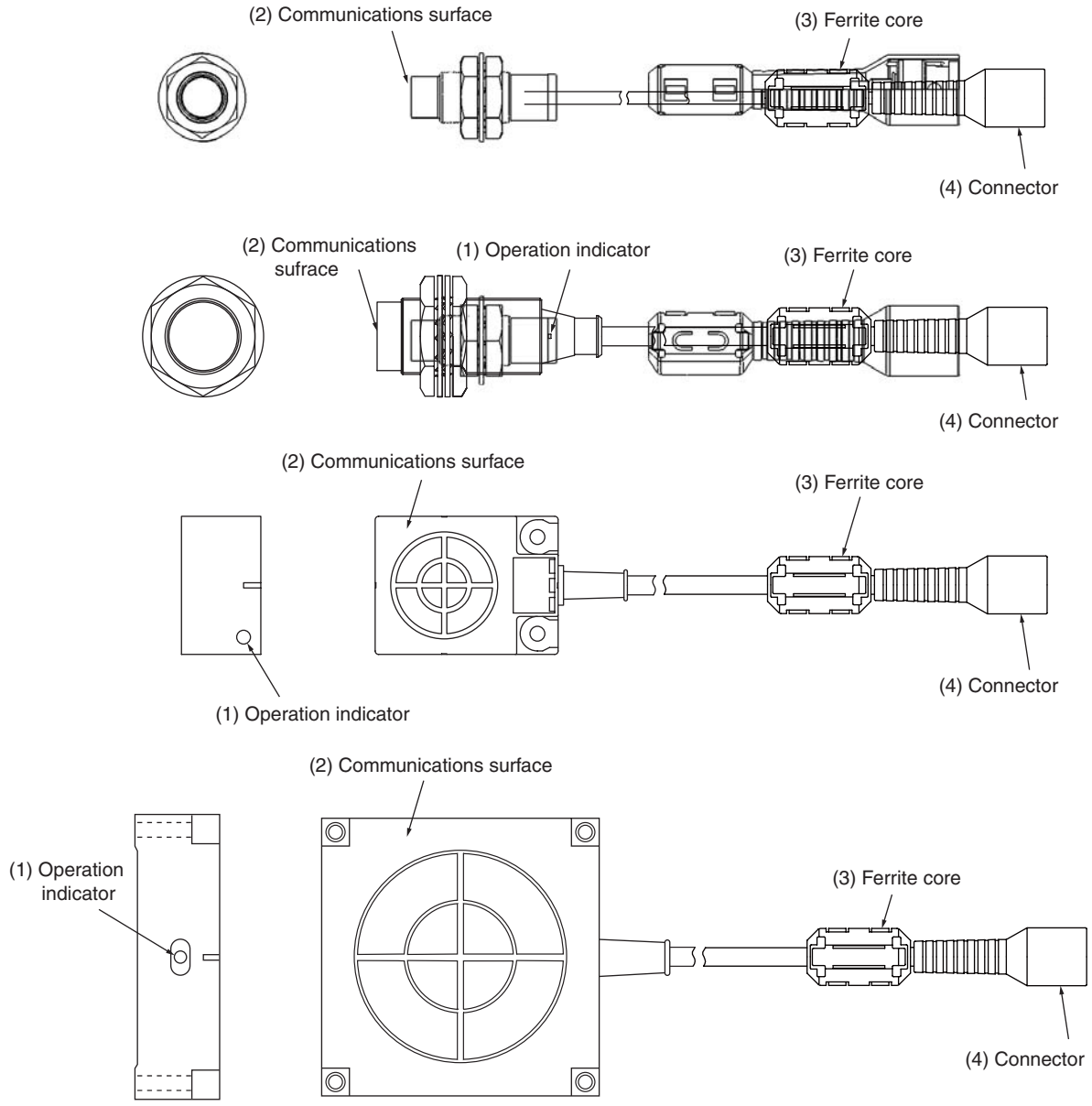
Antennas



No.	Name	Description
1	Operation indicator	Lights when a signal is transmitted.
2	Communications surface	Mounted facing the ID Tags.
3	Ferrite core	Attenuates noise from the ID Tags.
4	Connector	Connects to the ID Controller.

ID Tags

The ID Controller communications with the ID Tags through the Antenna to read and write data in the internal memory of the ID Tags.
The printed side is the communications surface. Mount the ID Tags with the communications surfaces facing the Antenna.

MEMO

Section 3
Functions and Operation

ID Controller

Communications with ID Tags

With the DeviceNet Remote ID Controller, the operating mode is set on the mode switch and the command is selected to communicate with the ID Tags.

■ Operating Mode

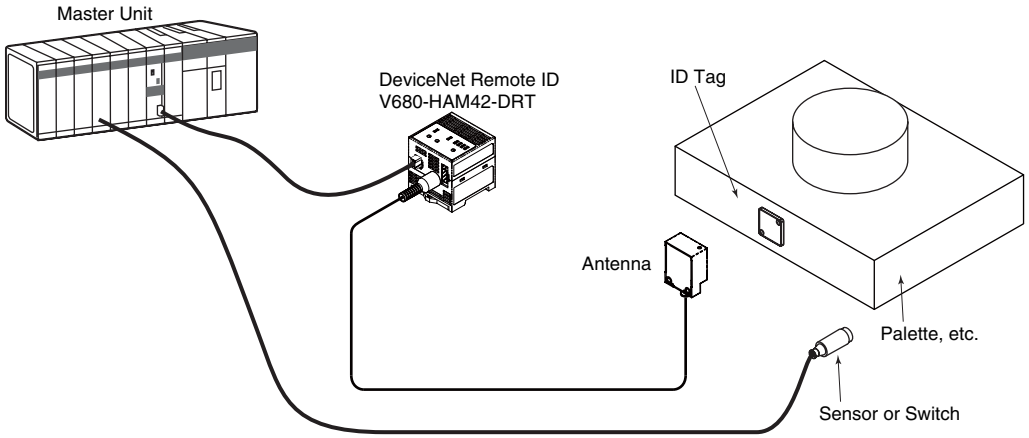
There are four operating modes.

CHECK! p.17

For the mode settings, refer to *Names and Functions of Components* in *Section 2*.

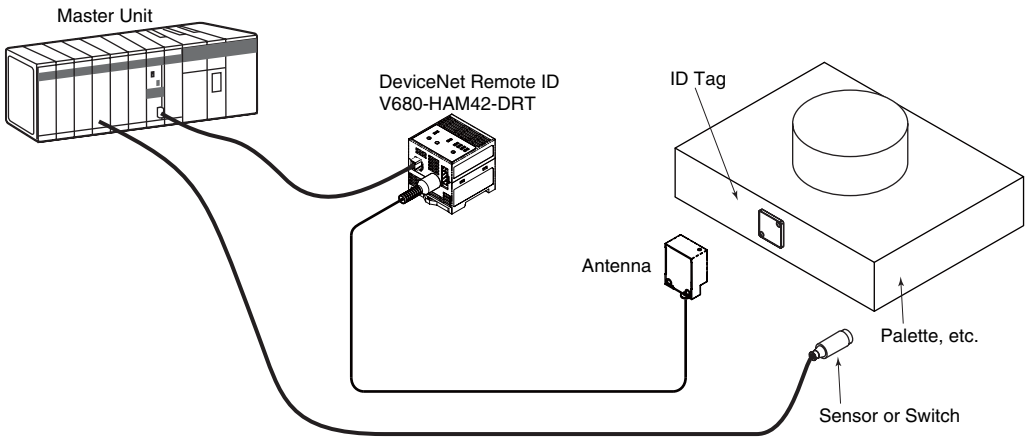
▪ Trigger Mode

When the ID Tag on a workpiece or palette moves within the communications range of the Antenna, it is detected by a sensor or a switch. A control signal (trigger signal) is output from the PLC to the DeviceNet Remote ID Controller, which triggers the DeviceNet Remote ID Controller to begin communications with the ID Tag. The DeviceNet Remote ID Controller reads the Tag data and outputs the results to the PLC.



▪ Auto Mode

When the ID Tag of a workpiece or palette is within the communications range of the Antenna, the Remote ID Controller automatically begins communications with the ID Tag and outputs the result to the PLC.



▪ Test Mode

During system installation or maintenance, the mode switch can be set to 7 (Test Mode) to read ID Tag data when the power supply is turned ON. The communications results are display on the operation indicators and the data/error code indicators.

▪ Noise Measurement Mode

If communications with the ID Tags is unstable, set the mode switch to 8 (Noise Measurement Mode). When the power supply is turned ON, the noise around the Antenna will be measured, and the data will be shown on the indicators.

Refer to *Noise Measurement* in this section for information on measuring noise.


p.30

■ Commands

Communications with the ID Tag is controlled by commands allocated to the DeviceNet Remote ID Controller signals.

▪ Using 4-byte, 26-byte, and 56-byte Access Modes

The commands given in the following table can be used if the mode switch is set to 0 to 2.

Command	Explanation
READ	Data in the ID Tag memory is read by specifying the number of bytes to process.
WRITE	Data is written to the ID Tag by specifying the memory address, number of bytes to process, and the data.
BIT SET	Bits in the ID Tag memory are set by specifying the memory address and number of bytes to process.
BIT CLEAR	Bits in the ID Tag memory are cleared by specifying the memory address and number of bytes to process.
DATA FILL	Based on the specified address, number of blocks to process, and data, the specified memory area of the ID Tag is filled with the same data.
NOISE MEASUREMENT	The strength of noise affecting the Antenna is measured.

Noise measurement is not a command used for communications with ID Tag, but a command used for maintenance. Refer to *Noise Measurement* for details.

p.30

▪ Using V600-compatible Sync Modes 1 and 2

The commands given in the following table can be used if the mode switch is set to 3 to 4.

Command	Explanation
READ/WRITE	Switches between the WRITE command and the READ command.
BYTE/BIT WRITE	Switches between the BYTE WRITE command and the BIT WRITE command.
BIT SET/CLEAR	Switches between the BIT SET and the BIT CLEAR command when the BIT WRITE command is used.
WRITE BYTES	Switches the number of bytes to be written.
WRITE AREA	Switches the address where writing will be performed.

▪ Using V600-compatible Auto Modes 1 and 2

The commands given in the following table can be used if the mode switch is set to 4 to 5.

Command	Explanation
READ/WRITE	Switches between the WRITE command and the READ command.
BYTE/BIT WRITE	Switches between the BYTE WRITE command and the BIT WRITE command.
BIT SET/CLEAR	Switches between the BIT SET and the BIT CLEAR command when the BIT WRITE command is used.
WRITE BYTES	Switches the number of bytes to be written.
WRITE AREA	Switches the address where writing will be performed.

■ Options

The following functions can be used with the DeviceNet Remote ID Controller by setting the control signal options.

▪ Using 4-byte, 26-byte, and 56-byte Access Modes

The functions given in the following table can be used if the mode switch is set to 0 to 2.

Function	Explanation
Communications Speed	The communications time required for writing large amounts of data to the ID Tag using the DATA FILL command can be reduced by setting the communications speed to high. Be aware that the noise resistance may be lower during communications when this function is being used. For details on the communications time, refer to *Communications Time* (Reference). p.101
Verification	Select whether to enable or disable the verification function.
Write Protection	Important data stored in the memory of an ID Tag, such as the product model or type, can be protected from being overwritten inadvertently by enabling the Write Protection function. Refer to *Write Protection* for details. p.32
Output Time	When Auto Mode is being used, the result output time can be set to either 100 ms or 500 ms. Refer to *I/O Settings and Control Methods* for details on the output timing. p.61
Host Communications Mode	Trigger Mode or Auto Mode can be selected as the method for the communications with the PLC.
Read/Write Data Code	The number of bytes that can be accessed can be increased by converting the read/write data code from ASCII to hexadecimal if the data code in the ID Tag is ASCII.

▪ Using V600-compatible Sync Modes 1 and 2

The functions given in the following table can be used if the mode switch is set to 3 or 4.

Function	Explanation
Output Time	When Auto Mode is being used, the result output time can be set to either 100 or 500 ms. Refer to *I/O Settings and Control Methods* for details on output timing. p.61
Host Communications Mode	Trigger Mode or Auto Mode can be selected as the method for the communications with the PLC.

▪ Using V600-compatible Auto Modes 1 and 2

The functions given in the following table can be used if the mode switch is set to 5 or 6.

Function	Explanation
Output Time	When Auto Mode is being used, the result output time can be set to either 100 or 500 ms. Refer to *I/O Settings and Control Methods* for details on output timing. p.61
Host Communications Mode	Trigger Mode or Auto Mode can be selected as the method for the communications procedure with the PLC.

Noise Measurement

You can check whether noise that affects communications with ID Tags exists in the area where the Antenna and ID Controller are installed.
When a noise measurement command is sent from the PLC, the noise strength received by the Antenna is output in a value from 00 to 99.
The measured noise strength is also displayed in four levels on the data indicators, and so it can be checked directly on the DeviceNet Remote ID Controller.

Refer to *NOISE MEASUREMENT* for details of the noise measurement command.

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■ Relation between Result Output and Data Indicators

Result output	Data indicator status	Result output	Data indicator status
00 to 09	7 6 5 4 3 2 1 0	10 to 19	7 6 5 4 3 2 1 0
20 to 29	7 6 5 4 3 2 1 0	30 to 39	7 6 5 4 3 2 1 0
40 to 99	7 6 5 4 3 2 1 0		

□: OFF ■: ON

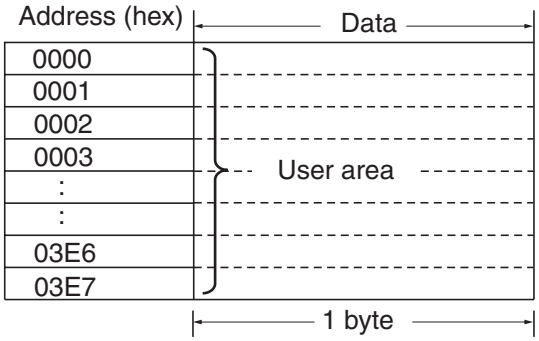
■ Example of Results Output and Influence on Communications Distance

★Figure

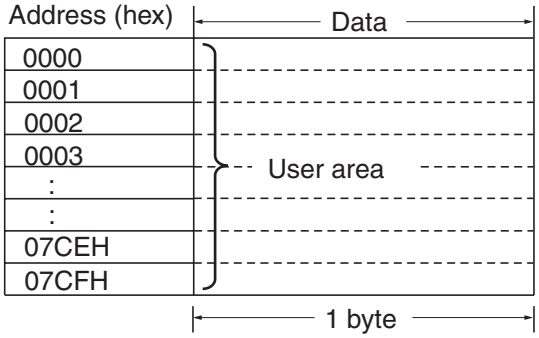
ID Tags

ID Tag Memory Map

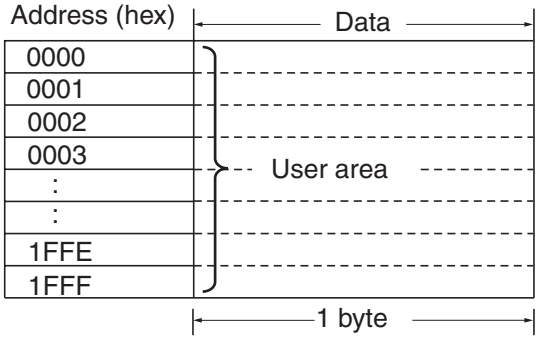
■ V680-D1KP□□



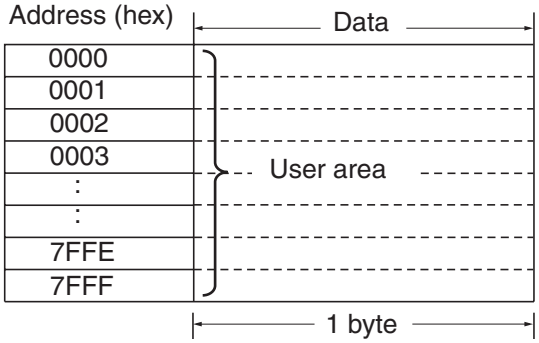
■ V680-D2KF□□



■ V680-D8KF□□



■ V680-D32KF□□



Write Protection

The write protection function protects important data stored in the memory of a ID Tag, such as the product model or type, from being overwritten inadvertently.
Enable the write protection function after writing important data as described in this section.

■ Setting Write Protection

For the write protection function to be effective, it must be enabled or disabled in both the DeviceNet Remote ID Controller settings and the ID Tag settings.

1. Enabling the Write Protection for the DeviceNet Remote ID Controller

The write protection function can be enabled or disabled by setting the write-protect bit of the DeviceNet Remote ID Controller in the I/O Allocation Table.

Refer to the *Signal Names and Functions* for details.

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2. Setting Write Protection in ID Tags

Write protection for individual ID Tags is set in the most significant bit of address 0000H.
Write protection is set in the 4 bytes from Tag address 0000H to 0003H.

Address / Bit	7	6	5	4	3	2	1	0
0000H	Enable/disable	Upper two digits of start address (00 to 7F)						
0001H	Lower two digits of start address (00 to 7F)							
0002H	Upper two digits of end address (00 to 7F)							
0003H	Lower two digits of end address (00 to 7F)							

- Write-protect bit (most significant bit of address 0000H)
  1: Write-protected (Enable)
  0: Not write-protected (Disable)

- Addresses in Tag Memory That Can Be Write Protected
  Start address: 0000H to 7FFFH
  End address: 0000H to FFFFH

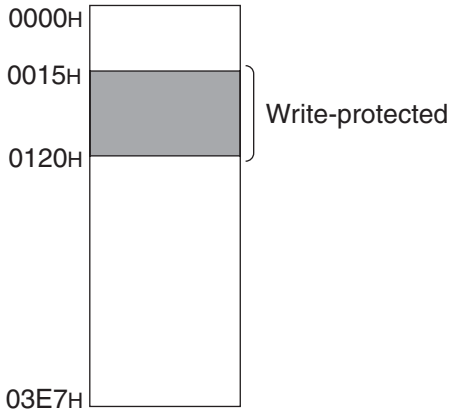
The ID Tag write protection setting area (addresses 0000 hex to 0003 hex) can be used as user memory if the write protection function is not used. To use the ID Tag's write protection setting area (addresses 0000 hex to 0003 hex) as user memory, be sure to disable write protection by setting the Write Protect Bit in the DeviceNet Remote ID Controller.

■ Example of Write Protection

▪ Start Address Is Lower Than the End Address

The memory area between the start address and end address will be write-protected.

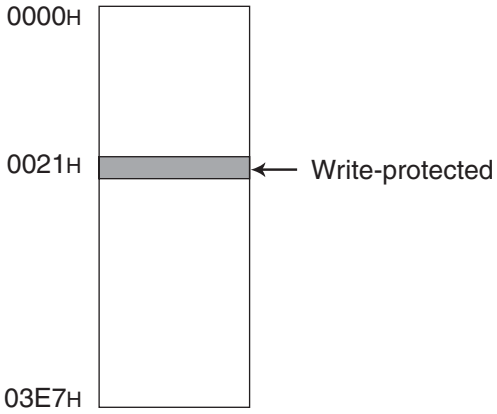
Address	Bit	Upper digits				Lower digits			
0000H		1	0	0	0	0	0	0	0
		8				0			
0001H		0	0	0	1	0	1	0	1
		1				5			
0002H		0	0	0	0	0	0	0	1
		0				1			
0003H		0	0	1	0	0	0	0	0
		2				0			



▪ Start Address Is Equal to End Address

Only the selected address (one byte) will be write-protected.

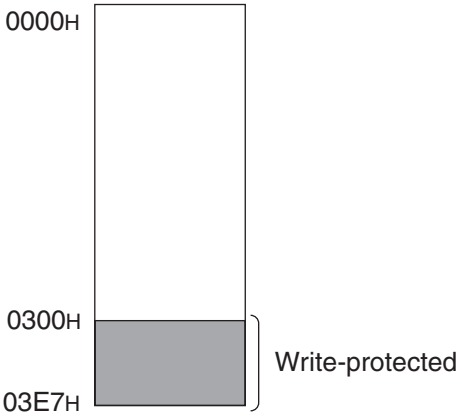
Address	Bit	Upper digits				Lower digits			
0000H		1	0	0	0	0	0	0	0
		8				0			
0001H		0	0	1	0	0	0	0	1
		2				1			
0002H		0	0	0	0	0	0	0	0
		0				0			
0003H		0	0	1	0	0	0	0	1
		2				1			



▪ End Address Is Higher than the Last ID Tag Address

The memory area between the start address and the last ID Tag address will be write-protected.

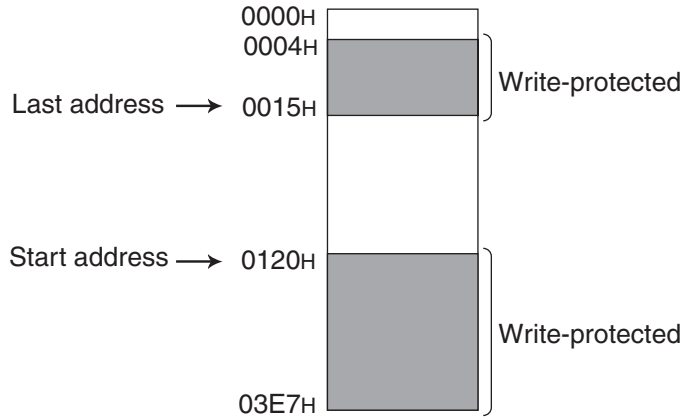
Address	Bit	Upper digits				Lower digits			
0000H		1	0	0	0	0	0	1	1
		8				3			
0001H		0	0	0	0	0	0	0	0
		0				0			
0002H		0	0	0	0	0	0	1	1
		0				3			
0003H		1	1	1	1	1	1	1	1
		F				F			



▪ Start Address Is Higher Than End Address

The memory area between the start address and the last ID Tag address, as well as the area between 0004H and the end address will be write-protected.

Address	Bit	Upper digits				Lower digits			
0000H		1	0	0	0	0	0	0	1
		8				1			
0001H		0	0	1	0	0	0	0	0
		2				0			
0002H		0	0	0	0	0	0	0	0
		0				0			
0003H		0	0	0	1	0	1	0	1
		1				5			



■ Disabling Write Protection

▪ Disabling Write Protection for Part of the ID Tags

Set the uppermost bit of 0000H to 0.

▪ Disabling All Write Protection for the Whole RFID system

Set the Write Protection Enable Bit to 1 in the DeviceNet Remote ID Controller.

CHECK!

Caution When Using Write Protection
The write protect function is a DeviceNet Remote ID Controller function. It cannot be used with ID Controllers manufactured by other companies.

Section 4
Installation, Connections, and Wiring

DeviceNet Remote ID Controller

Installation

To ensure full functionality of the V680-HAM42-DRT DeviceNet Remote ID Controller, follow the instructions provided in this section for installation.

■ Installation Site

Do not install the DeviceNet Remote ID Controller in the following locations.

- Locations exposed to ambient temperatures that are not between −10 and 55°C or where there are radical temperature changes resulting in condensation
- Locations exposed to humidity that is not between 25% and 85%
- Locations subject to corrosive gas, flammable gas, dust, salt, or metal powder
- Locations that will expose the DeviceNet Remote ID Controller to direct vibration or shock
- Locations exposed to direct sunlight
- Locations exposed to spray of water, oil, or chemicals
- Locations more than 2,000 m above sea level

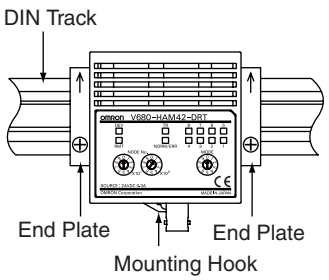
■ Mounting in a Panel

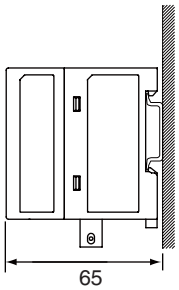
The DeviceNet Remote ID Controller can be used at an ambient temperature range of −10 to 55°C. Be sure to observe the following precautions.

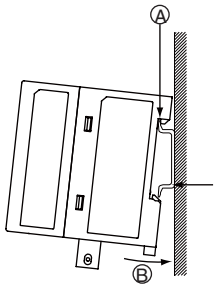
- Make sure that the Unit is provided with sufficient ventilation space.
- Do not install the Unit close to heaters, transformers, or large-capacity resistors that radiate excessive heat.

■ Installation Method

▪ Mounting to DIN Track

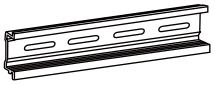




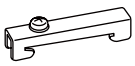


OMRON PFP-100N2
(track length: 1 m)
is recommended.

DIN Track (recommended)
PFP-100N2



End Plate
PFP-M



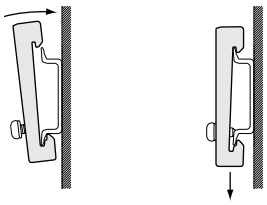
1. First hook the DeviceNet Remote ID Controller to part A, then press it in direction B to mount it to the DIN Track.
2. To disconnect the DeviceNet Remote ID Controller from the DIN Track, pull the mounting hook downwards, and then lift the Controller upwards.

CHECK!

Attaching the End Plates

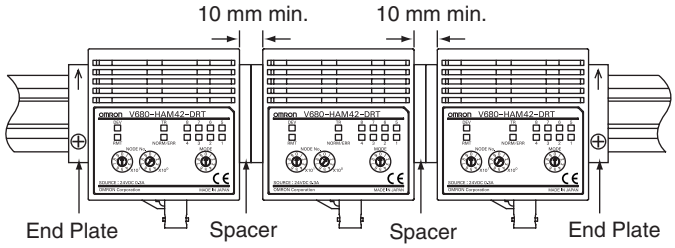
To mount an End Plate easily, first hook the bottom of the End Plate and then hook the top on the DIN Track, pull the End Plate downwards and tighten the screw.

Recommended tightening torque: 1.2 N·m.

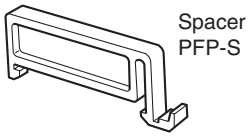


■ Mounting Interval

The V680-HAM42-DRT DeviceNet Remote ID Controllers will generate heat if they are mounted side-by-side. Leave space between the Controllers of at least 10 mm.



Use at least 2 OMRON DIN Track Spacers. (Each Spacer is 5 mm wide.)



Connection and Wiring

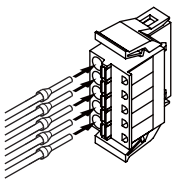
■ DeviceNet Remote Connector

Use the connector that comes with the Unit. You must provide the connecting cable.

		Brand	Model	Note
Cable	Power line	---	---	1.0 mm² (equivalent to AWG18)
Connector		Phoenix Contact	FKC2.5/5ST5.08RFAUM	---
Crimp Terminal	When one line is connected to one terminal		AI1-10RD	---
	When two lines are connected to one terminal		AI-TWIN2 × 1-10RD	---
Crimping Tool			CRIMPFOX UD6	---

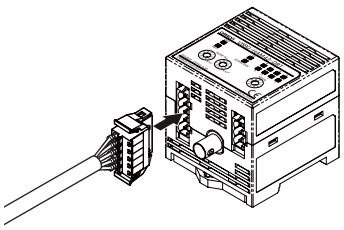
1. Attach the crimp terminals to the sections of the cable where the sheath has been stripped.

2. Make sure the connector is facing the right direction and insert each crimp terminal into the correct connector hole.



3. Once all of the cables have been connected to the connector, attach the connector to the DeviceNet Remote ID Controller.

Align the cable connector with the connector on the DeviceNet Remote ID Controller. Hold the connector body and push the connector firmly into place.



CHECK!

Removing the Connector

Remove the connector by pressing in on the lock on the cable connector to release the lock and pulling the connector straight out. If the connector is difficult to remove, press on the DeviceNet Remote ID Controller while pulling on the connector.

CHECK!

Do not connect cables to the connector after attaching the connector to the DeviceNet Remote ID Controller.

CHECK!

Use the recommended Power Supply (S8VS-03024, OMRON).

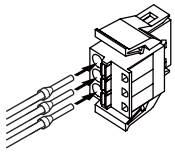
■ Power Supply Connector

Use the enclosed connector. The user must provide the cable.

		Brand	Model	Note
Cable	Power line	---	---	1.0 mm² (equivalent to AWG18)
Connector		Phoenix Contact	FKC2.5/3-ST-5.08-RF	---
Crimp Terminal	When one line is connected to one terminal		AI1-10RD	---
	When two lines are connected to one terminal		AI-TWIN2 × 1-10RD	---
Crimping Tool			CRIMPFOX UD6	---

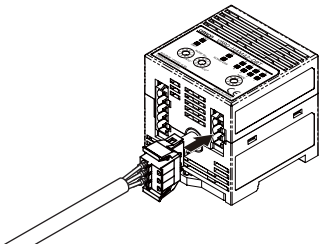
1. Attach the crimp terminals to the sections of the cable where the sheath has been stripped.

2. Make sure the connector is facing the right direction and insert each crimp terminal into the correct connector hole.



3. Once all of the cables have been connected to the connector, attach the connector to the DeviceNet Remote ID Controller.

Align the cable connector with the connector on the DeviceNet Remote ID Controller. Hold the connector body and push the connector firmly into place.



CHECK! Removing the Connector

Remove the connector by pressing in on the lock on the cable connector to release the lock and pulling the connector straight out. If the connector is difficult to remove, press on the DeviceNet Remote ID Controller while pulling on the connector.

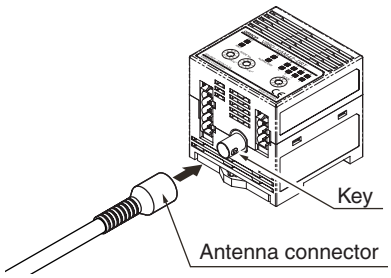
CHECK! Do not connect cables to the connector after attaching the connector to the DeviceNet Remote ID Controller.

CHECK! Use the recommended Power Supply (S8VS-03024, OMRON).

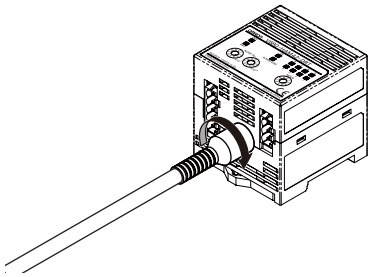
■ Antenna Connector

▪ Mounting the Antenna

1. Hold the connector part of the Antenna and insert it into the Antenna port while matching the key on the Unit with the groove on the connector.

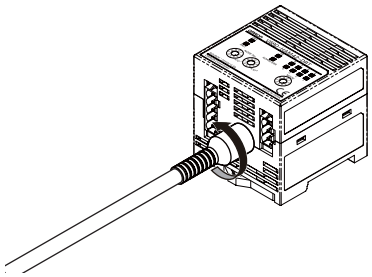


2. Turn the connector clockwise to lock it in place.

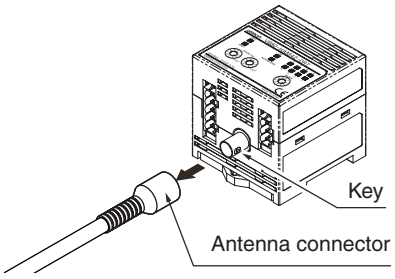


▪ Removing the Antenna

1. Turn the connector in counterclockwise to release the lock.



2. Pull the connector straight out of the port.



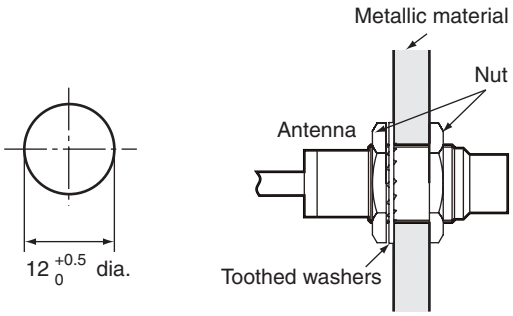
CHECK!

The connector cannot be removed without turning it to release the lock. If the cable is pulled without releasing the lock, it may cause the cable or wires to break. Make sure that the lock is released before pulling out the connector.

Installing Antennas

V680-HS51

Install the Antenna using the nuts and toothed washers that are provided on both sides of the mounting material, as shown in the diagram below.



CHECK! Securely tighten the screws to a maximum torque of 6 N·m.

V680-HS52

Install the Antenna using the nuts and toothed washers that are provided on both sides of the mounting material, as shown in the diagram below.

CHECK! When the Antenna is mounted to a metal object, the communications distance will be reduced by approximately 10% compared with mounting to a non-metallic object. For details on the effect of metal surrounding the Antenna, refer to *Effect of Surrounding Metals on the Antenna (Reference)*.

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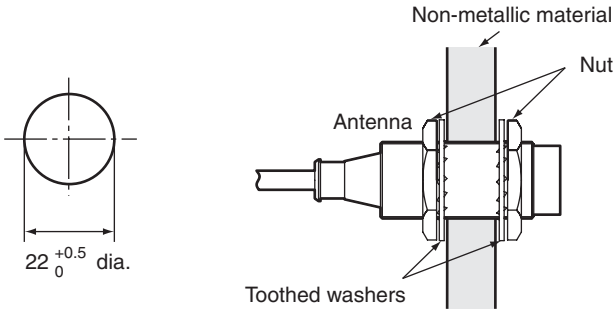
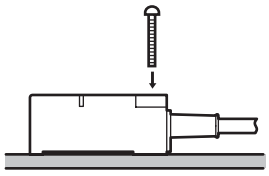
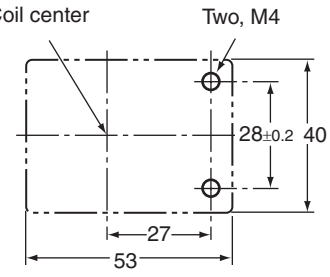


CHECK! Securely tighten the screws to a maximum torque of 40 N·m.

V680-HS63

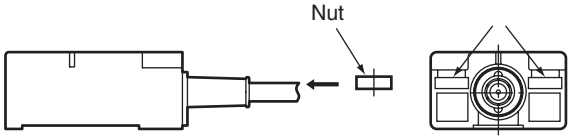
■ Installation from the Front

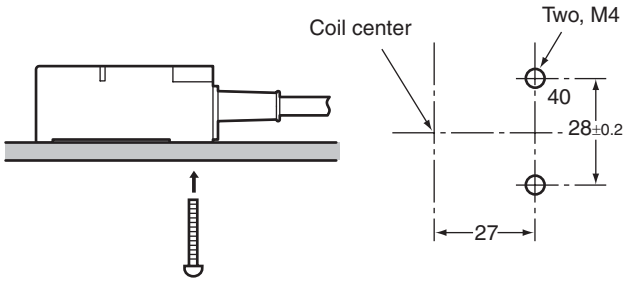




■ Installation from the Back

Insert the nuts that come with the Antenna into sections A.

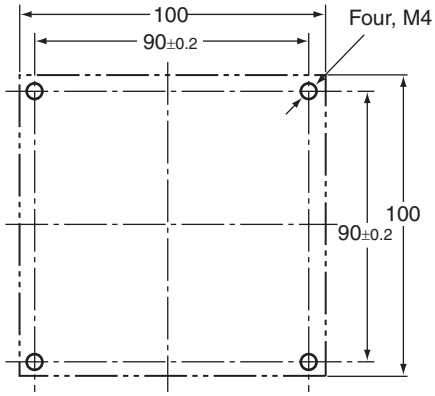




CHECK!

Securely tighten screws to a maximum torque of 1.2 N·m.

V680-HS65

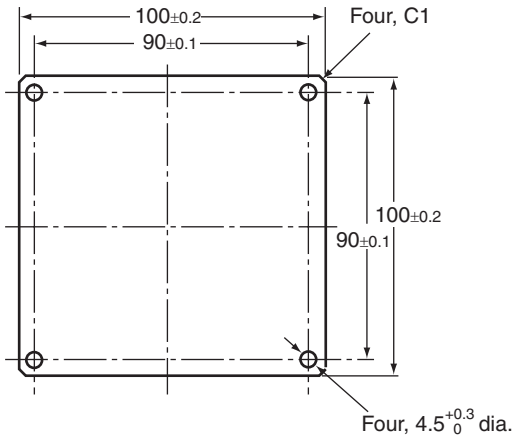


Use M4 screws and spring washers (in four places) for Antenna installation.
Tighten the screws to a torque of 0.7 to 1.2 N·m.
There are no restrictions on the mounting direction or the direction of access to the Tag, but if the Antenna is to be installed near a device such as a conveyance belt, make sure there is no danger of the Antenna being accidentally struck.

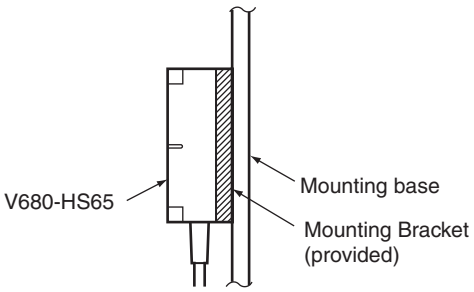
CHECK!

Securely tighten screws to a torque of 0.7 to 1.2 N·m.

■ Mounting Bracket Dimensions (Provided Only with the V680-HS65)



Note: When installing the Antenna, mount it on the enclosed Mounting Bracket. The Mounting Bracket is not necessary, however, if the Antenna is mounted on a metal base that is larger than the Antenna (100 × 100 mm).



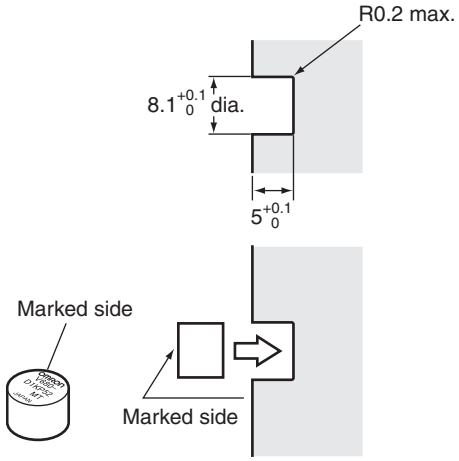
Installing ID Tags

V680-D1KP52MT

■ Tag Installation

Mount Tags as shown in the diagram on the right. The epoxy adhesives listed in the following table are recommended for the given temperature ranges.

Ambient operating temperature	Product name	Manufacturer
–40 to 70°C	Two-part Epoxy-compound Resin: TB2001 (main agent)/TB2105C (curing agent)	Three Bond Co., Ltd.
	One-part Moisture-curing Elastic Adhesive TB1530	Three Bond Co., Ltd.
–40 to 150°C	One-part Epoxy Resin: TB2285	Three Bond Co., Ltd.
	Two-part Epoxy Resin: TB2087	Three Bond Co., Ltd.



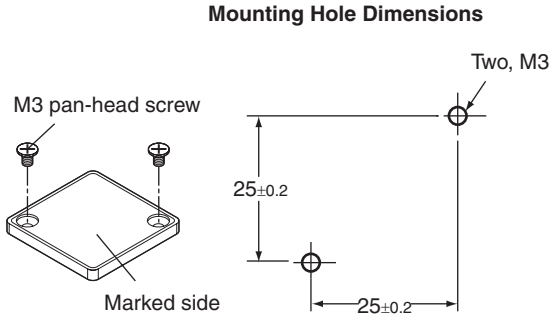
CHECK! When embedding the V680-D1KP52MT into a metal surface, use the V680-HS51/-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

V680-D1KP66T

■ Mounting on Non-metallic Material

Mount the ID Tag using M3 pan-head screws from the marked side.

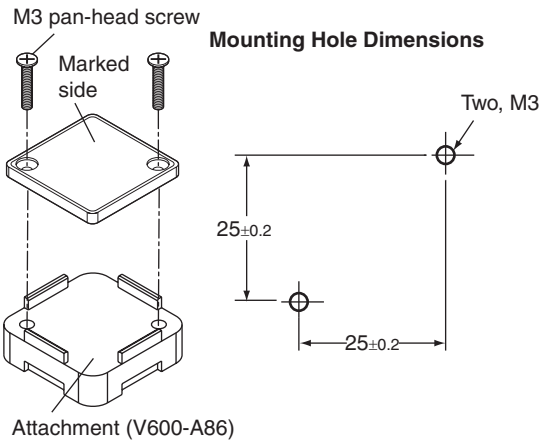
Tightening torque: 0.3 to 0.5 N·m



■ Mounting on Metal

The communications distance will decrease if there is metal at the back of the V680-D1KP66T ID Tag.

If the ID Tag is mounted to metal, use the separately sold Special Attachment (V600-A86) or a non-metallic spacer (e.g., plastic or resin).



CHECK! Refer to *Effect of Metal behind Tags (Reference)* in *Section 6 Appendices* for information on the effect of metal behind the V680-D1KP66T.

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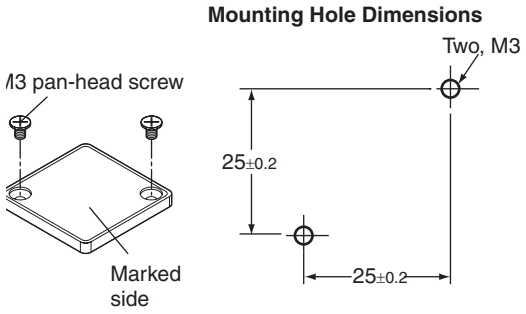
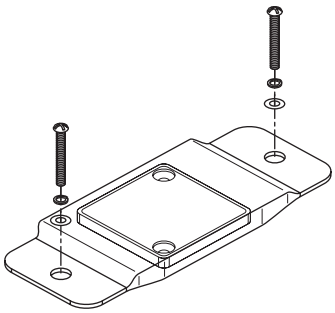
V680-D1KP66MT

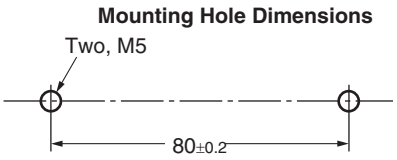
Mount the ID Tag to metal using M3 pan-head screws from the marked side. Tighten the screws to a torque of 0.3 to 0.5 N·m.



V680-D1KP66T-SP

Mount the ID Tag using M5 screws and washers. Tighten the screws to a torque of 1.2 N·m or less. The installation direction of ID Tags is not restricted by the travel direction in respect to the Antenna.





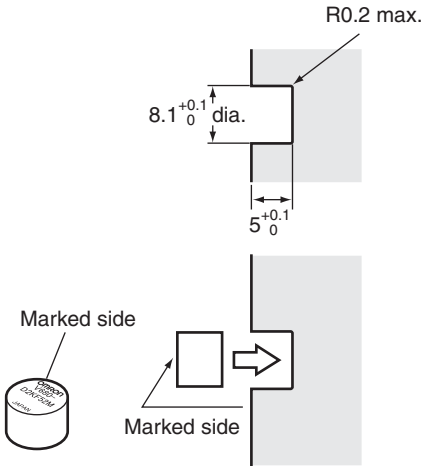
V680-D2KF52M

■ **Tag Installation**

Mount Tags as shown in the diagram on the right.

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

Ambient operating temperature	Product name	Manufacturer
–40 to 70°C	Two-part Epoxy-compound Resin: TB2001 (main agent)/TB2105C (curing agent)	Three Bond Co., Ltd.
	One-part Moisture-curing Elastic Adhesive TB1530	Three Bond Co., Ltd.
–40 to 85°C	One-part Epoxy Resin: TB2285	Three Bond Co., Ltd.
	Two-part Epoxy Resin: TB2087	Three Bond Co., Ltd.



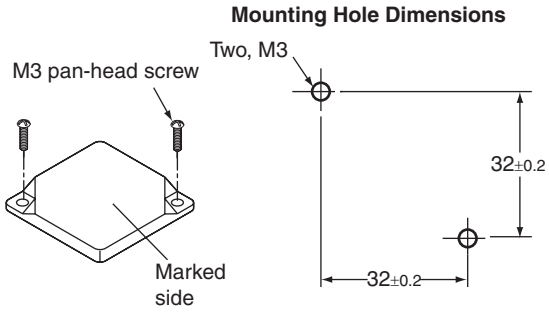
CHECK!

When embedding the V680-D2KF52M into a metal surface, use the V680-HS51/HS-52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

V680-D2KF67/-D2KF67M

■ Tag Installation

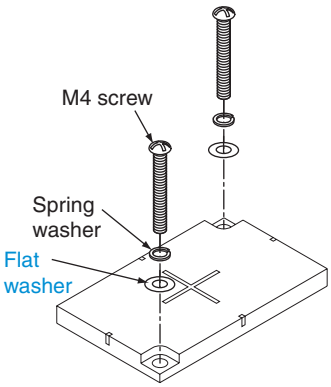
Secure the Tag with M3 screws. Tighten the screws to a torque of 0.6 N·m or less.

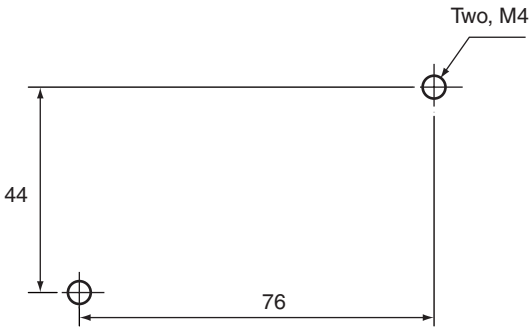


V680-D8KF68/-D32KF68

■ Tag Installation

Secure the Tag with M4 screws. Tighten the screws to a torque of 0.7 to 1.2 N·m.





Section 5
I/O Settings and Control Methods

I/O Specifications

I/O Allocation Table

■ Mode: 4-byte Access

The DeviceNet Remote ID Controller is allocated 64 inputs (4 words) and 64 outputs (4 words) in the PLC. The inputs and outputs that are allocated (X words, Y words) depend on the node address set for the Master and the DeviceNet Remote ID Controller.

▪ Master Unit to Remote ID Controller

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	INHBIT/TRG	AUTO/ SYNC	OUTPUTTIM E	W PROTECT	VERIFY	HIGHSPD	ASCII/HEX	
(X+1)	CMD3	CMD2	CMD1	CMD0	LEN3	LEN2	LEN1	LEN0
(X+2)	ADDR7	ADDR6	ADDR5	ADDR4	ADDR3	ADDR2	ADDR1	ADDR0
(X+3)	ADDR15	ADDR14	ADDR13	ADDR12	ADDR11	ADDR10	ADDR9	ADDR8
(X+4)	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA
(X+5)	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA
(X+6)	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA
(X+7)	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA

▪ Remote ID Controller to Master Unit

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Y							BUSY	RUN
(Y+1)							ERROR	NORM
(Y+2)	SYS_ERR		CMD_ERR					
(Y+3)		7F_ERR	7E79_ERR	71_ERR	7D_ERR	7A_ERR	70_ERR	72_ERR
(Y+4)	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA
(Y+5)	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA
(Y+6)	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA
(Y+7)	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA

■ Signal Names and Functions

▪ Master Unit to Remote ID Controller

Category	Symbol	Meaning
Interface signal	INHIBT/TRG	Auto Mode: Functions as INHIBT. 0: No communications with ID Tag. 1: Communications with ID Tag. Sync Mode: Functions as TRIG. 1: Communications with ID Tag.
Execution command	CMD3 to CMD0	0000: DATA READ 0001: DATA WRITE 0010: BIT SET 0011: BIT CLEAR 0100: DATA FILE
Process address	ADDR0 to ADDR15	Specifies the process start address.
Process bits	LEN0 to LEN7	Specifies the number of process bits.
Write/manipulate data	W-DATA	Stores the write data when writing is executed.
Option specifications	HIGHSPD	Communications Speed 0: Standard communications 1: High-speed communications
	VERIFY	Write Verification 0: Enabled 1: Disabled
	W PROTECT	Write Protection 0: Enabled 1: Disabled
	OUTPUT TIME	Output time 0: 100 ms 1: 500 ms
	AUTO/SYNC	Host communications mode selection setting 0: Sync Mode 1: Auto Mode

▪ Remote ID Controller to Master Unit

Category	Symbol	Meaning
Interface signal	RUN	Normal operation: 1
	BUSY	Normal communications: 1
	NORM	Communications ended normally, for the set output time: 1
	ERROR	Communications ended in an error: 1
	CMD_ERR	Error in execution command specifications: 1
	SYS_ERR	System error: 1
Error details	70_ERR	Communications error
	71_ERR	Verification error
	72_ERR	Tag missing error
	7A_ERR	Address error
	7D_ERR	Write protection error
	79,7E_ERR	Tag error, lock error
	7F_ERR	Customer code error
Tag read data	R_DATA	Stores the read data when reading is executed.

■ Mode: 26-byte/58-byte Access

In 26-byte Access Mode, the DeviceNet Remote ID Controller is allocated 256 inputs (16 words) and 256 outputs (16 words) in the PLC, and in 58-byte Access Mode, it is allocated 512 inputs (32 words) and 512 outputs (32 words) in the PLC. The inputs and outputs that are allocated (X words, Y words) depend on the node address set for the Master and the DeviceNet Remote ID Controller.

▪ Master Unit to Remote ID Controller

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	INHBIT/TRG	AUTO/ SYNC	OUTPUTTIM E	W PROTECT	VERIFY	HIGHSPD	ASCII/HEX	
(X+1)	CMD3	CMD2	CMD1	CMD0	LEN3	LEN2	LEN1	LEN0
(X+2)	ADDR7	ADDR6	ADDR5	ADDR4	ADDR3	ADDR2	ADDR1	ADDR0
(X+3)	ADDR15	ADDR14	ADDR13	ADDR12	ADDR11	ADDR10	ADDR9	ADDR8
(X+4)	LEN7	LEN6	LEN5	LEN4	LEN3	LEN2	LEN1	LEN0
(X+5)								
(X+6)	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA
(X+7)	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA
···	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA
(X+1F) or (X+3F)	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA	W-DATA

▪ Remote ID Controller to Master Unit

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Y							BUSY	RUN
(Y+1)							ERROR	NORM
(Y+2)	SYS_ERR		CMD_ERR					
(Y+3)		7F_ERR	7E79_ERR	71_ERR	7D_ERR	7A_ERR	70_ERR	72_ERR
(Y+4)								
(Y+5)								
(Y+6)	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA
(Y+7)	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA
···	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA
(Y+1F) or (Y+3F)	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA	R_DATA

■ V600-compatible Mode

The DeviceNet Remote ID Controller is allocated 32 inputs (2 words) and 32 outputs (2 words) in the PLC. The inputs and outputs that are allocated (X words, Y words) depend on the node address set for the Master and the DeviceNet Remote ID Controller.

▪ Master Unit to Remote ID Controller

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	ID7	ID6	ID5	ID4	ID3	ID2	ID1	ID0
(X+1)	ID15	ID14	ID13	ID12	ID11	ID10	ID9	ID8
(X+2)	ADDR7	ADDR6	ADDR5	ADDR4	ADDR3	ADDR2	ADDR1	ADDR0
(X+3)	INHIBIT/ TRG	WRITE/ READ			WT_AREA	WT_BYTE	WT_MODE1	WT_MODE0

▪ Remote ID Controller to Master Unit

Normal Completion

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Y	OD7	OD6	OD5	OD4	OD3	OD2	OD1	OD0
(Y+1)	OD15	OD14	OD13	OD12	OD11	OD10	OD9	OD8
(Y+2)	EXTOD23	EXTOD22	EXTOD21	EXTOD20	EXTOD19	EXTOD18	EXTOD17	EXTOD16
(Y+3)	HS	NOMAL	ERROR					

Completion with Error

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Y								
(Y+1)								
(Y+2)	Hard_ERR		7E,79_ERR	7D_ERR	7A_ERR	72_ERR	71_ERR	70_ERR
(Y+3)	HS	NOMAL	ERROR					

■ Signal Names and Functions

▪ Master Unit to Remote ID Controller

Category	Symbol	Meaning
Interface signal	INHIBT/TRG	Auto Mode: Functions as INHIBT. 0: No communications with ID Tag. 1: Communications with ID Tag. Sync Mode: Functions as TRIG. 1: Communications with ID Tag.
Execution command	WRITE/READ	0: Write command 1: Read command
	WT_MODE0	0: Byte write command 1: Bit write command
	WT_MODE1	(Enabled only when WT_MODE0 is 1.) 0: Bit set command 1: Bit clear command
	WT_BYTE	0: 2-byte write 1: 1-byte write
	WT_AREA	(Enabled only when WT_BYTE is 1.) 0: Write from the address specified in ADDR. 1: Write from the address specified in ADDR + 1 address.
Process address	ADDR0 to ADDR7	Specifies the process start address.
Write/manipulate data	ID0 to 15	Stores the write data when writing is executed.

▪ Remote ID Controller to Master Unit

Category	Symbol	Meaning
Interface signal	HS	Handshake Handshakes with the TRG signal. Process start flag.
	NORM	Communications ended normally, for the set output time: 1
	ERROR	Communications ended in an error: 1
Error details	70_ERR	Communications error
	71_ERR	Verification error
	72_ERR	Tag missing error
	7A_ERR	Address error
	7D_ERR	Write protection error
	79,7E_ERR	Tag error, lock error
	7F_ERR	Customer code error
	Hard_ERR	Hardware error
Tag read data	OD0 to 15 EXTOD16 to EXTOD23	Stores the read data when reading is executed.

Detailed Command Settings

■ Using 4-byte, 26-byte, and 58-byte Access Modes

▪ DATA READ

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
CMD0 to 3	4	0000B	Data read
LEN0 to LEN7	8	01H to 3AH	Number of bytes to process (no ASCII/hex conversion)
		01H to 74H	Number of bytes to process (ASCII/hex conversion)
ADDR0 to 15	16	0000H to FFFFH	Read start address

DeviceNet Remote ID Controller to Master Unit

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	The corresponding bit is set to 1 if the command ends in an error.
ERR_SUB*	1	0 or 1	The bit corresponding to error completion will be 1, and the error details will be displayed.
ID	32	---	Read data (4-byte Access Mode)
	240	---	Read data (26-byte Access Mode)
	464	---	Read data (56-byte Access Mode)

Master Unit to DeviceNet Remote ID Controller Settings Example

Example: Reading 2 Bytes of Data from Address 0120H.

	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	*	*	0	0	0	0	0	0	0	1	0
	Change according to settings.							Fixed		DATA Read			2 bytes			
CIO +1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
	Address 120															
CIO +2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fixed															
CIO +3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fixed															

▪ DATA WRITE

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
CMD0 to CMD3	4	0001B	DATAN WRITE
LEN0 to LEN7	8	01H to 3AH	Number of bytes to process (no ASCII/hex conversion)
		01H to 74H	Number of bytes to process (ASCII/hex conversion)
ADDR0 to ADDR15	16	0000H to FFFFH	Write start address
OD	32	---	Write data (4-byte Access Mode)
	240	---	Write data (26-byte Access Mode)
	464	---	Write data (56-byte Access Mode)

DeviceNet Remote ID Controller to Master Unit

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	The corresponding bit is set to 1 if the command ends in an error.
ERR_SUB*	1	0 or 1	The bit corresponding to error completion will be 1, and the error details will be displayed.

Master Unit to DeviceNet Remote ID Controller Settings Example

Example: Writing Three Bytes “1278ABH” Starting from Address 0321H.

	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	*	*	0	0	0	0	1	0	0	1	0
	Change according to settings.							Fixed	DATA WRITE				2 bytes			
CIO +1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1
	Address 0321															
CIO +2	0	1	1	1	1	0	0	0	0	0	0	1	0	0	1	0
	78_H								12_H							
CIO +3	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	1
	Fixed								AB_H							

▪ BIT SET

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
CMD0 to CMD3	4	0010B	BIT SET
LEN0 to LEN7	8	1 to 4	Number of BIT SET data bytes An error will occur if 0, or 5 or higher is specified.
ADDR0 to ADDR15	16	0000H to FFFFH	BIT SET start address
OD	32	---	BIT SET data Valid to the number of BIT SET data bytes.

DeviceNet Remote ID Controller to Master Unit

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	Set to 1 if the command ends in an error.
XXX_ERR	10	0 or 1	The bit corresponding to error completion will be 1, and the error details will be displayed.
ID	32	---	Write data

▪ BIT CLEAR

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
CMD0 to CMD3	4	0011B	BIT Clear
LEN0 to LEN7	8	1 to 4	Number of BIT CLEAR data bytes A specification error will occur if 0H, or 5H or higher is specified.
ADDR0 to ADDR15	16	0000H to FFFFH	BIT CLEAR start address
OD	32	---	BIT clear data Valid to the number of BIT CLEAR data bytes.

DeviceNet Remote ID Controller to Master Unit

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	Set to 1 if the command ends in an error.
XXX_ERR	10	0 or 1	The bit corresponding to error completion will be 1, and the error details will be displayed.
ID	32	---	Write data

▪ DATA FILL

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
CMD0 to CMD3	4	0100B	DATA FILL
LEN0 to LEN7	4	1H to FH 4-byte mode	Number of blocks to process (specified number of blocks x 8 bytes) If the number of blocks is 0, all memory will be selected.
	8	00H to FFH For 26-byte or 58-byte Access Mode	
ADDR0 to ADDR15	16	0000H to FFFFH	DATA FILL start address
OD	32	00H to FFH	DATA FILL data Data between OD1 and OD3 is invalid.

DeviceNet Remote ID Controller to Master Unit

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	Set to 1 if the command ends in an error.
XXX_ERR	10	0 or 1	The bit corresponding to error completion will be 1, and the error details will be displayed.
ID	32	Disabled	ID Tag memory cannot be rewritten.

Master Unit to DeviceNet Remote ID Controller Settings Example

Example: Filling with FFH to 16 bytes from Address 0006H (2 Blocks × 8 Bytes/Block)

	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	*	*	0	0	1	0	0	0	0	1	0
	Change according to settings.							Fixed		DATA FILL				2 bytes		
CIO +1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
	Address 0006H															
CIO +2	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Fixed											FFH				
CIO +3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fixed											Fixed				

▪ NOISE MEASUREMENT

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
CMD0 to CMD3	4	0111B	NOISE MEASUREMENT

DeviceNet Remote ID Controller to Master Unit

Mode: 4-byte Access

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	Set to 1 if the command ends in an error.
XXX_ERR	10	0 or 1	The bit corresponding to error completion will be 1, and the error details will be displayed.
R-DATA	32	---	Result of noise measurement 05 hex: Average noise level 04 hex: Maximum noise level 07 hex: Minimum noise level 06 hex: Always 00H

Mode: 26-byte or 58-byte Access

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	Set to 1 if the command ends in an error.
XXX_ERR	10	0 or 1	The bit corresponding to error completion will be 1, and the error details will be displayed.
R-DATA	32	---	Result of noise measurement 07 hex: Average noise level 06 hex: Maximum noise level 09 hex: Minimum noise level 08 hex: Always 00H

Master Unit to DeviceNet Remote ID Controller Settings Example

	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	*	*	0	1	1	1	1	0	0	0	0
	Change according to settings.							Fixed	NOISE MEASUREMENT				Fixed			
CIO +1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fixed															
CIO +2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fixed															
CIO +3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fixed															

■ Using V600-compatible Mode

▪ BIT SET

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
WRITE/READ	1	1	Write operation
WT_MODE1	1	1	BIT WRITE
WT_MODE2	1	0	BIT SET
WT_BYTE	1	0 or 1	If the bit is 0, the operation will be 8-bit write, and 16-bit write if the bit is 1.
WT_AREA	1	0 or 1	Write Address Switching When Using 8-bit Write Operation If the bit is 0, the data for ID0 to 7 will be written to the ID Tag, and data for ID8 to 15 will be written to the ID Tag if the bit is 1.
OD	32	---	BIT SET data Valid to the number of BIT SET data bytes.

DeviceNet Remote ID Controller to Master Unit

Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	Set to 1 if the command ends in an error.
ID	24	0000····	Filled with zeroes.

▪ BIT CLEAR

Master Unit to DeviceNet Remote ID Controller

Signal	Bit length	Value	Description
WRITE/READ	1	1	Write operation
WT_MODE1	1	1	BIT WRITE
WT_MODE2	1	0	BIT CLEAR
WT_BYTE	1	0 or 1	If the bit is 0, the operation will be 8-bit write, and 16-bit write if the bit is 1.
WT_AREA	1	0 or 1	Write Address Switching When Using 8-bit Write Operation If the bit is 0, the data for ID0 to 7 will be written to the ID Tag, and data for ID8 to 15 will be written to the ID Tag if the bit is 1.
OD	32	---	BIT CLEAR data Valid to the number of BIT clear data bytes.

DeviceNet Remote ID Controller to Master Unit

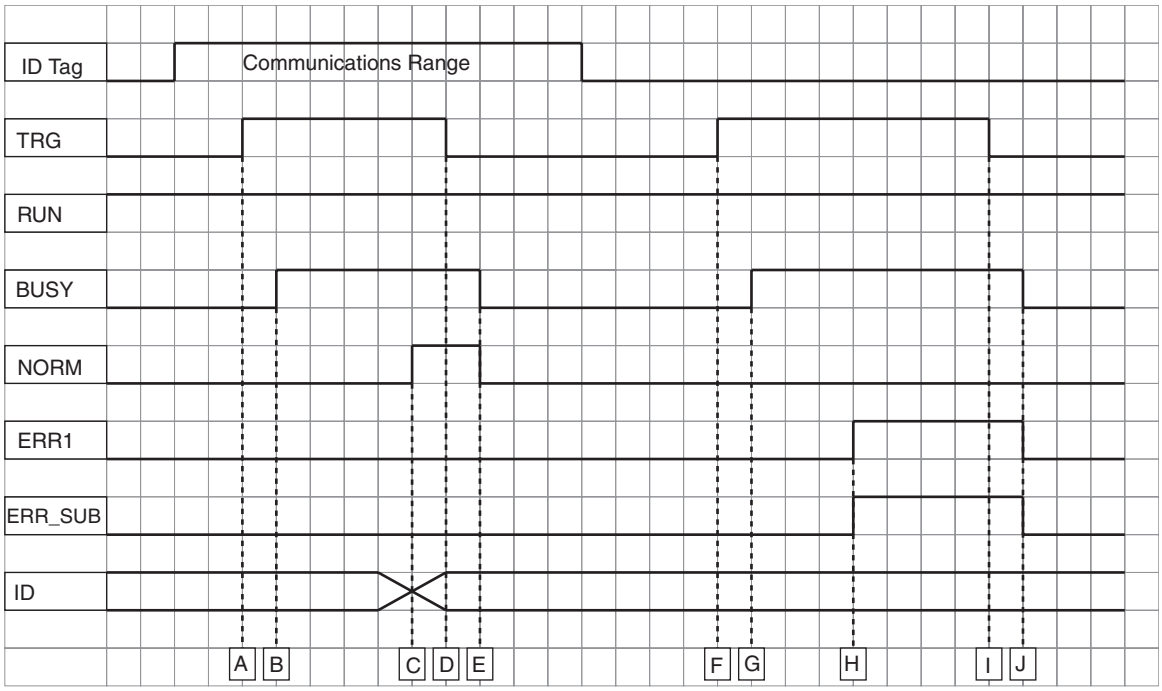
Signal	Bit length	Value	Description
NORM	1	0 or 1	Set to 1 when operation is ended normally.
ERR	1	0 or 1	Set to 1 if the command ends in an error.
ID	24	0000····	Filled with zeroes.

Timing Charts

Trigger Mode

The Trigger Mode timing chart is shown below.

■ Mode Switch Settings 0 to 2 (4-byte, 26-byte, and 58-byte Access Modes)



▪ ID Tag within the Antenna's Communications Range

A: The PLC turns ON TRG, and sends the execution command to DeviceNet Remote ID Controller.

B: The DeviceNet Remote ID Controller receives TRG, determines the CMD (command), LEN (data length), and ADDR (start address), starts communications with ID Tag, and then turns ON BUSY.

C: The DeviceNet Remote ID Controller turns ON NORM when communications with ID Tag ends normally.

D: Check from PLC that NORM Signal is ON, and then turn OFF TRG.

E: After confirming that TRG is OFF, the DeviceNet Remote ID Controller turns OFF BUSY and NORM.

▪ ID Tag Not within Communications Range

F: The PLC turns ON TRG and sends execution command to DeviceNet Remote ID Controller.

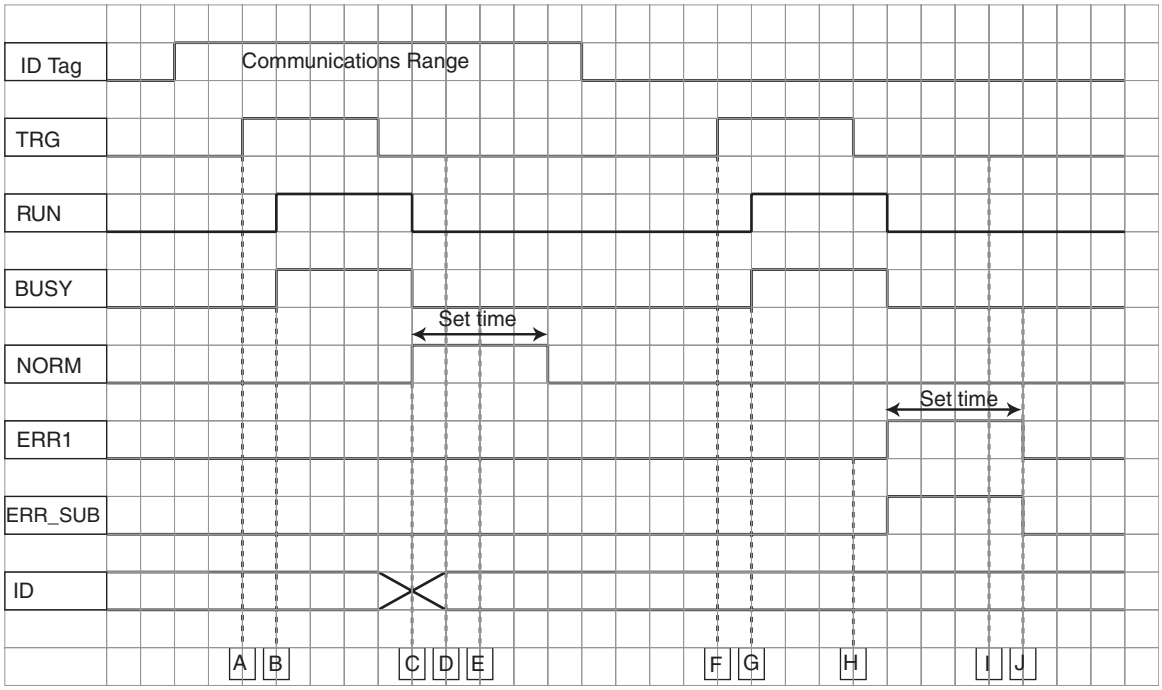
G: The DeviceNet Remote ID Controller receives TRG, starts communications with ID Tag, and then turns ON BUSY.

H: When communications with ID Tag ends in an error, DeviceNet Remote ID Controller turns ON ERR (ID Tag communications error) and ERR_SUB0 (No ID Tag).

I: Confirm that the ERR signal is 1 (ON), and then turn OFF TRG.

J: After confirming that TRG is OFF, the DeviceNet Remote ID Controller turns OFF ERR and ERR_SUB0.

■ Mode Switch Settings 3 and 4 (V600-compatible Trigger Mode)



▪ ID Tag within the Antenna's Communications Range

A: The PLC turns ON TRG, and sends the execution command to DeviceNet Remote ID Controller.

B: The DeviceNet Remote ID Controller receives TRG, determines the CMD (command), LEN (data length), and ADDR (start address), then turns ON HS output, starts communications with the ID Tag, and turns ON BUSY.

C: HS output will turn OFF when TRG turns OFF.

D: The DeviceNet Remote ID Controller turns ON NORM when communications with ID Tag ends normally.

E: The PLC checks that the NORM signal is ON, and then the data output is read.

F: Once the time set in the output mode has elapsed, the DeviceNet Remote ID Controller turns OFF the data output and NORM.

▪ ID Tag Not within Communications Range

G: The PLC turns ON TRG and sends execution command to DeviceNet Remote ID Controller.

H: The DeviceNet Remote ID Controller receives TRG, turns ON HS output, and then starts communications with the ID Tag ID and turns ON BUSY.

I: HS output will turn OFF when TRG turns OFF.

J: When communications with ID Tag ends in an error, DeviceNet Remote ID Controller turns ON ERR (ID Tag communications error) and ERR_SUB0 (No ID Tag).

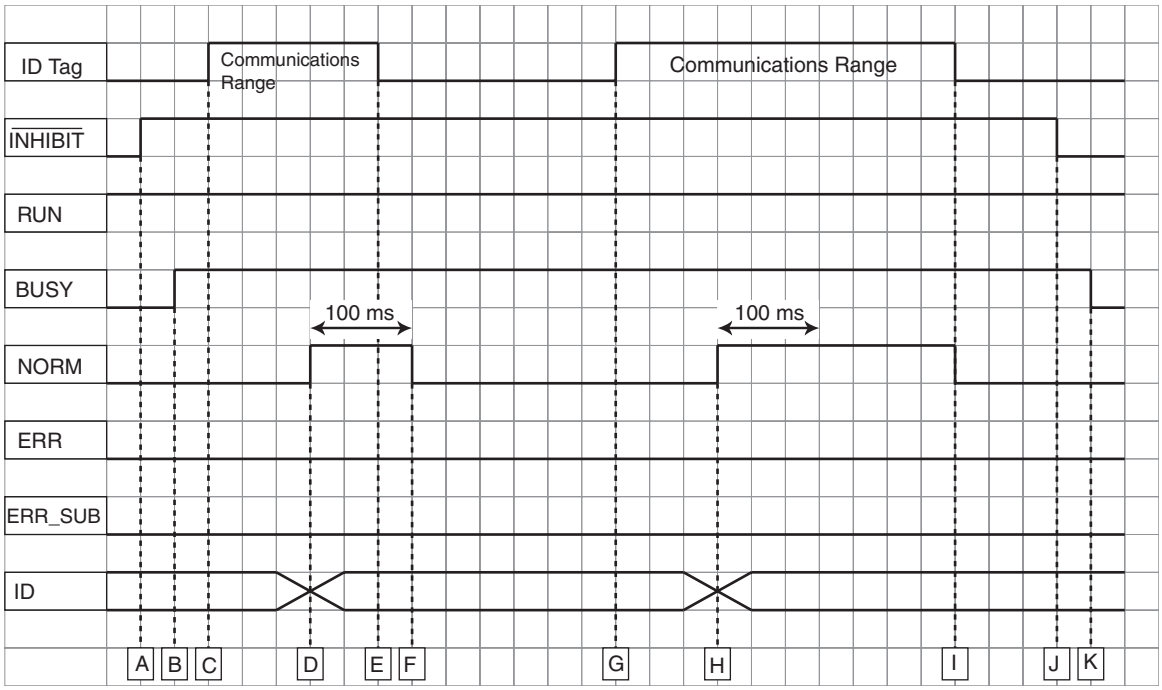
K: The PLC confirms that the ERR signal is ON, and then the data output is read.

L: Once the time set in the output mode has elapsed, the DeviceNet Remote ID Controller turns OFF ERR and ERR_SUB0.

Auto Mode with 100-ms Output Time

The timing chart for Auto Mode with a 100-ms output time is shown in the following figure.

■ Mode Switch Settings 0 to 2 (4-byte, 26-byte, and 58-byte Access Mode)



A: The PLC turns ON $\overline{\text{INHIBIT}}$ and sends the execution command to the DeviceNet Remote ID Controller.

B: The DeviceNet Remote ID Controller checks that $\overline{\text{INHIBIT}}$ is ON, determines the CMD (command), LEN (data length), and ADDR (start address), and then turns ON BUSY.

C: The DeviceNet Remote ID Controller starts communications with an ID Tag when one enters the Antenna's communications range.

D: The DeviceNet Remote ID Controller turns ON NORM when communications with ID Tag end normally.

E: The ID Tag moves outside the Antenna's communications range within 100 ms after the DeviceNet Remote result is output.

F: The result output is turned OFF 100 ms after the DeviceNet Remote ID Controller result is output.

G: The DeviceNet Remote ID Controller starts communications with ID Tag when it enters the Antenna's communications range.

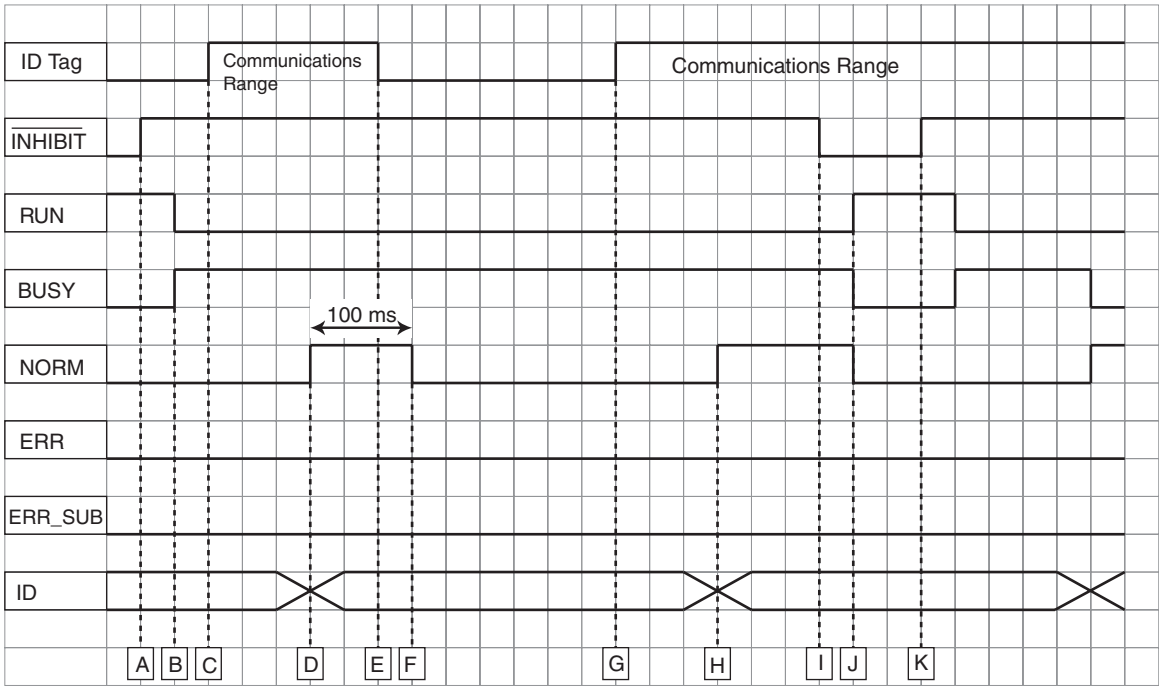
H: The DeviceNet Remote ID Controller turns ON NORM when communications with the ID Tag ends normally.

I: Result output is turned OFF when the ID Tag moves outside the Antenna's communications range 100 ms after the DeviceNet Remote ID Controller result is output.

J: The PLC turns OFF $\overline{\text{INHIBIT}}$ to prevent command execution by the DeviceNet Remote ID Controller.

K: The DeviceNet Remote ID Controller confirms that $\overline{\text{INHIBIT}}$ is OFF, and then turns OFF BUSY.

■ Mode Switch Setting 5 (V600-compatible Auto Mode)



A: The PLC turns ON $\overline{\text{INHIBIT}}$ and sends the execution command to the DeviceNet Remote ID Controller.

B: The DeviceNet Remote ID Controller checks that $\overline{\text{INHIBIT}}$ is ON, determines the CMD (command), LEN (data length), and ADDR (start address), and then turns ON BUSY.

C: The DeviceNet Remote ID Controller starts communications with an ID Tag when one enters the Antenna's communications range.

D: The DeviceNet Remote ID Controller turns ON NORM when communications with ID Tag end normally.

E: The ID Tag moves outside the Antenna's communications range within 100 ms after the DeviceNet Remote result is output.

F: The result output is turned OFF 100 ms after the DeviceNet Remote ID Controller result is output.

G: The DeviceNet Remote ID Controller starts communications with ID Tag when it enters the Antenna's communications range.

H: The DeviceNet Remote ID Controller turns ON NORM when communications with the ID Tag ends normally.

I: The PLC turns OFF $\overline{\text{INHIBIT}}$ when processing continues with the ID Tag in the Antenna's communications range.

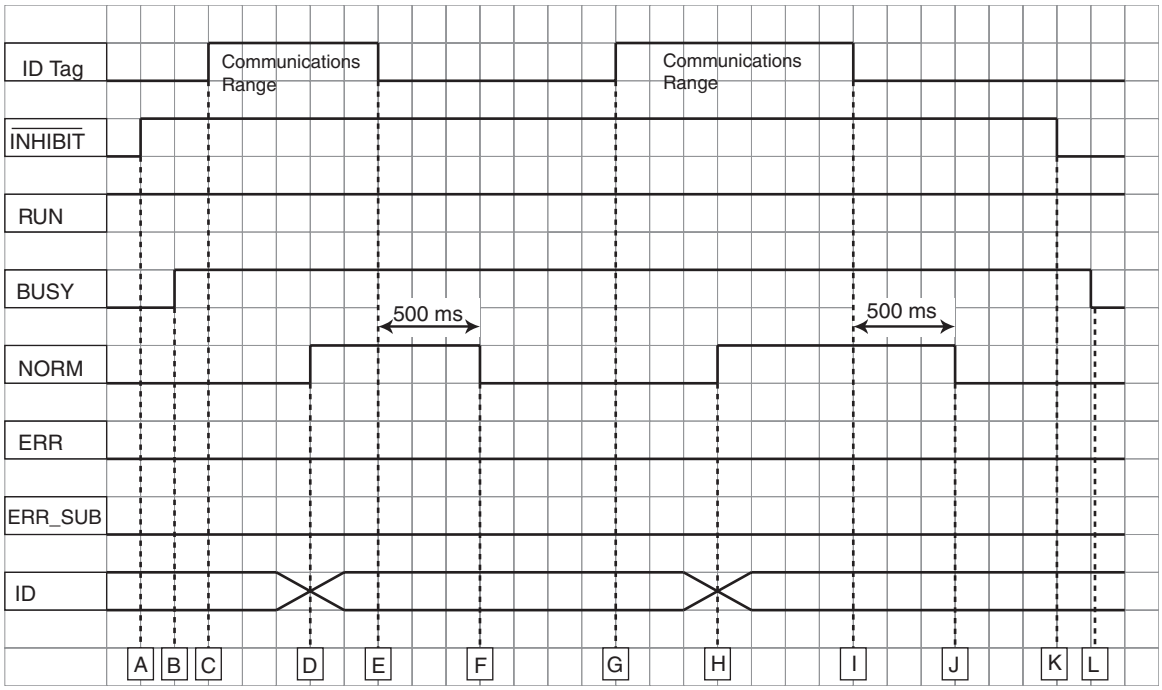
J: The DeviceNet Remote ID Controller confirms that $\overline{\text{INHIBIT}}$ is OFF, and then turns ON HS output and turns OFF the result output.

K: The PLC turns ON $\overline{\text{INHIBIT}}$, detects an ID Tag again, and starts communications.

Auto Mode (500 ms Output Time)

The timing chart for Auto Mode with a 500-ms output time is shown in the following figure.

■ Mode Switch Settings 0 to 2 (4-byte, 26-byte, and 58-byte Access Mode)



A: The PLC turns ON $\overline{\text{INHIBIT}}$, and sends the execution command to the DeviceNet Remote ID Controller.

B: The DeviceNet Remote ID Controller checks that $\overline{\text{INHIBIT}}$ is ON, determines the CMD (command), LEN (data length), and ADDR (start address), and then turns ON BUSY.

C: The DeviceNet Remote ID Controller starts communications with an ID Tag when one enters the Antenna's communications range.

D: The DeviceNet Remote ID Controller turns ON NORM when communications with the ID Tag ends normally.

E: The ID Tag moves out of the Antenna's communications range.

F: The DeviceNet Remote ID Controller waits for the ID Tag to leave the Antenna's communications range, and then turns OFF the result output 500 ms afterward.

G: The DeviceNet Remote ID Controller starts communications with the ID Tag when one enters the Antenna's communications range.

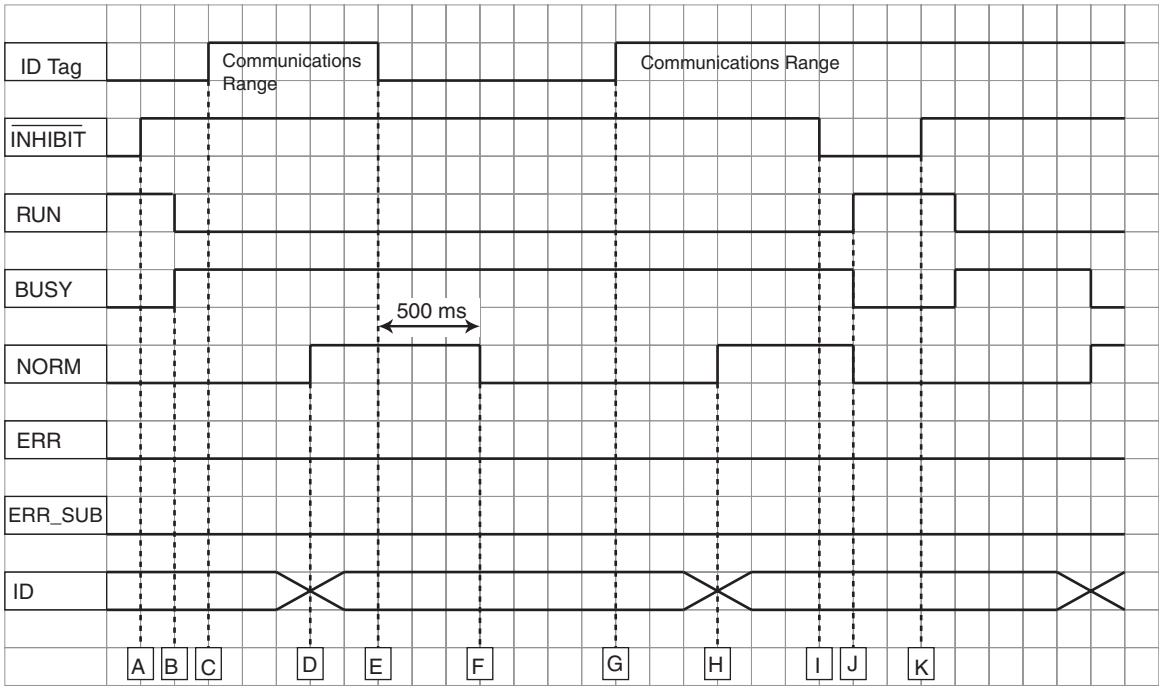
H: The DeviceNet Remote ID Controller turns ON NORM when communications with the ID Tag ends normally.

I: The DeviceNet Remote ID Controller waits for the ID Tag to move outside the Antenna's communications range, and then turns ON the result output 500 ms afterward.

J: The PLC sets $\overline{\text{INHIBIT}}$ to 0 (OFF) to prevent command execution by the DeviceNet Remote ID Controller.

K: The DeviceNet Remote ID Controller confirms that $\overline{\text{INHIBIT}}$ is OFF, and then turns OFF BUSY.

■ Mode Switch Setting 6 (V600-compatible Auto Mode)



A: The PLC turns ON $\overline{\text{INHIBIT}}$, and sends the execution command to the DeviceNet Remote ID Controller.

B: The DeviceNet Remote ID Controller checks that $\overline{\text{INHIBIT}}$ is ON, determines the CMD (command), LEN (data length), and ADDR (start address), and then turns ON BUSY.

C: The DeviceNet Remote ID Controller starts communications with an ID Tag when one enters the Antenna's communications range.

D: The DeviceNet Remote ID Controller turns ON NORM when communications with the ID Tag is finished.

E: The ID Tag moves outside the Antenna's communications range within 500 ms after the DeviceNet Remote result is output.

F: The result output is turned OFF 500 ms after the DeviceNet Remote ID Controller result is output.

G: The DeviceNet Remote ID Controller starts communications with the ID Tag when one enters the Antenna's communications range.

H: The DeviceNet Remote ID Controller turns ON NORM when communications with the ID Tag is finished.

I: The PLC turns OFF $\overline{\text{INHIBIT}}$ when processing continues with the ID Tag in the Antenna's communications range.

J: The DeviceNet Remote ID Controller confirms that $\overline{\text{INHIBIT}}$ is OFF, and then turns ON HS output and turns OFF the result output.

K: The PLC turns ON $\overline{\text{INHIBIT}}$, detects the ID Tag again, and starts communications.

Noise Check Control

■ Handling Errors

Check the status of the DeviceNet Remote ID Controller network and hardware by using the MS and NS operation indicators.

■ MS Indicator (Machine Status)

		Error	Corrective action
	Lit red	Hardware error	If the error continues after resetting the power, replace the DeviceNet Remote ID Controller.
	Flashing red	Settings error	Set the node address switches within the correct range.

■ NS Indicator (Network Status)

		Error	Corrective action
	Lit red	Duplicate node address	Assign unique node addresses to all nodes within the same network.
	Flashing red	Leaving link	Check whether the communications cable is connected correctly. If noise enters on the communications cable, the node made leave the link. Take suitable noise countermeasures.

■ RFID-related Errors

When the ERR indicator lights, check the LED indicators from bit 7 to bit 0 or the error output for errors relating to RFID, and then take suitable actions

Indicator	Output bits	Error	Corrective action
Bit 0 Flashing red	Error Termination + ID Tag Missing Error	An ID Tag could not be detected in Trigger Mode.	Change the control timing so that communications can be started while the ID Tag is within the Antenna's communications range. Measure the noise and take suitable noise countermeasures. Check the effect of surrounding metal and make sure that the desired communications distance can be obtained.
Bit 1 Flashing red	Error Termination + ID Tag Missing Error	ID Tag was detected in Trigger Mode but communications could not be ended normally.	Change the control timing so that communications can be started while the ID Tag is within the Antenna's communications range. Measure the noise and take suitable noise countermeasures. Check the effect of surrounding metal and make sure that the desired communications distance can be obtained.
Bit 2 Flashing red	Error Termination + Address Error	The command specified a memory area outside the ID Tag memory range.	Set the command memory area within the ID Tag memory range.
Bit 3 Flashing red	Error Termination + Protection Error	The command specified data to be written to the write-protected area of ID Tag.	Set the command memory area to outside the write-protected area.
Bit 4 Flashing red	Error Termination + Mismatch Error	Data was not correctly written to ID Tag.	Retry the writing process. If the error persists, replace the ID Tag.
Bit 5 Flashing red	Error Termination + ID System Error 1	ID Tag used is not supported by the DeviceNet Remote ID Controller.	Change the ID Tag to one supported by the DeviceNet Remote ID Controller.
Bit 6 Flashing red	Error Termination + ID System Error 2		
Bit 0 and bit 4 Flashing red	Error Termination + Command Error	There is an error with the execution command, or the command cannot not be received.	Check the command, address, and number of bytes to process.

Indicator	Output bits	Error	Corrective action
Bit 7 to bit 0 Flashing red	Error Termination + Switch Error	Mode switch setting error	Set the mode switch correctly.
Bit 7 to bit 0 Lit red	Error Termination + System Error	The DeviceNet Remote ID Controller cannot operate.	If the error continues after resetting the power, replace the DeviceNet Remote ID Controller.

Section 6
Appendices

Product Specifications

DeviceNet Remote ID Controller

■ General Specifications

V680-HAM42-DRT

Item / Model	V680-HAM91/V680-HAM81
Supply volTage	24 VDC +10%/-15%, Ripple (p-p): 10% max.
Power consumption	3.6 W (5 W max.)
Ambient operating temperature	−10 to 55°C (with no icing)
Ambient storage temperature	−20 to 65°C (with no icing)
Ambient operating humidity	25% to 85% (with no condensation)
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and case
Dielectric strength	1000 VAC (50/60 Hz) for 1 minute between cable terminals and case
Vibration resistance	10 to 150 Hz, 0.2-mm double amplitude at 15 m/s^2 in X, Y, and Z directions ten sweeps each for 8 minutes
Shock resistance	150 m/s^2 in X, Y, and Z directions 3 times each (18 times in total)
Dimensions	90 × 30 × 65 mm (excluding protruding parts)
Degree of protection	Panel-mounting (conforms to IP20)
Material	PC+ABS
Weight	Approx. 130 g
Mounting method	DIN Track

Antenna

Four models of Antennas can be used with I/O Sensors. Select the best Antenna for the application.

■ General Specifications

V680-HS51

Item / Model	V680-HS51
Ambient operating temperature	−10 to 60°C (with no icing)
Ambient storage temperature	−25 to 75°C (with no icing)
Ambient operating humidity	35% to 95% (with no condensation)
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and case
Dielectric strength	1,000 VAC, 50/60Hz for 1 min between cable terminals and case
Degree of protection	IP67 (IEC60529) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g) (Read/Write Antenna portion) Note: The Connector is not waterproof.
Vibration resistance	10 to 2,000 Hz variable vibration, 1.5-mm double amplitude at 150 m/s² acceleration, with 10 sweeps in X, Y, and Z directions for 15 minutes each
Shock resistance	1,000 m/s² in X, Y, and Z directions 3 times each (18 times in total)
Dimensions	M12 × 35 mm
Material	ABS, brass, epoxy resin filling
Weight	Approx. 55 g
Cable length	Standard length of 2 m

V680-HS52-W/-R

Item / Model	V680-HS52-W (Standard cable, waterproof connector)	V680-HS52-R (Flexible cable, non-waterproof connector)
Ambient operating temperature	−10 to 60°C (with no icing)	
Ambient storage temperature	−25 to 75°C (with no icing)	
Ambient operating humidity	35% to 95% (with no condensation)	
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and the case	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between cable terminals and case	
Degree of protection	IP67 (IEC60529) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g) Note: The connector specifications are IP67 and IP65 (IEC60529).	IP67 (IEC60529) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g) Note: The connectors are not waterproof.
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 1 sweep in each of 3 axis directions (up/down, left/right, and forward/backward) for 8 minutes each	
Shock resistance	500 m/s², 3 times each in 6 directions (Total: 18 times)	
Dimensions	M22 × 65 mm	
Material	ABS resin, brass, and epoxy resin filler	
Weight	Approx. 850 g (with 12.5 m cable)	
Cable length	Standard lengths of 2 and 12.5 m	

V680-HS63-W/-R

Item Model	V680-HS63-W (Standard cable, waterproof connector)	V680-HS63-R (Flexible cable, non-waterproof connector)
Ambient operating temperature	−10 to 60°C (with no icing)	
Ambient storage temperature	−25 to 75°C (with no icing)	
Ambient operating humidity	35% to 95% (with no condensation)	
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and case	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between cable terminals and case	
Degree of protection	IP67 (IEC60529) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g) Note: The connector specifications are IP67 and IP65 (IEC 60529).	IP67 (IEC60529) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g) Note: The connectors are not waterproof.
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 10 sweeps in each of 3 axis directions up/down, left/right, and forward/backward) for 11 minutes each	
Shock resistance	500 m/s², 3 times each in 6 directions (Total: 18 times)	
Dimensions	40 × 53 × 23 mm	
Material	ABS resin case, epoxy resin filler	
Weight	Approx. 850 g (with 12.5 m cable)	
Cable length	Standard lengths of 2 and 12.5 m	

V680-HS65-W/-R

Item Model	V680-HS65-W (Standard cable, waterproof connector)	V680-HS65-R (Flexible cable, non-waterproof connector)
Ambient operating temperature	−25 to 70°C (with no icing)	
Ambient storage temperature	−40 to 85°C (with no icing)	
Ambient operating humidity	35% to 95% (with no condensation)	
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and case	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between connector terminals and case	
Degree of protection	IP67 (IEC60529) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g) Note: The connector specifications are IP67 and IP65 (IEC 60529).	IP67 (IEC60529) In-house standard for Antenna oil resistance former JEM standard equivalent to IP67g) Note: The connectors are not waterproof.
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 10 sweeps in each of 3 axis directions up/down, left/right, and forward/backward) for 11 minutes each	
Shock resistance	500 m/s², 3 times each in 6 directions (Total: 18 times)	
Dimensions	100 × 100 × 30 mm	
Material	ABS resin case, epoxy resin filler	
Weight	Approx. 1,100 g (with 12.5 m cable)	
Cable length	Standard lengths of 2 and 12.5 m	

ID Tags

■ General Specifications

V680-D1KP52MT

Item / Model	V680-D1KP52MT
Memory capacity	1,000 bytes (user area)
Memory type	EEPROM
Data backup time	10 years after writing (85°C or less), 0.5 years after writing (125°C max.)
Memory longevity	100,000 times per block (25°C)
Ambient operating temperature when communicating	−25 to 85°C (with no icing)
Ambient operating temperature when not communicating	−40 to 125°C (with no icing)
Ambient storage temperature	−40 to 125°C (with no icing)
Ambient operating humidity	35% to 95%
Degree of protection	IP68 (IEC 60529) (See note.) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g)
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s^2, 10 sweeps each in X, Y, and Z directions for 15 minutes each
Shock resistance	500 m/s^2, 3 times each in X, Y, and Z directions (Total: 18 times)
Dimensions	8 dia. × 5 mm
Materials	Case: PPS resin, Fill resin: Epoxy resin
Weight	Approx. 0.5 g
Metal countermeasures	Yes

Note: OMRON Test Method

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

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

V680-D1KP66T/-D1KP66MT

Item / Model	V680-D1KP66T	V680-D1KP66MT
Memory capacity	1,000 bytes (user area)	
Memory type	EEPROM	
Data backup time	10 years after writing (85°C or less), 2.5 years after writing (125°C max.)	
Memory longevity	100,000 times per block (25°C)	
Ambient operating temperature when communicating	–25 to 85°C (with no icing)	
Ambient operating temperature when not communicating	–40 to 125°C (with no icing)	
Ambient storage temperature	–40 to 125°C (with no icing)	
Ambient operating humidity	35% to 95%	
Degree of protection	IP68 (IEC 60529) (See note.) In-house standard for Antenna oil resistance (former JEM standard equivalent to IP67g)	
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s², 10 sweeps each in X, Y, and Z directions for 15 minutes each	
Shock resistance	500 m/s², 3 times each in X, Y, and Z directions (Total: 18 times)	
Dimensions	34 × 34 × 3.5 mm	
Materials	Case: PPS resin	
Weight	Approx. 6 g	Approx. 7.5 g
Metal countermeasures	None	Yes

Note: OMRON Test Method

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

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

The V680-D1KP66MT is designed to be mounted directly to metal. The V680-D1KP66T and V680-D1KP66MT markings are shown in the following diagrams.

● V680-D1KP66MT

● V680-D1KP66T

CHECK! The side with the markings is the communications surface. Mount the Tag with this side facing the Antenna.

CHECK! The ID READ command is used to write the ID code to the ID Tag's memory, and therefore will be affected by the ambient temperature. Be careful when using the ID Tag in environments with high ambient temperatures.

V680-D1KP66T-SP

Item	Specifications
Memory capacity	1,000 bytes
Memory type	EEPROM
Data backup time	10 years after writing (85°C or less)
Memory longevity	100,000 times per block (25°C)
Ambient operating temperature	When communicating: –25 to 70°C (with no icing) When not communicating: –40 to 110°C (with no icing)
Ambient operating humidity	35% to 95% (with no condensation)
Ambient storage temperature	–40 to 110°C (with no icing)
Ambient storage humidity	35% to 95% (with no condensation)
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude at 150 m/s² in X, Y, and Z directions 10 sweeps each for 15 minutes
Shock resistance	5500 m/s², 3 times each in 6 directions (Total: 18 times)
Dimensions	95 × 36.5 × 6.5 mm (excluding protruding parts)
Degree of protection	IP67
Material	External coating: Fluororesin (PFA) Tag body: PPS resin
Weight	Approx. 20 g
Mounting method	Two M5 screws
Metal countermeasures	None

V680-D2KF52M

Item Model	V680-D2KF52M
Memory capacity	2,000 bytes (user area)
Memory type	FRAM
Data backup time	10 years after writing (55°C or less), 2.9 years after writing (85°C max.)
Memory longevity	10 billion times per block. Access frequency (See note): 10 billion times
Ambient operating temperature	–25 to 85°C (with no icing)
Ambient storage temperature	–40 to 85°C (with no icing)
Ambient operating humidity	35% to 85%
Degree of protection	IP67 (IEC 60529) In-house standard for oil resistance (former JEM standard equivalent to IP67g)
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s², 10 sweeps each in X, Y, and Z directions for 15 minutes each
Shock resistance	500 m/s², 3 times each in X, Y, and Z directions (Total: 18 times)
Dimensions	8 dia. × 5 mm
Materials	Case: PPS resin, Fill resin: Epoxy resin
Weight	Approx. 0.5 g
Metal countermeasures	Yes

Note: The total communications frequency of the Read or Write is called an access frequency.

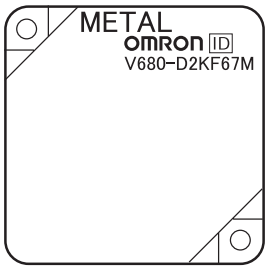
V680-D2KF67/-D2KF67M

Item / Model	V680-D2KF67	V680-D2KF67M
Memory capacity	2,000 bytes (user area)	
Memory type	FRAM	
Data backup time	10 years after writing (55°C or less), 2.9 years after writing (85°C max.)	
Memory longevity	10 billion times per block. Access frequency (See note.): 10 billion times	
Ambient operating temperature	–25 to 85°C (with no icing)	
Ambient storage temperature	–40 to 85°C (with no icing)	
Ambient operating humidity	35% to 85%	
Degree of protection	P67 (IEC 60529) In-house standard for oil resistance (former JEM standard equivalent to IP67g)	
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s^2,10 sweeps each in X, Y, and Z directions for 15 minutes each	
Shock resistance	500 m/s^2, 3 times each in X, Y, and Z directions (Total: 18 times)	
Dimensions	40 × 40 × 4.5 mm	
Materials	Case: ABS resin	
Weight	Approx. 6.5 g	Approx. 7 g
Metal countermeasures	None	Yes

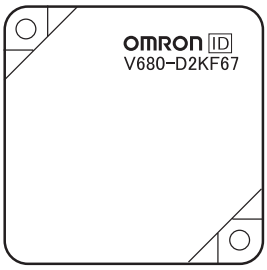
Note: The total communications frequency of the Read or Write is called an access frequency.

The V680-D2KF67M is designed to be mounted directly to metal. The V680-D2KF67 and V680-D2KF67M markings are shown in the following diagrams.

- V680-D2KF67M



- V680-D2KF67



CHECK! The side with the markings is the communications surface. Mount the Tag with this side facing the Antenna.

CHECK! The ID READ command is used to write the ID code to the ID Tag's memory, and therefore will be affected by the ambient temperature. Be careful when using the ID Tag in environments with high ambient temperatures.

V680-D8KF68/-D32KF68

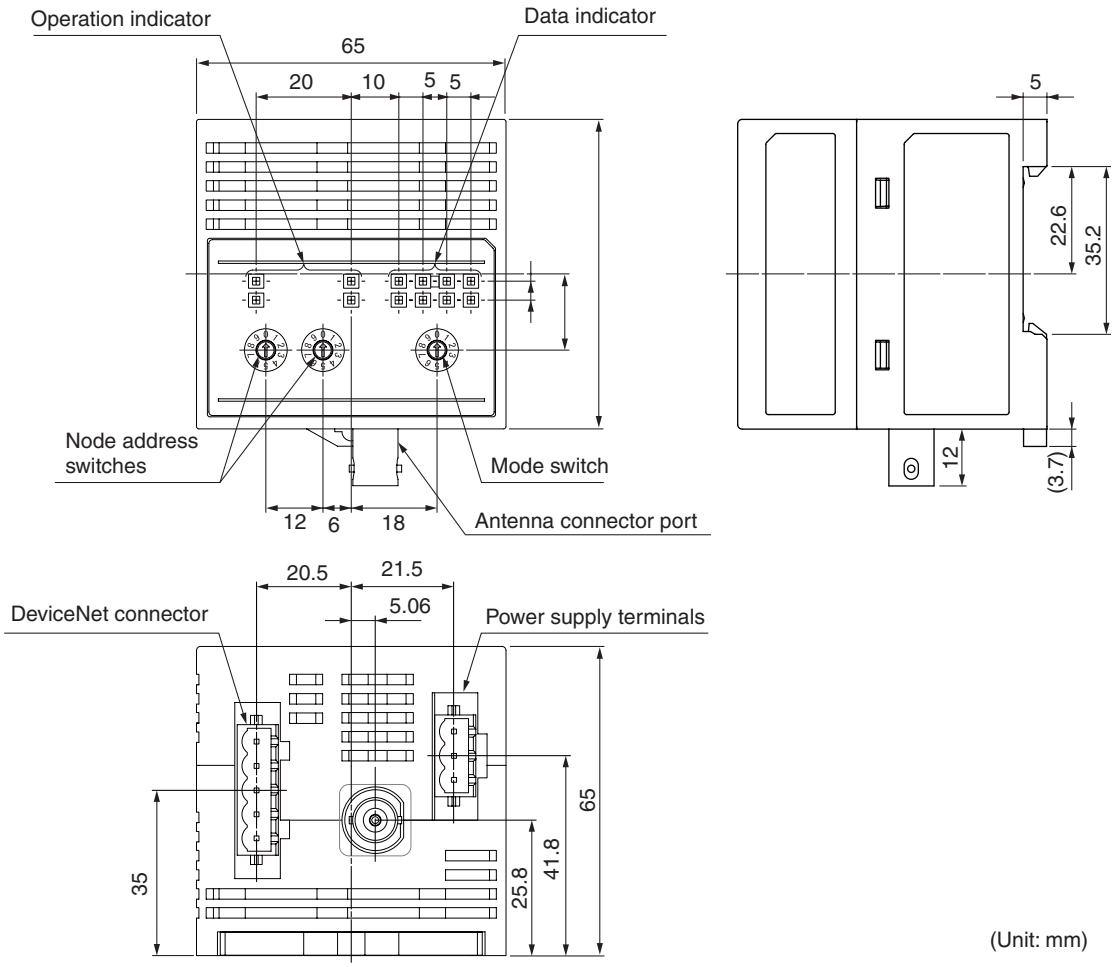
Item / Model	V680-D8KF68	V680-D32KF68
Memory capacity	8,192 bytes (user area)	32,744 bytes (user area)
Memory type	FRAM	
Data backup time	10 years after writing (70°C max.), 6 years after writing (85°C max.)	
Memory longevity	10 billion times per block (85°C or less) Access frequency (See note.): 10 billion times	
Ambient operating temperature	–20 to 85°C (with no icing)	
Ambient storage temperature	–40 to 85°C (with no icing)	
Ambient operating humidity	35% to 85%	
Degree of protection	P67 (IEC 60529) In-house standard for oil resistance (former JEM standard equivalent to IP67g)	
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 10 sweeps each in X, Y, and Z directions for 11 minutes each	
Shock resistance	500 m/s², 3 times each in X, Y, and Z directions (Total: 18 times)	
Dimensions	86 × 54 × 10 mm	
Materials	Case: PBT resin Fill resin: Epoxy resin	
Weight	Approx. 50 g	
Metal countermeasures	None	

Note: The total communications frequency of the Read or Write is called an access frequency.

Dimensions

DeviceNet Remote ID Controller

■ V680-HAM42-DRT

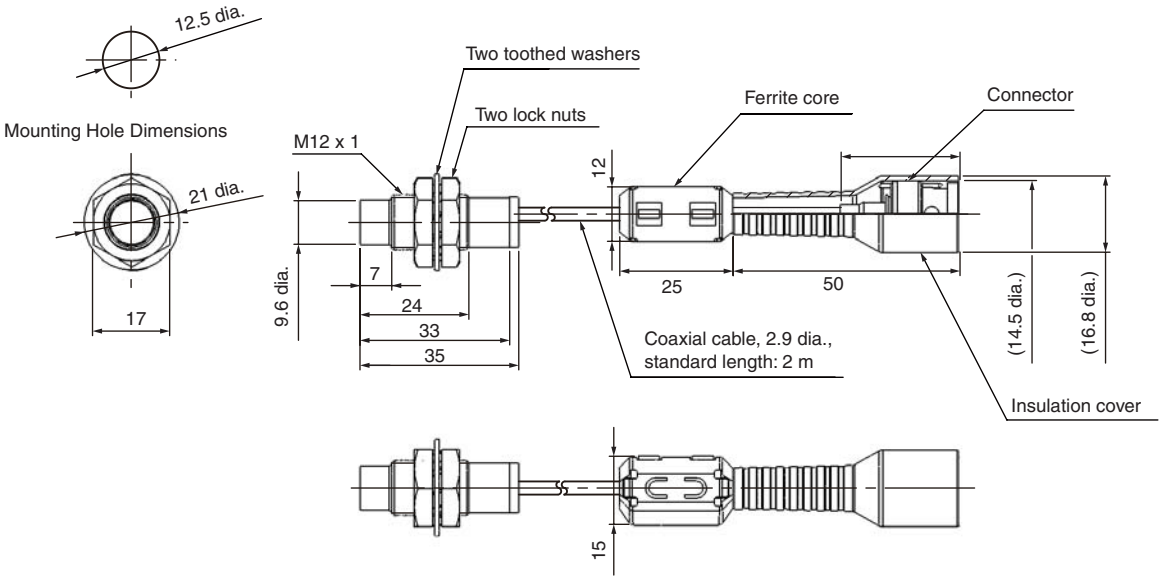


(Unit: mm)

Antennas

■ V680-HS51

(Unit: mm)

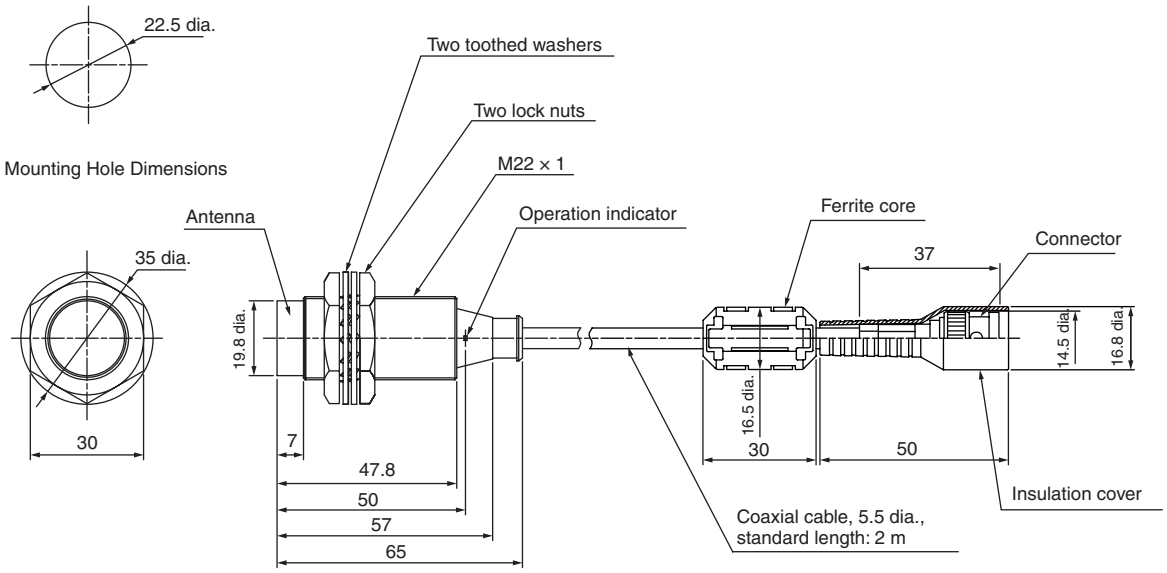


Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (gray)

■ V680-HS52

▪ V680-HS52-W

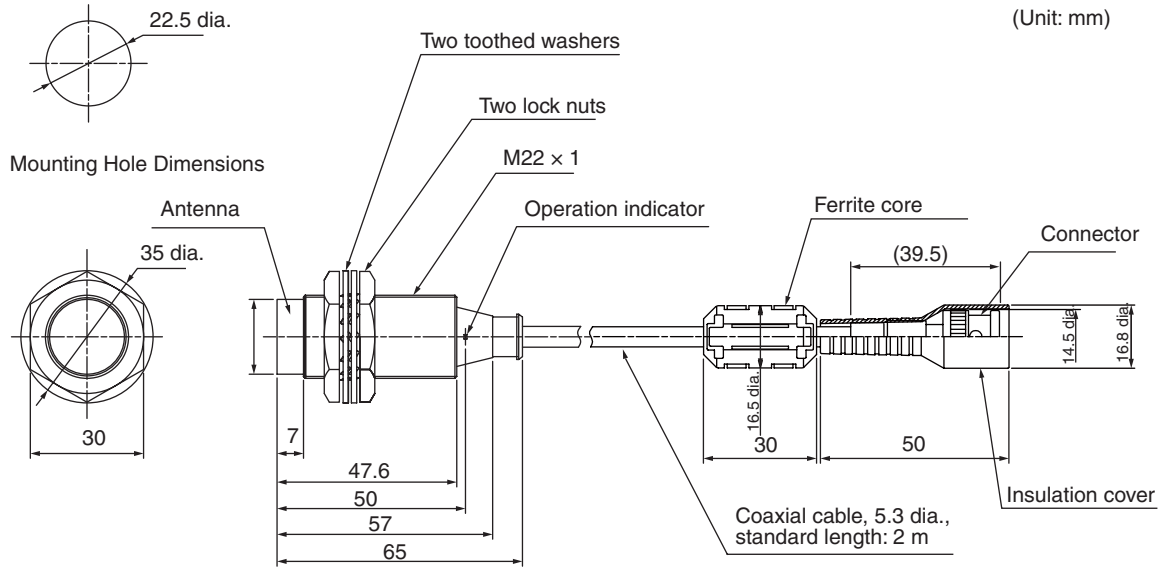
(Unit: mm)



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

▪ V680-HS52-R

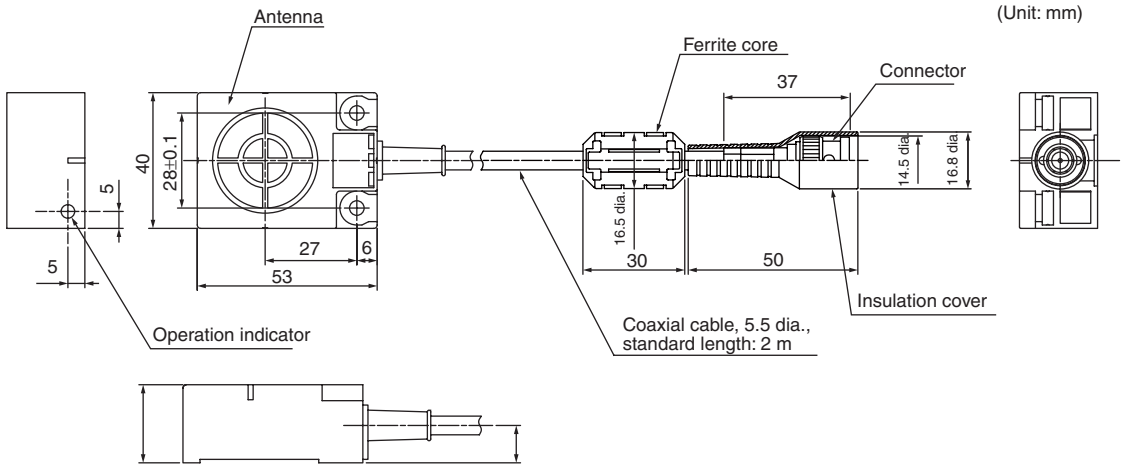
(Unit: mm)



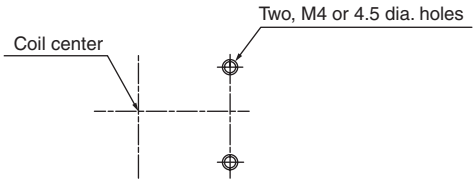
Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (black)

■ V680-HS63-R/-W

▪ V680-HS63-W

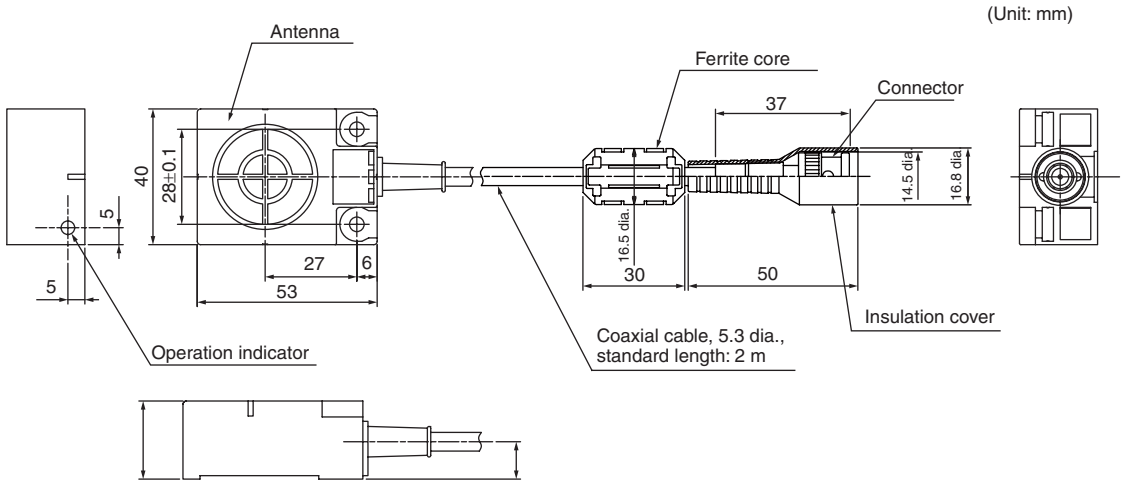


Note: Mounting Hole Dimensions

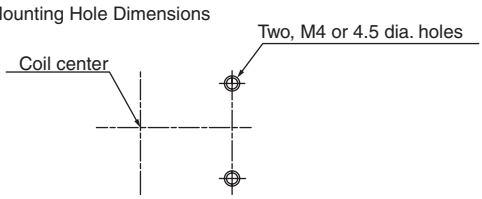


Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (gray)

▪ V680-HS63-R



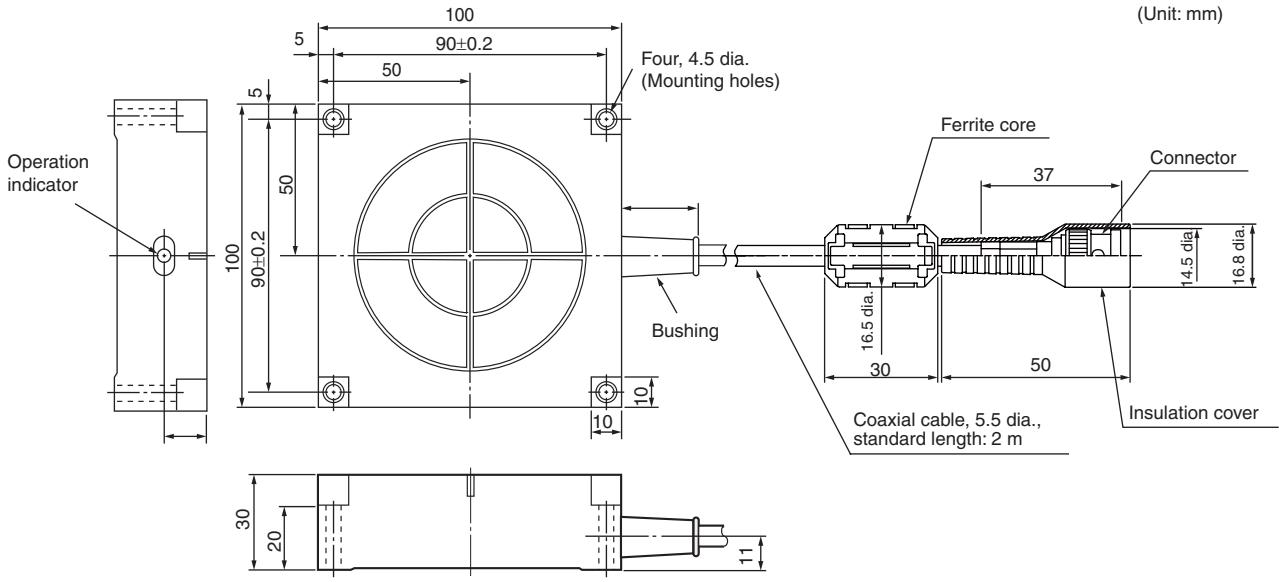
Note: Mounting Hole Dimensions



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (black)

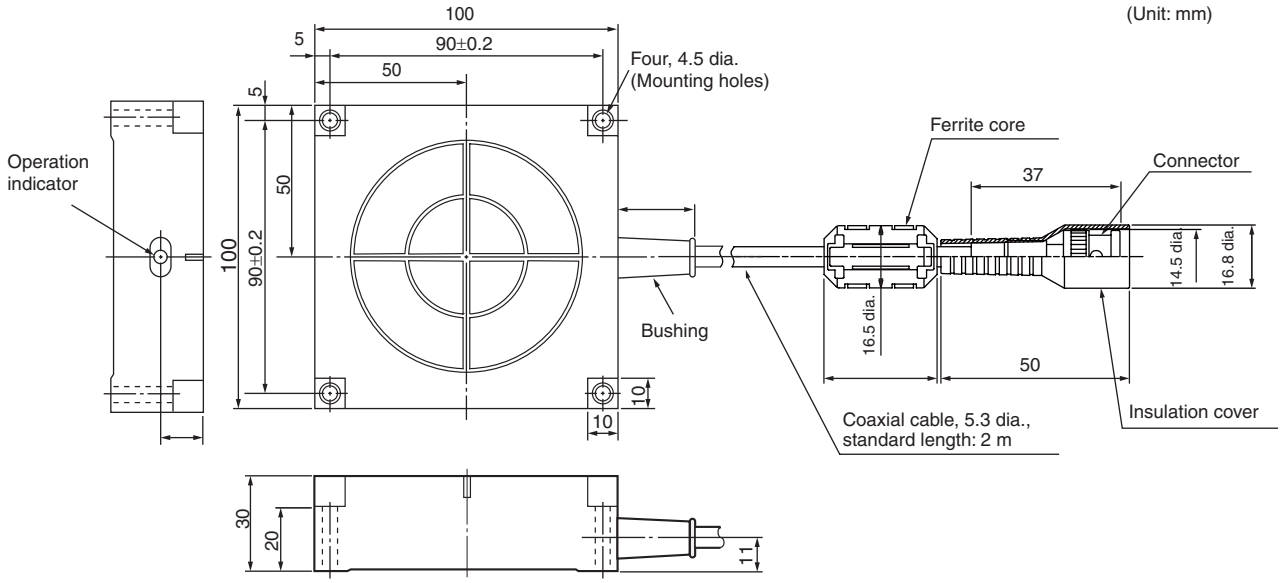
■ V680-HS65-R/-W

▪ V680-HS65-W



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (gray)

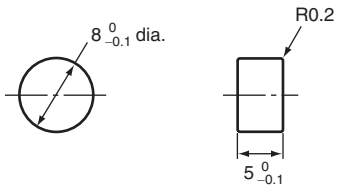
▪ V680-HS65-R



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (black)

ID Tags

■ V680-D1KP52MT



(Unit: mm)

Case material	ABS resin
Fill resin	Epoxy resin

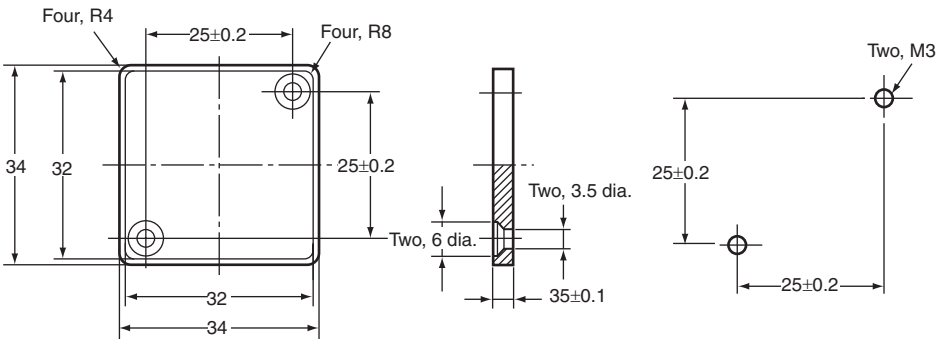
CHECK! When embedding the V680-D1KP52MT into a metal surface, use the V680-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

CHECK! The side with the markings is the communications surface. Mount the Tag with this side facing the Antenna.

CHECK! The ID READ command is used to write the ID code to the ID Tag's memory, and therefore will be affected by the ambient temperature. Be careful when using the ID Tag in environments with high ambient temperatures.

■ V680-D1KP66T/-D1KP66MT

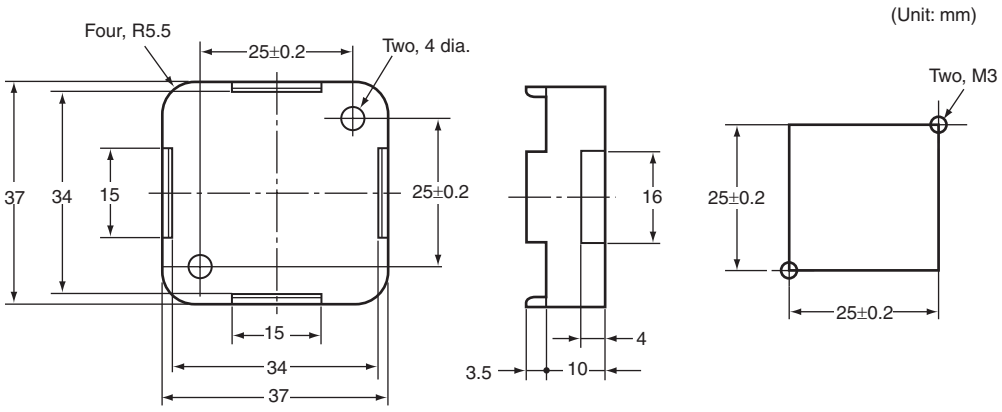
(Unit: mm)



Case material	PPS resin

▪ V600-A86 Attachment

(Unit: mm)



Case material	PPS resin

▪ Tag Heat Resistivity

- Storing Tags under high temperatures will adversely affect the performance of the internal parts and the service life of the Tags.
- An LTPD of 10% was determined during the evaluation for Tags that reached the end of their life after testing under the following test conditions.

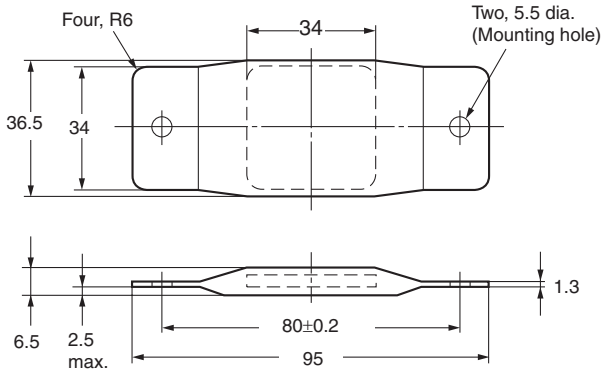
Heat cycle	−10°C/+150°C, 30 minutes each for 1,000 cycles
	−10°C/+180°C, 30 minutes each for 200 cycles
High temperatures	+150°C 1,000 hours
	+180°C, 2,000 hours

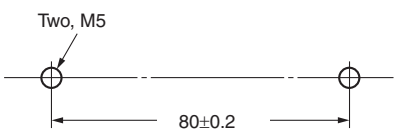
CHECK!

LTPD: Lot tolerance percent defective
The lower limit of the malfunction rate for lots to be considered unacceptable during reliability testing.

■ V680-D1KP66T-SP

(Unit: mm)

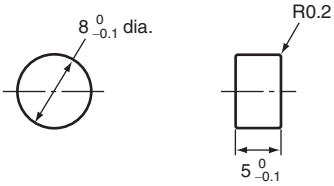




Case material	PFA resin

■ V680-D2KF52M

(Unit: mm)



Case material	PPS resin
Fill resin	Epoxy resin

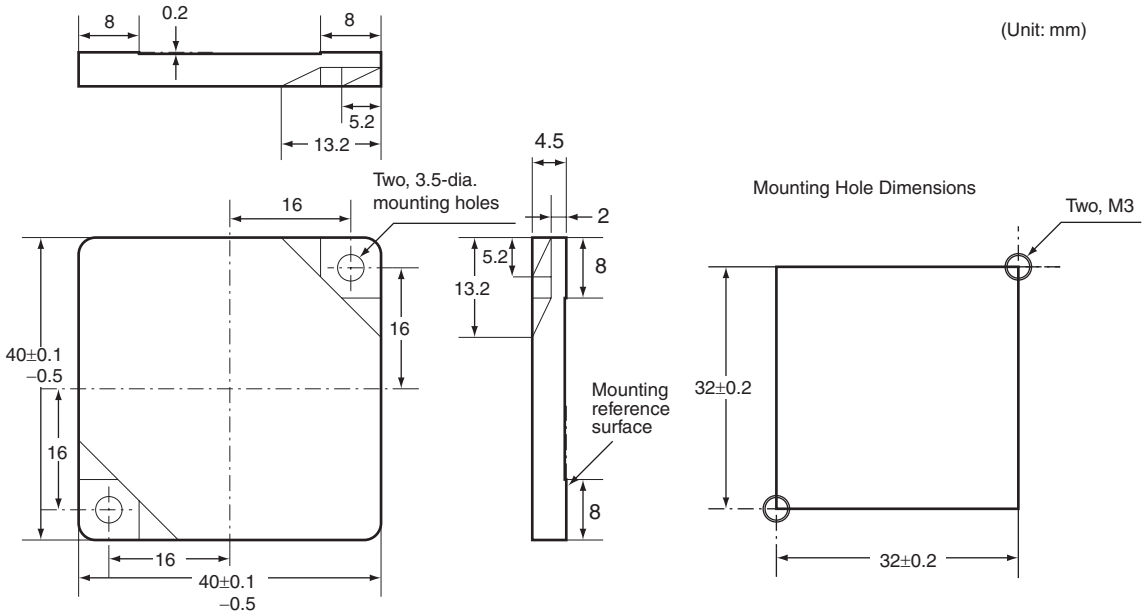
When embedding the V680-D1KP52M into a metal surface, use the V680-HS51/-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

The side with the markings is the communications surface. Mount the Tag with this side facing the Antenna.

The ID READ command is used to write the ID code to the ID Tag's memory, and therefore will be affected by the ambient temperature. Be careful when using the ID Tag in environments with high ambient temperatures.

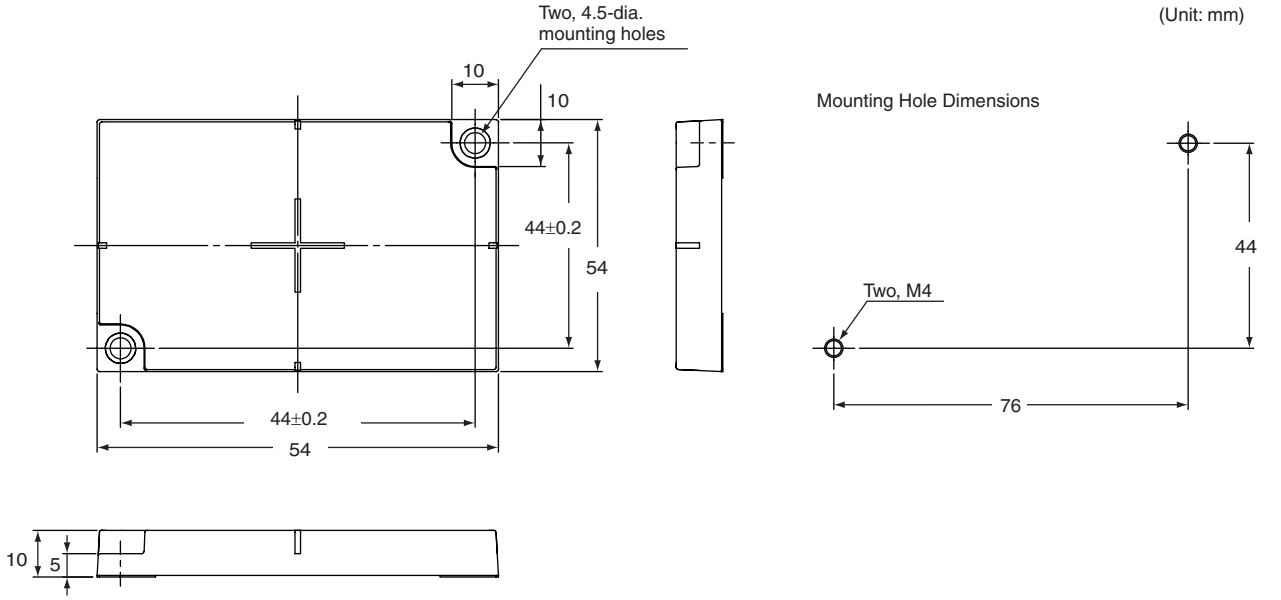
■ V680-D2KF67/-D2KF67M

(Unit: mm)



Case material	ABS resin
Fill resin	Epoxy resin

■ V680-D8KF68/-D32KF68

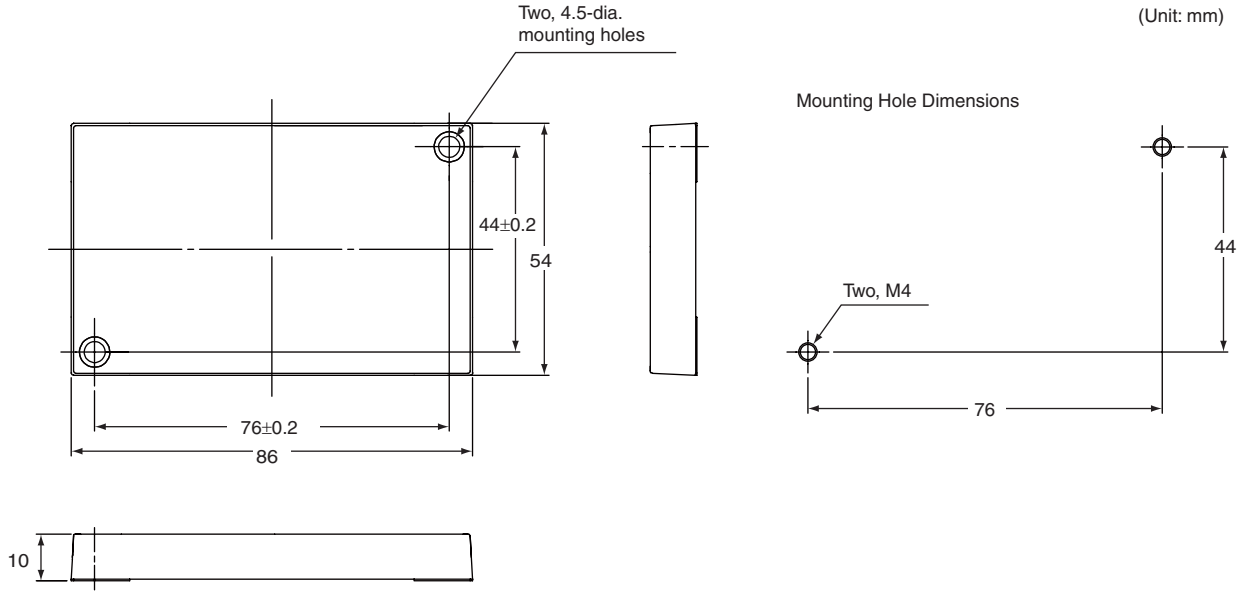


Case material	PBT resin
Fill resin	Epoxy resin

CHECK!

The side with the markings is the communications surface. Mount the Tag with this side facing the Antenna.

▪ V680-A81 Attachment



Case material	PBT resin
Fill resin	Epoxy resin

Characteristics

Communications Distance Specifications

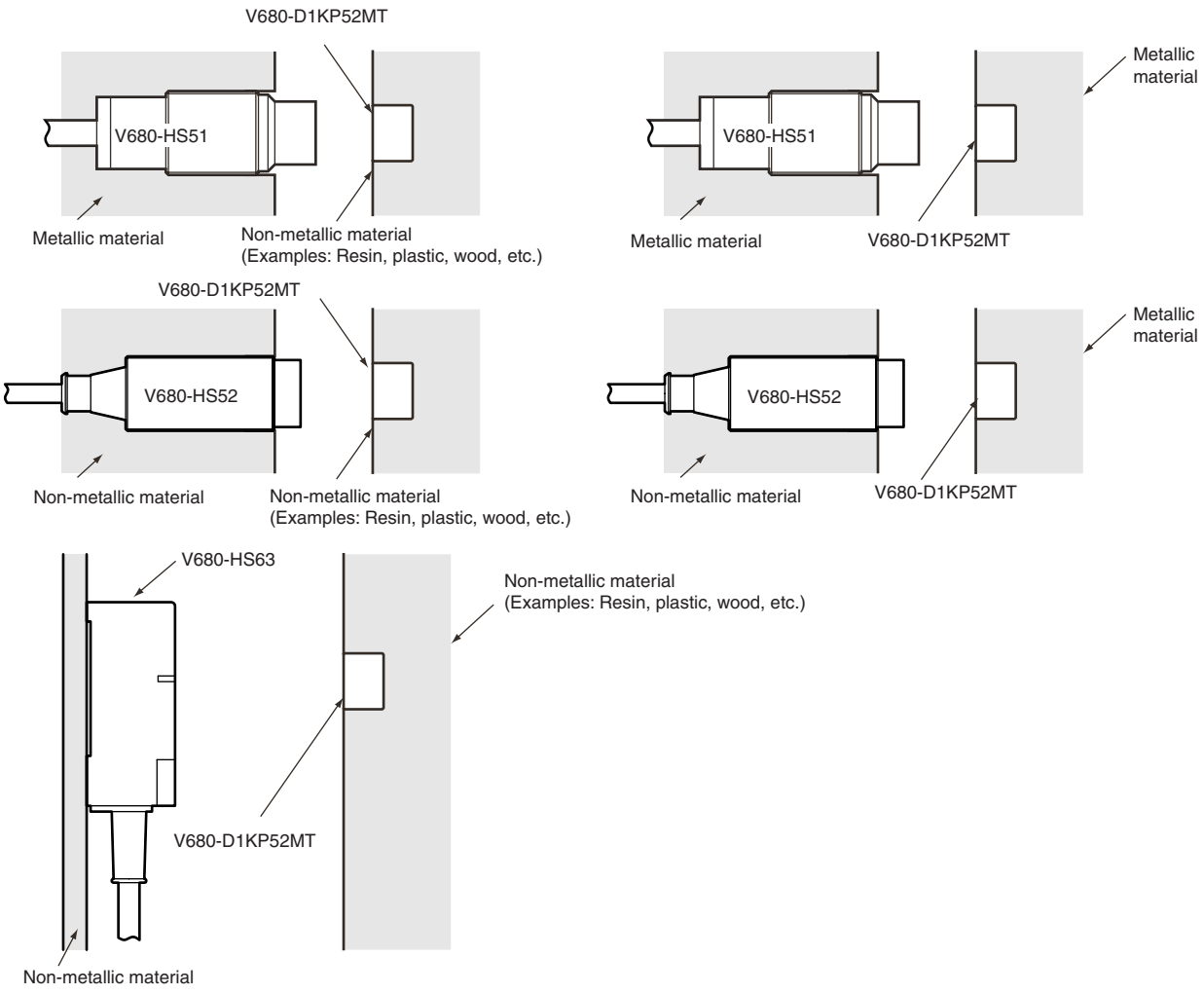
■ V680-D1KP52MT

Antenna	ID Tag	Communications distance	
V680-HS51	V680-D1KP52MT	Read	0.5 to 6.5 mm (Axis offset: ±2)
		Write	0.5 to 6.0 mm (Axis offset: ±2)
	V680-D1KP52MT embedded in metal (steel)	Read	0.5 to 3.5 mm (Axis offset: ±2)
		Write	0.5 to 3.0 mm (Axis offset: ±2)
V680-HS52	V680-D1KP52MT	Read	0.5 to 9.0 mm (Axis offset: ±2)
		Write	0.5 to 8.5 mm (Axis offset: ±2)
	V680-D1KP52MT embedded in metal (steel)	Read	0.5 to 4.5 mm (Axis offset: ±2)
		Write	0.5 to 4.0 mm (Axis offset: ±2)
V680-HS63	V680-D1KP52MT	Read	0.5 to 12.0 mm (Axis offset: ±2)
		Write	0.5 to 9.5 mm (Axis offset: ±2)

CHECK!

When embedding the V680-D1KP52MT into a metal surface, use the V680-HS51/-HS52 Antenna.
Transmission will not be possible if the V680-HS63 Antenna is used.

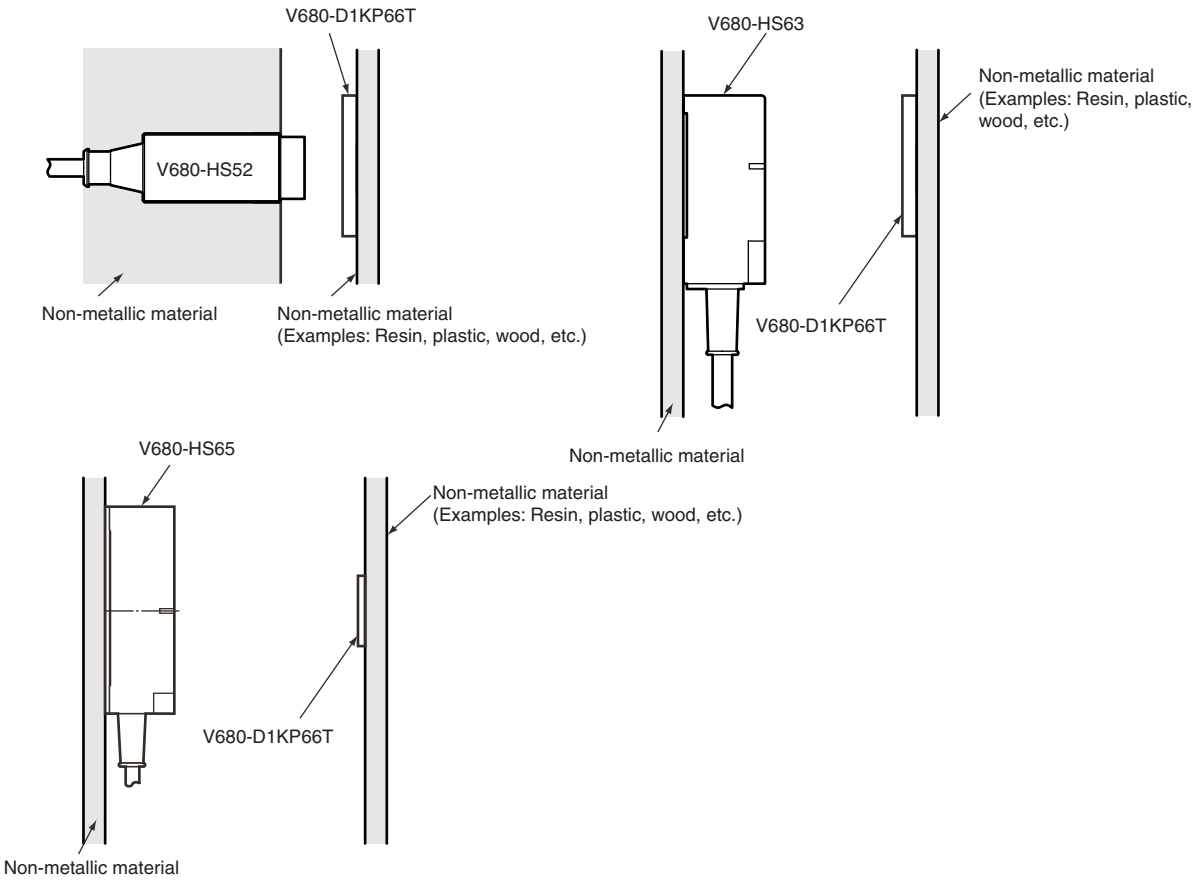
▪ Measurement Conditions



■ V680-D1KP66T

Antenna	ID Tag	Communications distance	
V680-HS52	V680-D1KP66T	Read	1.0 to 17.0 mm (Axis offset: ±2)
		Write	1.0 to 17.0 mm (Axis offset: ±2)
V680-HS63	V680-D1KP66T	Read	5.0 to 30.0 mm (Axis offset: ±10)
		Write	5.0 to 25.0 mm (Axis offset: ±10)
V680-HS65	V680-D1KP66T	Read	5.0 to 47.0 mm (Axis offset: ±10)
		Write	5.0 to 42 mm (Axis offset: ±10)

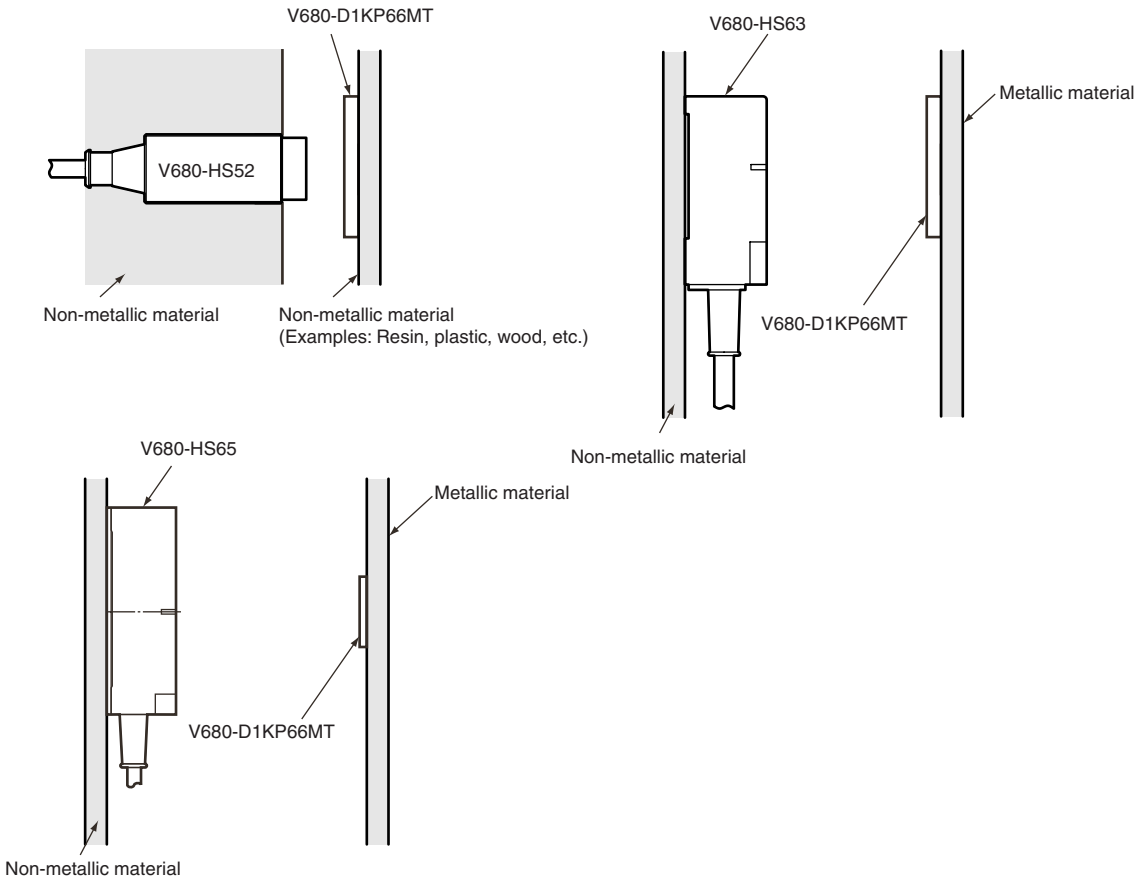
▪ Measurement Conditions



■ V680-D1KP66MT

Antenna	ID Tag	Communications distance	
V680-HS52	V680-D1KP66MT embedded in metal (steel)	Read	1.0 to 16.0 mm (Axis offset: ±2)
		Write	1.0 to 14.0 mm (Axis offset: ±2)
V680-HS63	V680-D1KP66MT embedded in metal (steel)	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 20.0 mm Axis offset: ±10)
V680-HS65	V680-D1KP66MT embedded in metal (steel)	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 20.0 mm (Axis offset: ±10)

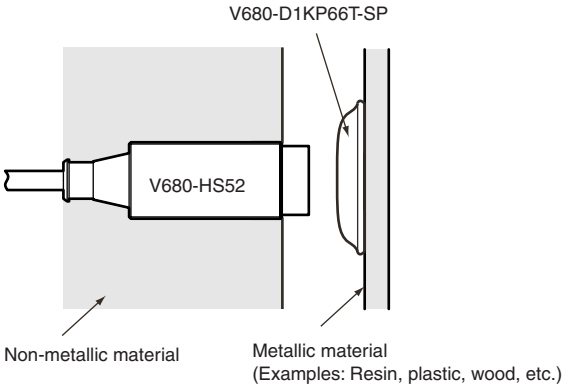
▪ Measurement Conditions

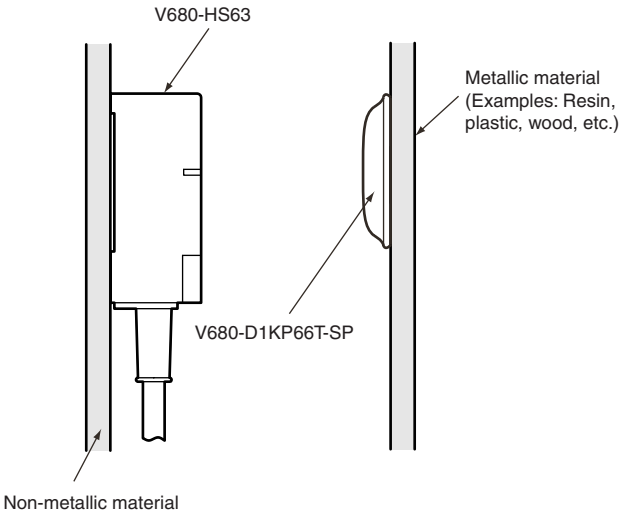


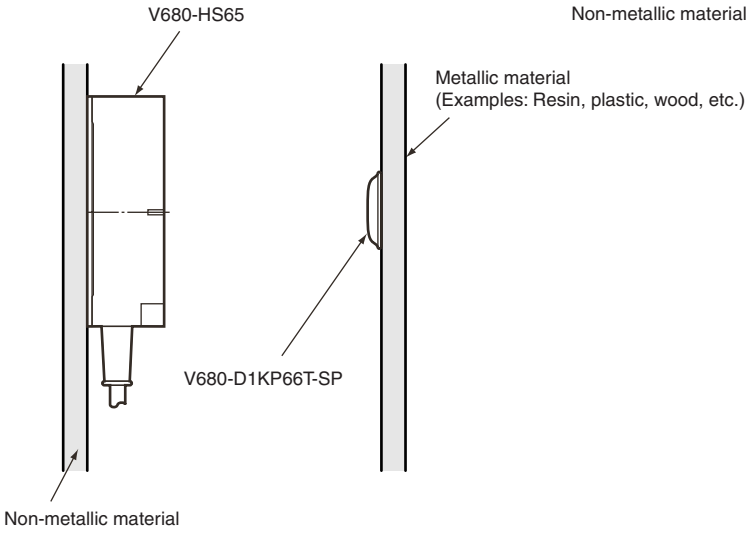
■ V680-D1KP66-SP

Antenna	ID Tag	Communications distance	
V680-HA63A	V680-HS52	Read	0 to 15.0 mm (Axis offset: ±2)
		Write	0 to 15.0 mm (Axis offset: ±2)
	V680-HS63	Read	0 to 25.0 mm (Axis offset: ±10)
		Write	0 to 20.0 mm (Axis offset: ±10)
	V680-HS65	Read	0 to 42.0 mm (Axis offset: ±10)
		Write	0 to 37.0 mm (Axis offset: ±10)

▪ Measurement Conditions







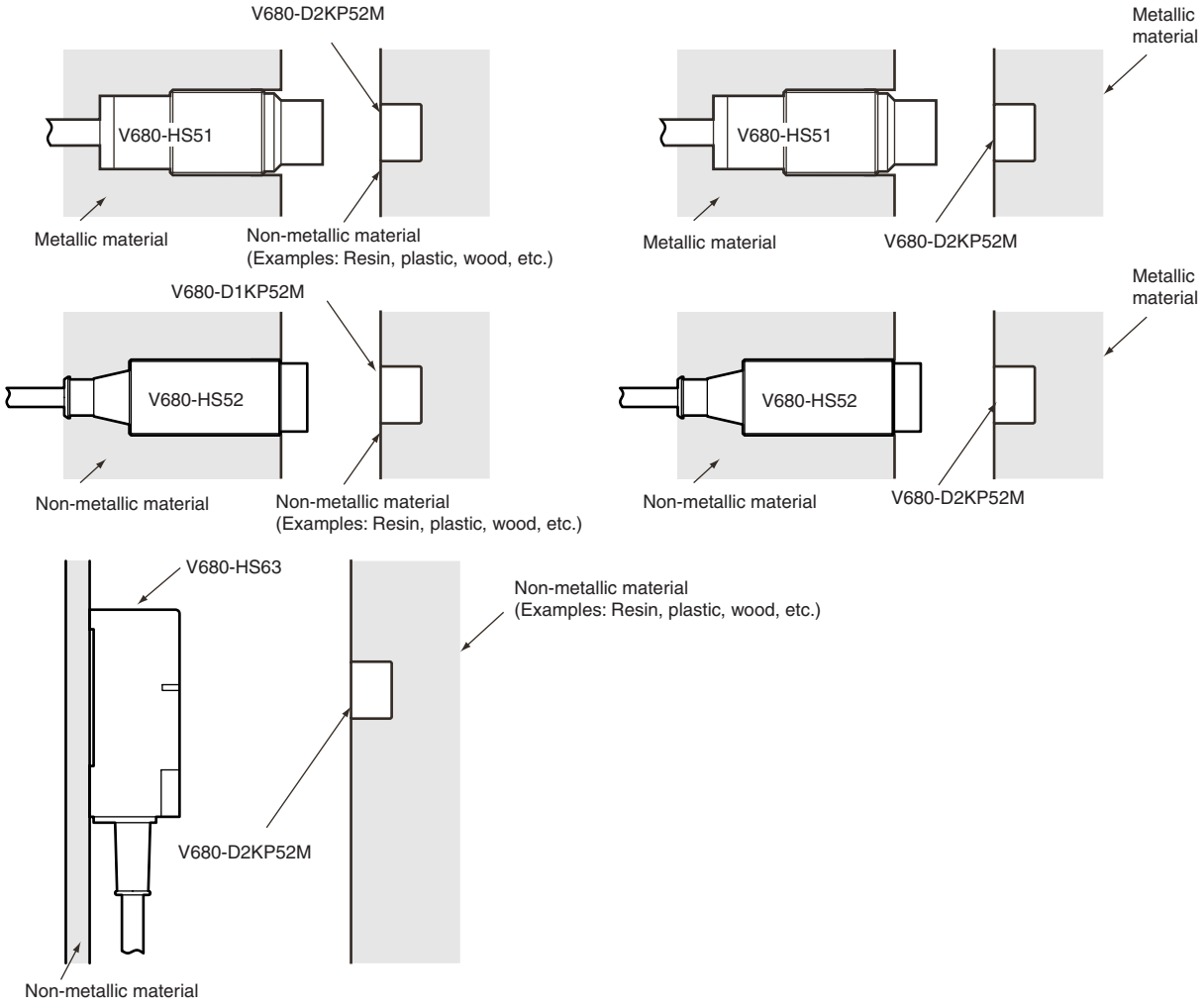
■ V680-D2KF52M

Antenna	ID Tag	Communications distance	
V680-HS51	V680-D2KF52M	Read	0.5 to 5.5 mm (Axis offset: ±2)
		Write	0.5 to 5.5 mm (Axis offset: ±2)
	V680-D2KF52M embedded in metal (steel)	Read	0.5 to 3.5 mm (Axis offset: ±2)
		Write	0.5 to 3.5 mm (Axis offset: ±2)
V680-HS52	V680-D2KF52M	Read	0.5 to 8.0 mm (Axis offset: ±2)
		Write	0.5 to 8.0 mm (Axis offset: ±2)
	V680-D2KF52M embedded in metal (steel)	Read	0.5 to 3.0 mm (Axis offset: ±2)
		Write	0.5 to 3.0 mm (Axis offset: ±2)
V680-HS63	V680-D2KF52M	Read	0.5 to 9.5 mm (Axis offset: ±2)
		Write	0.5 to 9.5 mm (Axis offset: ±2)

CHECK!

When embedding the V680-D2KP52M into a metal surface, use the V680-HS51/-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

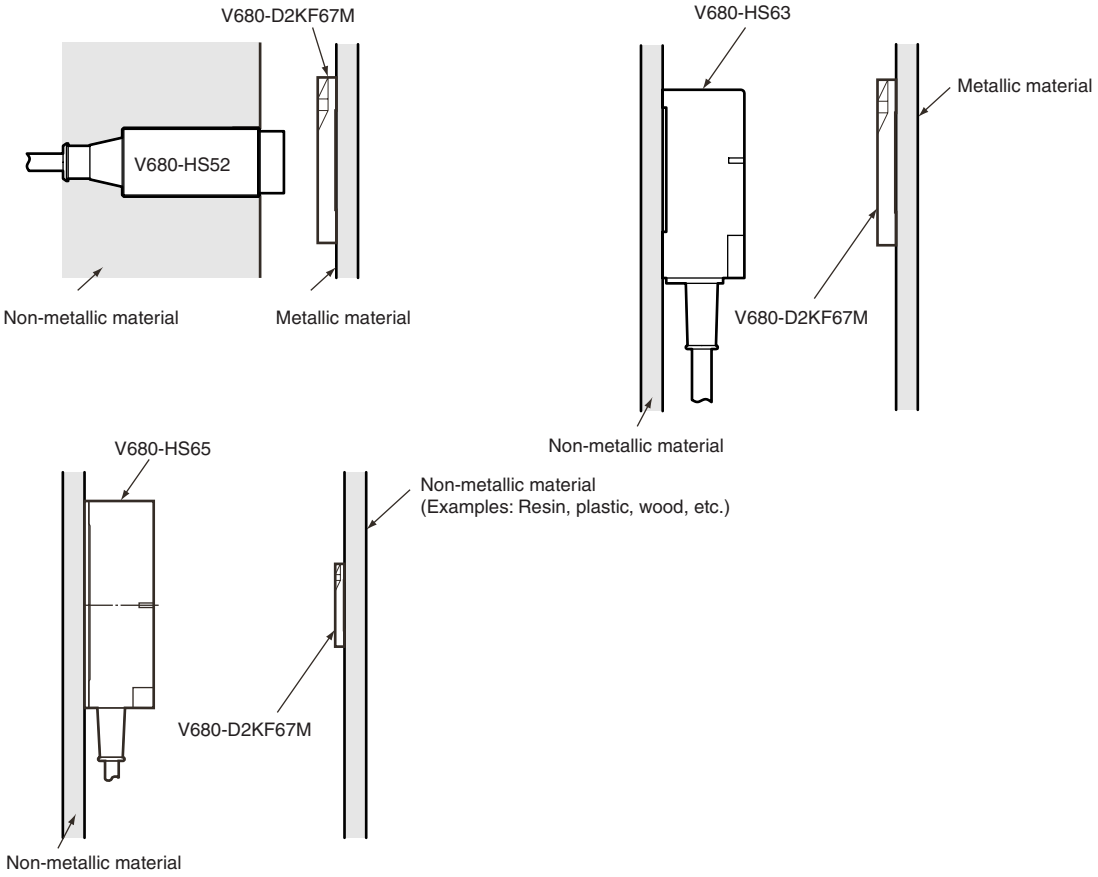
▪ Measurement Conditions



■ V680-D2KF67

Antenna	ID Tag	Communications distance	
V680-HS52	V680-D2KF67	Read	7.0 to 30.0 mm (Axis offset: ±2)
		Write	7.0 to 30.0 mm (Axis offset: ±2)
V680-HS63	V680-D2KF67	Read	7.0 to 30.0 mm (Axis offset: ±10)
		Write	7.0 to 30.0 mm (Axis offset: ±10)
V680-HS65	V680-D2KF67	Read	5.0 to 42.0 mm (Axis offset: ±10)
		Write	5.0 to 42.0 mm (Axis offset: ±10)

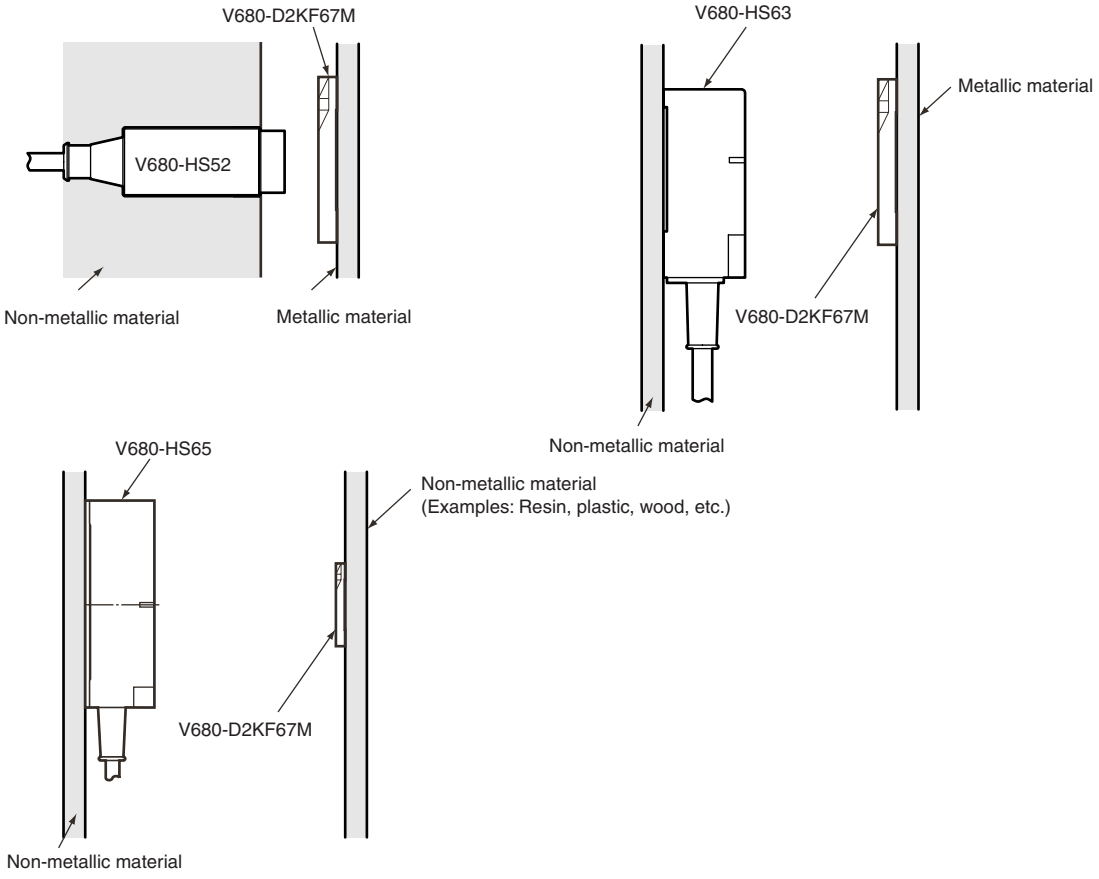
▪ Measurement Conditions



■ V680-D2KF67M

Antenna	ID Tag	Communications distance	
V680-HS52	V680-D2KF67M embedded in metal (steel)	Read	6.0 to 25.0 mm (Axis offset: ±2)
		Write	6.0 to 25.0 mm (Axis offset: ±2)
V680-HS63	V680-D2KF67M embedded in metal (steel)	Read	6.0 to 25.0 mm (Axis offset: ±10)
		Write	6.0 to 25.0 mm (Axis offset: ±10)
V680-HS65	V680-D2KF67M embedded in metal (steel)	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 25.0 mm (Axis offset: ±10)

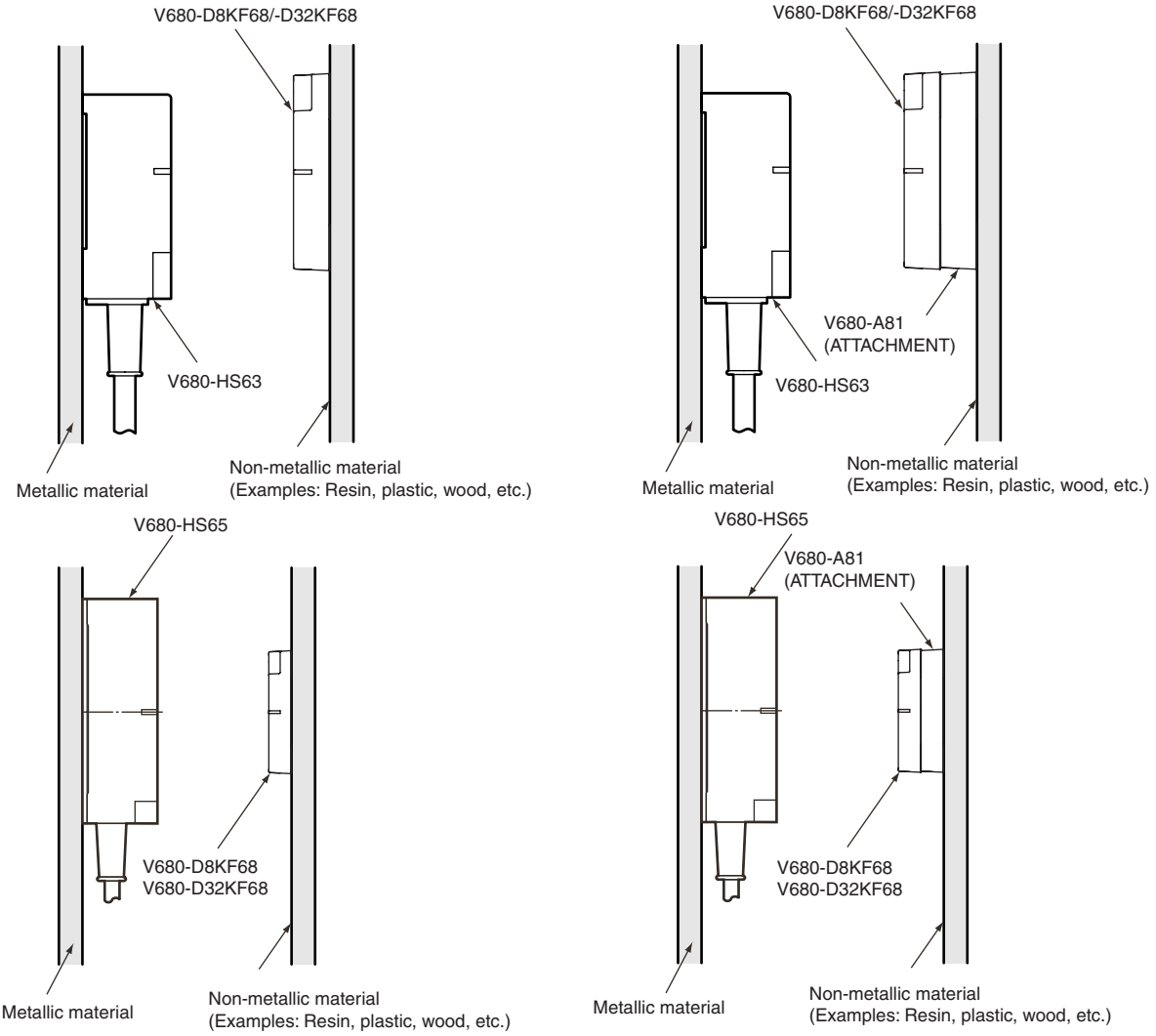
▪ Measurement Conditions



■ V680-D8KF68/-D32KF68

Antenna	ID Tag	Communications distance	
V680-HS63	V680-D8KF68	Read	5.0 to 45.0 mm (Axis offset: ±2)
		Write	5.0 to 45.0 mm (Axis offset: ±2)
	V680-D8KF68 (with ATTACHMENT, V680-A81) with metal on back surface (steel)	Read	5.0 to 35.0 mm (Axis offset: ±10)
		Write	5.0 to 35.0 mm (Axis offset: ±10)
	V680-D32KF68	Read	5.0 to 45.0 mm (Axis offset: ±10)
		Write	5.0 to 45.0 mm (Axis offset: ±10)
	V680-D32KF68 (with ATTACHMENT, V680-A81) with metal on back surface (steel)	Read	5.0 to 35.0 mm (Axis offset: ±10)
		Write	5.0 to 35.0 mm (Axis offset: ±10)
V680-HS65	V680-D8KF68	Read	5.0 to 75.0 mm (Axis offset: ±2)
		Write	5.0 to 75.0 mm (Axis offset: ±2)
	V680-D8KF68 (with ATTACHMENT, V680-A81) with metal on back surface (steel)	Read	5.0 to 55.0 mm (Axis offset: ±10)
		Write	5.0 to 55.0 mm (Axis offset: ±10)
	V680-D32KF68	Read	5.0 to 75.0 mm (Axis offset: ±10)
		Write	5.0 to 75.0 mm (Axis offset: ±10)
	V680-D32KF68 (with ATTACHMENT, V680-A81) with metal on back surface (steel)	Read	5.0 to 55.0 mm (Axis offset: ±10)
		Write	5.0 to 55.0 mm (Axis offset: ±10)

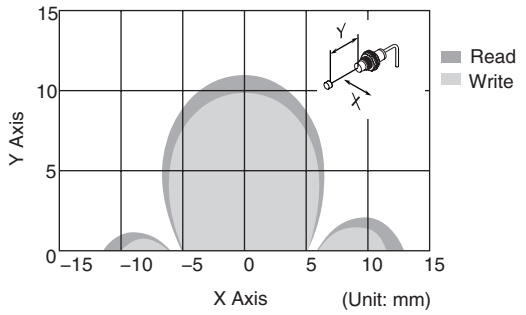
▪ Measurement Conditions



Communications Area

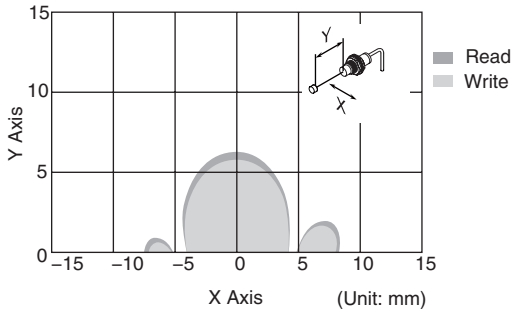
■ 680-D1KP52MT

● V680-HS51 and V680-D1KP52MT

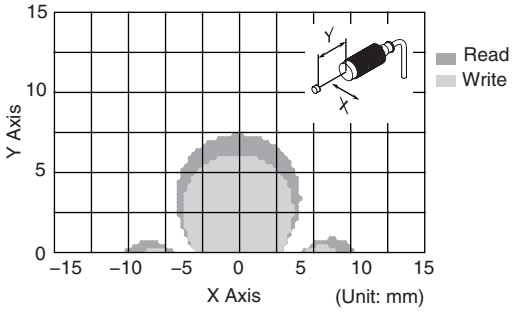


● V680-HS51 and V680-D1KP52MT

(Embedded in Metal: Steel)

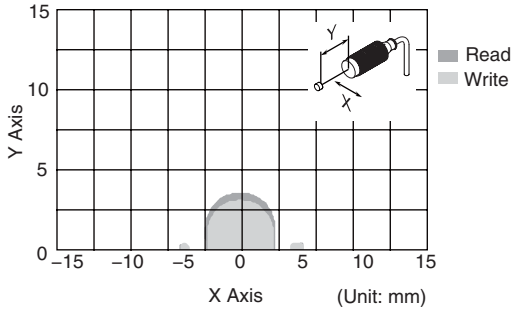


● V680-HS52 and V680-D1KP52MT

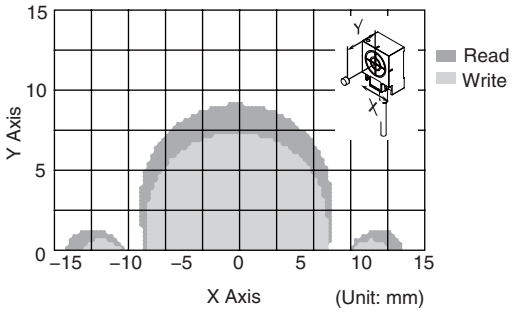


● V680-HS52 and V680-D1KP52MT

(Embedded in Metal: Steel)

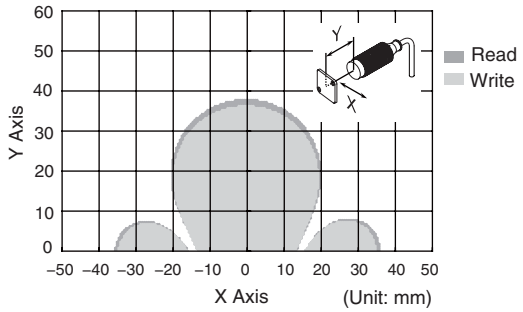


● V680-HS63 and V680-D1KP52MT

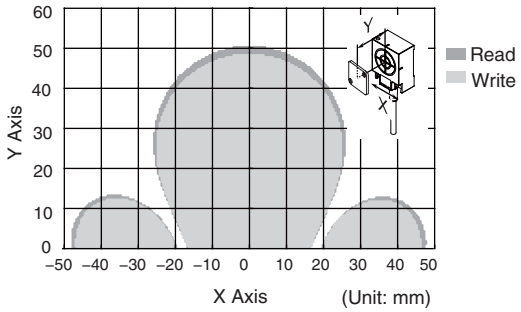


■ V680-D1KP66T

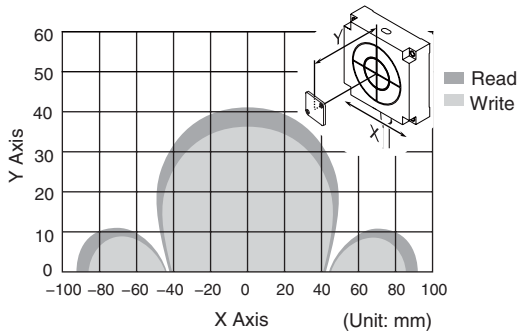
● V680-HS52 and V680-D1KP66T



● V680-HS63 and V680-D1KP66T

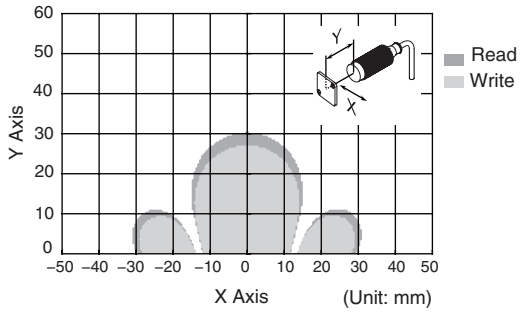


● V680-HS65 and V680-D1KP66T

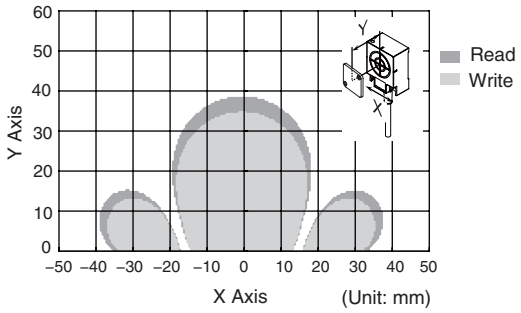


■ V680-D1KP66MT

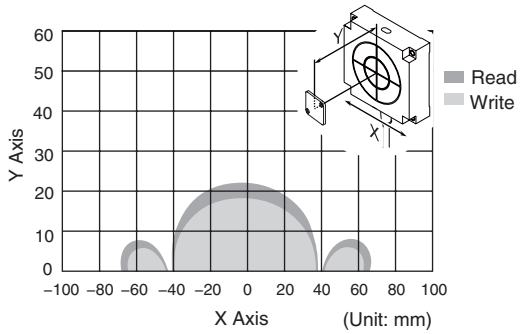
● V680-HS52 and V680-D1KP66MT
with Metal on Back Surface (Steel)



● V680-HS63 and V680-D1KP66MT
with Metal on Back Surface (Steel)

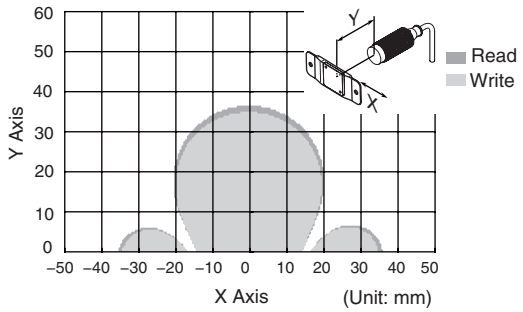


● V680-HS65 and V680-D1KP66MT
with Metal on Back Surface (Steel)

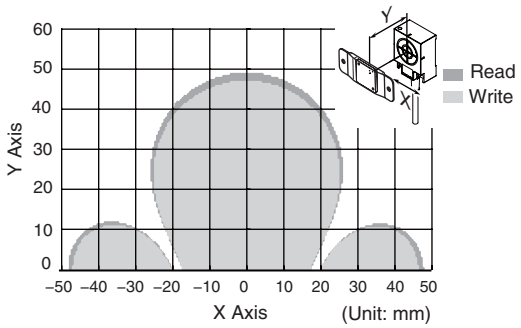


■ V680-D1KP66T-SP

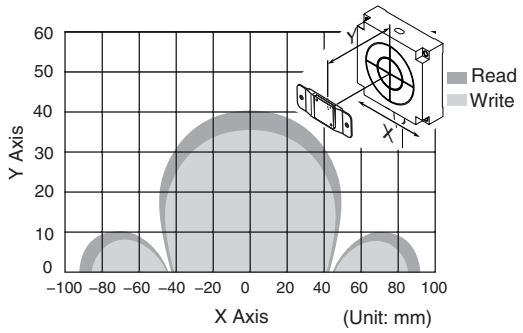
● V680-HS52 and V680-D1KP66T-SP



● V680-HS63 and V680-D1KP66T-SP

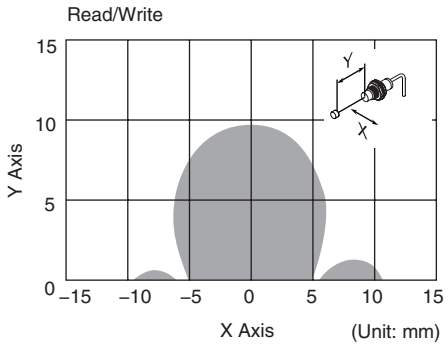


● V680-HS65 and V680-D1KP66T-SP

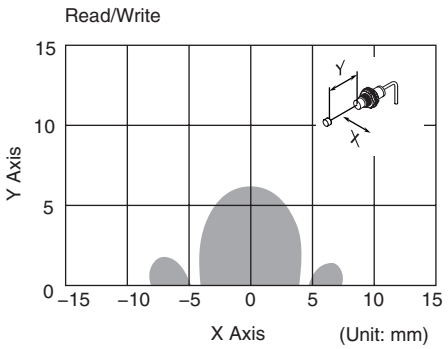


■ V680-D2KF52M

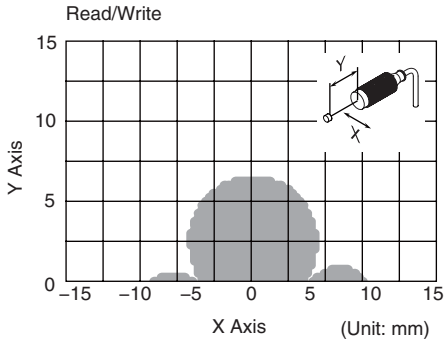
● V680-HS51 and V680-D2KF52M



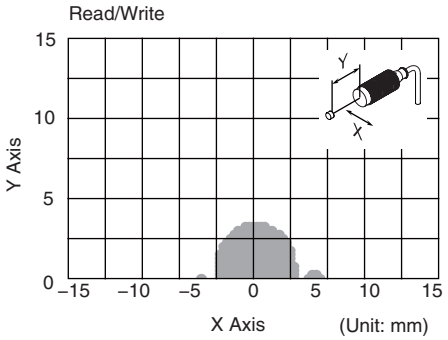
● V680-HS51 and V680-D2KF52M
(Embedded in Metal: Steel)



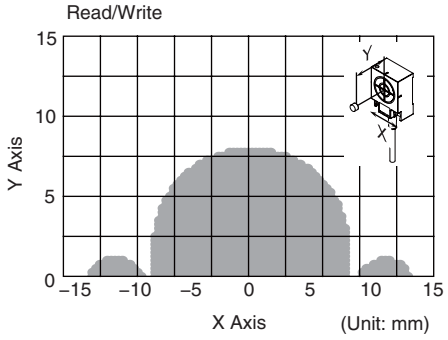
● V680-HS52 and V680-D2KP52M



● V680-HS52 and V680-D2KF52M
(Embedded in Metal: Steel)

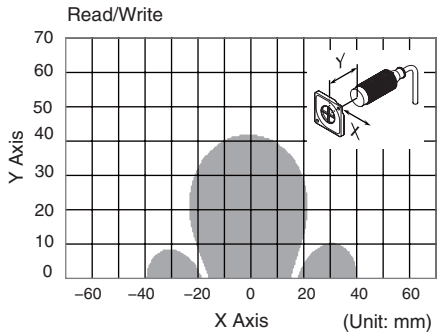


● V680-HS63 and V680-D2KP52M

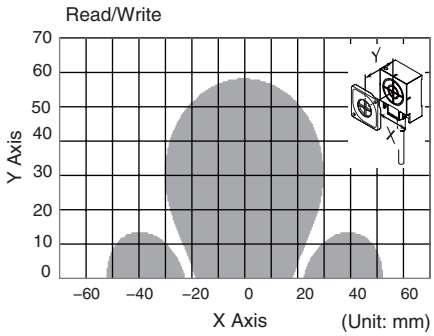


■ V680-D2KF67

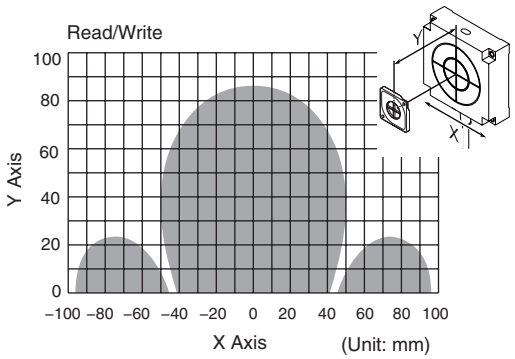
● V680-HS52 and V680-D2KF67



● V680-HS63 and V680-D2KF67

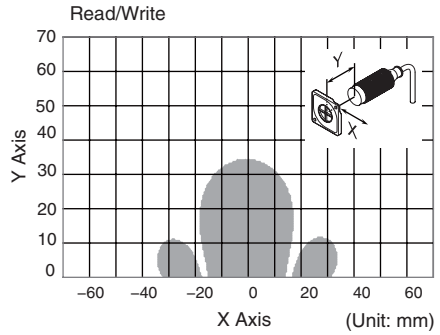


● V680-HS65 and V680-D2KF67

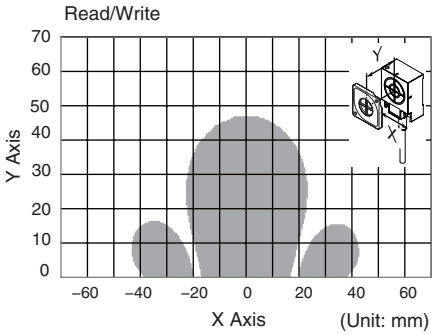


■ V680-D2KF67M

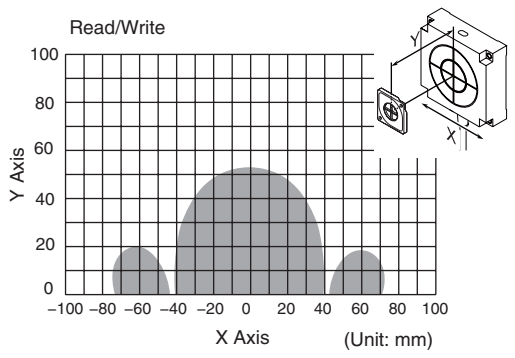
● V680-HS52 and V680-D2KF67M
with Metal on Back Surface (Steel)



● V680-HS63 and V680-D2KF67M
with Metal on Back Surface (Steel)

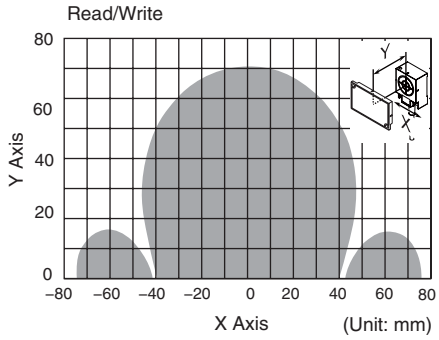


● V680-HS65 and V680-D2KF67M
with Metal on Back Surface (Steel)

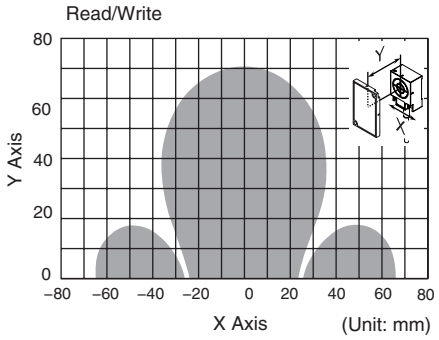


■ V680-D8KF68/-D32KF68

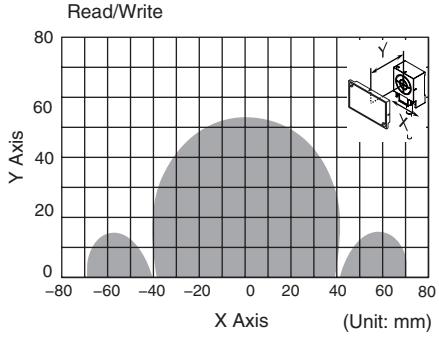
● V680-HS63 and V680-D8KF68/-D32KF68
(Horizontal-facing ID Tag)



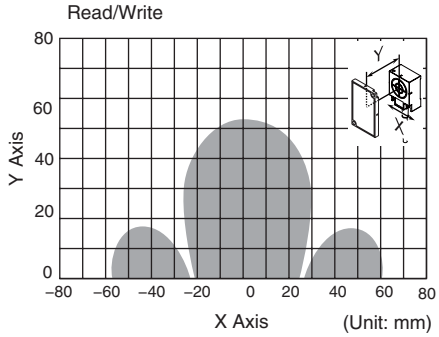
● V680-HS63 and V680-D8KF68/-D32KF68
(Vertical-facing ID Tag)



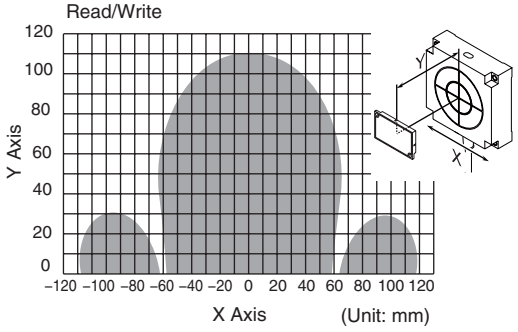
● V680-HS63 and V680-D8KF68/-D32KF68
(with Attachment, V680-A81)
Metal on back: Steel (Vertical-facing ID Tag)



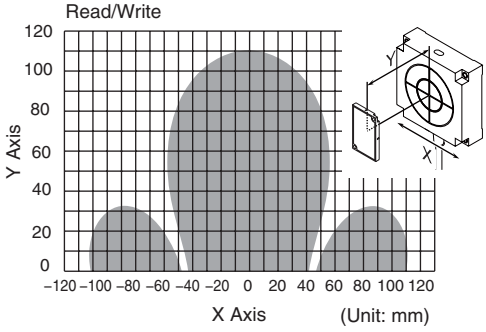
● V680-HS63 and V680-D8KF68/-D32KF68
(with Attachment, V680-A81)
Metal on back: Steel (Vertical-facing ID Tag)



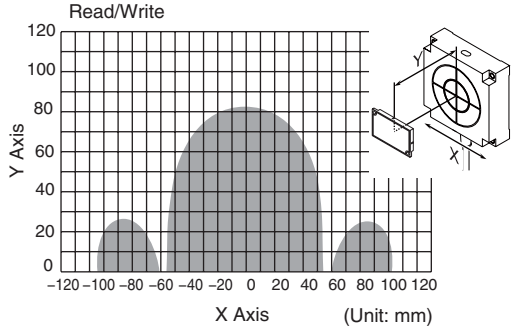
● V680-HS65 and V680-D8KF68/-D32KF68
(Horizontal-facing ID Tag)



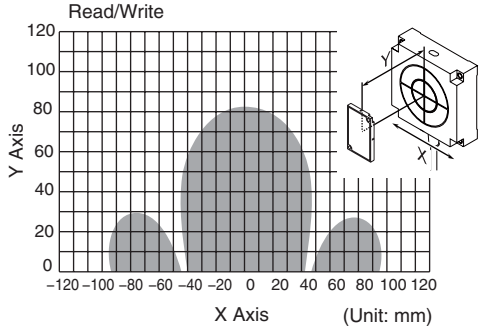
● V680-HS65 and V680-D8KF68/-D32KF68
(Vertical-facing ID Tag)



● V680-HS65 and V680-D8KF68/-D32KF68
(with Attachment, V680-A81)
Metal on back: Steel (Vertical-facing ID Tag)



● V680-HS65 and V680-D8KF68/-D32KF68
(with Attachment, V680-A81)
Metal on back: Steel (Vertical-facing ID Tag)



Communications Time

The communications time is the time required for communications between the Antenna and the ID Tag. The communications time of the DeviceNet Remote ID Controller is longer when data is being written.

■ Communications Time Specifications

Model		V680-HAM91/V680-HAM81		
		Read	Write	
Function		Data write mode Verify read mode	Byte mode	Bit set mode Bit clear mode
ID Tag type	EEPROM type	●● ms	●● ms	●● ms
	FRAM type	●● ms	●● ms	●● ms

■ ID Tag Travel Speed

The travel time (i.e., conveyor speed) of an ID Tag on the line can be calculated by finding the communications area and communications time for the I/O Sensor ID.

$$\text{ID Tag travel speed (i.e., conveyor speed)} = \frac{\text{Travel distance (x) in communications area}}{\text{Communications time}}$$

▪ Data Read Calculation Example

$$\text{ID Tag travel speed (m/min.)} = \frac{●● \text{ (mm)}}{▲▲ \text{ (ms)}}$$

Note 1: The travel speed depends on communications distance Y and axis offset. It is recommended to refer to the communications area diagram and use the part with the widest area.

2. These values are guidelines. Perform testing with the actual device before operation.

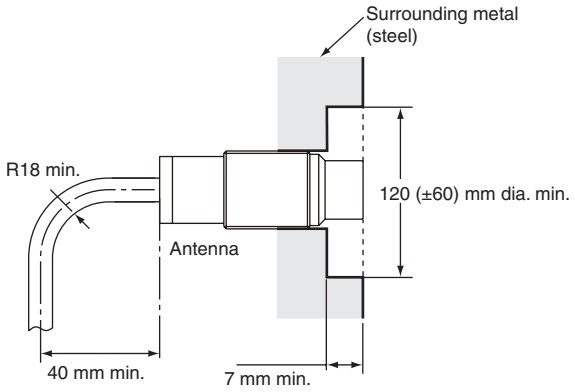
3. Processing for communications errors is not included in this formula.

Reference Data

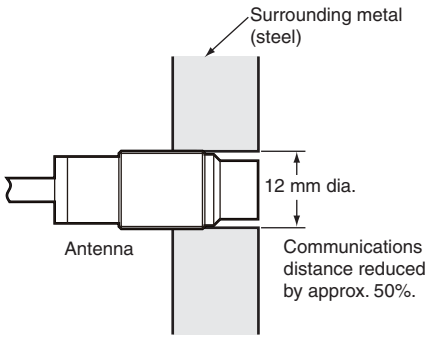
Effect of Surrounding Metals on the Antenna (Reference)

■ V680-HS51

When embedding the Antenna in metal, be sure the metal does not extend beyond the communications section (coil surface) of the Antenna.



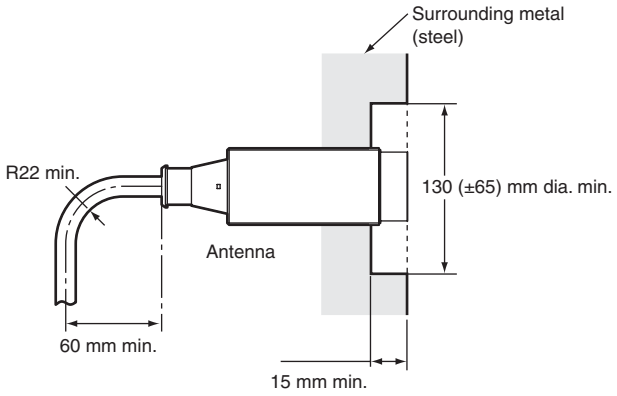
Do not bend the cable into a curve tighter than 18 mm in radius.



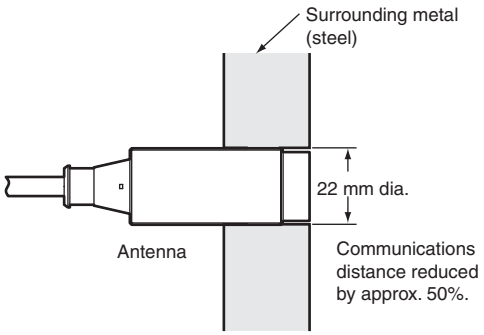
If the metal around the Antenna reaches the coil surface, the communications distance will be reduced by approx. 50% compared with mounting to a non-metallic surface.

■ V680-HS52

When embedding the Antenna in metal, be sure the metal does not extend beyond the communications section (coil surface) of the Antenna.



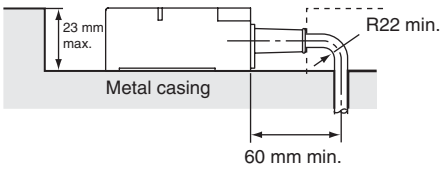
Do not bend the cable into a curve tighter than 22 mm in radius.

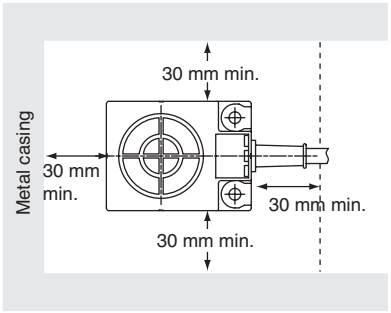


If the metal around the Antenna reaches the coil surface, the communications distance will be reduced by approx. 50% compared with mounting to a non-metallic surface.

■ V680-HS63

In addition to surface mounting, it is also possible to embed the V680-HS63 in a metal casing to protect it from being struck by other objects. To prevent malfunctioning, allow a space of at least 30 mm between the Antenna and the sides of the metal casing. If the space is less than 30 mm, the read/write distance will be greatly diminished. In addition, the height of metal casing must not exceed that of the Antenna.

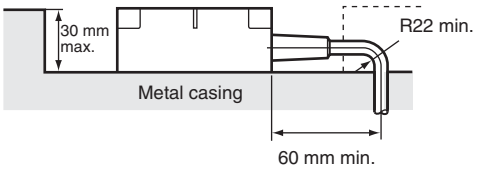


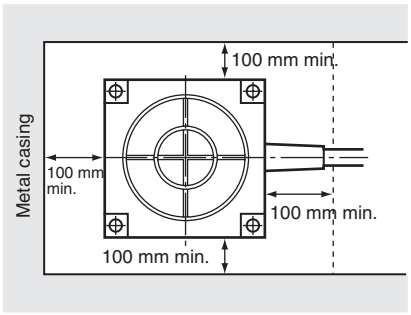


Note 1: Do not bend the cable into a curve tighter than 22 mm in radius.
2: The communications distance will be reduced significantly if the Antenna is installed closer than 30 mm to metal surfaces.

■ V680-HS65

In addition to surface mounting, it is also possible to embed the V680-HS65 in a metal casing to protect it from being struck by other objects. To prevent malfunctioning, allow a space of at least 100 mm between the Antenna and the sides of the metal casing. If the space is less than 100 mm, the read/write distance will be greatly diminished. In addition, the height of metal casing must not exceed that of the Antenna.





Note 1: Do not bend the cable into a curve tighter than 22 mm in radius.
2: The communications distance will be reduced significantly if the Antenna is installed closer than 100 mm to metal surfaces.

Effect of Surrounding Metals on the ID Tags

■ V680-D1KP52MT

▪ Differences in Surrounding Metals

Communications distances are affected by the type of metal in back of or surrounding the Tag, as shown in the following table.

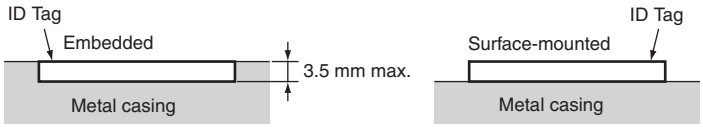
	Steel	SUS	Brass	Aluminum
V680-D2KF52M	100%	85% to 90%	80% to 85%	80% to 85%

Note: The value for steel around or behind the Tag is set to 100%.

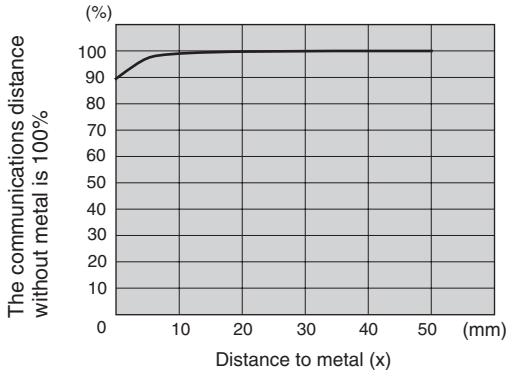
■ V680-D1KP66MT

▪ Effect of Surrounding Metals (Reference)

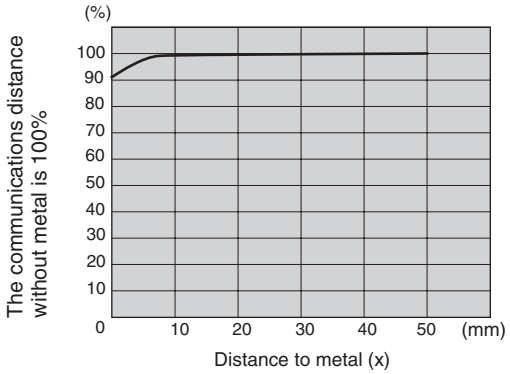
The V680-D1KP66MT can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the Tag.



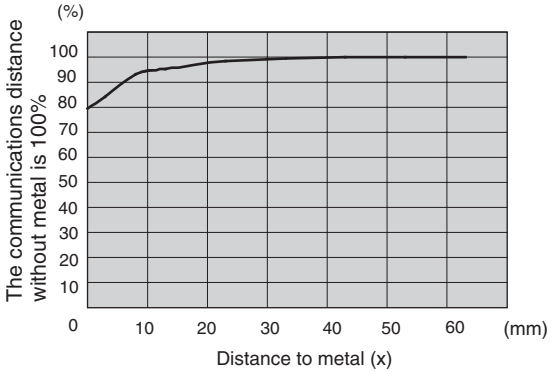
● V680-HS52 and V680-D1KP66MT

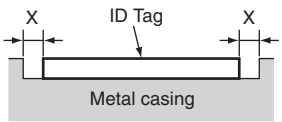


● V680-HS63 and V680-D1KP66MT



● V680-HS65 and V680-D1KP66MT





■ V680-D2KF52M

▪ Differences in Surrounding Metals

Communications distances are affected by the type of metal in back of or surrounding the Tag, as shown in the following table.

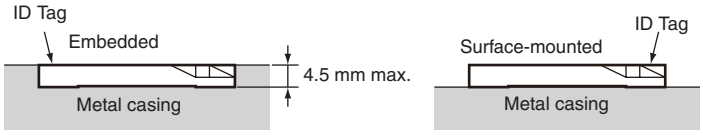
	Steel	SUS	Brass	Aluminum
V680-D2KF52M	100%	80% to 85%	80% to 85%	75% to 80%

Note: The value for steel around or behind the Tag is set to 100%.

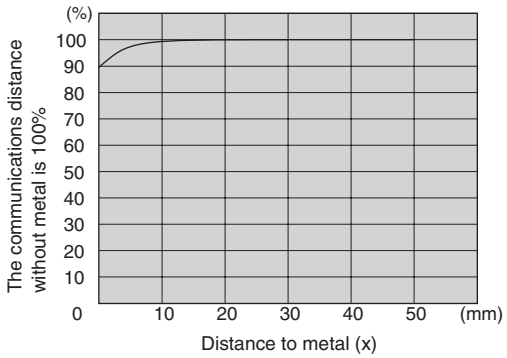
■ V680-D2KF67M

▪ Effect of Surrounding Metals (Reference)

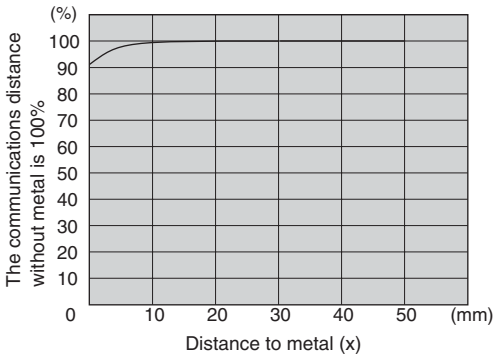
The V680-D2KF67M can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the Tag.



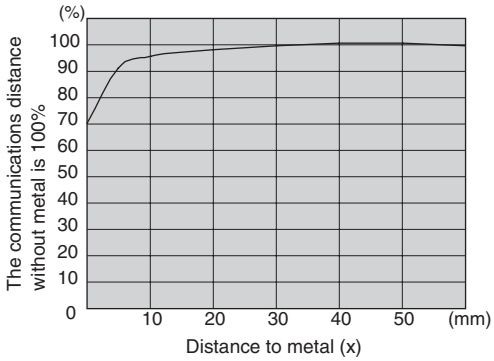
● V680-HS52 and V680-D2KF67M

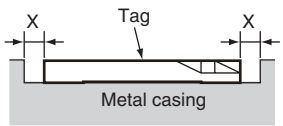


● V680-HS63 and V680-D2KF67M



● V680-HS65 and V680-D2KF67M

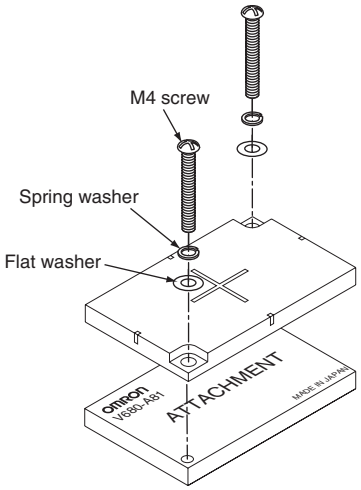




■ V680-D8KF67/-D32KF68

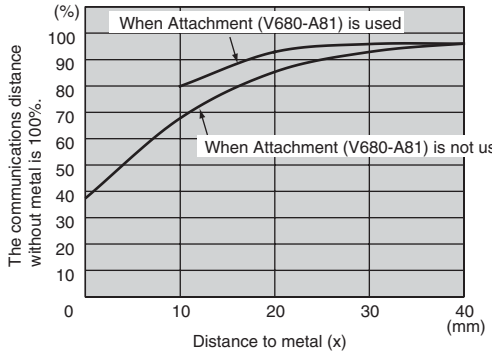
▪ Effect of Surrounding Metals (Reference)

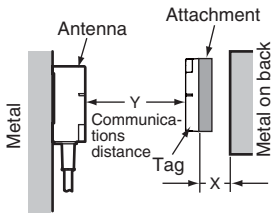
•Special Attachment (V680-A81) Installation Direction



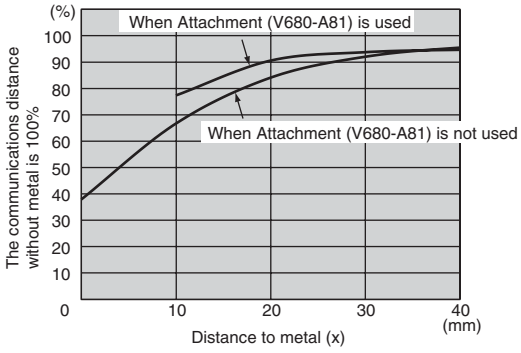
The transmission distance will be reduced if there is metal in back of a Tag. When mounting on a metal surface, use the special Attachment (V680-A81) of another sales or insert a non-metallic spacer (e.g., plastic, wood, etc.).

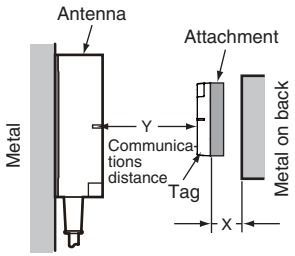
● V680-HS63 and V680-D8KF68/-D32KF68





● V680-HS65 and V680-D8KF68/-D32KF68





Effect of Metal behind Tags (Reference)

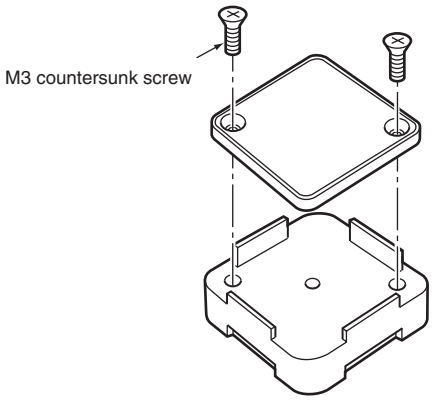
■ V680-D1KP66T

▪ Effect of Metal behind Tags (Reference)

The V680-D1KP66T communications distance is reduced if there is any metal material behind the Tag. If the Tag is to be mounted to metal, then either use a V600-A86 Attachment (sold separately) or insert a non-metal spacer (such as plastic or resin). The relationship between the distance from the Tag to the metal surface and the communications distance is shown below.

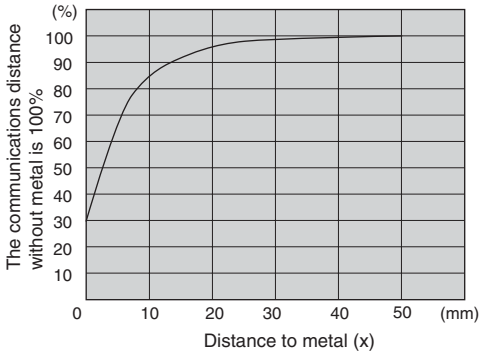
The Attachment is 10 mm thick, and more than one Attachment can be stacked.

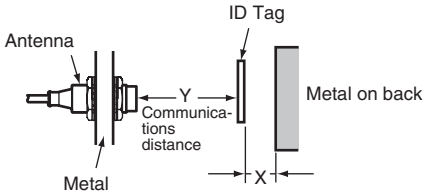
V600-A86 Attachment Installation



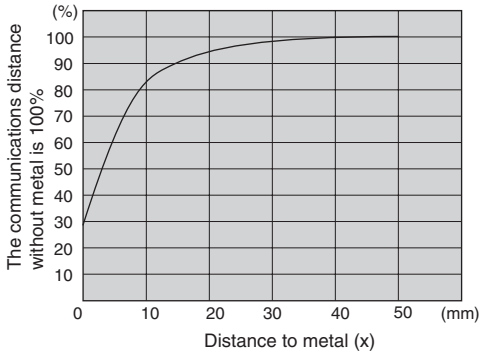
Note: Install so that the mounting holes are aligned.

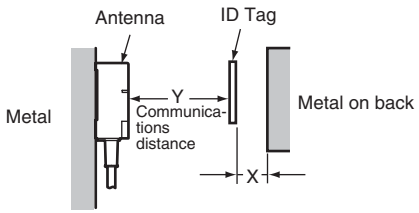
● V680-HS52 and V680-D1KP66T



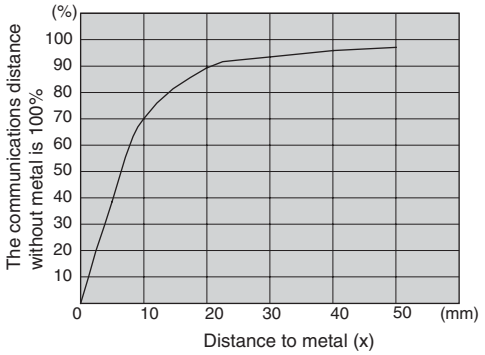


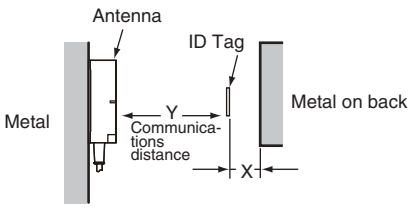
● V680-HS63 and V680-D1KP66T





● V680-HS65 and V680-D1KP66T

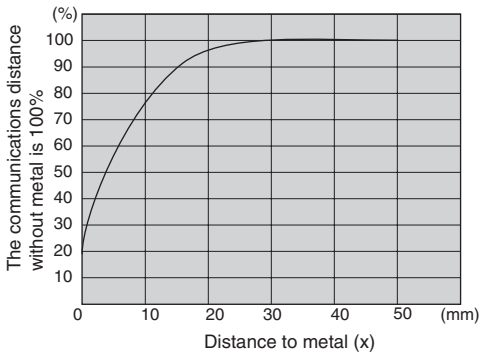


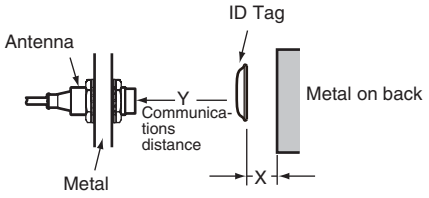


■ V680-D1KP66T-SP

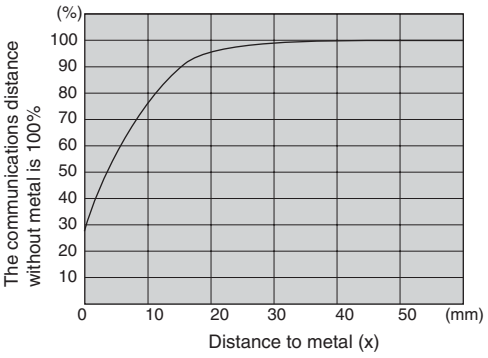
The V680-D1KP66T-SP communications distance is reduced if there is any metal material behind the Tag. If the Tag is mounted on metal, insert a non-metal spacer (such as plastic or resin).
The relationship between the distance from the Tag to the metal surface and the communications distance is shown below.

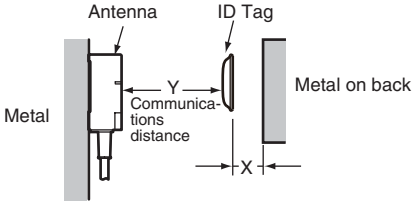
● V680-HS52 and V680-D1KP66T-SP



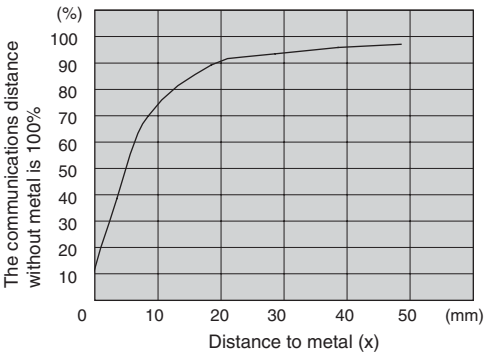


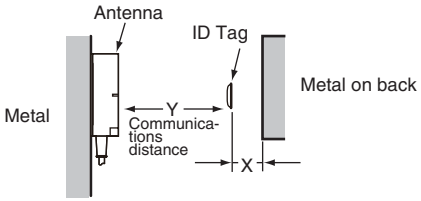
● V680-HS63 and V680-D1KP66T-SP





● V680-HS65 and V680-D1KP66T-SP



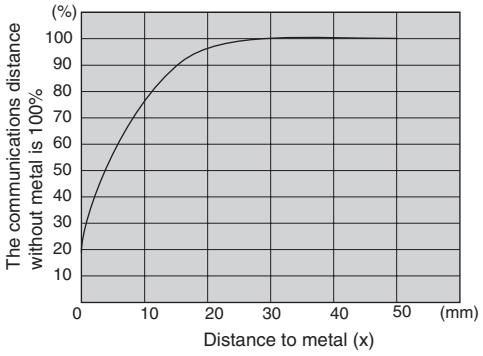


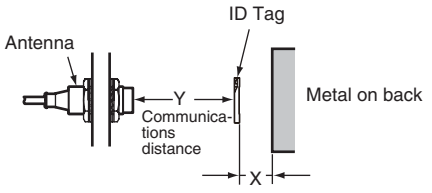
■ V680-D2KF67

▪ Effect of Metal behind Tags (Reference)

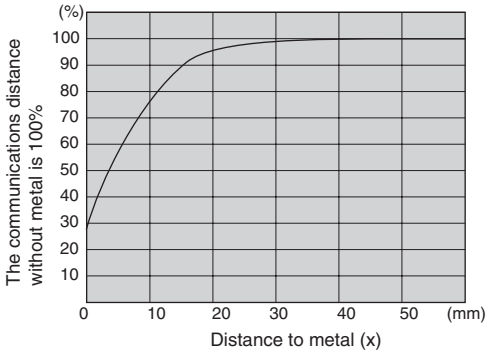
The V680-D2KF67 communications distance is reduced if there is any metal material behind the Tag.

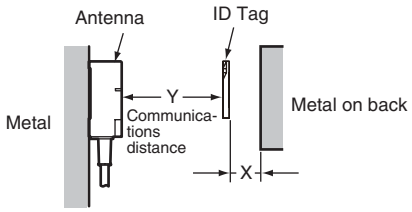
● V680-HS52 and V680-D2KF67



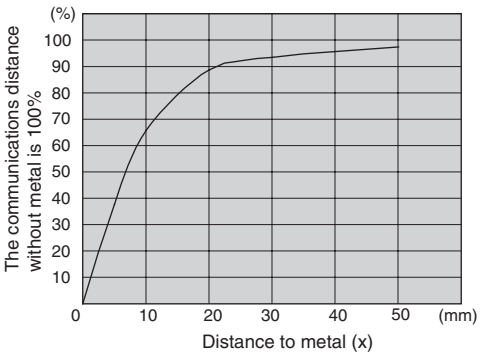


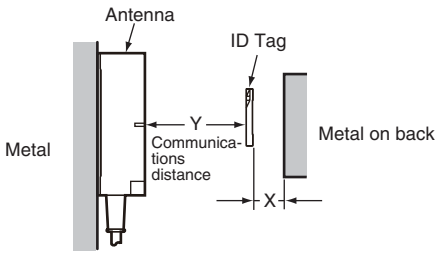
● V680-HS63 and V680-D2KF67





● V680-HS65 and V680-D2KF67



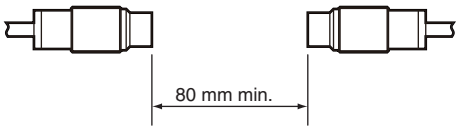


Mutual Interference between Antennas (Reference)

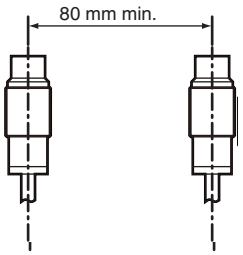
To prevent malfunctioning due to mutual interference when using more than one Antenna, leave sufficient space between them as shown in the following diagrams.

■ V680-HS51

- Installing the Antennas Facing Each Other

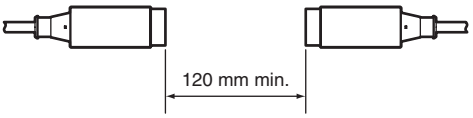


- Installing the Antennas in Parallel

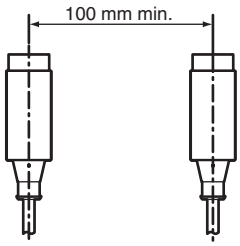


■ V680-HS52

- Installing the Antennas Facing Each Other



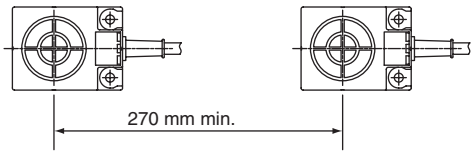
- Installing the Antennas in Parallel



■ V680-HS63

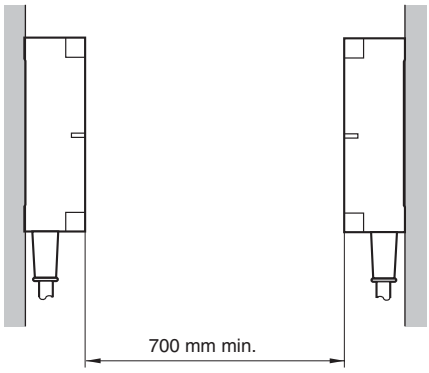
- Installing the Antennas Facing Each Other

- Installing the Antennas in Parallel

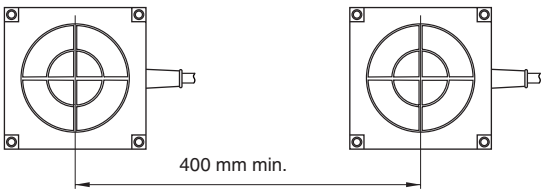


■ V680-HS65

- Installing the Antennas Facing Each Other



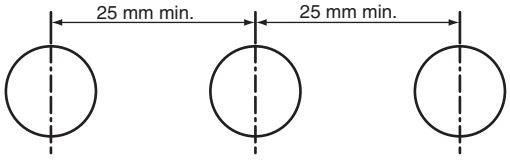
- Installing the Antennas in Parallel



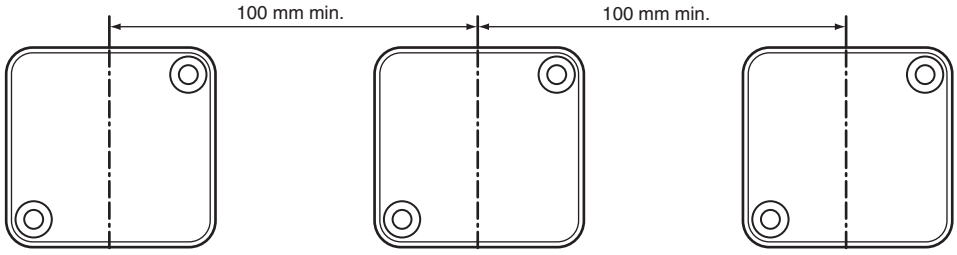
Mutual Interference with ID Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one Tag, leave sufficient space between them as shown in the following diagram.

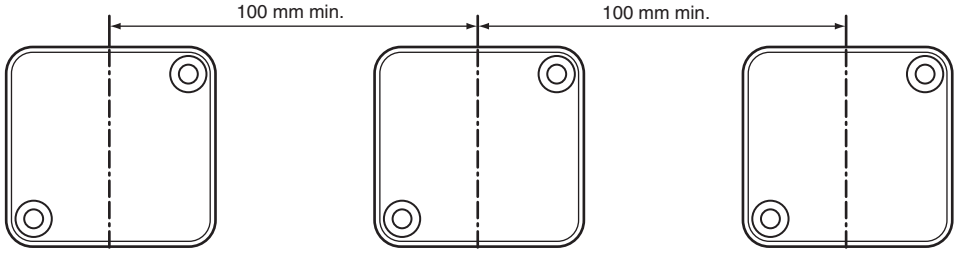
■ V680-D1KP52MT



■ V680-D1KP66T

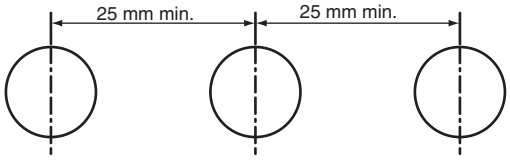


■ V680-D1KP66MT



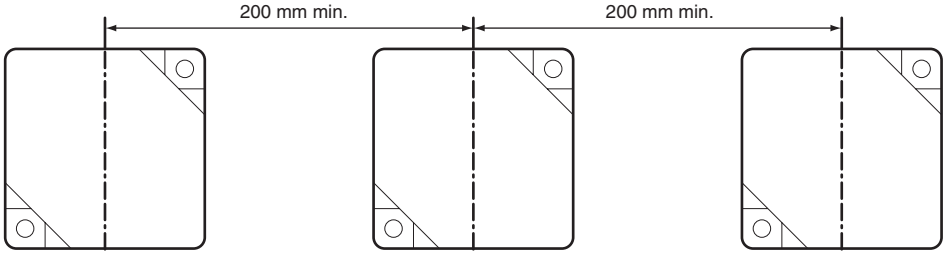
■ V680-D2KF52M

▪ When V680-HS51, V680-HS52, and V680-HS63 Are Used



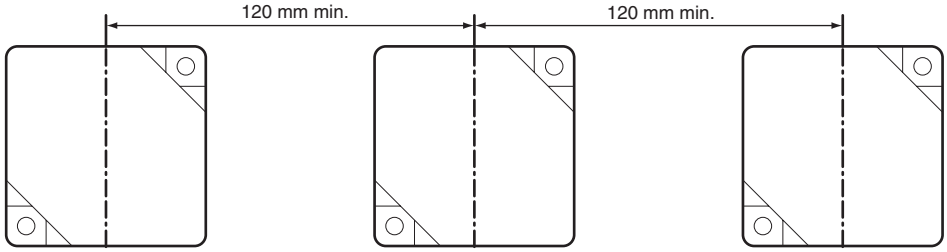
■ V680-D2KF67

▪ When V680-HS52, V680-HS63, and V680-HS65 Are Used



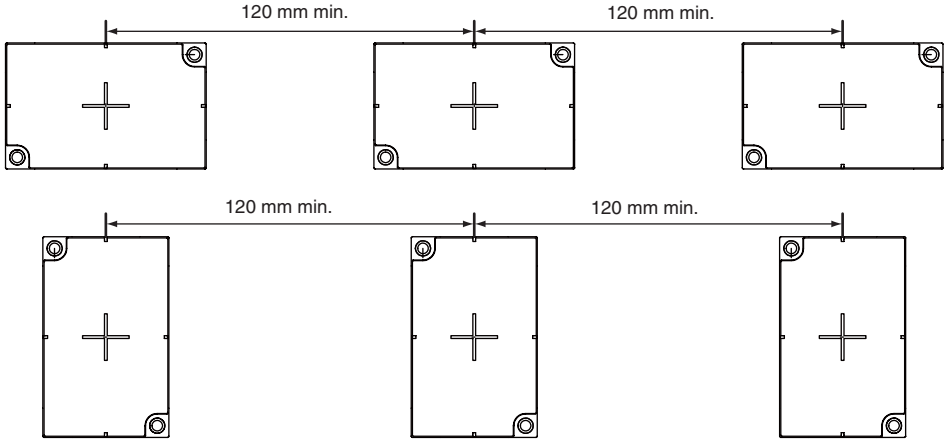
■ V680-D2KF67M

▪ When V680-HS52, V680-HS63, and V680-HS65 Are Used

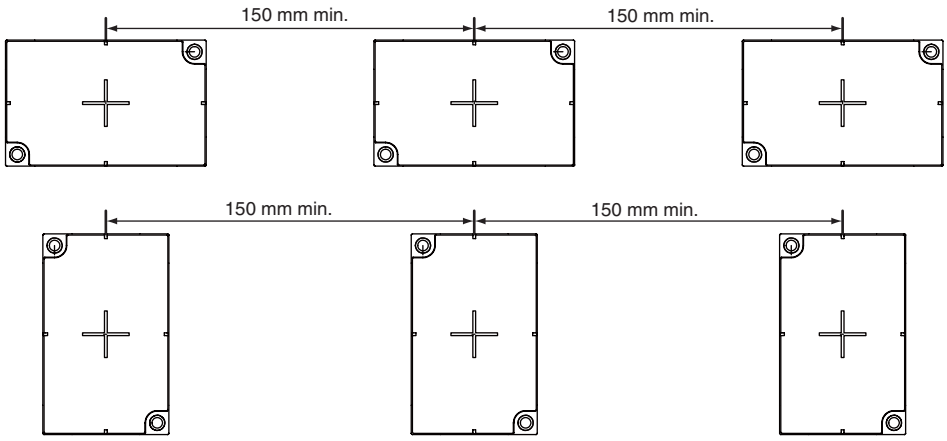


■ V680-D8KF68/-D32KF68

▪ When V680-HS63 Is Used



▪ When V680-HS65 Is Used



Influence of Tag Angle (Reference)

Install Antennas and Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and a Tag are mounted at an angle, but the communications distance will be shortened. The relation between the angle and the communications distance is shown below.

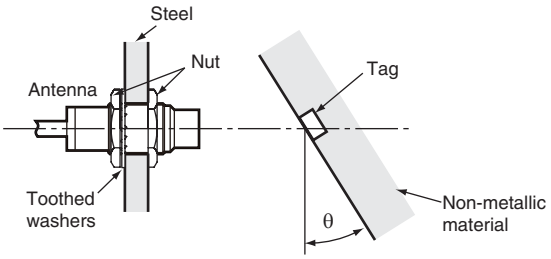
■ Percentage of Change in Communications Distance for 680-D1KP52MT Angle

	Tag angle (θ°)				
	0	10	20	30	40
V680-HS51 and V680-D1KP52MT	0%	–1%	–5%	–10%	–15%
V680-HS51 and V680-D1KP52MT (Metal on back: Steel)	0%	0%	0%	–4%	–28%
V680-HS52 and V680-D1KP52MT	0%	0%	0%	–2%	–6%
V680-HS52 and V680-D1KP52MT (Metal on back: Steel)	0%	–6%	–13%	–25%	---
V680-HS63 and V680-D1KP52MT	0%	–2%	–5%	–9%	–14%

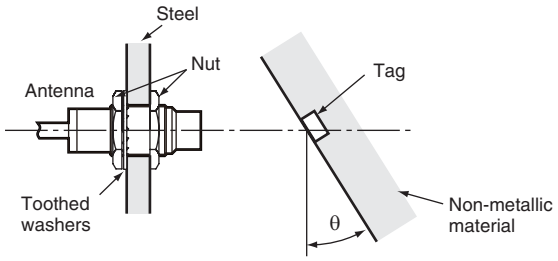
---: Measurement is not possible because Antenna and Tag would strike each other.

▪ Measurement Conditions

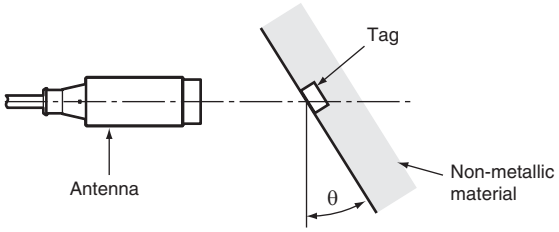
● V680-HS51 and V680-D1KP52MT



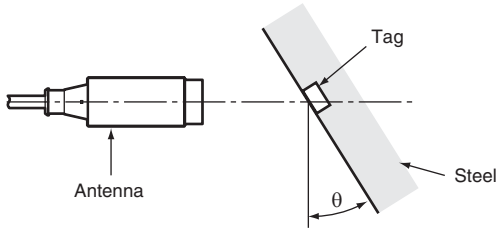
● V680-HS51 and V680-D1KP52MT (Metal on back: Steel)



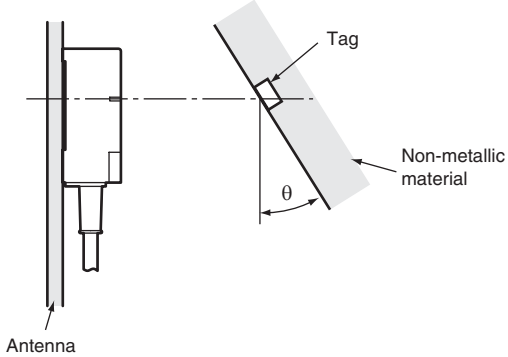
● V680-HS52 and V680-D1KP52MT



● V680-HS52 and V680-D1KP52MT (Metal on back: Steel)



● V680-HS63 and V680-D1KP52MT

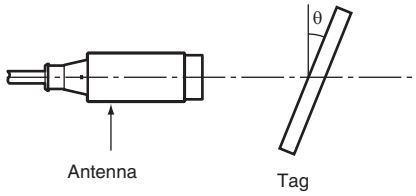


■ Reduction in Communications Distance for V680-D1KP66T Angle

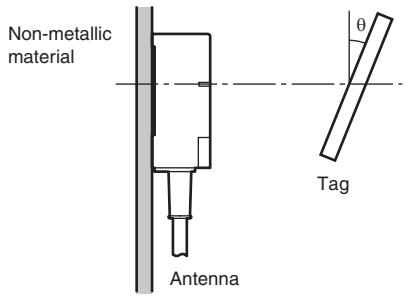
	Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D1KP66T	0%	–1%	–2%	–4%	–7%
V680-HS63 and V680-D1KP66T	0%	–2%	–3%	–5%	–9%
V680-HS65 and V680-D1KP66T	0%	–1%	–3%	–6%	–11%

▪ Measurement Conditions

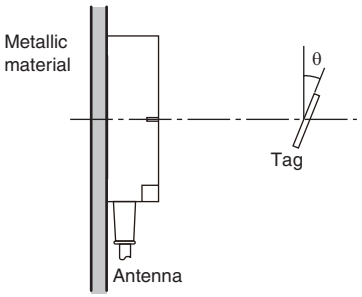
● V680-HS52 and V680-D1KP66T



● V680-HS63 and V680-D1KP66T



● V680-HS65 and V680-D1KP66T



■ Reduction in Communications Distance for V680-D1KP66MT Angle

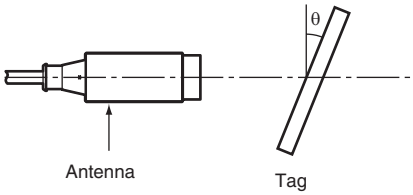
	Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D1KP66MT (Metal on back: Steel)	0%	−1%	−2%	−5%	−9%
V680-HS63 and V680-D1KP66MT (Metal on back: Steel)	0%	−1%	−4%	−7%	−13%
V680-HS65 and V680-D1KP66MT (Metal on back: Steel)	0%	−1%	−6%	−15%	---

---: Measurement is not possible because Antenna and Tag would strike each other.

▪ Measurement Conditions

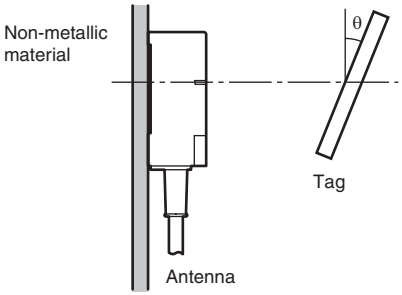
● V680-HS52 and V680-D1KP66MT

(Metal on back: Steel)



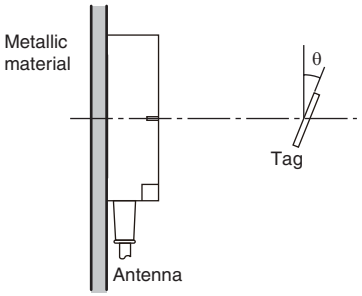
● V680-HS63 and V680-D1KP66MT

(Metal on back: Steel)



● V680-HS65 and V680-D1KP66MT

(Metal on back: Steel)

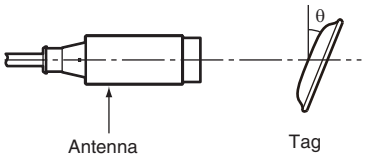


■ Reduction in Communications Distance for V680-D1KP66T-SP Angle

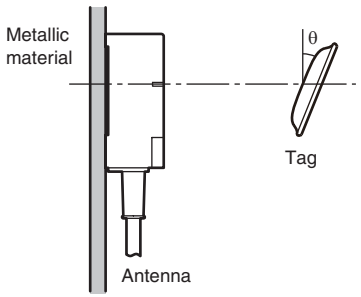
	Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D1KP66T	0%	–1%	–2%	–4%	–7%
V680-HS63 and V680-D1KP66T	0%	–2%	–3%	–5%	–9%
V680-HS65 and V680-D1KP66T	0%	–1%	–3%	–6%	–11%

▪ Measurement Conditions

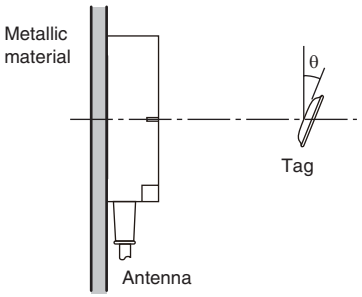
- V680-HS52 and V680-D1KP66T



- V680-HS63 and V680-D1KP66T



- V680-HS65 and V680-D1KP66T



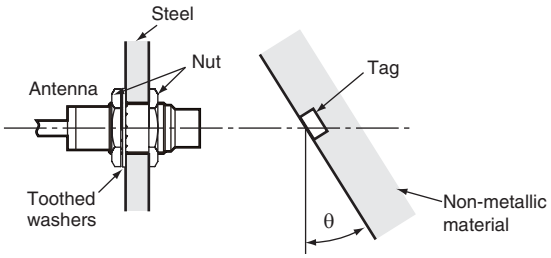
■ Reduction in Communications Distance for V680-D2KF52M Angle

	Tag angle (θ°)				
	0	10	20	30	40
V680-HS51 and V680-D2KF52M	0%	–2%	–6%	-–	–22%
V680-HS51 and V680-D2KF52M (Metal on back: Steel)	0%	0%	0%	–7%	–30%
V680-HS52 and V680-D2KF52M	0%	0%	0%	–2%	–5%
V680-HS52 and V680-D2KF52M (Metal on back: Steel)	0%	–2%	–7%	---	---
V680-HS63 and V680-D2KF52M	0%	0%	–1%	–4%	–9%

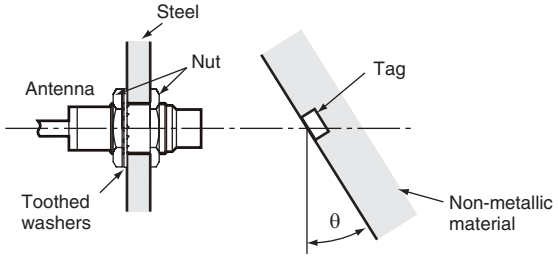
---: Measurement is not possible because Antenna and Tag would strike each other.

▪ Measurement Conditions

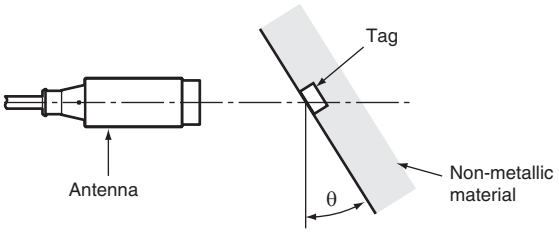
● V680-HS51 and V680-D2KF52M



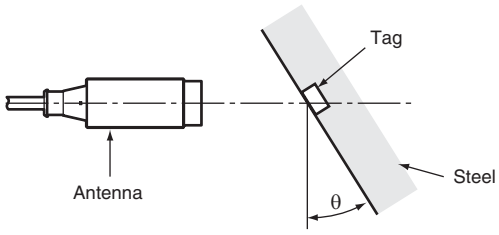
● V680-HS51 and V680-D2KF52M (Metal on back: Steel)



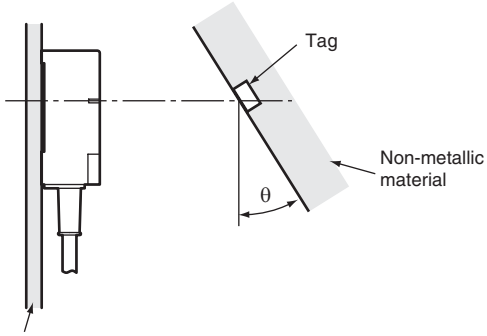
● V680-HS52 and V680-D2KF52M



● V680-HS52 and V680-D2KF52M (Metal on back: Steel)



● V680-HS63 and V680-D2KF52M

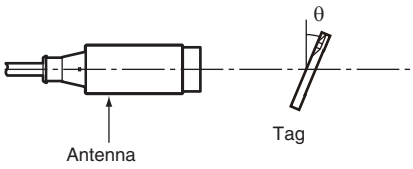


■ Reduction in Communications Distance for V680-D2KF67 Angle

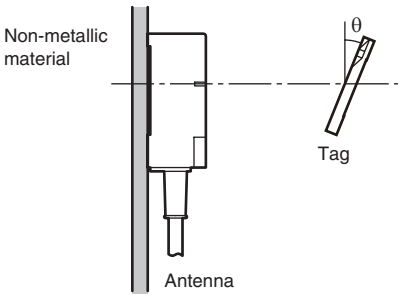
	Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D2KF67	0%	0%	0%	–1%	–2%
V680-HS63 and V680-D2KF67	0%	–1%	–2%	–3%	–6%
V680-HS65 and V680-D2KF67	0%	–1%	–3%	–7%	–11%

▪ Measurement Conditions

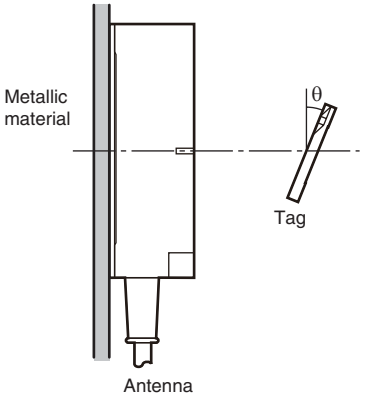
● V680-HS52 and V680-D2KF67



● V680-HS63 and V680-D2KF67



● V680-HS65 and V680-D2KF67



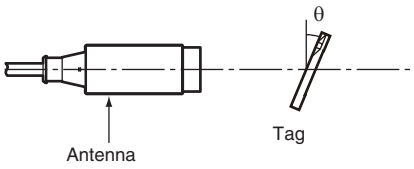
■ Reduction in Communications Distance for V680-D2KF67M Angle

	Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D2KF67M (Metal on back: Steel)	0%	−1%	−2%	−4%	−6%
V680-HS63 and V680-D2KF67M (Metal on back: Steel)	0%	−2%	−5%	−8%	−14%
V680-HS65 and V680-D2KF67M (Metal on back: Steel)	0%	−2%	−7%	−16%	−31%

Measurement Conditions

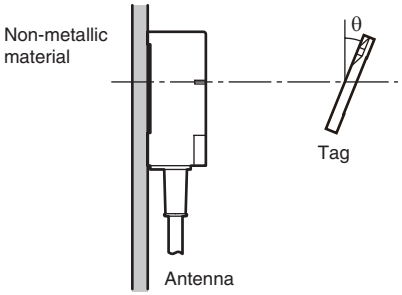
- V680-HS52 and V680-D2KF67M

(Metal on back: Steel)



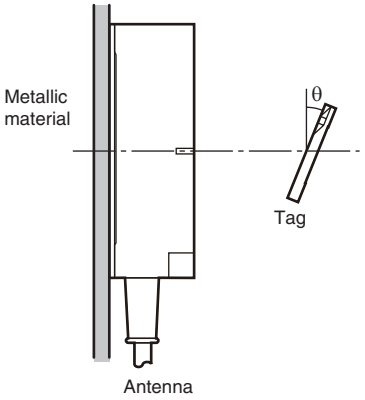
- V680-HS63 and V680-D2KF67M

(Metal on back: Steel)



- V680-HS65 and V680-D2KF67M

(Metal on back: Steel)



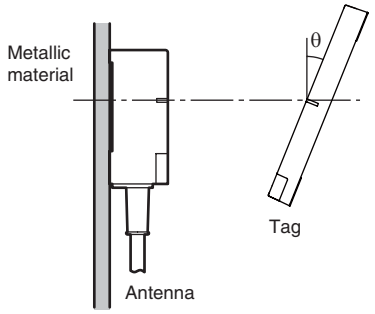
■ Reduction in Communications Distance for V680-D8KF68/-D32KF68

Angle

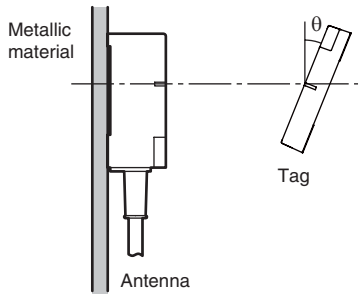
	Tag angle (θ°)				
	0	10	20	30	40
V680-HS63 and V680-D8KF68/-D32KF68 (Horizontal-facing ID Tag)	0%	0%	0%	0%	0%
V680-HS63 and V680-D8KF68/-D32KF68 (Vertical-facing ID Tag)	0%	–1%	–2%	–3%	–5%
V680-HS65 and V680-D8KF68/-D32KF68 (Horizontal-facing ID Tag)	0%	–1%	–2%	–4%	–6%
V680-HS65 and V680-D8KF68/-D32KF68 (Vertical-facing ID Tag)	0%	–1%	–3%	–6%	–10%

Measurement Conditions

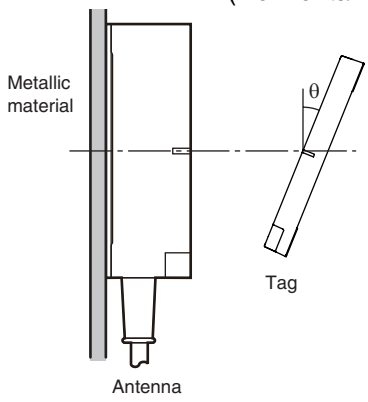
- V680-HS63 and V680-D8KF68/-D32KF68 (Horizontal-facing ID Tag)



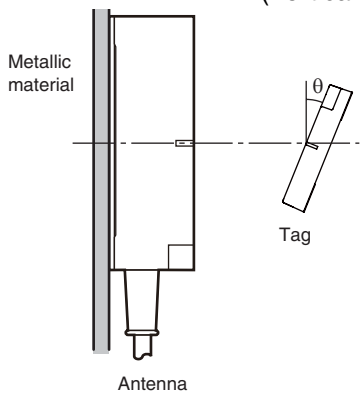
- V680-HS63 and V680-D8KF68/-D32KF68 (Vertical-facing ID Tag)



- V680-HS65 and V680-D8KF68/-D32KF68 (Horizontal-facing ID Tag)



- V680-HS65 and V680-D8KF68/-D32KF68 (Vertical-facing ID Tag)



Multi-vendor Use

■ Connecting a Non-OMRON Configurator

This section describes how to connect OMRON Slaves to a non-OMRON Master.

Do not perform communications with a bit strobe connection for Slaves that have outputs. DeviceNet I/O communications have multiple connection types, such as poll and bit strobe, but for DeviceNet specifications, bit strobe connections are used for inputs only. Following these specifications, OMRON Master Units communicate with output Slaves by using a poll connection.

Some non-OMRON Masters perform communications with output units by using a bit strobe connection. Check the specifications before performing connections when connecting with a non-OMRON Master.

When connecting an OMRON Slave to a non-OMRON Master, it is necessary to install the OMRON Slave's EDS file in the non-OMRON Configurator, and set the Slave data in the Master. (Some non-OMRON Masters can be connected with performing this setting.) In addition to enabling connection to non-OMRON Masters, installing the EDS file in the Configurator also enables setting specific parameters for each Slave by using the Configurator.


CHECK!

If the EDS file cannot be obtained or the non-OMRON Configurator does not support EDS files, you must directly input the connection type and the data size.

Refer to the following devices profiles if more detailed DeviceNet specifications for Slaves are required when registering the scan list.

■ Device Profiles

General data	Applicable DeviceNet specifications	Volume 1 Edition 3.1 Volume 3 Edition 1.3	
	Vendor name	OMRON Corporation	Vendor ID = 47
	Device profile name	Slave: Generic	Profile number = 0
	Product catalog number	Manual number	
	Product revision	2.1	
Physical conformance data	Network power consumption	24 VDC, 40 mA max.	
	Connector type	Open flag	
	Physical layer insulation	Yes	
	Support indicator	Module Network	
	MAC ID setting	Set with software or rotary switches (software setting numbers 64 to 99)	
	Default MAC ID	0	
	Transmission baud rate setting	No (baud rate recognized automatically)	
	Supported transmission baud rates	125, 250, or 500 kbps	
Communications data	Predefined Master/Slave connection set	Group 2 only server	
	Dynamic connection support (UCOMM)	No	
	Explicit message fragmentation support	Yes	

■ Object Implementation

▪ Identity Object (0 × 01)

Object class	Attribute	Not supported
	Service	Not supported

		ID	Description	GET	SET	Value (hex)
Object instance	Attribute	1	Vender	○	×	47
		2	Product type	○	×	0
		3	Product code	○	×	208
		4	Revision	○	×	2,1
		5	Status (Bits Supported)	○	×	bit 0 only
		6	Serial number	○	×	per Unit
		7	Product name	○	×	V680-HAM42*1
		8	State	×	×	
	Service	DeviceNet service		Parameter option		
		05Hex	Reset	No		
		0EHex	Get_Attribute_Single	No		

*1 The number of characters to be registered is limited, so “-DRT” is omitted.

▪ Message Router Object (0 × 02)

Object class	Attribute	Not supported
	Service	Not supported
Object instance	Attribute	Not supported
	Service	Not supported
Addition of vender-specific specifications		No

▪ DeviceNet Object (0 × 03)

		ID	Description	GET	SET	Value (hex)
Object class	Attribute	1	Revision	○	×	02
	Service	DeviceNet service		Parameter option		
		0EHex	Get_Attribute_Single	No		

Object instance	Attribute	ID	Description	GET	SET	Value (hex)
		1	MAC ID	○	×	
		2	Baud rate	○	×	
		3	BOI	○	×	00
		4	Bus off counter	○	×	
		5	Allocation information	○	×	
		6	MAC ID switch changed	○	×	
		7	Baud rate switch changed	×	×	
		8	MAC ID switch value	○	×	
		9	Baud rate switch value	×	×	
	Service	DeviceNet service		Parameter option		
		0EHex		No		
		10Hex		No		
		4BHex		No		
		4CHex		No		

▪ Assembly Object (0 × 04)

Object class	Attribute	Not supported
	Service	Not supported

Object instance **	Section	Data		Maximum number of instances		
	Instance type	Static I/O		1		
	Attribute	Description		GET	SET	Value (hex)
		1	Number of Members in List	○	×	
		2	Member List	○	×	
		3	Data	○	×	00
	Service	DeviceNet service		Parameter option		
		0EHex	Get_Attribute_Single	No		
		10Hex	Set_Attribute_Single	No		

** OUT: Instance 100, IN: Instance 101

▪ Connection Object (0 × 05)

Object class	Attribute	Not supported
	Service	Not supported
	Maximum number of active connections	1

Object instance1	Section	Data		Maximum number of instances		
	Instance type	Explicit Message		1		
	Production trigger	Cyclic				
	Transport type	Server				
	Transport class	3				
	Attribute	ID	Description	GET	SET	Value (hex)
		1	State	○	×	
		2	Instance type	○	×	00
		3	Transport class trigger	○	×	83
		4	Produced connection ID	○	×	---
		5	Consumed connection ID	○	×	---
		6	Initial comm characteristics	○	×	21
		7	Produced connection size	○	×	F
		8	Consumed connection size	○	×	FE
		9	Expected packet rate	○	×	
		12	Watchdog time-out action	○	×	01
		13	Produced connection path length	○	×	0000
		14	Produced connection path	○	×	
		15	Consumed connection length	○	×	0000
		16	Consumed connection path length	○	×	
		17	Production inhibit time	○	×	0000
	Service	DeviceNet service		Parameter option		
		05ex	Reset	No		
		0EHex	Get_Attribute_Single	No		
		10Hex	Set_Attribute_Single	No		

Object instance2	Section	Data		Maximum number of instances		
	Instance type	Polled I/O		1		
	Production trigger	Cyclic				
	Transport type	Server				
	Transport class	2				
	Attribute	ID	Description	GET	SET	Value (hex)
		1	State	○	×	
		2	Instance type	○	×	00
		3	Transport class trigger	○	×	82
		4	Produced connection ID	○	×	---
		5	Consumed connection ID	○	×	---
		6	Initial comm characteristics	○	×	01
		7	Produced connection size	○	×	040
		8	Consumed connection size	○	×	0400
		9	Expected packet rate	○	×	
		12	Watchdog time-out action	○	×	00
		13	Produced connection path length	○	×	06
		14	Produced connection path	○	×	20,04,24, 64,30,03
		15	Consumed connection length	○	×	06
		16	Consumed connection path length	○	×	20,04,24, 65,30,03
		17	Production inhibit time	○	×	0000
	Service	DeviceNet service		Parameter option		
		05ex	Reset	No		
		0EHex	Get_Attribute_Single	No		
		10Hex	Set_Attribute_Single	No		

Object instance3	Section	Data		Maximum number of instances		
	Instance type	Polled I/O		1		
	Production trigger	Cyclic				
	Transport type	Server				
	Transport class	2				
	Attribute	ID	Description	GET	SET	Value (hex)
		1	State	○	×	
		2	Instance type	○	×	01
		3	Transport class trigger	○	×	82
		4	Produced connection ID	○	×	---
		5	Consumed connection ID	○	×	---
		6	Initial comm characteristics	○	×	02
		7	Produced connection size	○	×	0400
		8	Consumed connection size	○	×	0800
		9	Expected packet rate	○	×	
		12	Watchdog time-out action	○	×	00
		13	Produced connection path length	○	×	06
		14	Produced connection path	○	×	20,04,24, 64,30,03
		15	Consumed connection length	○	×	0000
		16	Consumed connection path length	○	×	---
		17	Production inhibit time	○	×	
	Service	DeviceNet service		Parameter option		
		05ex	Reset	No		
		0EHex	Get_Attribute_Single	No		
		10Hex	Set_Attribute_Single	No		

Chemical Resistance of the Antennas

Applicable Models

V680-HS51 V680-HS52-W/R V680-HS63-W/R V680-HS65-W/R

ABS resin is used for case material and epoxy resin for filling material. Refer to the following lists and do not use chemicals that affect ABS and epoxy resin.

■ Chemicals That Cause Deformations, 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, acetic acid, 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

Note: The above results are from tests conducted a room temperature (23°C). Even if the chemicals do not affect the ABS or epoxy resins at room temperature, they may affect the resins at higher or lower temperatures. Check the chemicals carefully in advance.

Chemical Resistance of Tags

Applicable Models

V680-D1KP52 V680-D2KF52M

PPS resin is used for case material and epoxy resin for filling material. Refer to the following lists and do not use chemicals that affect PPS and epoxy resin.
Tags cannot be used in applications with explosion-proof specifications.

■ Chemicals That Cause Deformations, Cracks, Etc.

PPS resin	Epoxy resin
Aqua regia	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.

PPS resin	Epoxy resin
Nitric acid (60% RT)	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 PPS Resin or Epoxy Resin

PPS resin	Epoxy resin
Hydrochloric acid (37%RT), sulfuric acid (98%RT), nitric acid (40%RT), Hydrogen fluoride solution (40%RT), chromic acid (40%RT), hydrogen peroxide (28%RT), sodium hydroxide solution (60%RT), ammonia solution (28%RT), sodium chloride (10%RT), sodium carbonate (20%RT), sodium hypochlorite, phenol solution (5%RT), glacial acetic acid, acetic acid, oleic acid, Methyl alcohol (95%RT), ethyl alcohol (95%RT), Ethyl acetate, sebacic acid, diethylhexyl, acetone, diethyl ether, n-heptane, 2-2-4 trimethylpentane, benzine, toluene, aniline, mineral oil, gasoline, insulating oil, dichloroethylene, carbon tetrachloride	Ammonia, hydrochloric acid (10% RT), potassium hydroxide, petroleum, gasoline, Yushiroken S50, Chemi-Cool Z, Velocity No. 3, Yushiroken EEE-30Y, methyl ethyl ketone, sodium hydroxide (10%RT)

Note: The above results are from tests conducted a room temperature (23°C). Even if the chemicals do not affect the PPS or epoxy resins at room temperature, they may affect the resins at higher or lower temperatures. Check the chemicals carefully in advance.

Applicable Models

V680-D1KP66T/MT

Chemical		At room temperature	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

Chemical		At room temperature	90°C
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.

CHECK!

The above table shows the extent of changes in PPS resin 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 under the actual conditions in which the Tags are to be used.

Applicable Model

V680-D1KP66T-SP

PFA is used for the V680-D1KP66T-SP ID Tag coating.
Refer to the following materials and check the characteristics before using them.

■ Chemical Resistance of PFA Fluororesin (Reference Material)

PFA: Tetrafluorethylene-Perfluoroalkylvinyletheir copolymer

PFA fluororesin is non-reactive to most chemicals.
It reacts to alkaline metals in the melted state, F2 (fluorine) under high temperature and high pressure, and some halogen derivatives.
The results testing by immersing the PFA material in commonly used organic and inorganic chemicals are shown below. This testing involves placing a compression molded test piece (1.3 mm thickness) in the chemicals at room temperature for one week (168 hours), then removing it to measure the change in weight, tensile strength, and stretch. If the change in tensile strength is less than 15%, elasticity is less than 10%, and weight is less than 0.5%, the effect is considered minimal.
When fluids that wet the resin surface, such as trichloroacetic acid, Tri-n-butylamine hydrofluoride, perchloroethylene, and carbon tetrachloride, are applied at high temperatures, it is likely that the PFA will increase weight by absorption and lose its tensile strength. Even if chemicals that are solvents are absorbed, the molecular structure will not change. If the PFA is subject to deformation at high temperatures, deformation at high pressures, or other physical damage, the absorbed chemicals will repeatedly expand and contract within the PFA, causing physical defects such as cracks or blistering. However, these are problems that are likely to occur with any type of plastic.

▪ Inorganic Chemicals

Chemical	Test temperature (°C)	Residual characteristic (%)		Weight gain (%)
		Tensile strength	Stretch	
Concentrated hydrochloric acid	120	98	100	0.0
Concentrated sulfuric acid	120	95	98	0.0
Hydrofluoric acid (60%RT)	23	99	99	0.0
Fuming sulfuric acid	23	95	96	0.0
Aqua regia	120	99	100	0.0
Chromic acid (50% RT)	120	93	97	0.0
Concentrated nitric acid	120	95	98	0.0
Fuming nitric acid	23	99	99	0.0
66	98	100	100	0.0
Caustic soda (50% RT)	120	93	99	0.4
Hydrogen peroxide solution (30% RT)	23	93	95	0.0
Bromine	23	99	100	0.0
Chlorine	120	92	100	0.5
Ferrous chloride (25% RT)	100	93	98	0.0
Zinc chloride (25% RT)	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	Test temperature (°C)	Residual characteristic (%)		Weight gain (%)
		Tensile strength	Stretch	
Water-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	0.6
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: Satokawa Takaomi, Fluoro-resin Handbook, Nikkan Kogyo Shimbun Ltd.

■ Substances Extracted from Tag (Reference)

If chemicals penetrate through PFA into the Tag (V680-D1KP66T) built into the V680-D1KP66T-SP, ions may be extracted from the Tag.

- **Results of Ion-exchange Chromatography**

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

Extracted Ions (Concentration)

Cl: 0.5 ppm, Na^+: 10 ppm, NH_4^+: 11 ppm, K^+: 1.0 ppm

- **Results of ICP Emission Spectral Analysis**

The V680-D1KP66T-SP Tag 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

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

Applicable Models

V680-D2KF67/67M

Chemicals that affect Tags are shown below.
ABS resin is used for case material and epoxy resin for filling material. Refer to the following lists and do not use chemicals that affect ABS and epoxy resin.
Tags cannot be used in applications with explosion-proof specifications.

■ Chemicals That Cause Deformations, 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, acetic acid, 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

Note: The above results are from tests conducted a room temperature (23°C). Even if the chemicals do not affect the ABS or epoxy resins at room temperature, they may affect the resins at higher or lower temperatures. Check the chemicals carefully in advance.

Applicable Models

V680-D8KF68/D32KF68

Chemicals that affect Tags are shown below.
Polybutylene terephthalate (PBT) resin is used for case material and epoxy resin for filling material.
Refer to the following lists and do not use chemicals that affect PBT and epoxy resins.
Tags cannot be used in applications with explosion-proof specifications.

■ Chemicals That Cause Deformations, Cracks, Etc.

PBT resin	Epoxy resin
Acetone, trichloroethylene, ethylene dichloride, sodium hydroxide, and other alkaline substances	Aqua regia, chromic acid, sulfuric acid (90% RT), nitric acid (60% RT), liquid ammonia, acetone, methylene chloride, phenol

■ Chemicals That May Cause Discoloration, Swelling, Etc.

PBT resin	Epoxy resin
Hydrochloric acid (10% RT), acetic acid (5% RT), benzene	Sulfuric acid (10% RT), nitric acid (10% RT), concentrated hydrochloric acid, acetic acid (50% RT), nitric acid, calcium hydroxide, benzene, cresol, alcohol, microhexanon, toluene, xylene, benzene, grease

■ Chemicals that Do Not Affect PPS Resin or Epoxy Resin

PBT resin	Epoxy resin
Nitric acid (30% RT), concentrated hydrochloric acid, acetic acid, ethyl acetate (100% RT), potassium permaganate (5% RH), ethyl acetate, carbon tetrachloride, methanol, ethanol, gasoline	Ammonia, hydrochloric acid (10% RT), calcium hydroxide, petroleum, gasoline, Yushiroken S50, Chemi-cool Z, Velocity No. 3, Yushiroken EEE-30Y, methyl ethyl ketone, sodium hydroxide

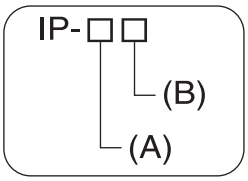
Note: The above results are from tests conducted at room temperature (23°C). Even if the chemicals do not affect the PPS or epoxy resins at room temperature, they may affect the resins at higher or lower temperatures. Check the chemicals carefully in advance.

MEMO

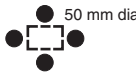
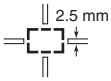
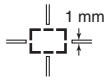
Degree of Protection

Ingress protection degrees (IP-□□) are determined by the following tests. Be sure to check the sealing capability under the actual operating environment and conditions before actual use.

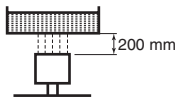
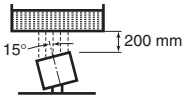
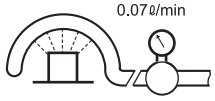
■ IEC (International Electrotechnical Commission) IEC 60529:1989-11

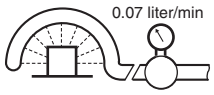
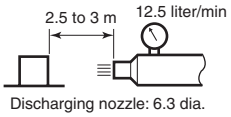
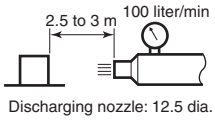
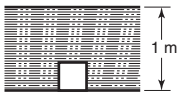


(A) First Digit: Degree of Protection from Solid Materials

Degree	Protection	
0		No protection
1		Protects against penetration of any solid object such as a hand that is 50 mm or more in diameter.
2		Protects against penetration of any solid object, such as a finger, that is 12.5 mm or more in diameter. Even if finger or other object 12 mm in diameter penetrates, it will not reach a hazardous part.
3		Protects against penetration of any solid object, such as a wire, that is 2.5 mm or more in diameter.
4		Protects against penetration of any solid object, such as a wire, that is 1 mm or more in diameter.
5		Protects against penetration of dust of a quantity that may cause malfunction or obstruct the safe operation of the product.
6		Protects against penetration of all dust.

(B) Second Digit: Degree of Protection Against Water

Degree	Protection		Test method (with pure water)
0	No protection	Not protected against water.	No test
1	Protection against water drops 	Protects against vertical drops of water towards the product.	Water is dropped vertically towards the product from the test machine for 10 min. 
2	Protection against water drop 	Protects against drops of water approaching at a maximum angle of 15° to the left, right, back, and front from vertical towards the product.	Water is dropped for 2.5 min each (i.e., 10 min in total) towards the product inclined 15° to the left, right, back, and front from the test machine. 
3	Protection against sprinkled water 	Protects against sprinkled water approaching at a maximum angle of 60° from vertical towards the product.	Water is sprinkled for 10 min at a maximum angle of 60° to the left and right from vertical from the test machine. 

Degree	Protection		Test method (with pure water)
4	Protection against water spray 	Protects against water spray approaching at any angle towards the product.	Water is sprayed at any angle towards the product for 10 min from the test machine. 
5	Protection against water jet spray 	Protects against water jet spray approaching at any angle towards the product.	Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. 
6	Protection against high pressure water jet spray 	Protects against high-pressure water jet spray approaching at any angle towards the product.	Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. 
7	Protection underwater 	Resists the penetration of water when the product is placed underwater at specified pressure for a specified time.	The product is placed 1 m deep in water (if the product is 850 mm max. in height) for 30 min. 
8	Protection underwater 	Can be used continuously underwater.	The test method is determined by the manufacturer and user.

■ Oil resistance (OMRON in-house standard)

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

Note: This OMRON in-house standard confirms resistance to cutting and other oils. It is equivalent to the former JEM standard.

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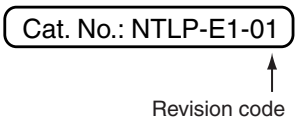
Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and rear pages.



Revision code	Date	Revised contents
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