OMRON

Machine Automation Controller

NX-series

RFID Units

User's Manual

NX-V680C□

RFID Units

SYSMAC always in control

Z401-E1-03

NOTE

Trademarks

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Introduction

Thank you for purchasing an NX-V680C□ RFID Unit. This manual contains information that is necessary to use the NX-series RFID Unit. Please read this manual and make sure you understand the functionality and performance of the NX-series RFID Unit before you attempt to use it in a control system. Keep this manual in a safe place where it will be available for reference during operation.

Intended Audience

This manual covers the following product. This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and maintaining FA systems.
- Personnel in charge of managing FA systems and facilities.

For programming, this manual is intended for personnel who understand the programming language specifications in international standard IEC 61131-3 or Japanese standard JIS B 3503.

Applicable Products

This manual covers the following product.

- NX-series RFID Unit
  NX-V680C□

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Relevant Manuals

The table below provides the relevant manuals for the NX-series RFID Units. Read all of the manuals that are relevant to your system configuration and application to make the most of the NX-series RFID Units. Other manuals, such as related product manuals, are necessary for specific system configurations and applications.

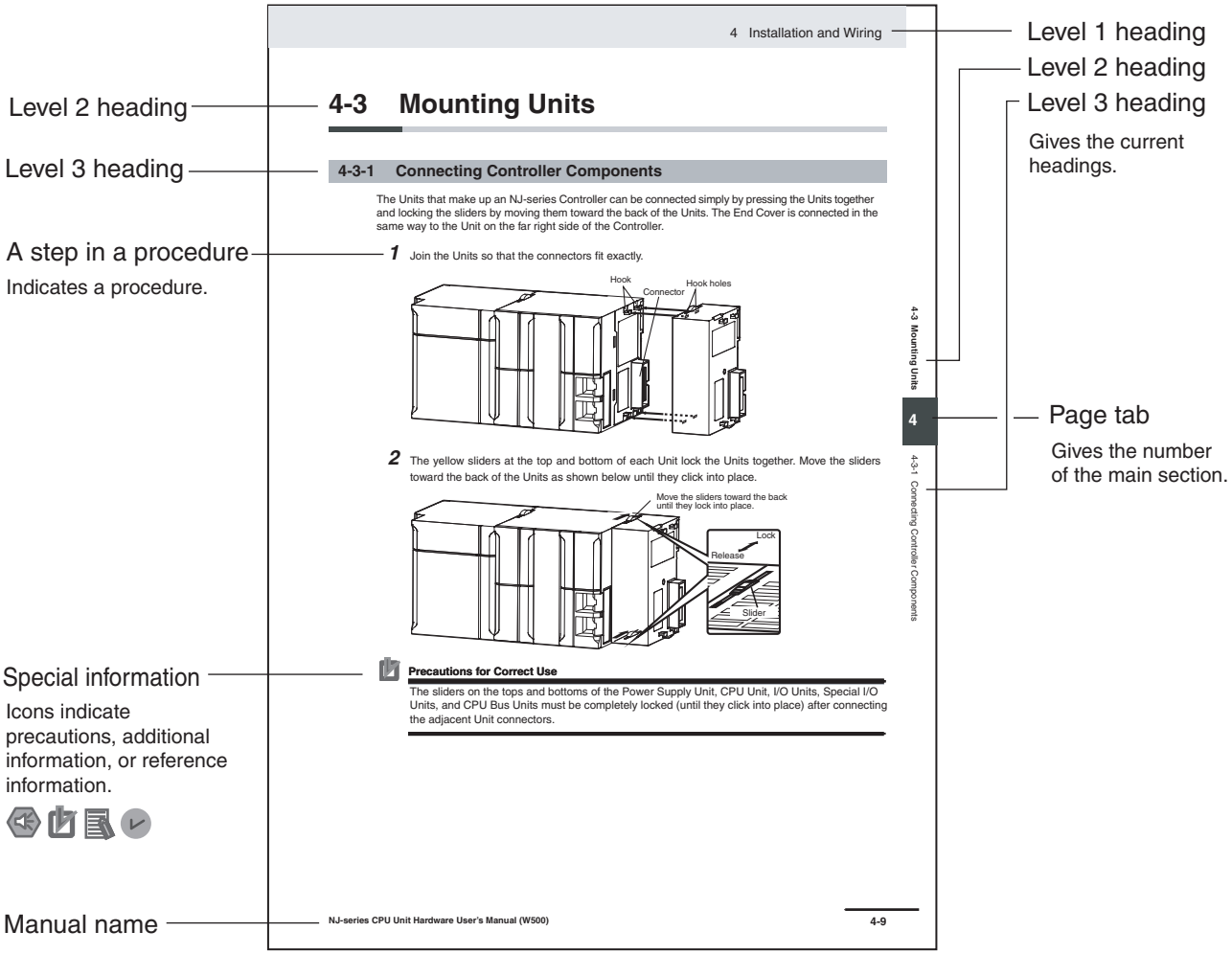
Refer to *Related Manuals* on page 28 for the related manuals.

Manual name	Application
NX-series RFID Units User's Manual	Learning how to use NX-series RFID Units.
NX-series Data Reference Manual	Referencing lists of the data that is required to configure systems with NX-series Units

Manual Structure

Page Structure and Icons

The following page structure and icons are used in this manual.



Note: This illustration is provided only as a sample. It may not literally appear in this manual.

Special Information

Special information in this manual is classified as follows:

Precautions for Safe Use

Precautions on what to do and what not to do to ensure safe usage of the product.

Precautions for Correct Use

Precautions on what to do and what not to do to ensure proper operation and performance.

Additional Information

Additional information to read as required.

This information is provided to increase understanding or make operation easier.

Version Information

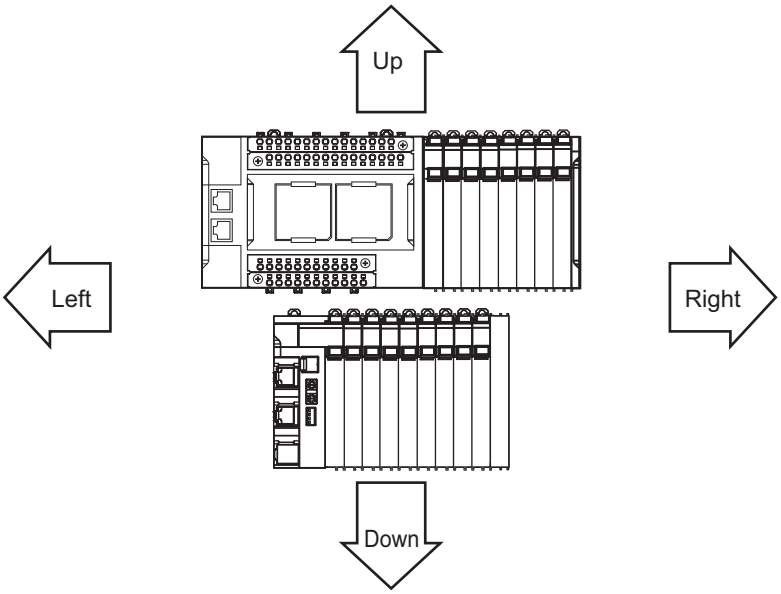
Information on differences in specifications and functionality for CPU Units, Industrial PCs, and Communications Coupler Units with different unit versions and for different versions of the Support Software is given.

Note

References are provided to more detailed or related information.

Precaution on Terminology

- In this manual, “download” refers to transferring data from the Support Software to a physical device and “upload” refers to transferring data from a physical device to the Support Software.
- In this manual, the directions in relation to the Units are given in the following figure, which shows upright installation.



- This user's manual refers to NY-series IPC Machine Controller Industrial Panel PCs and Industrial Box PCs as simply Industrial PCs or as NY-series Industrial PCs.
- This user's manual refers to the built-in EtherCAT port on an NJ/NX-series Controller or NY-series Industrial PC as simply a built-in EtherCAT port.
- This user's manual may omit manual names and manual numbers in places that refer to the user's manuals for CPU Units and Industrial PCs. The following table gives some examples. *Related Manuals* on page 28When necessary, refer to determine the appropriate manual based on the common text for the omitted contents.

  Examples

Manual name	Omitted contents	Common text
NJ/NX-series CPU Unit Software User's Manual	Software user's manual for the connected CPU Unit or Industrial PC	Software User's Manual
NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual		
NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual	User's manual for the built-in EtherCAT port on the connected CPU Unit or Industrial PC	Built-in EtherCAT port
NY-series Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT® Port User's Manual		

- This user's manual may omit manual names and manual numbers in places that refer to the user's manuals for Communications Coupler Units. If you will use a Communications Coupler Unit, refer to *Related Manuals* on page 28 to identify the manual for your Unit.
- This user's manual omits the "x" sign for units displayed in decimals. For example, "x0.1°C" is described as "0.1°C".

Terms and Conditions Agreement

Warranty, Limitations of Liability

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NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part 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 part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of the NX-series RFID Units.

The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

The following notation is used.

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

Symbols

	The circle and slash symbol indicates operations that you must not do. The specific operation is shown in the circle and explained in text. This example indicates prohibiting disassembly.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.
	The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.

Warnings

⚠ WARNING

During Power Supply

Do not touch the terminal section while power is ON.

Electrical shock may occur.

Do not disassemble any of the Unit.

Particularly the Power Supply Units contain parts with high voltages when power is ON or immediately after power is turned OFF. Electrical shock may occur. There are sharp parts inside the Unit that may cause injury.

Fail-safe Measures

Provide safety measures in external circuits to ensure safety in the system if an abnormality occurs due to malfunction of the CPU Unit, Industrial PC, other Units, or slaves or due to other external factors affecting operation.

Not doing so may result in serious accidents due to incorrect peration.

Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.

The CPU Unit or Industrial PCs will turn OFF all outputs from Output Units in the following cases. The remote I/O slaves will operate according to the settings in the slaves.

- If an error occurs in the power supply.
- If the power supply connection becomes faulty.
- If a CPU watchdog timer error or CPU reset occurs.
- If a Controller error in the major fault level occurs.
- While the CPU Unit is on standby until RUN mode is entered after the power is turned ON

External safety measures must be provided to ensure safe operation of the system in such cases.

The outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safe operation of the system.

If external power supplies for slaves or other devices are overloaded or short-circuited, the voltage will drop, outputs will turn OFF, and the system may be unable to read inputs. Provide external safety measures in control with monitoring of external power supply voltage as required so that the system operates safely in such a case.

You must take fail-safe measures to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.

Not doing so may result in serious accidents due to incorrect operation.

Voltage and Current Inputs

Make sure that the voltages and currents that are input to the Units and slaves are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

Transferring

Always confirm safety at the destination node before you transfer Unit configuration information, parameters, settings, or other data from tools such as the Sysmac Studio.

The devices or machines may operate unexpectedly, regardless of the operating mode of the Controller.

Cautions

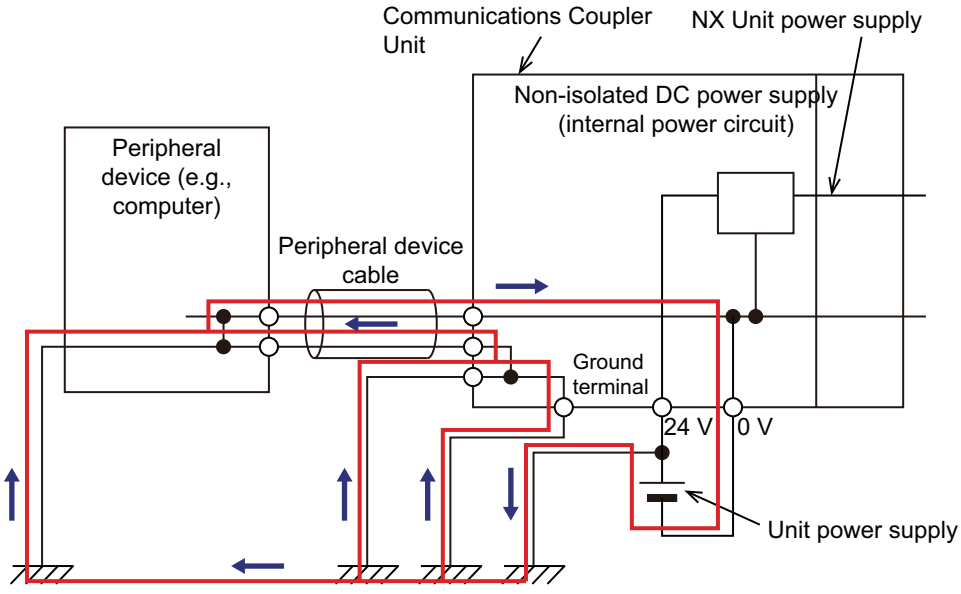
⚠ Caution

Wiring

When you connect a computer or other peripheral device to a Communications Coupler Unit that has a non-isolated DC power supply, either ground the 0-V side of the external power supply (i.e. Unit power supply) or do not ground it at all.

If the peripheral devices are grounded incorrectly, the external power supply (i.e. Unit power supply) may be short-circuited.

Never ground the 24-V side of the power supply, as shown in the following figure.



Online Editing

Execute online editing only after confirming that no adverse effects will be caused by deviations in the timing of I/O. If you perform online editing, the task execution time may exceed the task period, I/O may not be refreshed with external devices, input signals may not be read, and output timing may change.

Precautions for Safe Use

Transporting

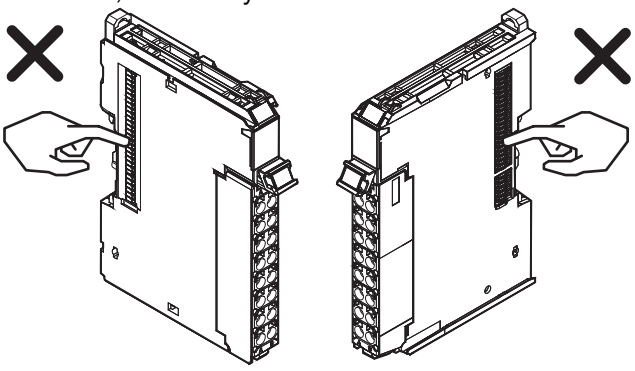
- When transporting any Unit, use the special packing box for it.
  Also, do not subject the Unit to excessive vibration or shock during transportation.
- Do not drop any Unit or subject it to abnormal vibration or shock.
  Doing so may result in Unit malfunction or burning.

Mounting

- Mount connectors only after checking the mounting location carefully.
  Be sure that items with locking devices are properly locked into place.

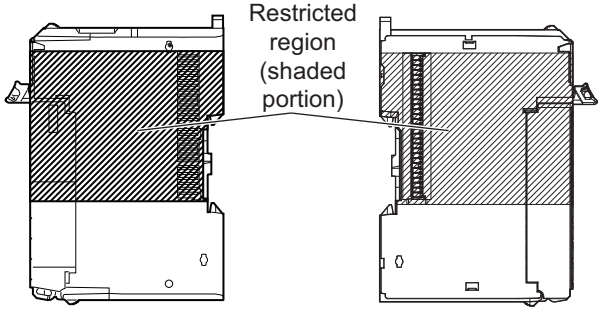
Installation

- Always turn OFF the power supply before installing the Unit. If the power supply is not OFF, the Unit may malfunction or may be damaged.
- Always turn OFF the Unit power supply and I/O power supply before you remove the NX Unit.
- Do not apply labels or tape to the Unit. Adhesive material or dust may adhere to the terminals of the NX bus connector when mounting or removing the Unit, which may result in malfunction.
- Do not touch the pins in the NX bus connector on the Unit. Dirt may adhere to the pins in the NX bus connector, which may result in malfunctions.

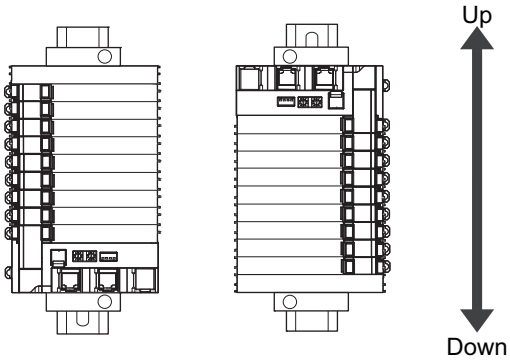


Example: NX Unit (12 mm width)

- Do not write on an NX Unit with ink within the restricted region that is shown in the following figure. Also do not get this area dirty. When the Unit is installed or removed, ink or dirt may adhere to the pins in the NX bus connector, which may result in malfunctions in the CPU Rack or Slave Terminal. Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for the restricted region of CPU Unit and Communications Coupler Unit.

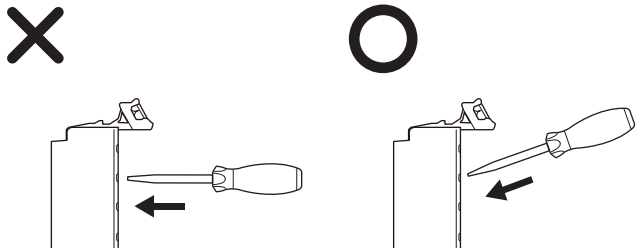


- For the installation orientations in the following figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured to the DIN Track, which may result in malfunctions.

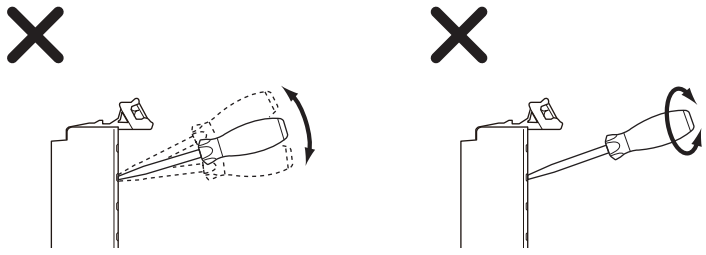


Wiring

- Double-check all switches and other settings and double-check all wiring to make sure that they are correct before turning ON the power supply.
  Use the correct wiring parts and tools when you wire the system.
- Do not pull on the cables or bend the cables beyond their natural limit. Also, do not place heavy objects on top of the cables or other wiring lines. Doing so will damage the cable.
- When wiring or installing the Units, do not allow metal fragments to enter the Units.
- Do not press the flat-blade screwdriver straight into the release hole of the FG terminal. Doing so may damage the terminal block.



- When you insert a flat-blade screwdriver into a release hole of the FG terminal block, press it down with a force of 30 N or less. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole of the FG terminal block. Doing so may damage the terminal block.



- Ground the FG terminal on the power supply to 100 Ω or less. Otherwise, performance may deteriorate.

Power Supply Design

- Use all Units within the I/O power supply ranges that are given in the specifications.
- For CPU Racks of NX-series CPU Units, the I/O power supply current should be less than or equal to the value specified for each type of CPU Unit. For example for an NX1P2 CPU Unit, the current consumption should be 4 A or less. Malfunction or damage may result in if any current outside the specification range is used. Refer to the user's manual of the CPU Unit to be connected for the I/O power supply current for each type of CPU Unit.
- Supply sufficient power according to the contents of this manual.
- Use the power supply voltage that is specified in this manual.
- Do not apply voltages that exceed the rated value to any Input Unit.
- Do not apply voltages or connect loads to the Output Units or slaves in excess of the maximum ratings.
- Inrush current occurs when the power supply is turned ON. When selecting fuses or breakers for external circuits, consider their fusing and detection characteristics as well as the above precautions and allow sufficient margin in shut-off performance.
- Install external breakers and take other safety measures against short-circuiting and overcurrents in external wiring.

Turning ON the Power Supply

- When you set the Operating Mode at Startup, confirm that no adverse effect will occur in the system.

Actual Operation

- Before you start operation, always register the NX Units that are connected to the Communications Coupler Unit in the host communications master as the Unit Configuration Information.
- Check the user program, data, and parameter settings for proper execution before you use them for actual operation.
- If you change the fail-soft operation setting, the output status when the error occurs may also change. Confirm safety before you change the fail-soft operation setting.
- If you use fail-soft operation, write programming to determine whether Unit I/O data is valid. Without such programming, the user program cannot distinguish between Units for which I/O refreshing is continued and Units for which I/O refreshing is stopped.

Turning OFF the Power Supply

- Do not disconnect the cable or turn OFF the power supply to the Controller or a Slave Terminal when downloading data or the user program from the Support Software.
- Always turn OFF the external power supply to the Units before attempting any of the following.

  Mounting or removing an NX Unit, Communications Coupler Unit, CPU Unit, or Industrial PC

  Assembling Units

  Connecting or wiring cables

  Attaching or removing connectors

  Units that supply power continue to supply power to the Units for up to several seconds after the power supply is turned OFF. The PWR indicator remains lit as long as power is supplied. Confirm that the PWR indicator is not lit before you perform any of the above.

Operation

- Confirm that the controlled system will not be adversely affected before you perform any of the following operations.

  Changing the operating mode of the CPU Unit or the Industrial PC (including changing the setting of the Operating Mode at Startup)

  Changing the user program or settings

  Changing set values or present values

  Forced refreshing
- Always sufficiently check the safety at the connected devices before you change the settings of a slave or Unit and restart them.
- If you transfer parameters for Unit operation settings that are updated when the Unit is restarted after the settings are changed on the Sysmac Studio, the Unit will be restarted after the transfer is completed. Always sufficiently check the safety at the connected devices before you transfer the Unit operation settings.

General Communications

- Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.
- Refer to the user's manual for the Communications Coupler Unit for precautions for the safe use of communications with the connected Communications Coupler Unit.

Unit Replacement

- When you replace a Unit, start operation only after you transfer the settings and variables that are required for operation to the new Unit.

Disposal

- Dispose of the product according to local ordinances as they apply.

Precautions for Correct Use

Storage, Mounting, and Wiring

- Follow the instructions in this manual to correctly perform installation and wiring.
- Do not operate or store the Units in the following locations. Doing so may result in malfunction, in operation stopping, or in burning.

  Locations subject to direct sunlight

  Locations subject to temperatures or humidity outside the range specified in the specifications

  Locations subject to condensation as the result of severe changes in temperature

  Locations subject to corrosive or flammable gases

  Locations subject to dust (especially iron dust) or salts

  Locations subject to exposure to water, oil, or chemicals.

  Locations subject to shock or vibration
- Take appropriate and sufficient countermeasures when installing the Controller in the following locations.

  Locations subject to strong, high-frequency noise

  Locations subject to static electricity or other forms of noise

  Locations subject to strong electromagnetic fields

  Locations subject to possible exposure to radioactivity

  Locations close to power supplies.
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up.
- Use the rated power supply voltage for the Units that supply power. Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied in places where the power supply is unstable.
- Install the Units away from sources of heat and ensure proper ventilation. Not doing so may result in malfunction, in operation stopping, or in burning.
- Do not allow foreign matter to enter the openings in the Unit. Doing so may result in Unit burning, electric shock, or failure.

Actual Operation

- If you change the event level of an error, the output status when the error occurs may also change. Confirm safety before you change an event level.

Turning OFF the Power Supply

- Do not turn OFF the power supply while data is being transferred.
- Do not turn OFF the power supply while parameters are being written to the CPU Unit, the Communications Coupler Unit or NX Units.

General Communications

- Refer to the user's manual for the Communications Coupler Unit for precautions for the correct use of communications with the connected Communications Coupler Unit.

Regulations and Standards

Conformance to EU Directives

Applicable Directives

- EMC Directives
- Low Voltage Directive

Concepts

● EMC Directives

OMRON devices that comply with EU Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards.*1

Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer. EMC-related performance of the OMRON devices that comply with EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

*1. Applicable EMC (Electromagnetic Compatibility) standards are as follows:
EMS (Electromagnetic Susceptibility): EN 61131-2
EMI (Electromagnetic Interference): EN 61131-2 (Radiated emission: 10-m regulations).

● Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC meet the required safety standards. The applicable directive is EN 61010-2-201.

● Conformance to EU Directives

The NX-series Units comply with EU Directives. To ensure that the machine or device in which the NX-series Units are used complies with EU Directives, the following precautions must be observed.

- The NX-series Units must be installed within a control panel.
- You must use SELV power supply for the DC power supplies that are connected as the Unit power supplies and I/O power supplies for the NX-series Units.

Compliance with the EMC standard has been confirmed using the recommended Power Supplies. Refer to the user's manual for the connected CPU Unit for information on the recommended Power Supplies for a CPU Rack with an NX-series CPU Unit. We recommend that you use the OMRON S8VK-S Series Power Supplies to connect an RFID Unit on a Slave Terminal.

- NX-series Units that comply with EU Directives also conform to the Common Emission Standard (EN 61131-2). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions.

  You must therefore confirm that the overall machine or equipment in which the NX-series Units are used complies with EU Directives.
- You must use power supplies with an output hold time of 10 ms or longer for the DC power supplies that are connected as the Unit power supplies and I/O power supplies for the NX-series Units.

- This is a Class A product (for industrial environments). In a residential environment, it may cause radio interference. If radio interference occurs, the user may be required to take appropriate measures.

Conformance to UL and CSA Standards

Some NX-series products comply with UL and CSA standards. If you use an NX-series product that complies with UL or CSA standards and the machinery or system in which you use the NX-series product must also comply with the standards, refer to the Instruction Sheet that is provided with the product. The Instruction Sheet provides the application conditions for complying with the standards.

Conformance to KC Standards

Observe the following precaution if you use NX-series Unit in Korea.

사 용 자 안 내 문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

This device is conformity evaluated for business use.

When used in home, there is a risk of radio interference.

Unit version

This section describes the notation that is used for unit versions, the confirmation method for unit versions, and the relationship between unit versions and Support Software versions.

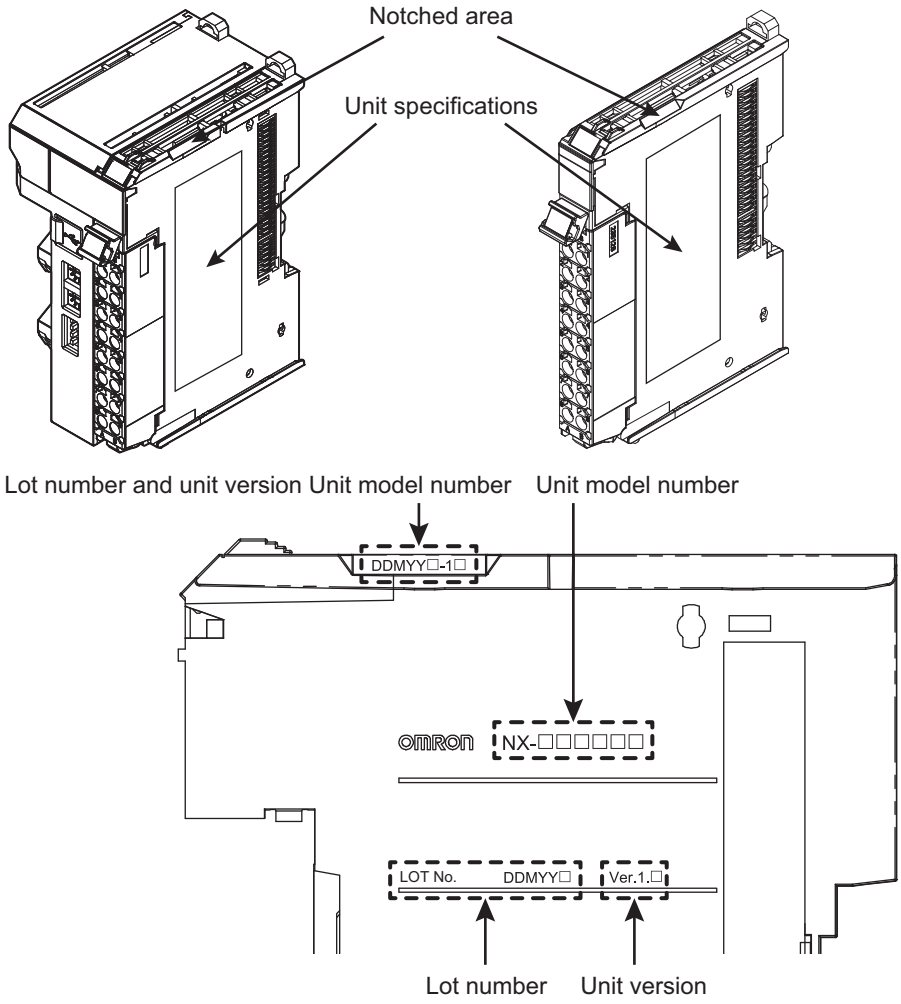
Unit Versions

A “unit version” has been introduced to manage the Units in the NX Series according to differences in functionality accompanying Unit upgrades.

An example is provided below for Slave Terminals. For the notation that is used for the unit versions of CPU Units or Industrial PCs and the confirmation method for unit versions, refer to the user's manual for each Unit.

Notation of Unit Versions on Products

The unit version is given with the Unit specifications on the side of the Unit or in the notched area.



The following information is provided in the Unit specifications on the Unit.

Name	Function
Unit model number	Gives the model of the Unit.
Unit version	Gives the unit version of the Unit.
Lot number	Gives the lot number of the Unit. DDMYY□ : Lot number, □: Used by OMRON “M” gives the month (1 to 9: January to September, X: October, Y: November, Z: December)

The following information is provided in the notched area on the Unit.

Name	Function
Lot number and unit version	Gives the lot number and unit version of the Unit. • DDMYY□: Lot number, □: Used by OMRON “M” gives the month (1 to 9: January to September, X: October, Y: November, Z: December) • 1□: Unit version The decimal portion of the unit version is omitted. (It is provided in the Unit specifications.)

Confirming Unit Versions with the Support Software

If your NX Unit is connected to a CPU Unit, refer to the user’s manual of the connected CPU Unit for the confirmation method for the unit version of the NX Unit.

If your NX Unit is connected to a Communications Coupler Unit, refer to the user’s manual of the connected Communications Coupler Unit for the confirmation method for the unit version of the Communications Coupler Unit and NX Unit.

Unit Versions and Support Software Versions

The functions that are supported depend on the unit version of the Unit. The version of Support Software that supports the functions that were added for an upgrade is required to use those functions. Refer to *A-6 Version Information with CPU Units* on page A-47 or *A-7 Version Information with Communications Coupler Units* on page A-48 for the functions that are supported by each unit version.

Related Manuals

The following table shows related manuals. Use these manuals for reference.

Manual name	Cat. No.	Model numbers	Application	Description
NX-series RFID Units User's Manual	Z401	NX-V680C□	Learning how to use NX-series RFID Units	The hardware, setup methods, and functions of the NX-series RFID Units are described.
V680-series User's Manual for RF Tags and Amplifiers (FRAM Type)	Z248	V680-HA63B V680-HS□□ V680-H01-V2 V680-D2K□□□□ V680-D8K□□□□ V680S-D2K□□□□ V680S-D8K□□□□	Learning about the specifications, performance, and installation of the V680-series RF Tags and amplifiers (FRAM type)	The general specifications, communications specifications, and installation method of the V680-series RF Tags and amplifiers (FRAM type) are described.
V680-series User's Manual for RF Tags and Amplifiers (EEPROM Type)	Z262	V680-HA63A V680-HS□□ V680-H01-V2 V680-D1KP□□□□	Learning about the specifications, performance, and installation of the V680-series RF Tags and amplifiers (EEPROM type)	The general specifications, communications specifications, and installation method of the V680-series RF Tags and amplifiers (EEPROM type) are described.
NX-series Data Reference Manual	W525	NX-□□□□□□	Referencing lists of the data that is required to configure systems with NX-series Units	Lists of the power consumptions, weights, and other NX Unit data that is required to configure systems with NX-series Units are provided.
NX-series System Units User's Manual	W523	NX-PD1□□□ NX-PF0□□□ NX-PC0□□□ NX-TBX01	Learning how to use NX-series System Units	The hardware and functions of the NX-series System Units are described.
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC- SE2□□□	Learning about the operating procedures and functions of the Sysmac Studio	Describes the operating procedures of the Sysmac Studio.
NX-IO Configurator Operation Manual	W585	CXONE- AL□□D-V4	Learning about the operating procedures and functions of the NX-IO Configurator.	Describes the operating procedures of the NX-IO Configurator.
NJ/NX-series Troubleshooting Manual	W503	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ NX1P2-□□□□	Learning about the errors that may be detected in an NJ/NX-series Controller	Concepts on managing errors that may be detected in an NJ/NX-series Controller and information on individual errors are described.
NY-series Troubleshooting Manual	W564	NY532-□□□□ NY512-□□□□	Learning about the errors that may be detected in an NY-series Industrial PC	Concepts on managing errors that may be detected in an NY-series Controller and information on individual errors are described.

Manual name	Cat. No.	Model numbers	Application	Description
NX-series EtherCAT® Coupler Unit User's Manual	W519	NX-ECC20□	NX-series Learning how to use the EtherCAT Coupler Unit and EtherCAT Slave Terminals.	The following items are described: the overall system and configuration methods of an EtherCAT Slave Terminal (which consists of an NX-series EtherCAT Coupler Unit and NX Units), and information on hardware, setup, and functions to set up, control, and monitor NX Units through EtherCAT.
NX-series EtherNet/IP™ Coupler Unit User's Manual	W536	NX-EIC202	Learning how to use an NX-series EtherNet/IP Coupler Unit and EtherNet/IP Slave Terminals	The following items are described: the overall system and configuration methods of an EtherNet/IP Slave Terminal (which consists of an NX-series EtherNet/IP Coupler Unit and NX Units), and information on hardware, setup, and functions to set up, control, and monitor NX Units.
NX-series CPU Unit Hardware User's Manual	W535	NX701-□□□□	Learning the basic specifications of the NX-series NX701 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NX701 CPU Unit system is provided along with the following information on the CPU Unit. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and inspection
NX-series NX102 CPU Unit Hardware User's Manual	W593	NX102-□□□□	Learning the basic specifications of the NX-series NX1P2 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NX102 CPU Unit system is provided along with the following information on the NX102 CPU Unit. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and inspection

Manual name	Cat. No.	Model numbers	Application	Description
NX-series NX1P2 CPU Unit Hardware User's Manual	W578	NX1P2-□□□□	Learning the basic specifications of the NX-series NX1P2 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NX1P2 CPU Unit system is provided along with the following information on the CPU Unit. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and inspection
NJ-series CPU Unit Hardware User's Manual	W500	NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	Learning the basic specifications of the NJ-series CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NJ-series system is provided along with the following information on the CPU Unit. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and inspection
NY-series IPC Machine Controller Industrial Panel PC Hardware User's Manual	W557	NY532-□□□□	Learning the basic specifications of the NY-series Industrial Panel PCs, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NY-series system is provided along with the following information on the Industrial Panel PC. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and inspection
NY-series IPC Machine Controller Industrial Box PC Hardware User's Manual	W556	NY512-□□□□	Learning the basic specifications of the NY-series Industrial Box PCs, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NY-series system is provided along with the following information on the Industrial Box PC. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and inspection

Manual name	Cat. No.	Model numbers	Application	Description
NJ/NX-series CPU Unit Software User's Manual	W501	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ NX1P2-□□□□	Learning how to program and set up an NJ/NX-series CPU Unit. Mainly software information is provided.	The following information is provided on an NJ/NX-series CPU Unit. • CPU Unit operation • CPU Unit features • Initial settings • Programming based on IEC 61131-3 language specifications
NY-series IPC Machine Controller Industrial Panel PC Industrial Box PC Software User's Manual	W558	NY532-□□□□ NY512-□□□□	Learning how to program and set up the Controller functions of an NY-series Industrial PC	The following information is provided on NY-series Machine Automation Control Software. • Controller operation • Controller features • Controller settings • Programming based on IEC 61131-3 language specifications
NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual	W505	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ NX1P2-□□□□	Using the built-in EtherCAT port on an NJ/NX-series CPU Unit	Information on the built-in EtherCAT port is provided. This manual provides an introduction and provides information on the configuration, features, and setup.
NY-series IPC Machine Controller Industrial Panel PC Industrial Box PC Built-in EtherCAT® Port User's Manual	W562	NY532-□□□□ NY512-□□□□	Using the built-in EtherCAT port on an NY-series Industrial PC	Information on the built-in EtherCAT port is provided. This manual provides an introduction and provides information on the configuration, features, and setup.
NJ/NX-series Instructions Reference Manual	W502	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ NX1P2-□□□□	Learning detailed specifications on the basic instructions of an NJ/NX-series CPU Unit	The instructions in the instruction set (IEC 61131-3 specifications) are described.
NY-series Instructions Reference Manual	W560	NY532-□□□□ NY512-□□□□	Learning detailed specifications on the basic instructions of an NY-series Industrial PC	The instructions in the instruction set (IEC 61131-3 specifications) are described.

Terminology

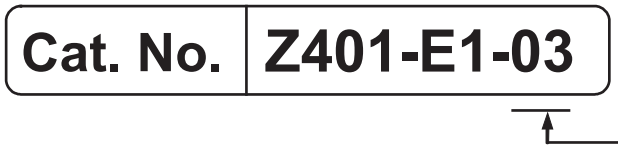
Term	Abbre-viation	Description
AL status (Application Layer Status)	---	Status for indicating information on errors that occur in an application on a slave.
CAN application protocol over EtherCAT	CoE	A CAN application protocol service implemented on EtherCAT.
CAN in Automation	CiA	CiA is the international users' and manufacturers' group that develops and supports higher-layer protocols.
channel	Ch	Indicates the unit of the antenna or amplifier that performs communications control with the RF Tags in an RFID Unit.
Communications Coupler Units	---	The generic name of an interface unit for remote I/O communications on a network between NX Units and a host network master.
CPU Rack	---	A rack to which a CPU Unit is mounted. For an NX-series CPU Unit to which NX Units can be connected, a CPU Rack refers to a configuration which consists of the CPU Unit, NX Units, and End Covers.
DC time	---	Time indicated by the clock shared between the CPU Unit and the NX Units in a CPU Rack with an NX-series CPU Unit to which NX Units can be connected. EtherCAT slaves that support distributed clock synchronization have a clock that is shared by all slaves in the network. The time that is based on this distributed clock is called the DC time. The same clock is shared by the CPU Unit, NX Units connected to the CPU Unit, and applicable EtherCAT slaves.
device profile	---	A collection of device dependent information and functionality providing consistency between similar devices of the same device type.
device variable	---	A variable that is used to access a specific device through an I/O port by an NJ/NX-series CPU Unit or NY-series Industrial PC. Process data on an EtherCAT slave is allocated to this variable. With an NX-series CPU Unit to which NX Units can be connected, I/O data is assigned to NX Units in the CPU Unit. A user application on a CPU Unit or Industrial PC accesses a device that can be connected, by directly reading and writing this device variable.
distributed clock	DC	Clock distribution mechanism used to synchronize EtherCAT slaves and the EtherCAT master.
divided data size	---	The size of input/output data that is read or written in one cycle after it has been segmented across multiple cycles.
EtherCAT slave controller	ESC	A controller for EtherCAT slave communications.
EtherCAT slave information	ESI	An XML file that contains setting information for an EtherCAT slave.
EtherCAT state machine	ESM	An EtherCAT communications state machine.
EtherCAT Technology Group	ETG	The ETG is a global organization in which OEM, end users, and technology providers join forces to support and promote the further technology development.
index	---	Address of an object within an application process.
Input data	---	Data read by the controller from the memory of the RF Tag.
ISO/IEC15693	---	An international standard of the HF band RFID (13.56 MHz electromagnetic induction method).
I/O map settings	---	Settings that assign variables to I/O ports. Assignment information between I/O ports and variables.
I/O port	---	A logical interface that is used by the NJ/NX-series CPU Unit or NY-series Industrial PC to exchange data with an external device (slave or Unit).
I/O refreshing	---	Cyclic data exchange with external devices that is performed with predetermined memory addresses.

Term	Abbre-viation	Description
network configuration information	---	The EtherCAT network configuration information held by the EtherCAT master.
Normal Mode	---	A mode in which the RFID Unit executes a command according to the instruction from the CPU Unit.
NX bus	---	The NX-series internal bus.
object	---	An abstract representation of a particular component within a device, which consists of data, parameters, and methods.
object dictionary	OD	Data structure that contains description of data type objects, communication objects and application objects.
Operational	---	A state in which I/O refresh communications and NX message communications are possible between the communications master and the Communications Coupler Unit or NX Units.
Output data	---	Data written from the controller to the RF Tag.
PDO	---	A process data object sent or received from or by an EtherCAT Slave Unit.
PDO communications	---	An acronym for process data communications.
Pre-Operational	---	A state in which NX message communications are possible between the communications master and the Communications Coupler Unit or NX Units, but I/O refresh communications are not possible.
primary periodic task	---	The task with the highest priority.
process data	---	Collection of application objects designated to be downloaded cyclically or acyclically for the purpose of measurement and control.
process data communications	---	One type of EtherCAT communications in which process data objects (PDOs) are used to exchange information cyclically and in realtime. This is also called PDO communications.
process data object	PDO	A structure that describes the mappings of parameters that have one or more process data entities.
receive PDO	RxPDO	A process data object received by an EtherCAT slave.
RF Tag	---	A passive tag of HF band. Communications is performed with the Reader/Writer through radio waves and the identification information is exchanged.
RF Tag communications	---	Data communications between an RF Tag and Reader/Writer.
RFID	---	Abbreviation of “Radio Frequency Identification”, and an automatic identification technology based on contact-less communications. As a result of RFID, data can be updated between the RF Tag installed on the target object and the reader/writer, without contact.
RFID Unit	---	A Reader/Writer in an HF-band RFID system for general purposes and short-to-medium distances. (This product)
Safe-Operational	---	A state in which input refresh communications and NX message communications are possible between the communications master and the Communications Coupler Unit or NX Units, but output refresh communications are not possible.
SDO communications	---	One type of EtherCAT communications in which service data objects (SDOs) are used to transmit information whenever required.
service data object	SDO	CoE asynchronous mailbox communications where all objects in the object dictionary can be read and written.
Slave Information Interface	SII	Slave information that is stored in non-volatile memory in the slave.
Slave Terminal	---	A building-block remote I/O terminal to which a Communications Coupler Unit and NX Units are mounted
subindex	---	Sub-address of an object within the object dictionary.
sync manager	SM	Collection of control elements to coordinate access to concurrently used objects.
Sync0	---	A signal that gives the interrupt timing based on the distributed clock (DC) in EtherCAT communications. The slaves execute controls according to this interrupt timing.
task period	---	The interval at which the primary periodic task or a periodic task is executed.

Term	Abbre-viation	Description
Test Mode	---	A mode in which the RFID Unit autonomously tests communications with an RF Tag.
transmit PDO	TxPDO	A process data object sent from an EtherCAT slave.
UID	---	Unique individual identification information written in an RF Tag or memory.
Watch Dog Timer (WDT)	---	Abbreviation of Watch Dog Timer, and a timer or mechanism for periodically checking and monitoring if the Unit is operating normally.

Revision History

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



Revision code	Date	Revised content
01	October 2018	Original production
02	January 2019	Corrected mistakes.
03	June 2019	Changed the guidance for users of KC standards.

Sections in this Manual

1 Features and System Configuration

2 Specifications and Application Procedures

3 Part Names and Functions

4 Installation and Wiring

5 I/O Refreshing

6 I/O Data Specifications

7 Setting RFID Units

8 Functions of the RFID Units

9 Troubleshooting

10 Maintenance and inspection

A Appendices

I Index

1

Features and System Configuration

This section describes the NX system configuration and the types of RFID Units.

1-1 Features of the RFID Units 1-2

1-2 System Configuration 1-3

1-2-1 System Configuration in the Case of a CPU Unit 1-3

1-2-2 System Configuration of Slave Terminals 1-4

1-2-3 System Configuration of an RFID Unit 1-6

1-3 Unit Models, Functions and Support Software 1-8

1-3-1 Unit Models 1-8

1-3-2 Functions 1-9

1-3-3 Support Software 1-10

1-1 Features of the RFID Units

The NX-V680 series achieves high-speed communications and high-reliability communications through the electromagnetic induction method and a unique technology. In addition, functions that are very easy to use from startup to operation, such as the easy visibility of the communications status, have been enhanced.

The NX-V680 series also complies with the Radio Laws of major countries with regard to its globally expanding markets and manufacturing bases, and the production information can be managed or traced from any country.

Through abundant variations ranging from RF Tags to the amplifier and controller, easy visibility is realized at all manufacturing sites, which contributes to an improvement in productivity and quality.

The RFID Units have the following characteristics.

- Conforms to the ISO/IEC18000-3 (15693) standard for HF bands (13.56 MHz), and can be used globally
- A maximum data size of 8 Kbytes can be read from or written to the RF Tags. Large volume transfer can be realized regardless of the split data size of the controller
- Easy programming on Sysmac Library
- The communications operation can be checked without any tool simply by using the test switch

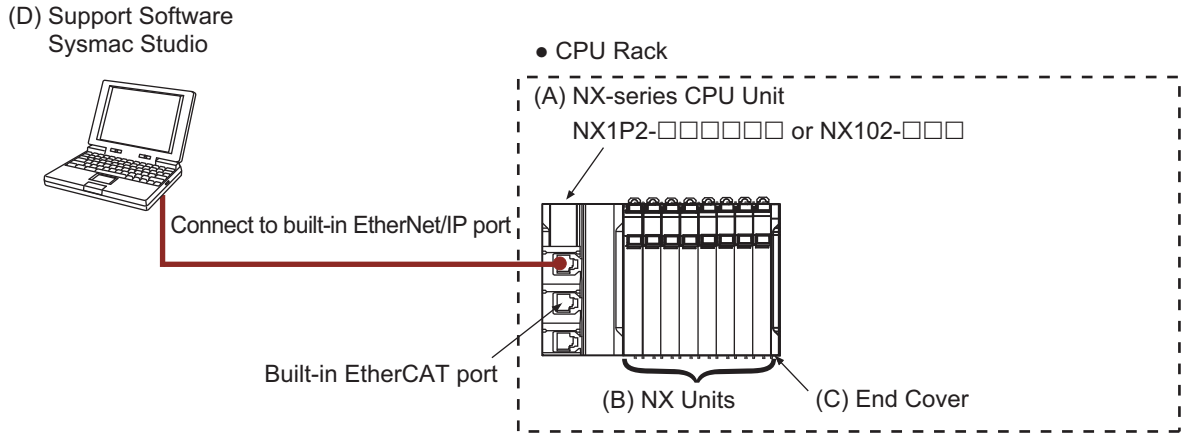
1-2 System Configuration

The NX-series RFID Unit, which is an NX Unit, can be connected to the following Units.

- NX-series CPU Unit
- NX-series EtherCAT Communications Coupler Units
- NX-series EtherNet/IP Communications Coupler Units

1-2-1 System Configuration in the Case of a CPU Unit

The following figure shows a system configuration when a group of NX Units is connected to an NX-series CPU Unit.



Letter	Item	Description
(A)	NX-series CPU Units	This is the central control Unit in the Machine Automation Controller. It executes tasks and performs I/O refreshing and other processing for other Units and slaves. NX Units can be connected to an NX1P2 and NX102 CPU Unit.
(B)	NX Units	The NX Units perform I/O processing with connected external devices. NX Units exchange data with the CPU Unit during I/O refreshing. The RFID Unit is one of the NX Units. A maximum of eight NX Units can be connected to an NX1P2 CPU Unit. You can connect up to 32 NX Units to an NX102 CPU Unit.
(C)	End Cover	The End Cover is attached to the end of the CPU Rack.
(D)	Support Software Sysmac Studio	A computer software application for setting, programming, debugging, and trouble-shooting NJ/NX/NY-series Controllers. With the NX1P2 and NX102 CPU Units, settings are made with the personal computer connected to the built-in EtherNet/IP port.

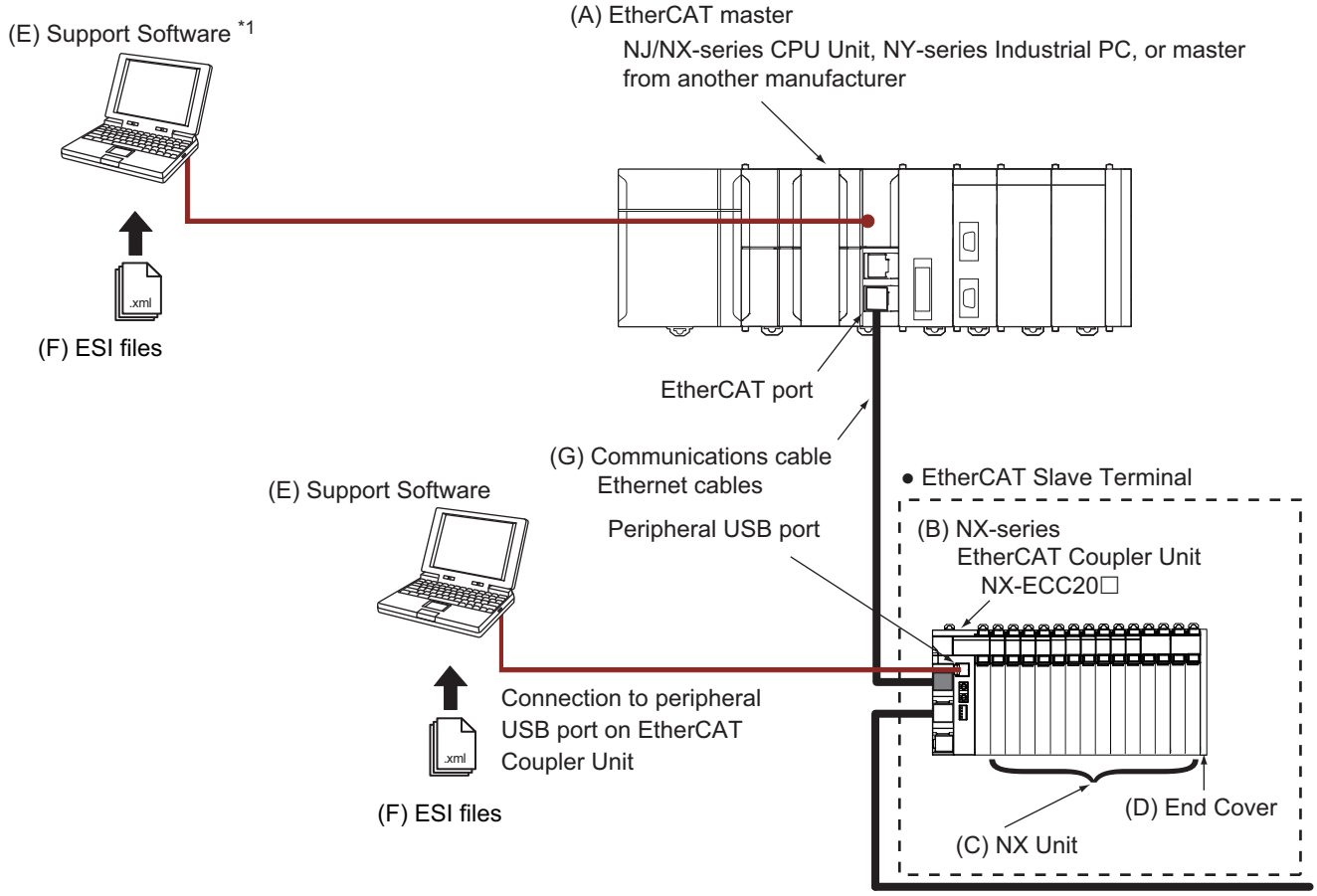
1-2-2 System Configuration of Slave Terminals

A building-block remote I/O slave provided with a group of NX Units connected to a Communications Coupler Unit is generically called a Slave Terminal.

The NX Units can be flexibly combined with a Communications Coupler Unit to achieve the optimum remote I/O slave for the application with less wiring, less work, and less space.

System Configurations of EtherCAT Slave Terminals

The following figure shows an example of the system configuration when an EtherCAT Coupler Unit is used as a Communications Coupler Unit.



*1. The connection method for the Support Software depends on the model of the CPU Unit or Industrial PC.

Letter	Item	Description
(A)	EtherCAT master *1	The EtherCAT master manages the network, monitors the status of slaves, and exchanges I/O data with slaves.
(B)	EtherCAT Coupler Unit	The EtherCAT Coupler Unit serves as an interface for process data communications between a group of NX Units and the EtherCAT master on the EtherCAT network. The I/O data for the NX Units is accumulated in the EtherCAT Coupler Unit and then all of the data is exchanged with the EtherCAT master at the same time. The EtherCAT Coupler Unit can also perform message communications (SDO communications) with the EtherCAT master.
(C)	NX Units	The NX Units perform I/O processing with connected external devices. The NX Units perform process data communications (PDO communications) with the EtherCAT master through the EtherCAT Coupler Unit. The RFID Unit is one of the NX Units.
(D)	End Cover	The End Cover is attached to the end of the Slave Terminal.

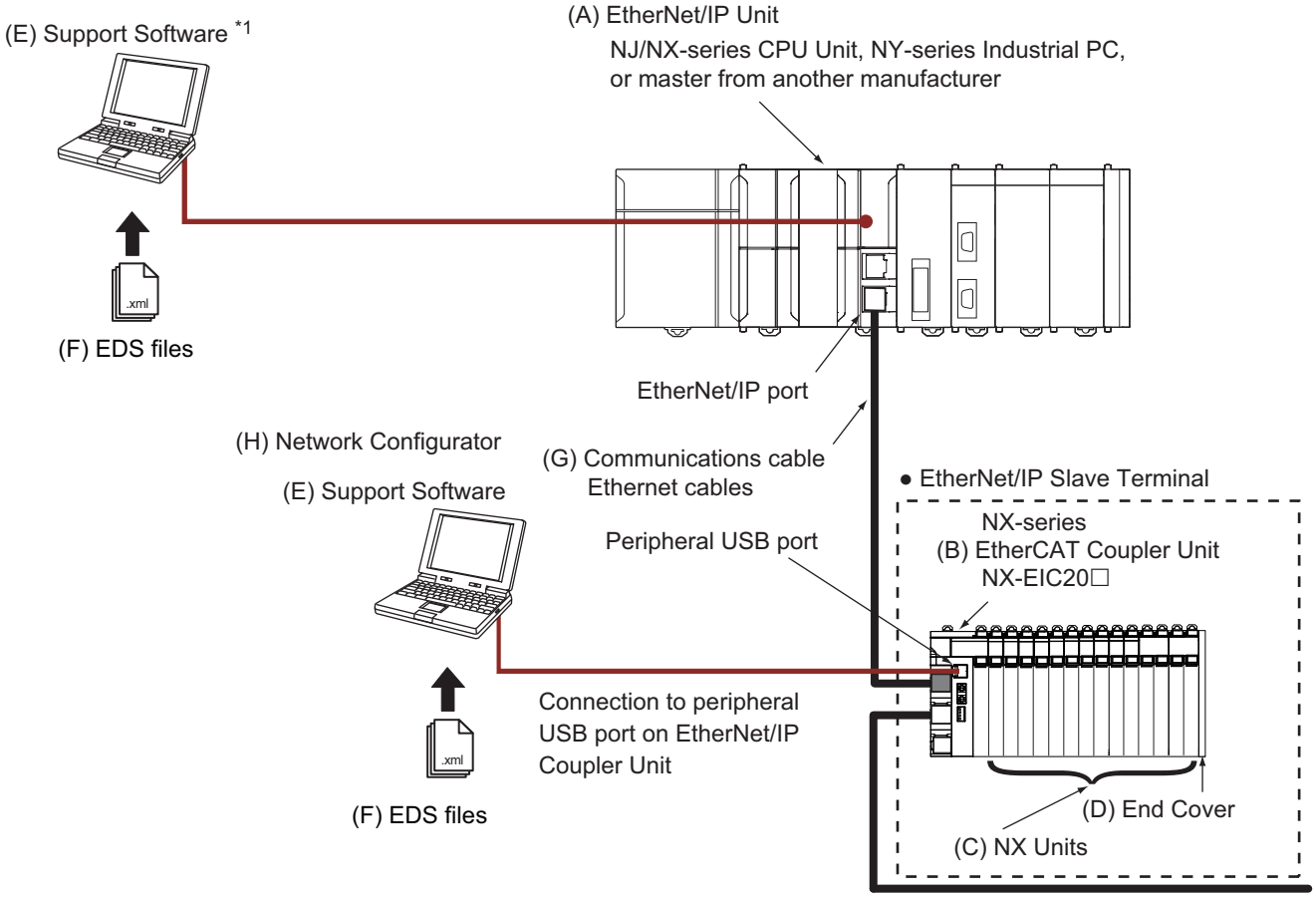
Letter	Item	Description
(E)	Support Software *2	The Sysmac Studio runs on a personal computer and it is used to configure the EtherCAT network and EtherCAT Slave Terminal, and to program, monitor, and troubleshoot the Controllers.
(F)	ESI (EtherCAT-SlaveInformation) Files	The ESI files contain information that is unique to the EtherCAT Slave Terminals in XML format. You can load an ESI file into the Support Software to easily allocate Slave Terminal process data and make other settings. The ESI files for OMRON EtherCAT slaves are installed in the Support Software. You can obtain the ESI files for the latest models through the Support Software's automatic update function.
(G)	Communications Cables	Use a double-shielded cable with aluminum tape and braiding of Ethernet category 5 (100Base-TX) or higher, and use straight wiring.

*1. An EtherCAT Slave Terminal cannot be connected to any of the OMRON CJ1W-NC□81/□82 Position Control Units even though they can operate as EtherCAT masters.

*2. The term Support Software indicates software that is provided by OMRON. If you connect to a master from another company, use the software tool corresponding to that master.

System Configurations of EtherNet/IP Slave Terminals

The following figure shows an example of the system configuration when an EtherNet/IP Coupler Unit is used as a Communications Coupler Unit.



*1. The connection method for the Support Software depends on the model of the CPU Unit or Industrial PC.

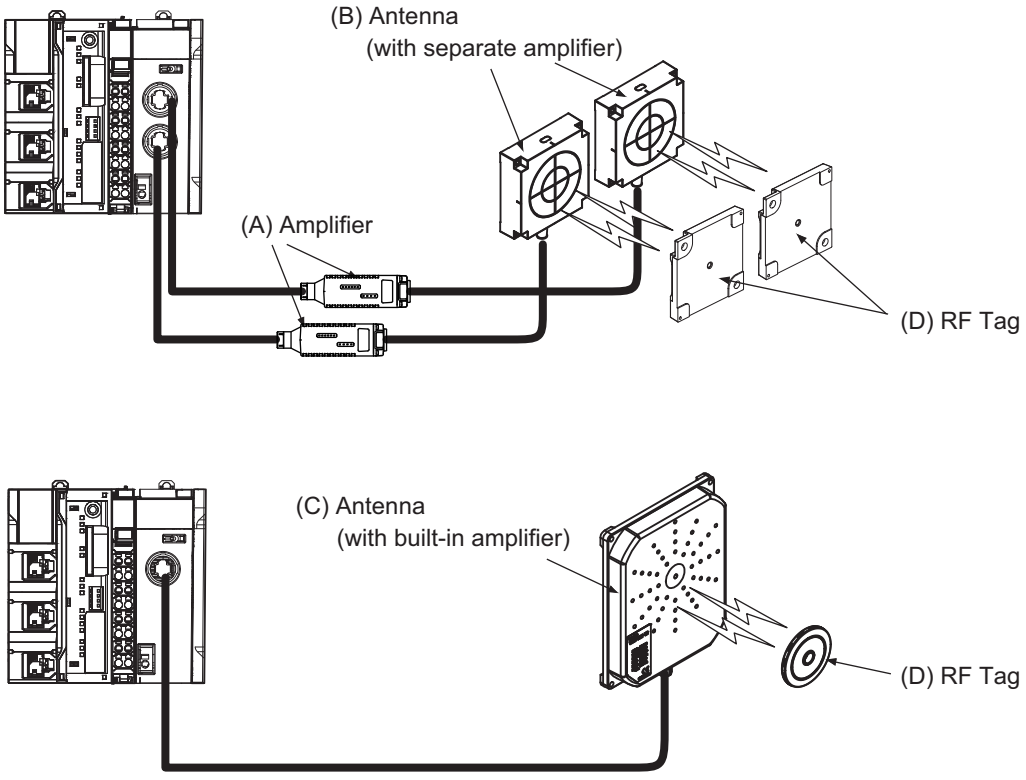
Letter	Item	Description
(A)	EtherNet/IP Unit	The EtherNet/IP master manages the EtherNet/IP network, monitors the status of the slaves, and exchanges I/O data with the slaves.

Letter	Item	Description
(B)	EtherNet/IP Coupler Unit	The EtherNet/IP Coupler Unit is an interface for I/O refresh communications between a group of NX Units and the EtherNet/IP Unit on an EtherNet/IP network. The I/O data for the NX Units is first accumulated in the EtherNet/IP Coupler Unit and then all of the data is exchanged with the EtherNet/IP Unit at the same time.
(C)	NX Units	The NX Units perform I/O processing with connected external devices. I/O refresh communications are performed with the EtherNet/IP Unit via the EtherNet/IP Coupler Unit. The RFID Unit is one of the NX Units.
(D)	End Cover	The End Cover is attached to the end of the Slave Terminal.
(E)	Support Software*1	The Sysmac Studio runs on a personal computer and it is used to configure EtherNet/IP Slave Terminals and to perform programming, monitoring, and troubleshooting.
(F)	EDS (Electronic Data Sheet) Files	The EDS files contain information that is unique to the EtherNet/IP Slave Terminals. You can load the EDS files on EtherNet/IP network configuration software, such as the Network Configurator to easily allocate data and view or change settings.
(G)	Communications Cables	Use a double-shielded cable with aluminum tape and braiding of Ethernet category 5 (100Base-TX) or higher, and use straight wiring.
(H)	Network Configurator	The software tool to configure the EtherNet/IP network.

*1. The term Support Software indicates software that is provided by OMRON. If you connect to a master from another company, use the software tool corresponding to that master.

1-2-3 System Configuration of an RFID Unit

The RFID system configuration when a V680-series amplifier, antenna, and RF Tags are used is as described below.



Letter	Item	Description
(A)	Amplifier	This is the amplifier part of the antenna connected to the RFID Unit. It performs modulation/demodulation and signal amplification during communications with RF Tags.
(B)	Antenna (with separate amplifier)	This is the antenna part connected to the RFID Unit. It outputs radio waves during communications with RF Tags.
(C)	Antenna (with built-in amplifier)	This is an antenna with a built-in amplifier that is connected to the RFID Unit.
(D)	RF Tag	An information medium with a built-in memory having the identification codes. It performs contact-less data communications with the antenna connected to the RFID Unit.

1-3 Unit Models, Functions and Support Software

This section describes the unit models, functions, and support software of the RFID Unit.

1-3-1 Unit Models

The RFID Unit has the following two models according to the number of ports of the antenna.

Model	Amplifier/Antenna			RF Tag	Command type
	Amplifier model	Antenna model	Number of Units connected		
NX-V680C1	V680-series HA63□	V680-HS□□ (with separate amplifier)	1	V680-series D□□F□□ D□□P□□ V680S-series D□□F□□	Memory read Memory write Memory initialization Bit operation Data calculation Memory life management Data restoration
	---	V680-H01-V2 (with built-in amplifier)			
NX-V680C2	V680-series HA63□	V680-HS□□ (with separate amplifier)	2	V680-series D□□F□□ D□□P□□ V680S-series D□□F□□	Memory read Memory write Memory initialization Memory copy Bit operation Data calculation Memory life management Data restoration

Additional Information

Refer to the manuals below for details on communications between the amplifier/antenna and the RF Tags.

- When you are using an FRAM RF Tag
  V680-series User's Manual for RF Tags and Amplifiers (FRAM type) (Cat. No.: SCHI-707)
- When you are using an EEPROM RF Tag
  User's Manual for RF Tags and Amplifiers (EEPROM type) (Cat. No.: Z262)

Precautions for Correct Use

A V680-H01-V2 antenna (with built-in amplifier) can only be connected to a one-channel NX-V680C1 RFID Unit.

It cannot be used with a two-channels NX-V680C2 RFID Unit.

1-3-2 Functions

This section describes the functions provided in an RFID Unit.

Function name	Description	When to use the function	Reference
RF Communications option function	This function switches the operation sequence during communications with an RF Tag.	Use this function when you want to select a communications operation in accordance with the RFID application at the work site.	*8-2 RF Communications Option Function* on page 8-5
Communications command function	This function reads or writes the memory for a RF Tag on the antenna communications area.	Use this function when you want to control the RFID system from the PLC during operation.	*8-3 Communications Command Function* on page 8-14
Write protection function	This function prevents the loss of data due to overwriting by specifying the areas in which it is not possible to write to an RF Tag.	Use this function when you want to protect important data saved in an RF Tag from malicious writing.	*8-4 Write Protection Function* on page 8-41
RF Tag service life detection function	This function records the number of times data is rewritten to an RF Tag, and determines the maximum rewrite count.	Use this function when you want to know the replacement period of an RF Tag once the maximum rewrite count of an RF Tag (EEPROM) is exceeded.	*8-5 RF Tag Service Life Detection Function* on page 8-49
RF Tag memory error detection function	This function detects an error during reading by performing CRC calculation for the memory of an RF Tag.	Use this function when you want to check the appropriateness of the memory contents of an RF Tag.	*8-6 RF Tag Memory Error Detection Function* on page 8-54
RF Tag memory error correction function	This function detects an error during reading by performing ECC calculation for the memory of an RF Tag, and corrects the error to an appropriate value.	Use this function when you want to check the appropriateness of the memory contents of an RF Tag and to correct a single bit error.	*8-7 RF Tag Memory Error Correction Function* on page 8-55
Test command function	This function checks the margin in communications with an RF Tag, and measures the surrounding noise.	Use this function when you want to check the installation and adjustment operation in the work site environment, and investigate the cause of occurrence of an operational error.	*8-8 Test Command Function* on page 8-56

1-3-3 Support Software

The Support Software that is used depends on the system configuration.

- Support software for a system configured with an NX-series CPU Unit.

  If your system is configured by connecting an NX Unit to a CPU Unit, the Sysmac Studio is used as the Support Software.
- Support Software for a System Configured with a Slave Terminal

If your system is configured by connecting an NX Unit to a Communications Coupler Unit, refer to the user's manual for the Communications Coupler Unit for information on the Support Software.

Refer to *A-6 Version Information with CPU Units* on page A-47 or *A-7 Version Information with Communications Coupler Units* on page A-48 for the version of your Support Software.

2

Specifications and Application Procedures

This section describes the specifications and operating procedure of the RFID Units.

2-1 Specifications 2-2
2-1-1 General Specifications 2-2
2-1-2 Individual Specifications 2-2
2-2 Procedure 2-3
2-2-1 Overall Procedure 2-3

2-1 Specifications

2-1-1 General Specifications

The general specifications of RFID Units are provided below.

Item		Specifications
Enclosure		Mounted in a panel
Grounding Methods		Ground to less than 100 Ω
Operating environment	**Ambient operating temperature**	0 to 55°C
	Ambient operating humidity	10 to 95% (with no condensation or icing)
	Atmosphere	Must be free from corrosive gases.
	Ambient storage temperature	−25 to 70°C (with no condensation or icing)
	Altitude	2,000 m max.
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2
	Noise immunity	2 kV on power supply line (Conforms to IEC61000-4-4.)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6. 5 to 8.4 Hz with amplitude of 3.5 mm, 8.4 to 150 Hz, acceleration of 9.8 m/s^2 100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60068-2-27, 147 m/s^2, 3 times each in X, Y, and Z directions
Applicable standards		cULus: Listed (UL61010-2-201), ANSI/ISA12.12.01, EU: EN61131-2, RCM, KC: KC Registration, EAC

2-1-2 Individual Specifications

Refer to *A-1 Datasheet* on page A-2 for the specifications of individual RFID Units.

2-2 Procedure

2-2-1 Overall Procedure

The overall operating procedures of RFID Units are described below.

Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for the application procedures and setting download method for the connected CPU Unit or Slave Terminal.

For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

Step	Item	Meaning	
1	Unit Registration and I/O Allocation Settings	Create a project using the support software. Register the RFID Unit offline. Set the I/O allocations.	• *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) • *Section 6 I/O Data Specifications*
2	Making the Unit Settings	Make the initial settings for the RFID Unit according to the Unit functions that you will use.	*Section 7 Setting RFID Units*
3	Installing Units	Attach the RFID Unit to the CPU Unit or Communications Coupler Unit.	*Section 4 Installation and Wiring*
4	Wiring the Unit	Wire the RFID Unit. Connect the amplifier or antenna according to the RF Tag or environment to be used.	*Section 4 Installation and Wiring*
5	Downloading the Unit settings	Turn ON the power supply of the CPU Rack or Slave Terminal and download the Unit settings created by the support software to the RFID Unit.	*Sysmac Studio Version 1 Operation Manual* (Cat. No. W504)
6	Simple operation check	Arrange the RF Tags in the communications area of the antenna, and perform the operation test for the RFID Unit. You can check the margin in communications with the RF Tag by implementing the following procedures. • When the support software is not used: Turn ON the test switch on the front side of the RFID Unit, and perform operation in the test mode. • When the support software is used: Operate the device variable allocated to the I/O port, and execute the test command.	• *8-1-2 Test Mode* on page 8-4 • *8-8 Test Command Function* on page 8-56
7	Adjusting the installation of the RF Tag and antenna	Adjust the installation position of the RF Tag and antenna according to the results of the simple operation check. If necessary, take actions to ensure that the RF Tag and antenna are not affected by the surrounding metals and noise.	*8-8 Test Command Function* on page 8-56
8	Writing the User Program	Create the user program by using the support software.	• Software user's manual for the connected CPU Unit or Industrial PC • *Section 8 Functions of the RFID Units* • *A-5 Sample Programming* on page A-25
9	User program download	Turn ON the power supply of the CPU Rack or Slave Terminal and download the user program created by the support software to the CPU Unit or the industrial PC.	*Sysmac Studio Version 1 Operation Manual* (Cat. No. W504)
10	Checking Operation	Check that the Unit settings and user program are running correctly. Execute the communications command in the user program, and check in the I/O data if the status in the normal case or error case, and the memory of the RF Tag can be read or written as intended.	• *Section 8 Functions of the RFID Units* • *Section 6 I/O Data Specifications*

3

Part Names and Functions

This section describes the names and functions of the parts of the RFID Units.

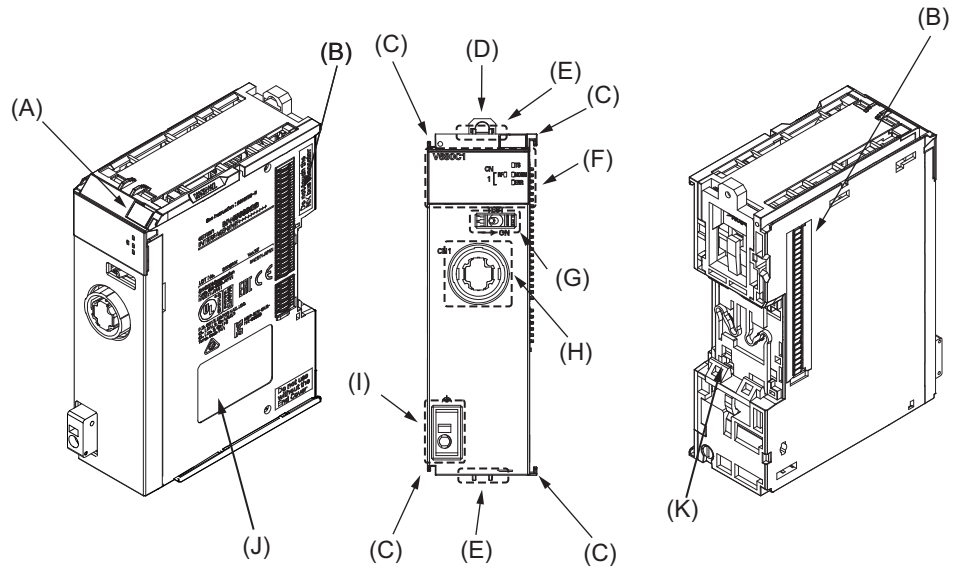
3-1 Parts and Names 3-2
3-1-1 Part Names and Function List 3-2
3-1-2 Indicators 3-3
3-1-3 Operation Part 3-4

3-1 Parts and Names

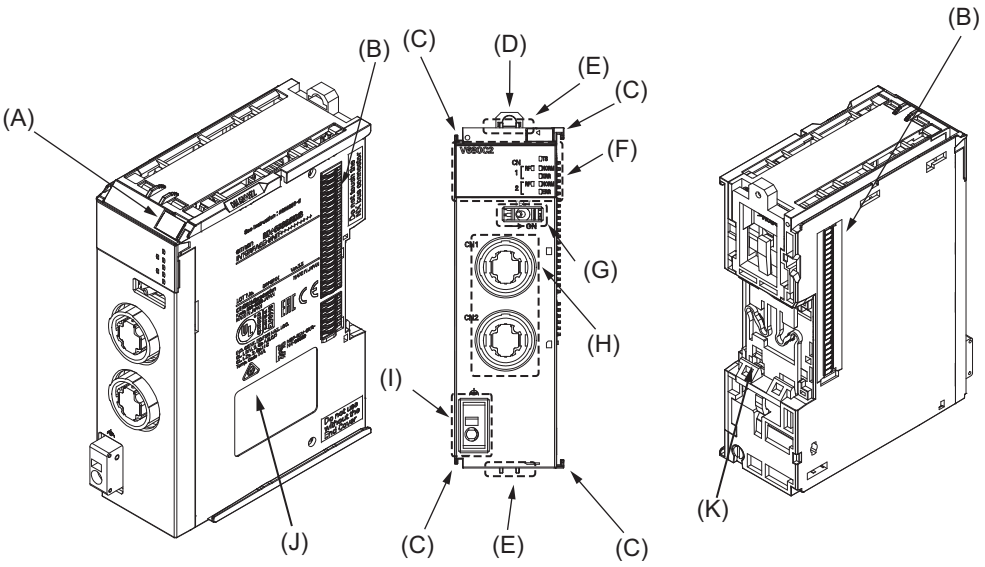
This section describes the names and functions of the various parts of an RFID Unit.

3-1-1 Part Names and Function List

NX-V680C1 One-channel RFID Unit



NX-V680C2 Two-channels RFID Unit

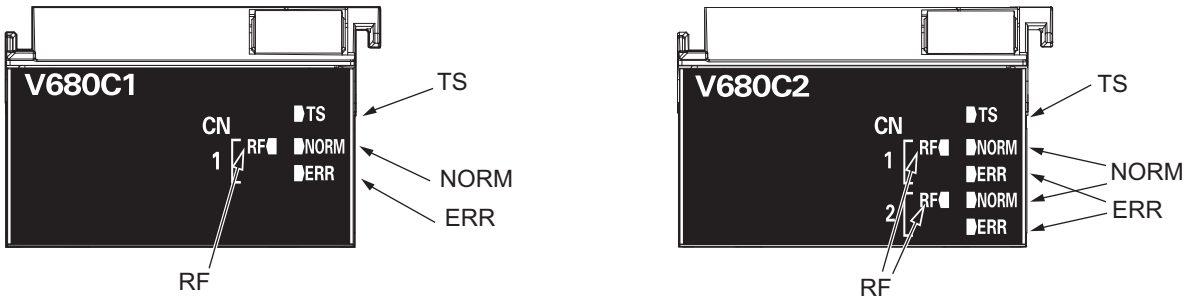


Letter	Name	Function
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed.
(B)	NX bus connector	This connector is used to connect each Unit.

Letter	Name	Function
(C)	Unit hookup guides	These guides are used to connect two Units.
(D)	DIN Track mounting hooks	These hooks are used to mount the Unit to a DIN Track.
(E)	Protrusions for removing the Unit	The protrusions to hold when removing the Unit.
(F)	Indicators	The indicators show the current operating status of the Unit.
(G)	Test switch	This is used to switch between the normal mode and the test mode. The test switch can be used when it has been enabled in the Unit operation settings.
(H)	Amplifier/antenna connector	This is a connector for connecting a V680-series amplifier or antenna (with a built-in amplifier).
(I)	FG terminal	This is an external connection terminal for grounding. It is shaped like a screwless clamping terminal.
(J)	Unit specifications	The specifications of the Unit are given.
(K)	DIN Track Contact Plates	This plate is connected internally to the functional ground terminal on the terminal block.

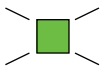
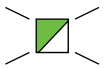
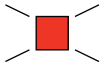
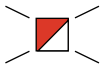
3-1-2 Indicators

The RFID Unit has indicators to show the current operating status and communication status of the Unit.



● TS Indicator

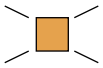
The indicator shows the current operating status of the NX Unit.

Color	Status		Description
Green		Lit	Lights up green during normal operation. • The Unit is ready for I/O refreshing. • I/O checking is operating.*1
		Flashing at 2-s intervals.	Flashes green in the following cases. • Initializing • Restarting is in progress for the Unit. • Downloading
Red		Lit	Lights up red if a hardware failure, WDT error, or other fatal error that is common to all RFID Units occurs.
		Flashing at 1-s intervals.	Flashes red if a communications error or other NX bus-related error that is common to all RFID Units occurs.
---		Not lit	Not lit in the following cases. • No Unit power supply • Restarting is in progress for the Unit • Waiting for initialization to start

*1. Refer to the manual for the Communications Coupler Unit for the status of the indicator on the Communications Coupler Units when I/O checking is in progress.

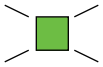
● RF Indicator

Displays the radio wave output status.

Color	Status		Description
Yellow		Lit	Lit during communications with an RF Tag.
---		Not lit	Not lit when communications are not being performed with an RF Tag.

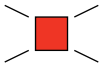
● NORM Indicator

Displays the result of the communications process with the RF Tag.

Color	Status		Description
Green		Lit	Lights up once (for 50 ms) when communications with the RF Tag end normally.
---		Not lit	Not lit when the Reader/Writer is on standby.

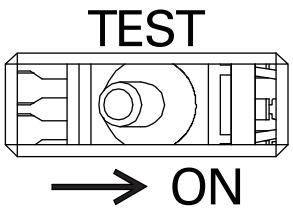
● ERR Indicator

Displays the result of the communications process with the RF Tag.

Color	Status		Description
Red		Lit	Lights up once (for 50 ms) when communications with the RF Tag end in an error.
---		Not lit	Not lit when the Reader/Writer is on standby.

3-1-3 Operation Part

- Test switch



Switches the operation mode of the RFID Unit.

Status	Description
OFF	Normal mode status (factory default state)
ON	Test mode status

4

Installation and Wiring

This section describes how to install the NX Units, the types of power supplies provided to the NX Units and wiring methods, and how to wire the NX Units.

4-1 Mounting NX Units 4-2
4-1-1 Mounting NX Units 4-2
4-1-2 Attaching Markers 4-4
4-1-3 Removing NX Units 4-5
4-1-4 Installation Orientation 4-7
4-2 Power Supply Types and Wiring 4-8
4-2-1 Applications of I/O Power Supply and Supply Methods 4-8
4-2-2 Calculating the Total Current Consumption from I/O Power Supply 4-9
4-3 Wiring the FG Terminal 4-10
4-3-1 Wires Applicable to the FG Terminal 4-10
4-3-2 Connecting/Removing Wires 4-12
4-4 Wiring the Amplifier/Antenna 4-17
4-4-1 Method of Attaching the Amplifier/Antenna Cable 4-17
4-4-2 Method of Removing the Amplifier/Antenna Cable 4-18
4-5 Wiring in Consideration of Safety and Noise Countermeasures 4-19
4-5-1 Routing the Amplifier/Antenna Cable 4-19
4-5-2 Implementing Noise Measures for the External Wiring 4-19

4-1 Mounting NX Units

This section describes how to install NX Units. Refer to the user's manual for the CPU Unit or Communications Coupler Unit to which NX Units are connected for information on preparations of installation and installation in a control panel.

4-1-1 Mounting NX Units

This section describes how to mount two NX Units to each other.

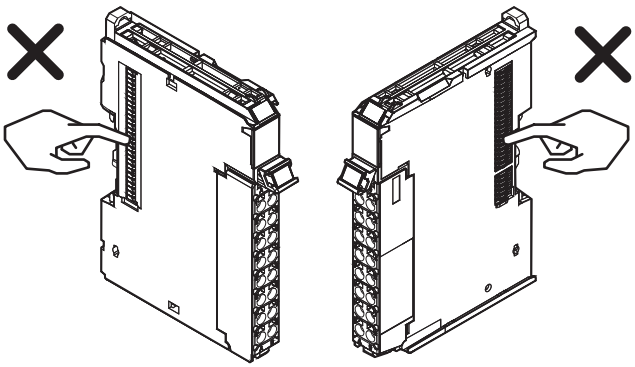
Always turn OFF the power supply before you mount NX Units.

Always mount NX Units one at a time.

If you attempt to mount multiple NX Units that are already connected together, the connections between the NX Units may separate from each other and fall.

Precautions for Safe Use

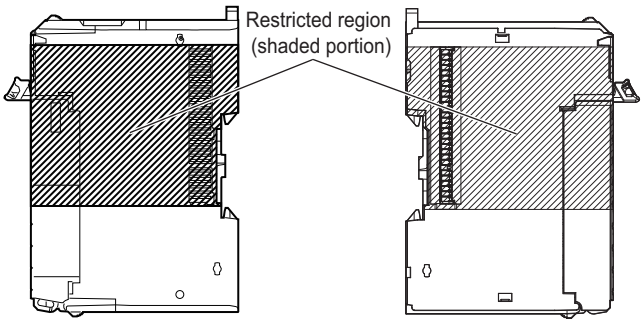
- Always turn OFF the power supply before installing the Unit. If the power supply is not OFF, the Unit may malfunction or may be damaged.
- Do not attach any labels or tapes on the NX Unit. When the NX Unit is installed or removed, adhesive or scraps may adhere to the terminals of the NX bus connector, which may result in malfunctions.
- Do not touch the pins in the NX bus connector on the Unit. Dirt may adhere to the pins in the NX bus connector, which may result in malfunctions.



Example: NX Unit (12 mm width)

- Do not write on an NX Unit with ink within the restricted region that is shown in the following figure. Also do not get this area dirty. When the Unit is installed or removed, ink or dirt may adhere to the pins in the NX bus connector, which may result in malfunctions in the CPU Rack or Slave Terminal.

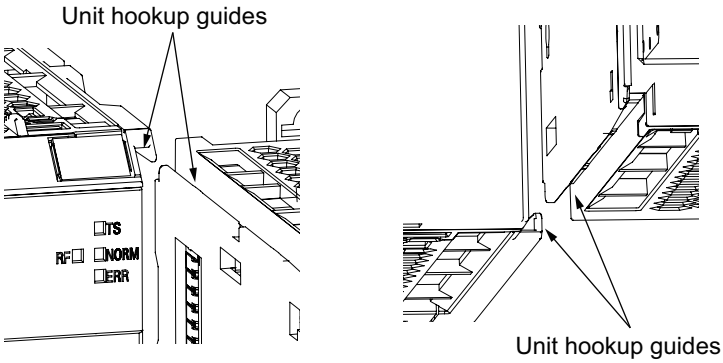
  Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for the restricted region of CPU Unit and Communications Coupler Unit.



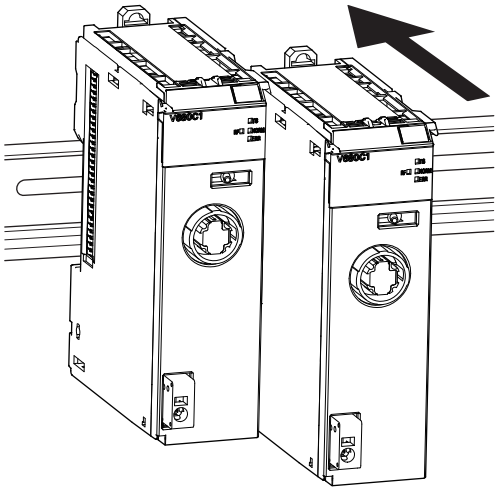
Precautions for Correct Use

- When mounting the NX Unit, avoid contact or collision between the Unit and the terminals of the NX bus connector.
- When you handle an NX Unit, be careful not to apply any stress to the terminals of the NX bus connector. Do not connect the NX Unit with deformed terminals of the NX bus connector. Doing so may result in malfunction due to a contact failure when the power is turned ON.

1 From the front of the previously mounted NX Unit, engage the Unit hookup guides on a new Unit with the Unit hookup guides on the previously mounted NX Unit.



2 Slide the NX Unit in on the hookup guides.



3 Press the NX Unit with a certain amount of force against the DIN Track until you hear the DIN Track mounting hook lock into place.

When you mount the NX Unit, it is not necessary to release the DIN track mounting hook on the NX Unit.

After you mount the NX Unit, make sure that it is locked to the DIN Track.

Additional Information

- It is not normally necessary to unlock the DIN Track mounting hook when you mount the NX Unit. However, if you mount the NX Unit on a DIN Track that is not a recommended DIN Track, the DIN track mounting hook may not lock correctly. If that happens, unlock the DIN Track mounting hook at the start of the procedure, mount the NX Unit to the DIN Track, and then lock the DIN Track mounting hook.
- Refer to the user's manual for the CPU Unit to which NX Units can be connected for information on how to mount the CPU Unit, and how to mount NX Units to the CPU Unit.
- Refer to the user's manual for the Communications Coupler Unit for information on how to mount the Communications Coupler Unit and how to mount the NX Unit to the Communications Coupler Unit.

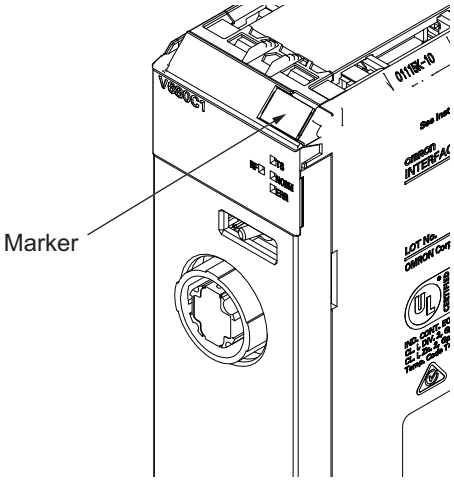
4-1-2 Attaching Markers

You can attach markers to the NX Units to identify them.

The plastic markers made by OMRON are installed for the factory setting. The ID information can be written on them.

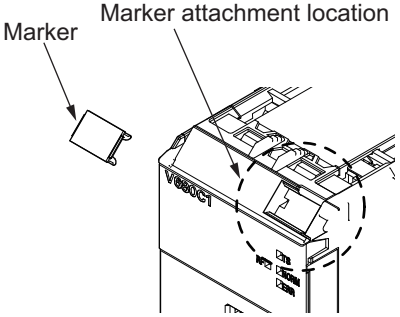
Commercially available markers can also be installed.

Replace the markers made by OMRON if you use commercially available markers now.



Installation Method

Insert the protrusions on the markers into the marker attachment locations on the NX Units.



<NX Unit>

● Commercially Available Markers

Commercially available markers are made of plastic and can be printed on with a special printer.

To use commercially available markers, purchase the following products.

Product name	Model number	
	Manufactured by Phoenix Contact	Manufactured by Weidmuller
Markers	UC1-TMF8	DEK 5/8
Special marker printer	UM EN BLUEMARK X1	PrintJet PRO

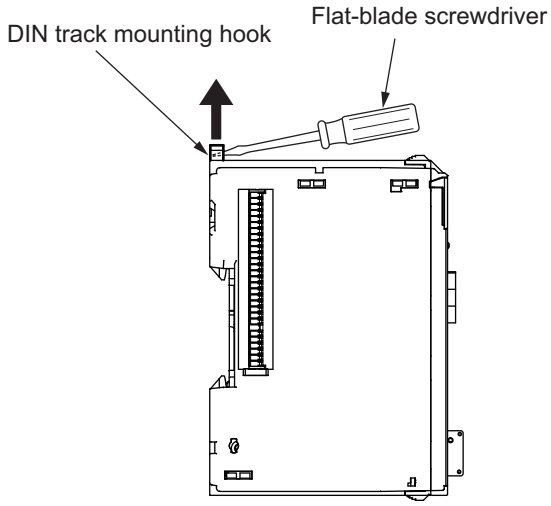
The markers made by OMRON cannot be printed on with commercially available special printers.

4-1-3 Removing NX Units

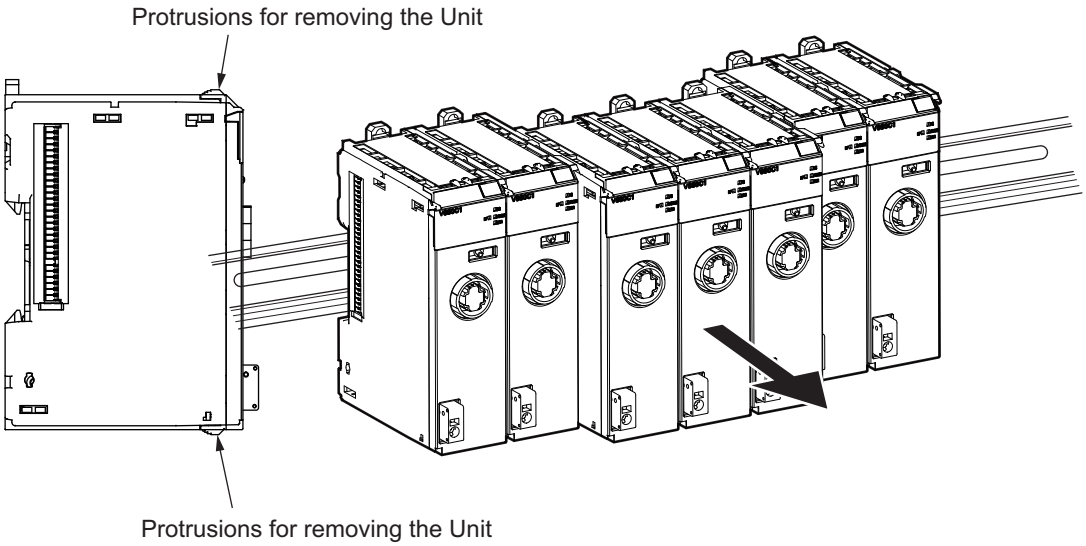
Precautions for Safe Use

Always turn OFF the Unit power supply and I/O power supply before you remove the NX Unit.

1 Use a flat-blade screwdriver to pull up the DIN Track mounting hook on the Unit to remove.



2 Put your fingers on the protrusions for removing multiple NX Units including the Unit to be removed, then pull out straight forward to remove.



Precautions for Correct Use

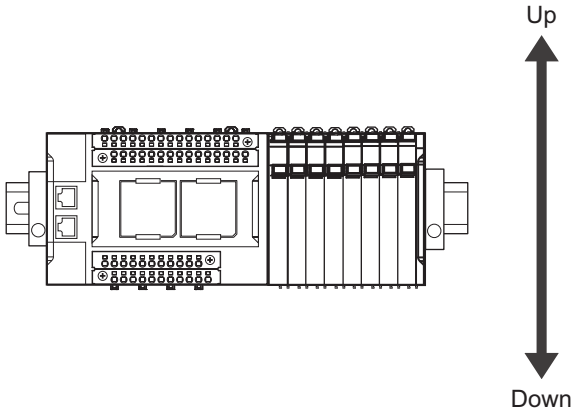
- When removing an NX Unit, remove multiple Units together which include the one you want to remove. If you attempt to remove only one Unit, it is stuck and hard to pull out.
- Do not unlock the DIN track mounting hooks on all of the NX Units at the same time. If you unlock the DIN Track mounting hooks on all of the NX Units at the same time, all of the Units may come off.

4-1-4 Installation Orientation

The following explains the installation orientation for each NX Unit connection destination.

Installation Orientation in the Case of a CPU Unit

Orientation is possible only in the upright installation orientation.



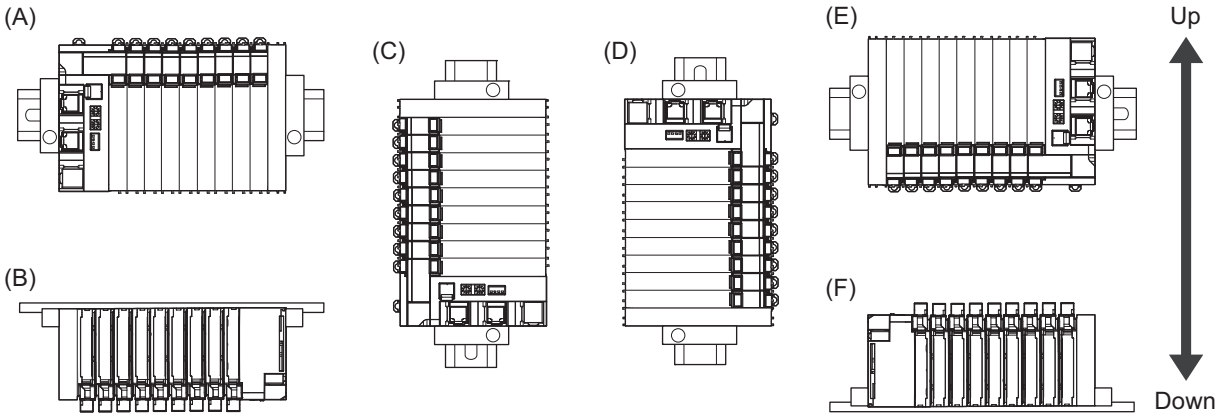
However, there are restrictions on the specifications depending on the NX Units to be used.

Refer to the user's manuals for the NX Units and System Units that you will use for details on restrictions.

Installation Orientation in the Case of a Slave Terminal

Orientation is possible in the following six directions.

(A) is the upright installation orientation and (B) to (F) are installation orientations other than upright.



However, there are restrictions on the installation orientation and restrictions to the specifications that can result from the Communications Coupler Units and NX Units that are used.

For detailed restrictions, refer to the user's manuals for the Communications Coupler Unit, NX Units, and NX-series System Units that you will use.

Precautions for Safe Use

For installation orientations (C) and (D) in the above figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured to the DIN Track, which may result in malfunctions.

4-2 Power Supply Types and Wiring

There are the following two types of power supplies that supply power to the NX Units.

Power supply name	Description
NX Unit power supply	This power supply is used for operating the NX Units.
I/O power supply	This power supply is used for driving the I/O circuits of the NX Units and for the connected external devices.

The method for supplying power to the NX Units and the wiring method depend on the specifications for the CPU Unit to which NX Units are connected or the specifications for the Slave Terminal. Refer to Designing the Power Supply System or Wiring, which are described both in the hardware user's manual for the CPU Unit to which NX Units are connected and user's manual for the Communications Coupler Unit, for details on the method for supplying power to the NX Units and the wiring method.

The subsequent sections describe the applications of I/O power supply for the RFID Units and supply methods, and how to calculate the total current consumption from the I/O power supply.

4-2-1 Applications of I/O Power Supply and Supply Methods

The applications of I/O power supply and supply methods for the RFID Units are given as follows.

Applications of I/O Power Supply

The I/O power supply is used for the following applications.

- Driving the amplifier/antenna

I/O Power Supply Method

I/O power is supplied to an RFID Unit from the NX bus.

This power is supplied through the NX bus connectors by connecting an I/O power supply to the I/O power supply terminals on the Communications Coupler Unit or Additional I/O Power Supply Unit.

For the Units to which I/O power supply is provided by a CPU Rack, refer to Designing the Power Supply System or Wiring in the hardware user's manual for the CPU Unit to which NX Units are connected.

For the Units to which I/O power supply is provided by a Slave Terminal, refer to Designing the Power Supply System or Wiring in the user's manual for the Communications Coupler Unit to be connected.

Additional Information

Power Supply-related Units for the NX-series

The following three NX-series Units are related to power supply.

- Additional NX Unit Power Supply Unit
- Additional I/O Power Supply Unit
- I/O Power Supply Connection Unit

Refer to the *NX-series System Unit User's Manual* (Cat. No. W523) for the specifications of these Units.

For a complete list of the latest power supply Units in the NX Series, refer to the product catalog or OMRON websites, or contact your OMRON representatives.

4-2-2 Calculating the Total Current Consumption from I/O Power Supply

The total current consumption of I/O power supplied from the NX bus must be within the range of the maximum I/O power supply current of the Communications Coupler Unit or the Additional I/O Power Supply Unit. However, for a CPU Rack, the specification for the maximum I/O power supply current is restricted regardless of the model of the Additional I/O Power Supply Unit. Refer to the hardware user's manual for the CPU Unit to which NX Units are connected for information on the restrictions for the CPU Rack.

To confirm this and to calculate the I/O power supply capacity, calculate the total current consumption of the I/O power supply from the NX bus.

The total current consumption from I/O power supply from the NX bus is the total sum of current consumption from I/O power supply of the NX Unit that supplies the I/O power from the NX bus, the current of each applicable I/O circuit, and current consumption of any connected external devices.

Refer to *A-1 Datasheet* on page A-2 for the current consumption from the I/O power supply for each model of the RFID Unit. The current consumption from the I/O power supply varies according to the amplifier/antenna connected to the RFID Unit.

Precautions for Safe Use

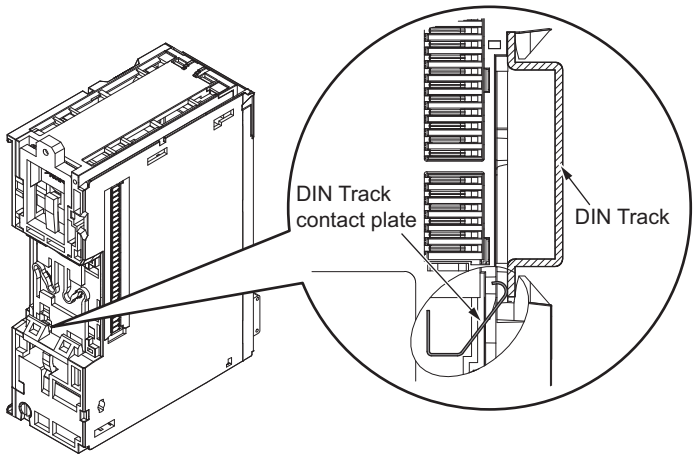
For the CPU Rack of the NX-series CPU Units, the current consumption from I/O power supply should not exceed the values specified for each model of CPU Units. For example for an NX1P2 CPU Unit, the current consumption should be 4A or less. Using the currents that are outside of the specifications may cause failure or damage.

4-3 Wiring the FG Terminal

An RFID Unit has a functional ground terminal (FG terminal), which requires grounding.

However, if the material of DIN Track to mount CPU Rack or Slave Terminals are made of steel and the surface is not insulated, you can omit the grounding wire to the FG terminal of the RFID Unit.

This is because the functional ground terminal of the RFID Unit is electrically connected to the DIN Track through the DIN Track contact plate.



Additional Information

For grounding of the CPU Rack, refer to the description of the wiring in the hardware user's manual of the connected CPU Unit. For the grounding of the Slave Terminals, refer to the description of the wiring in the user's manual of the connected Communications Coupler Unit.

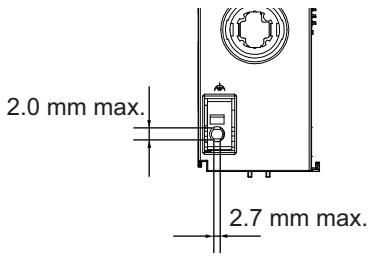
4-3-1 Wires Applicable to the FG Terminal

The wires that you can connect to the FG terminal block are twisted wires, solid wires, and ferrules that are attached to the twisted wires. The following section describes the dimensions and processed methods for applicable wires.

● Dimensions of Wires Connected to the FG Terminal Block

The dimensions of wires that you can connect into the terminal holes of the FG terminal block are as in the figure below.

Process the applicable wires that are specified in the following description to apply the dimensions.



Using Ferrules

If you use ferrules, attach the twisted wires to them.

Observe the application instructions for your ferrules for the wire stripping length when attaching ferrules.

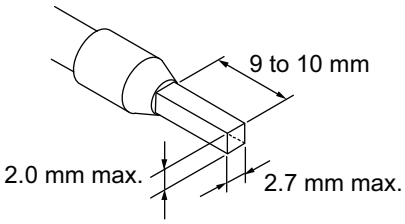
Always use plated one-pin ferrules. Do not use unplated ferrules or two-pin ferrules.

The applicable ferrules, wires, and crimping tools are listed in the following table.

Manufacturer	Ferrule model	Applicable wire (mm^2 (AWG))	Crimping tool
Phoenix Contact	AI2.5-10	2.0*1	Phoenix Contact (The figure in parentheses is the applicable wire size.) CRIMPFOX 6 (0.25 to 6 mm^2, AWG24 to 10)

*1. Some AWG14 wires exceed 2.0 mm^2 and cannot be used in the FG terminal block.

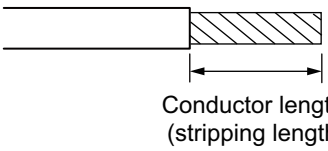
When you use any ferrules other than those in the above table, crimp them to the twisted wires so that the following processed dimensions are achieved.



Using Twisted Wires/Solid Wires

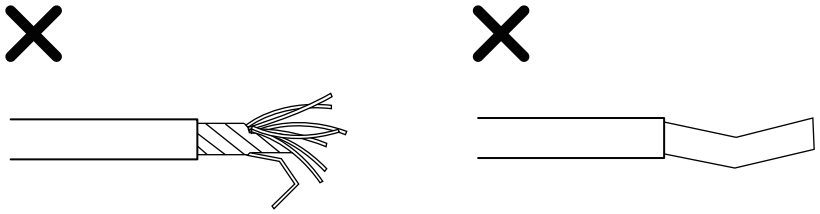
If you use twisted wires or solid wires, use the following table to determine the correct wire specifications.

Wire type				Wire size	Conductor length (stripping length)
Twisted wires		Solid wire			
Plated	Unplated	Plated	Unplated		
Supported	Possible	Possible	Possible	2.0 mm^2	9 to 10 mm



Precautions for Correct Use

- Use cables with suitable wire sizes for the carrying current. There are also restrictions on the current due to the ambient temperature. Refer to the manuals for the cables and use the cables correctly for the operating environment.
- For twisted wires, strip the sheath and twist the conductor portion. Do not unravel or bend the conductor portion of twisted wires or solid wires.

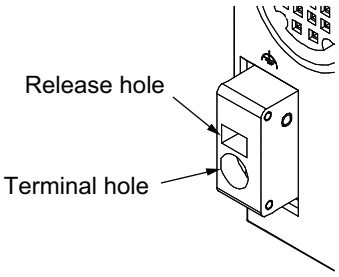


Unravel wires　　Bend wires

4-3-2 Connecting/Removing Wires

This section describes how to connect and remove wires.

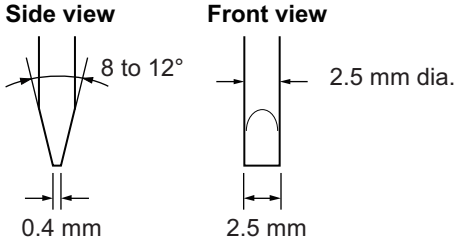
● Parts and Names of the FG Terminal Block



● Required Tools

Use a flat-blade screwdriver to connect and remove wires.

Use the following flat-blade screwdriver.



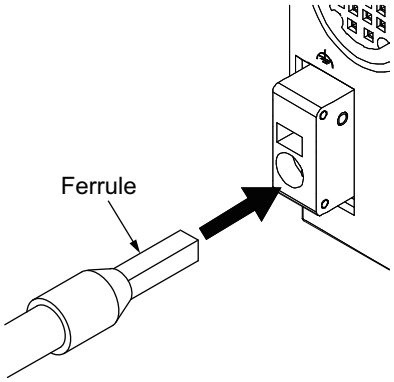
Recommended screwdriver

Model	Manufacturer
SZF 0-0,4X2,5	Phoenix Contact

Connecting Ferrules

Insert the ferrule straight into the terminal hole.

It is not necessary to press a flat-blade screwdriver into the release hole.



After you make a connection, make sure that the ferrule is securely connected to the terminal block.

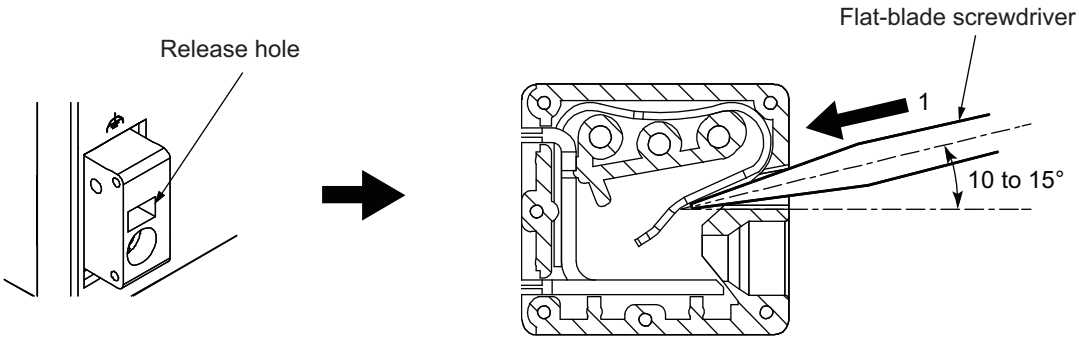
Connecting Twisted Wires/Solid Wires

Use the following procedure to connect the twisted wires or solid wires to the terminal block.

1 Press the a flat-blade screwdriver diagonally into the release hole.

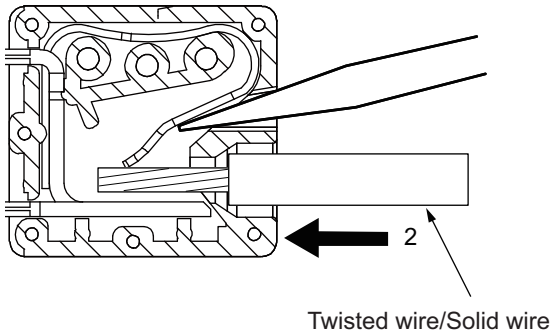
Press at an angle of 10° to 15°.

If you press in the screwdriver correctly, you will feel the spring in the release hole.

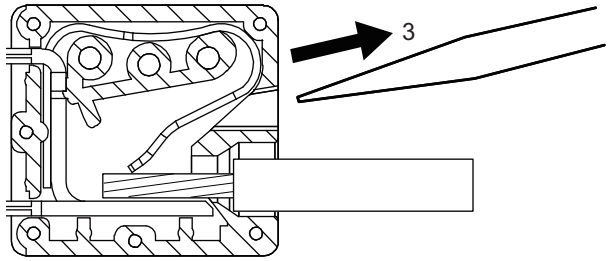


2 Leave the flat-blade screwdriver pressed into the release hole and insert the twisted wire or the solid wire into the terminal hole.

Insert the twisted wire or the solid wire until the stripped portion is no longer visible to prevent shorting.



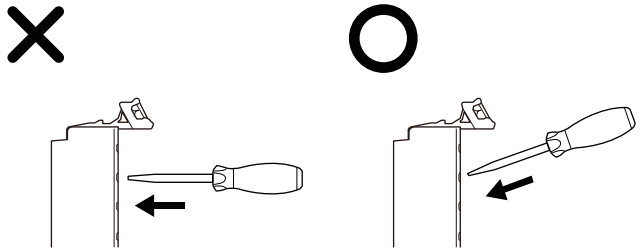
3 Remove the flat-blade screwdriver from the release hole.



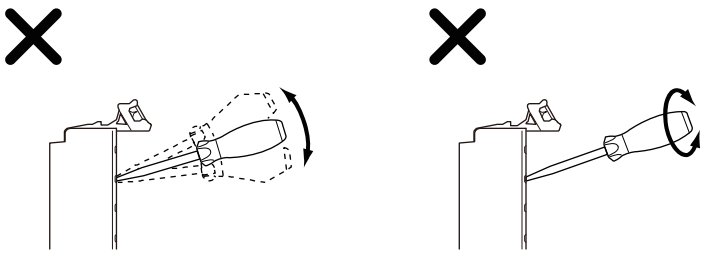
After you make a connection, pull gently on the wire to make sure that the twisted wire or the solid wire is securely connected to the terminal block.

Precautions for Safe Use

- Do not press the flat-blade screwdriver straight into the release hole. Doing so may damage the terminal block.



- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N or less. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may damage the terminal block.



- Make sure that all wiring is correct.
- Do not bend the cable forcibly. Doing so will damage the cable.

● Removing Wires

Use the following procedure to remove the wires from the terminal block.

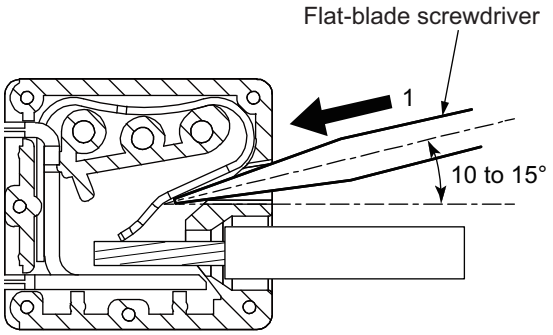
The removal method is the same for ferrules, twisted wires, and solid wires.

If wires are secured firmly to the terminal block, release them first.

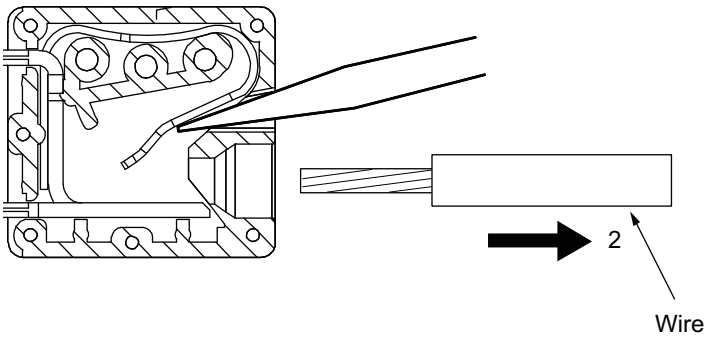
1 Press the a flat-blade screwdriver diagonally into the release hole.

Press at an angle of 10° to 15°.

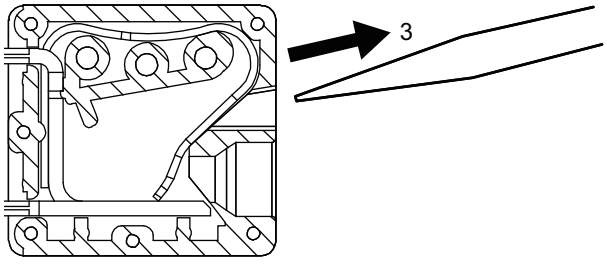
If you press in the screwdriver correctly, you will feel the spring in the release hole.



2 Leave the flat-blade screwdriver pressed into the release hole and pull out the wire.

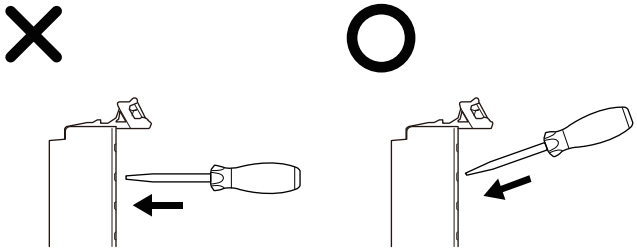


3 Remove the flat-blade screwdriver from the release hole.

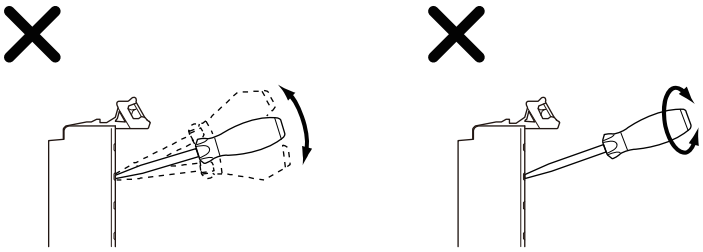


Precautions for Safe Use

- Do not press the flat-blade screwdriver straight into the release hole. Doing so may damage the terminal block.



- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N or less. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may damage the terminal block.



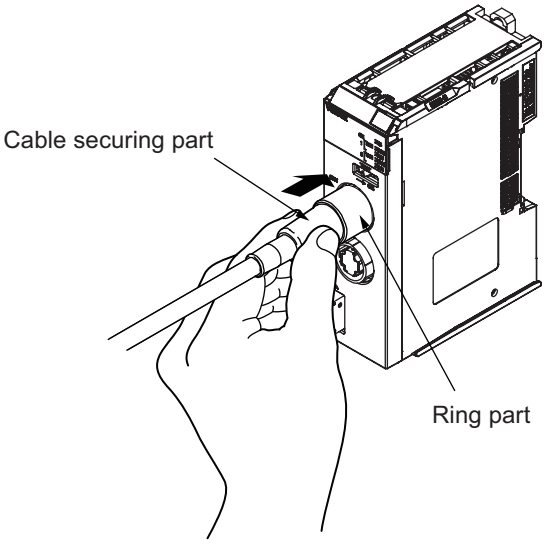
- Make sure that all wiring is correct.
- Do not bend the cable forcibly. Doing so will damage the cable.

4-4 Wiring the Amplifier/Antenna

This section describes the method of attaching and removing the amplifier or antenna cable to or from the amplifier/antenna connector.

4-4-1 Method of Attaching the Amplifier/Antenna Cable

1 Hold the cable securing part of the connector, and insert the connector by aligning the white point marked on the Unit and the white point marked on the connector.



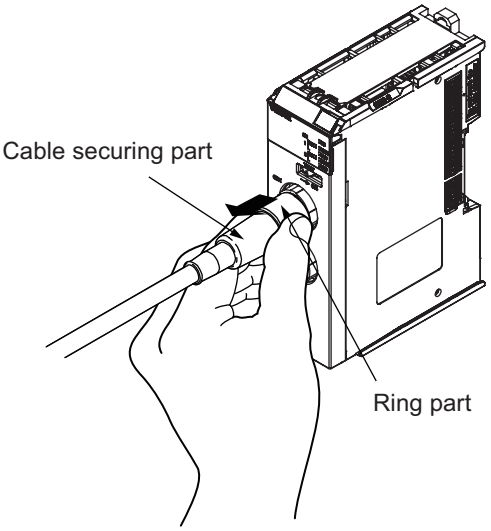
2 Keep pushing the connector straight inside until it locks.

Precautions for Correct Use

- The connector will not be locked even if you push the ring part. Therefore, be sure to hold the cable securing part while pushing in the connector.
- Do not attach or remove the connector when the Unit is ON. Otherwise, Unit failure may occur.
- You cannot directly connect the antenna cable. Connect it with the amplifier (V680-HA63□), extension cable (V700-A4□), or a dedicated cable (V700-A40-W).

4-4-2 Method of Removing the Amplifier/Antenna Cable

1 Hold the ring part, and pull the cable straight out.



Precautions for Correct Use

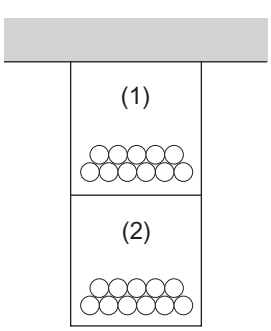
- You cannot pull out the cable by holding the cable securing part. Never pull out the cable with excessive force. Doing so may break the wires and cause failure.
- Do not attach or remove the connector when the Unit is ON. Otherwise, Unit failure may occur.

4-5 Wiring in Consideration of Safety and Noise Countermeasures

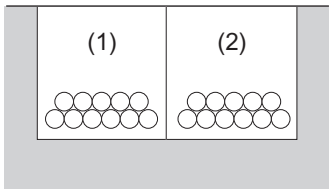
This section describes the procedure of wiring the RFID Unit in consideration of safety and noise countermeasures.

4-5-1 Routing the Amplifier/Antenna Cable

Route the antenna cable in a duct separate from that for the power circuit cable both inside and outside the control panel.

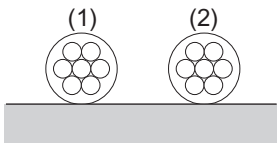


Suspended ducts



Floor ducts

(1): Amplifier/Antenna Cables
(2): Power lines

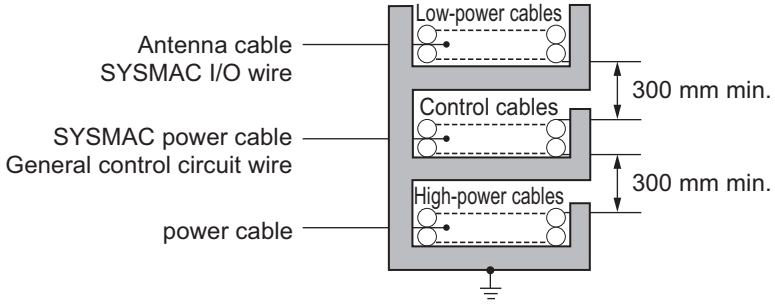


Conduits

4-5-2 Implementing Noise Measures for the External Wiring

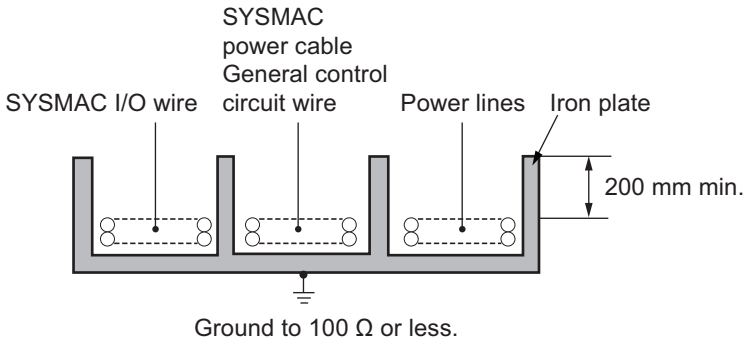
When performing external wiring for the antenna cable, as well as the input/output wire, power supply wire, and power cable, take note of the following items.

- When using a multi-core cable for the signal, avoid using it together with the input/output wire, or any other control wire.
- If the racks are to be arranged in parallel, keep a distance of 300 mm or more between the racks.



Ground to 100 Ω or less.

- When laying the cables, be sure to cover them with a grounded metal plate (made of iron) if the cables are to be stored in the same duct.


SYSMAC
power cable
General control
circuit wire
SYSMAC I/O wire
Power lines
Iron plate
200 mm min.
Ground to 100 Ω or less.

5

I/O Refreshing

This section describes the types and functions of I/O refreshing for the RFID Units.

5-1 Exchange of Data between the CPU Unit or Industrial PC, and the RFID Unit 5-2

5-2 I/O Refreshing 5-4

5-2-1 I/O Refreshing from the CPU Unit to NX Units 5-4

5-2-2 I/O Refreshing from the CPU Unit or Industrial PC to Slave Terminals 5-5

5-3 I/O Refreshing Methods 5-7

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5-1 Exchange of Data between the CPU Unit or Industrial PC, and the RFID Unit

An overview of exchange of data between the CPU Unit or industrial PC, and the RFID Unit is described below.

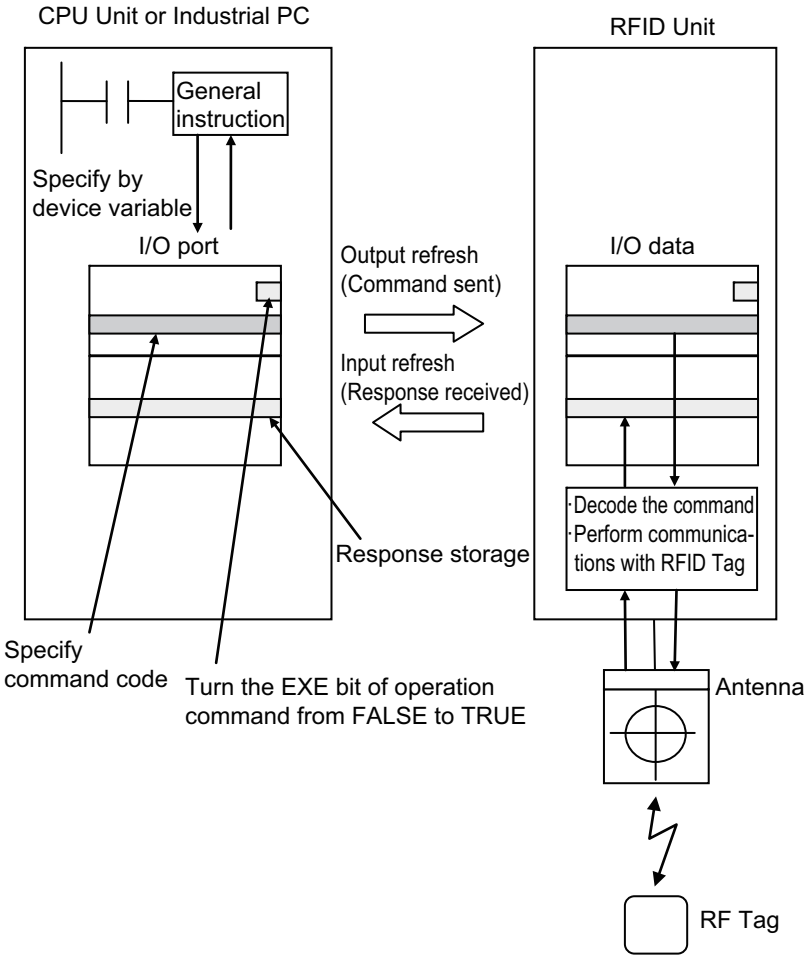
The exchange of data between the CPU Unit or industrial PC, and the RFID Unit is performed by the I/O data of the RFID Unit. The I/O data is exchanged with the I/O port of the CPU Unit or the industrial PC side. The I/O port is specified by a device variable at the CPU Unit or the industrial PC side.

An overview of the exchange of data between the CPU Unit or industrial PC, and the RFID Unit is presented below.

- The CPU Unit or the industrial PC specifies a command code in the output data of the I/O data, and then turns the EXE (command execution) from FALSE to TRUE in the operation instruction (of the I/O data).

  The CPU Unit or the industrial PC sends the specified command to the RFID Unit through the output refresh.
- The RFID Unit reads the received command, and executes the communications process with the RF Tag via the antenna.
- The CPU Unit or the industrial PC saves the command execution result from the RFID Unit to the response code (of the I/O data) through the input refresh.

As a result, the CPU Unit or the industrial PC can easily communicate data with the RF Tag by using a general transfer command rather than particularly using a communications command.



For details on the I/O data, refer to *6-1 Allocatable I/O Data* on page 6-2 and for details on the I/O data, refer to *6-2 Details of I/O Data* on page 6-6.

5-2 I/O Refreshing

This section describes I/O refreshing for the NX Units.

5-2-1 I/O Refreshing from the CPU Unit to NX Units

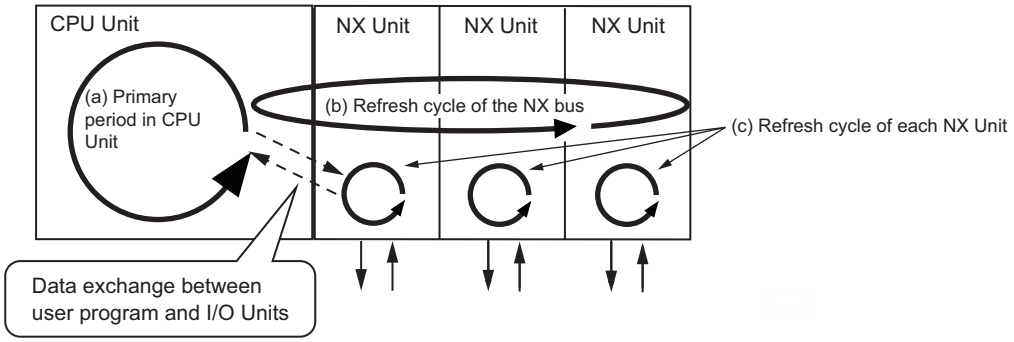
The NX-series CPU Unit performs cyclical I/O refreshing of the NX Units.

The following period and three cycles affect operation of the I/O refreshing between the CPU Unit and the NX Units.

(a) Primary period in CPU Unit

(b) Refresh cycle of the NX bus

(c) Refresh cycle of each NX Unit



The following operation occurs.

- The refresh cycle of the NX bus in item (b) is automatically synchronized with the primary period of the CPU Unit in item (a).
- The refresh cycle of each NX Unit in item (c) depends on the I/O refreshing method which is given below.

Refer to the software user's manual for the connected CPU Unit for detailed information on I/O refreshing between the CPU Unit and the NX Units.

5-2-2 I/O Refreshing from the CPU Unit or Industrial PC to Slave Terminals

The CPU Unit or the Industrial PC performs I/O refreshing cyclically with the Slave Terminals through the Communications Master Unit and the Communications Coupler Unit.

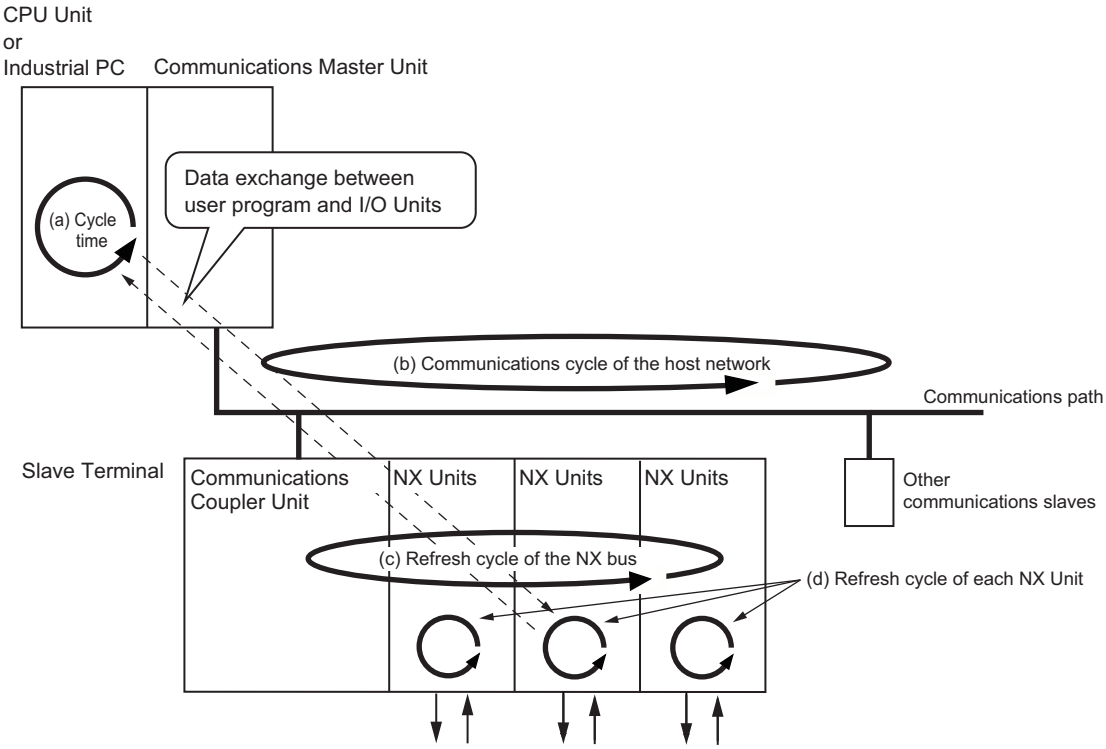
The following four cycles affect operation of the I/O refreshing between the CPU Unit or the Industrial PC and the NX Units in a Slave Terminal:

(a) Cycle time of the CPU Unit or Industrial PC

(b) Communications cycle of the host network

(c) Refresh cycle of the NX bus

(d) Refresh cycle of each NX Unit



The cycle time of the CPU Unit or Industrial PC, the communications cycle of the host network, and the NX bus I/O refresh cycle are determined by the type of the CPU Unit or Industrial PC and the type of communications.

The following explains operations when the built-in EtherCAT port on the NJ/NX-series CPU Unit or NY-series Industrial PC is used for communications with an EtherCAT Slave Terminal, with symbols in the figure.

Refer to the user's manual for the connected Communications Coupler Unit for information on the operation of I/O refreshing for Slave Terminals other than EtherCAT Slave Terminals.

Operation of I/O Refreshing with NX-series CPU Unit

The following shows the operation of I/O refreshing when the built-in EtherCAT port on the NX-series CPU Unit is used for communications with an EtherCAT Slave Terminal.

- The process data communications cycle in item (b) and the refresh cycle of the NX bus in item (c) are automatically synchronized with the primary period or the task period of the priority-5 periodic task of the CPU Unit in item (a) when the distributed clock is enabled in the EtherCAT Coupler Unit.
- The refresh cycle of each NX Unit in item (d) depends on the I/O refreshing method which is given below.

The priority-5 periodic task must be supported by the connected CPU Unit model. Refer to the software user's manual for the connected CPU Unit for the periodic tasks supported by each model of NX-series CPU Unit.

Operation of I/O Refreshing with NJ-series CPU Unit or NY-series Industrial PC

The operation of I/O refreshing is as follows when the built-in EtherCAT port on the NJ-series CPU Unit or NY-series Industrial PC is used for communications with an EtherCAT Slave Terminal.

- The process data communications cycle in item (b) and the refresh cycle of the NX bus in item (c) are automatically synchronized with the primary period of the CPU Unit or Industrial PC in item (a).* 1
- The refresh cycle of each NX Unit in item (d) depends on the I/O refreshing method which is given below.

*1. This applies when the distributed clock is enabled in the EtherCAT Coupler Unit.

Refer to *NX-series EtherCAT Coupler Unit User's Manual* (Cat. No. W519-E1-08 or later) for detailed information on I/O refreshing between the built-in EtherCAT port and EtherCAT Slave Terminals.

5-2-3 Calculating the NX Unit I/O Response Times

Refer to the manuals shown below to calculate the NX Unit I/O response times according to where the NX Unit is connected.

● Connected to a CPU Unit

Manual name	Meaning
Manuals for the connected CPU Unit Software	Describes the method to calculate the I/O response times of the NX Units in the CPU rack.
NX-series Data Reference Manual	Describes the parameter values used to calculate the I/O response times of the NX Units.

● Connected to a Communications Coupler Unit

Manual name	Meaning
User's manual for the connected Communications Coupler Unit	Describes the method to calculate the I/O response times of the NX Units at the Slave Terminal.
NX-series Data Reference Manual	Describes the parameter values used to calculate the I/O response times of the NX Units.

5-3 I/O Refreshing Methods

This section describes I/O refreshing for the NX-series RFID Units.

5-3-1 I/O Refreshing Methods

The I/O refreshing methods available between the CPU Unit or Communications Coupler Unit, and the NX Units are determined based on the CPU Unit or Communications Coupler Unit to be connected. In the case of the RFID Units, the available method is fixed as the Free-Run refreshing method described below.

I/O Refreshing Methods	Outline of operation
Free-Run refreshing	With this I/O refreshing method, the refresh cycle of the NX bus and I/O refresh cycles of the NX Units are asynchronous.

5-3-2 Setting the I/O Refreshing Methods

Setting Methods between the CPU Unit and the NX Units

The setting method for the I/O refreshing method between the CPU Unit and the NX Units is determined by the connected CPU Unit.

Refer to the software user's manual for the connected CPU Unit for information on how to set an I/O refreshing method between the CPU Unit and the NX Units.

CPU Units	RFID Units
NX1P2 CPU Unit	Operates with Free-Run refreshing
NX102 CPU Unit	

Setting Methods between the Communications Coupler Unit and the NX Units

The setting method for the I/O refreshing method between the Communications Coupler Unit and the NX Units is determined by the connected Communications Coupler Unit.

Refer to the user's manual for the connected Communications Coupler Unit for information on the setting method for I/O refreshing between the Communications Coupler Unit and the NX Units.

When an EtherCAT Coupler Unit is connected to the built-in EtherCAT port on an NJ/NX-series CPU Unit or an NY-series industrial PC, the I/O refreshing method between the EtherCAT Coupler Unit and the RFID Units is operated by the Free-Run refreshing method regardless of the DC enable setting in the EtherCAT Coupler Unit.

DC enable setting in the EtherCAT Coupler Unit	RFID Unit
Enabled (DC for synchronization)	Operates with Free-Run refreshing
Enabled (DC with priority in cycle time)	
Disabled (FreeRun)	

When an EtherNet/IP Coupler Unit is connected to the built-in EtherNet/IP port on an NJ/NX-series CPU Unit or an NY-series industrial PC, the I/O refreshing method between the EtherNet/IP Coupler Unit and the RFID Units is operated by the Free-Run refreshing method.

5-3-3 Operation of Free-Run Refreshing

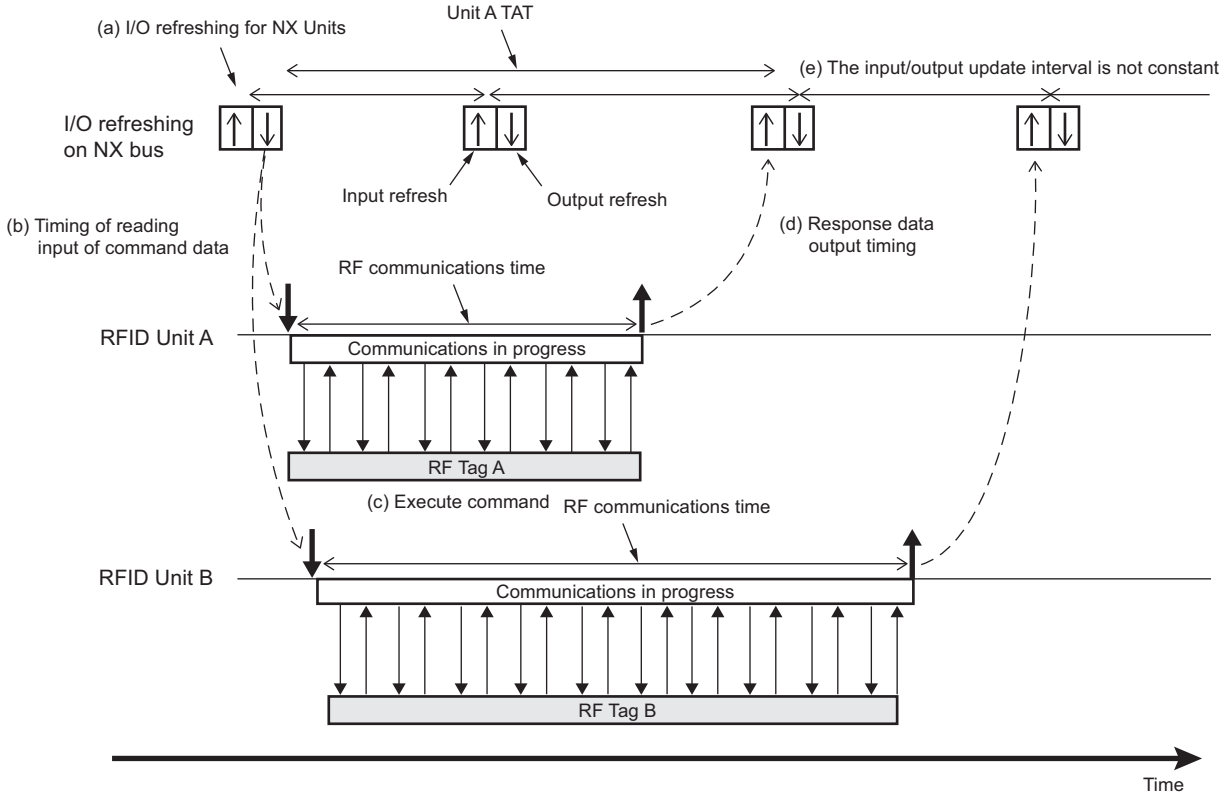
The Free-Run refreshing method is an I/O refreshing method in which the refresh cycle of the NX bus and the I/O refresh cycles of the NX Units are not synchronized.

The operation of Free-Run refreshing on an RFID Unit is as described below.

- The Communications Coupler Unit performs I/O refreshing for the RFID Units. (Refer to (a) in the figure below.)
- The RFID Unit reads the input of the most recent command data at the timing of I/O refreshing. (Refer to (b) in the figure below.)

  However, the timing of reading the input of each Unit within a Slave Terminal is not the same.
- The RFID Unit executes the communications process according to the command data. The results of execution are maintained as the response data. (Refer to (c) in the figure below.)
- The RFID Unit outputs the most recent response data at the timing of I/O refreshing. (Refer to (d) in the figure below.)

  However, the timing of reading the output refreshing of each Unit within a Slave Terminal is not the same.
- The I/O refreshing interval changes according to the processing conditions of the Communications Coupler Unit and host communications master. Moreover, the RF communications time with the RF Tag changes according to the environment. Therefore, the TAT from the time the command data is sent to the RFID Unit until the response data is received is not necessarily constant.



6

I/O Data Specifications

This section describes the I/O data specifications for RFID Units.

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6-1 Allocatable I/O Data

This section describes the allocatable I/O data for RFID Units.

Two I/O entry mappings for input and output are assigned to the I/O allocation settings for the RFID Unit.

A specific I/O entry is allocated to the I/O entry mapping for each mode of the RFID Unit. The allocation of I/O entry mappings is fixed. I/O entries can be added or deleted.

An I/O entry indicates the I/O data described in this section, and an I/O entry mapping indicates a collection of I/O entries.

To assign the I/O allocation information of the NX Unit or Slave Terminal to an NJ/NX-series CPU Unit or NY-series Industrial PC, use the I/O ports for the allocated I/O data. However, with a Slave Terminal, an I/O port is not used for some communications masters or Communications Coupler Units.

Refer to the user's manual for the connected Communications Coupler Unit for the I/O data application procedures for the Slave Terminal.

The following table shows the data that can be allocated to the I/O in an RFID Unit. The I/O port name, index number and subindex number are described in the following section.

6-1-1 NX-V680C1

The data items that you can allocate to the I/O for a one-channel Unit are listed in the following table.

Supported.: Fixed allocation, ---: Variable allocation

I/O entry mapping name	Data name	Size (Byte)	Data types	Fixed allocation*1
Input Data Set 1	Ch1 Status	2	WORD or BOOL	Supported.
	Ch1 Refresh Count	2	UINT	Supported.
	Ch1 Response Code	2	WORD	Supported.
	Ch1 Measurement Result	2	UINT	Supported.
	Ch1 Input SID	2	UINT	Supported.
	Ch1 Output SID Response	2	UINT	Supported.
	Ch1 Input Data 1	16	ARRAY[0..15]OF BYTE	Supported.
	Ch1 Input Data 2*2	16	ARRAY[0..15]OF BYTE	---
	Ch1 Input Data 3*2	16	ARRAY[0..15]OF BYTE	---
	Ch1 Input Data 4*2	16	ARRAY[0..15]OF BYTE	---
	:	-	-	:
	Ch1 Input Data 8*2	16	ARRAY[0..15]OF BYTE	---
	Ch1 UID	8	ARRAY[0..7]OF BYTE	---
	Ch1 RF Communications Time	2	UINT	---
	Ch1 Noise Level	2	UINT	---

I/O entry mapping name	Data name	Size (Byte)	Data types	Fixed allocation*1
Output Data Set 1	Ch1 Operation Command	1	BYTE or BOOL	Supported.
	Ch1 RF Communications Option	1	USINT	Supported.
	Ch1 Command Code	2	WORD	Supported.
	Ch1 Memory Address	2	UINT	Supported.
	Ch1 Data Size	2	UINT	Supported.
	Ch1 Refresh Count Response	2	UINT	Supported.
	Ch1 Output SID	2	UINT	Supported.
	Ch1 Input SID Response	2	UINT	Supported.
	Ch1 Output Data 1	16	ARRAY[0..15]OF BYTE	Supported.
	Ch1 Output Data 2*3	16	ARRAY[0..15]OF BYTE	---
	Ch1 Output Data 3*3	16	ARRAY[0..15]OF BYTE	---
	Ch1 Output Data 4*3	16	ARRAY[0..15]OF BYTE	---
	:	-	-	:
	Ch1 Output Data 8*3	16	ARRAY[0..15]OF BYTE	---
	Ch1 Select UID	8	ARRAY[0..7]OF BYTE	---

*1. I/O data that has been allocated when the Unit is shipped from the factory. It cannot be removed from the I/O allocation.

*2. As for input data 2 to 8, allocate the necessary data size in continuation.

*3. As for output data 2 to 8, allocate the necessary data size in continuation.

Precautions for Correct Use

The I/O allocation settings will be incorrect in the following cases.

- When Chn input data 2 to 8 is not allocated in continuation
- When Chn output data 2 to 8 is not allocated in continuation

The following errors are detected in the above cases:

CPU Unit connection: NX Unit Initialization Error

Communications Coupler Unit connection: Slave Initialization Error

6-1-2 NX-V680C2

The data items that you can allocate to the I/O for a two-channels Unit are listed in the following table.

Supported.: Fixed allocation, ---: Variable allocation

I/O entry mapping name	Data name	Size (Byte)	Data types	Fixed allocation*1
Input Data Set 1	Ch1 Status	2	WORD or BOOL	Supported.
	Ch1 Refresh Count	2	UINT	Supported.
	Ch1 Response Code	2	WORD	Supported.
	Ch1 Measurement Result	2	UINT	Supported.
	Ch1 Input SID	2	UINT	Supported.
	Ch1 Output SID Response	2	UINT	Supported.
	Ch1 Input Data 1	16	ARRAY[0..15]OF BYTE	Supported.
	Ch1 Input Data 2*2	16	ARRAY[0..15]OF BYTE	---
	Ch1 Input Data 3*2	16	ARRAY[0..15]OF BYTE	---
	Ch1 Input Data 4*2	16	ARRAY[0..15]OF BYTE	---
	:	-	-	---
	Ch1 Input Data 8*2	16	ARRAY[0..15]OF BYTE	---
	Ch1 UID	8	ARRAY[0..7]OF BYTE	---
	Ch1 RF Communications Time	2	UINT	---
	Ch1 Noise Level	2	UINT	---
Output Data Set 1	Ch1 Operation Command	1	BYTE or BOOL	Supported.
	Ch1 RF Communications Option	1	USINT	Supported.
	Ch1 Command Code	2	WORD	Supported.
	Ch1 Memory Address	2	UINT	Supported.
	Ch1 Data Size	2	UINT	Supported.
	Ch1 Refresh Count Response	2	UINT	Supported.
	Ch1 Output SID	2	UINT	Supported.
	Ch1 Input SID Response	2	UINT	Supported.
	Ch1 Output Data 1	16	ARRAY[0..15]OF BYTE	Supported.
	Ch1 Output Data 2*3	16	ARRAY[0..15]OF BYTE	---
	Ch1 Output Data 3*3	16	ARRAY[0..15]OF BYTE	---
	Ch1 Output Data 4*3	16	ARRAY[0..15]OF BYTE	---
	:	-	-	---
	Ch1 Output Data 8*3	16	ARRAY[0..15]OF BYTE	---
	Ch1 Select UID	8	ARRAY[0..7]OF BYTE	---

I/O entry mapping name	Data name	Size (Byte)	Data types	Fixed allocation*1
Input Data Set 2	Ch2 Status	2	WORD or BOOL	Supported.
	Ch2 Refresh Count	2	UINT	Supported.
	Ch2 Response Code	2	WORD	Supported.
	Ch2 Measurement Result	2	UINT	Supported.
	Ch2 Input SID	2	UINT	Supported.
	Ch2 Output SID Response	2	UINT	Supported.
	Ch2 Input Data 1	16	ARRAY[0..15]OF BYTE	Supported.
	Ch2 Input Data 2*2	16	ARRAY[0..15]OF BYTE	---
	Ch2 Input Data 3*2	16	ARRAY[0..15]OF BYTE	---
	Ch2 Input Data 4*2	16	ARRAY[0..15]OF BYTE	---
	:	-	-	---
	Ch2 Input Data 8*2	16	ARRAY[0..15]OF BYTE	---
	Ch2 UID	8	ARRAY[0..7]OF BYTE	---
	Ch2 RF Communications Time	2	UINT	---
	Ch2 Noise Level	2	UINT	---
Output Data Set 2	Ch2 Operation Command	1	BYTE or BOOL	Supported.
	Ch2 RF Communications Option	1	USINT	Supported.
	Ch2 Command Code	2	WORD	Supported.
	Ch2 Memory Address	2	UINT	Supported.
	Ch2 Data Size	2	UINT	Supported.
	Ch2 Refresh Count Response	2	UINT	Supported.
	Ch2 Output SID	2	UINT	Supported.
	Ch2 Input SID Response	2	UINT	Supported.
	Ch2 Output Data 1	16	ARRAY[0..15]OF BYTE	Supported.
	Ch2 Output Data 2*3	16	ARRAY[0..15]OF BYTE	---
	Ch2 Output Data 3*3	16	ARRAY[0..15]OF BYTE	---
	Ch2 Output Data 4*3	16	ARRAY[0..15]OF BYTE	---
	:	-	-	---
	Ch2 Output Data 8*3	16	ARRAY[0..15]OF BYTE	---
	Ch2 Select UID	8	ARRAY[0..7]OF BYTE	---

*1. I/O data that has been allocated when the Unit is shipped from the factory. It cannot be removed from the I/O allocation.

*2. As for input data 2 to 8, allocate the necessary data size in continuation.

*3. As for output data 2 to 8, allocate the necessary data size in continuation.

Precautions for Correct Use

The I/O allocation settings will be incorrect in the following cases.

- When Chn input data 2 to 8 is not allocated in continuation
- When Chn output data 2 to 8 is not allocated in continuation
- When the I/O data of Ch2 is allocated to Ch1 I/O entry mapping
- When the I/O data of Ch1 is allocated to Ch2 I/O entry mapping

The following errors are detected in the above cases:

CPU Unit connection: NX Unit Initialization Error

Communications Coupler Unit connection: Slave Initialization Error

6-2 Details of I/O Data

The details of the I/O data for RFID Units are described below.

6-2-1 Status

This is the status of commands executed by the RFID Unit. Access can be performed for both WORD data and BOOL data.

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Status	WORD or BOOL	0000 hex	Chn Status	n=1:6000 n=2:6001	01

The bit configuration of the Status is as shown below.

Bytes	7 bit	6 bit	5 bit	4 bit	3 bit	2 bit	1 bit	0 bit
0	TESTn	RF_WAR	RF_ERRn	ANT_ERRn	CMD_ERRn	ERRn	NORMn	BUSYn
+1	-	-	-	-	-	-	-	-

Abbreviation	Data name	Meaning	Data types	I/O port name
BUSYn	Command status	TRUE: The command is operating FALSE: The command has stopped	BOOL	Chn Command Busy
NORMn	Normal End	Change to TRUE: The command has ended normally Change to FALSE: The instruction for command execution is set to FALSE	BOOL	Chn Normal End
ERRn	Error End	Change to TRUE: The command has ended in an error. Change to FALSE: The instruction for command execution is set to FALSE	BOOL	Chn Error End
CMD_ERRn	Command Error	TRUE: A command error has occurred FALSE: No command error has occurred	BOOL	Chn Command Error
ANT_ERRn	Antenna Error	TRUE: An antenna error has occurred FALSE: No antenna error has occurred	BOOL	Chn Antenna Error
RF_ERRn	RF Communications Error	TRUE: An RF communications error has occurred FALSE: No RF communications error has occurred	BOOL	Chn RF Communications Error
RF_WARn	RF Communications Warning	TRUE: An RF communications warning has occurred FALSE: No RF communications warning has occurred	BOOL	Chn RF Communications Warning
TESTn	Test Mode	TRUE: The test mode is operating FALSE: The test mode has stopped	BOOL	Chn Test Mode

6-2-2 Refresh Count

The refresh count indicates the count value that is incremented by +1 each time the command execution result is updated to the next result when the RFID Unit continuously executes a command.

If the count value does not change since the last input, it means that there is no update in the execution results.

The value starts from 0 when command execution is started. The count value returns to 0 after it exceeds 65,535.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Refresh Count	UINT	0	Chn Refresh Count	n=1:6000 n=2:6001	02

Additional Information

- It is used if an update of the communications result is judged when the RF communications option is *Repeat*, *FIFO repeat*, *Multi trigger*, or *Multi repeat* in the communications command function.
- It is used when an update of the test result is judged in the test command function.

6-2-3 Response Codes

This the result for the command executed by the RFID Unit.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Response Code	WORD	0000 hex	Chn Response Code	n=1:6000 n=2:6001	03

Response Codes	Meaning	Remarks
0000 hex	Normal Command Completion	
E0XX hex	Error Command Completion	XX indicates the error code. For details on the error code, refer to *8-3-11 Error Code Details* on page 8-40.

6-2-4 Measurement Result

This the measurement result for the test command executed by the RFID Unit.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Measurement Result	UINT	0	Chn Measurement Result	n=1:6000 n=2:6001	04

The measurement result varies depending on the test command.

Test command	Measurement result	Meaning	Remarks
MEASURE DISTANCE LEVEL	0 to 6	Distance level (6 levels)	
MEASURE COMMUNICATIONS SUCCESS RATE	0 to 100	Success rate (%)	
MEASURE TRAVELING READING	0 to 8192	Read size (bytes)	
MEASURE TRAVELING WRITING	0 to 8192	Write size (bytes)	
MEASURE NOISE LEVEL	0 to 99	Noise level (99 levels)	

6-2-5 Input SID

The input SID indicates a value that is incremented from 0 to 512 for each I/O refreshing when the input data from the RFID Unit undergoes a division transfer.

If the input SID does not change since the last input, it means that there is no update in the input data.

The value starts from 0 when input data is started. The value returns to 0 during switching to the input data of the next RF Tag when the RF communications option is either Multi or Repeat.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Input SID	UINT	0	Chn Input SID	n=1:6000 n=2:6001	05

6-2-6 Output SID Response

The output SID response indicates the output SID of the division data that is received by the RFID Unit in the end, when the output data from the CPU Unit or the communications master undergoes a division transfer.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Output SID Response	UINT	0	Chn Output SID Response	n=1:6000 n=2:6001	06

6-2-7 Input Data

This the response data for the command executed by the RFID Unit. The data that was read from the RF Tag is returned as a response.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Input Data 1	ARRAY[0..15]OF BYTE	0	Chn Input Data1	n=1:6000 n=2:6001	07
Chn Input Data 2	ARRAY[0..15]OF BYTE	0	Chn Input Data2	n=1:6000 n=2:6001	08
Chn Input Data 3	ARRAY[0..15]OF BYTE	0	Chn Input Data3	n=1:6000 n=2:6001	09
Chn Input Data 4	ARRAY[0..15]OF BYTE	0	Chn Input Data4	n=1:6000 n=2:6001	0A
:					
Chn Input Data 8	ARRAY[0..15]OF BYTE	0	Chn Input Data8	n=1:6000 n=2:6001	0E

6-2-8 UID

The UID of the target RF Tag is returned as a response together with the response of the communications command executed by the RFID Unit.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn UID	ARRAY [0..7] OF BYTE	0	Chn UID	n=1:6000 n=2:6001	0F

6-2-9 RF Communications Time

The measured communications time (0 to 65,535 ms) is returned as a response together with the response of the communications command executed by the RFID Unit.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn RF Communications Time	UINT	-	Chn RF Communications Time	n=1:6000 n=2:6001	10

6-2-10 Noise Level

The measured noise level (0 to 99) is returned as a response together with the response of the communications command executed by the RFID Unit.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Noise Level	UINT	-	Chn Noise Level	n=1:6000 n=2:6001	11

6-2-11 Operation Command

This is a group of command bits that indicates the operation for the RFID Unit. Access can be performed for both BYTE type data and BOOL type data.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Operation Command	BYTE or BOOL	00 hex	Chn Operation Command	n=1:7000 n=2:7001	01

The bit configuration of the operation command is as described below.

Bytes	7 bit	6 bit	5 bit	4 bit	3 bit	2 bit	1 bit	0 bit
0	-	-	-	-	-	-	-	EXEn

Abbreviation	Data name	Meaning	Data types	I/O port name
EXEn	Command execution	Change to TRUE: Start command execution Change to FALSE: Command execution end	BOOL	Chn Command Execution

6-2-12 RF Communications Option

Indicates the RF communications option that performs communications with the RFID Unit.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn RF Communications Option	USINT	0	Chn RF Communications Option	n=1:7000 n=2:7001	02

The RF communications options are shown below.

RF communications option	Series
0	Trigger
1	Auto
2	Repeat
3	FIFO trigger
4	FIFO repeat
5	Multi trigger
6	Multi repeat
7	Selective

6-2-13 Command Code

Indicates the command type that is operated for the RFID Unit.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Command Code	WORD	0000 hex	Chn Command Code	n=1:7000 n=2:7001	03

Command code	Meaning	Remarks
XXXX hex	Command type	XXXX indicates the command code. Refer to *8-3-1 Communications Commands* on page 8-14 and *8-8-1 Test Commands* on page 8-56 for details on the command code.

6-2-14 Memory Address

Specifies the memory address of the RF Tag for a command.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Memory Address	UINT	0000 hex	Chn Memory Address	n=1:7000 n=2:7001	04

6-2-15 Data Size

Specifies the size of the data read/written with respect to a command.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Data Size	UINT	0000 hex	Chn Data Size	n=1:7000 n=2:7001	05

6-2-16 Refresh Count Response

Indicates the refresh count of the execution result received by the CPU Unit or the communications master in the end during the reception of the result of continuous execution of a command from the RFID Unit. Specifies a value that is incremented by +1 each time an execution result is received. The value starts from 0 when command execution is started. The count value returns to 0 after it exceeds 65,535.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Refresh Count Response	UINT	0	Chn Refresh Count Response	n=1:7000 n=2:7001	06

Additional Information

It is used to notify the RFID Unit about the acquisition of updated communications results when the RF communications option is *Repeat*, *FIFO repeat*, *Multi trigger*, or *Multi repeat* in the communications command function.

6-2-17 Output SID

The output SID indicates a value that is incremented from 0 to 512 for each I/O refreshing when the output data from the CPU Unit or communications master undergoes a division transfer.

If the output SID does not change since the last transmission, it means that there is no update in the output data.

The value starts from 0 when output data is started.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Output SID	UINT	0	Chn Output SID	n=1:7000 n=2:7001	07

6-2-18 Input SID Response

The input SID response indicates the input SID of the division data that is received by the CPU Unit or the communications master in the end, when the input data from the RFID Unit or the communications master undergoes a division transfer.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Input SID Response	UINT	0	Chn Input SID Response	n=1:7000 n=2:7001	08

6-2-19 Output Data

This is the data corresponding to the command indicated for the RFID Unit. Specify the data, etc. to write to RF Tag.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Output Data 1	ARRAY[0..15]OF BYTE	0	Chn Output Data1	n=1:7000 n=2:7001	09
Chn Output Data 2	ARRAY[0..15]OF BYTE	0	Chn Output Data2	n=1:7000 n=2:7001	0A
Chn Output Data 3	ARRAY[0..15]OF BYTE	0	Chn Output Data3	n=1:7000 n=2:7001	0B
Chn Output Data 4	ARRAY[0..15]OF BYTE	0	Chn Output Data4	n=1:7000 n=2:7001	0C
:					
Chn Output Data 8	ARRAY[0..15]OF BYTE	0	Chn Output Data8	n=1:7000 n=2:7001	10

6-2-20 Select UID

Specifies the UID of the communications target RF Tag when the *Selective* RF communications option is used.

n: Channel number

Data name	Data type	Default value	I/O port name	Index number (hex)	Subindex number (hex)
Chn Select UID	ARRAY[0..7]OF BYTE	0	Chn Select UID	n=1:7000 n=2:7001	11

7

Setting RFID Units

This section describes the settings of the RFID Unit.

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7-1 Settings of the RFID Unit

The following settings are made for an RFID Unit from the Support Software.

Classification	Item	
Unit Operation Settings	Event Level Setting	
	Operation parameters	Test Switch
		RF Tag Memory Map
		Data Storage Order
	RF Communications Speed (1Ch/2Ch)	
	Write Verify (1Ch/2Ch)	
	RF Communications Timeout (1Ch/2Ch)	
	Write Protect (1Ch/2Ch)	
I/O Allocation Settings	Setting the Divided Data Size	

7-2 Unit Operation Settings

This section describes the details of the unit operation settings of an RFID Unit.

7-2-1 Event Level Setting

You can change the event level of errors that occur in an RFID Unit.

Refer to *9-3-3 Error Table* on page 9-5 for details on errors for which the event level can be changed.

7-2-2 Test Switch

You can select whether to enable or disable the test switch provided on the front panel of the RFID Unit. This helps prevent shifting to the test mode through careless operation of the test switch while the Unit is running.

Settings	Description	Default	Update timing
Enable	The test switch is enabled. You can move to the test mode by operating the switch.	Enable	After the Unit is restarted
Disable	The test switch is disabled. You cannot move to the test mode even by operating the switch.		

7-2-3 RF Tag Memory Map

You can change the memory map of an RF Tag to a data storage method that is compatible with an old model of the RFID system.

During substitution from the old model, or during combined use with the old model, you can use as is the data of the RF Tag that is currently in use.

Settings	Description	Default	Update timing
Standard	Data is read from or written to an RF Tag with the standard memory map. OMRON recommends using this method in general cases.	Standard	After the Unit is restarted
V600 Method	Data is read from or written to an RF Tag with a memory map method that is compatible with a V600-series Controller (V600-□).*1		
V680-CA1D Method	Data is read from or written to an RF Tag with a memory map method that is compatible with a V680-series heat-resistant Controller (V680-CA1D/-CA2D).*2		

*1. Use this method when using the write protect function in a memory map that is compatible with the V600-series.

*2. Use this method when using a heat-resistant tag (V680-D1KP58HTN/V680-D1KP58HT) in a memory map that is compatible with the V680-CA1D/-CA2D.

Precautions for Correct Use

- If you use the V680-CA1D Method for the RF Tag memory map, you can use only the heat-resistant RF Tags (V680-D1KP58HTN/V680-D1KP58HT). You cannot communicate with the other RF Tags.
- When using the V680-CA1D Method, be sure to disable the write protect setting.

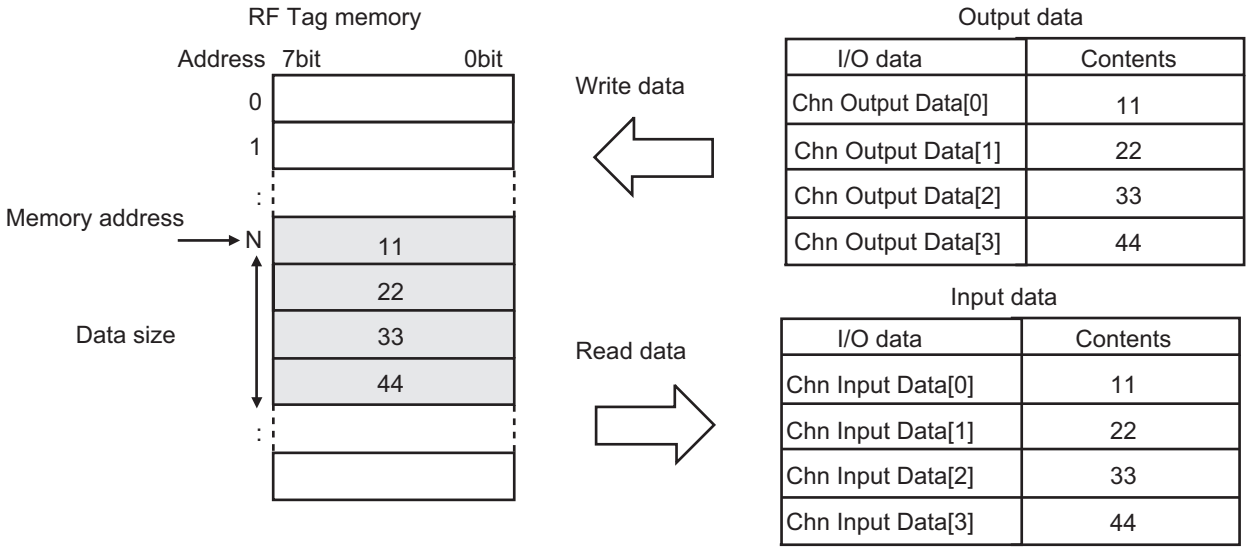
7-2-4 Data Storage Order

You can select the order of storage of data obtained by reading/writing the RF Tag memory.

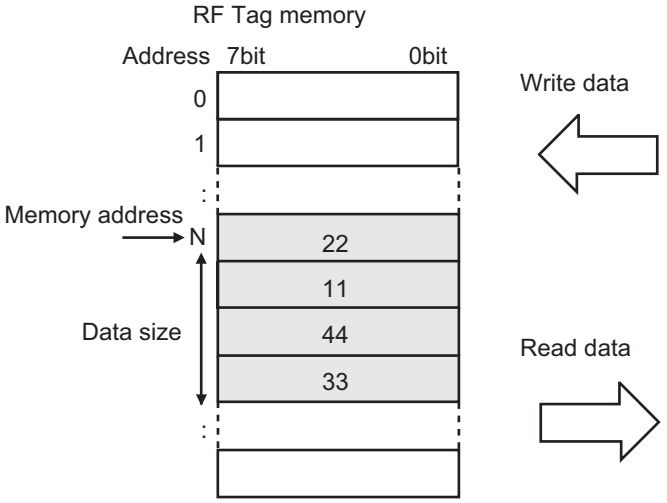
If you are connecting to the PLC of another company, or using the Unit concurrently with a PLC, you need not perform conversion with the user program if you make the settings in accordance with the storage order of the upper byte and lower byte of the PLC word address.

Settings	Description	Default	Update timing
Ascending	Save the data in the order of upper byte to lower byte, in the word unit.	Ascending	After the Unit is restarted
Descending	Save the data in the order of lower byte to upper byte, in the word unit.		

Example of an ascending data storage



Example of a descending data storage order



Output data

I/O data	Contents
Chn Output Data[0]	11
Chn Output Data[1]	22
Chn Output Data[2]	33
Chn Output Data[3]	44

Input data

I/O data	Contents
Chn Input Data[0]	11
Chn Input Data[1]	22
Chn Input Data[2]	33
Chn Input Data[3]	44

Precautions for Correct Use

The target I/O entries of the data storage order are *Chn Input Data*, *Chn Output Data*, *UID*, and *Select UID*.

The order does not change in this setting for the other I/O entries.

7-2-5 RF Communications Speed

By changing the speed of communications with RF Tags, you can select whether to give priority to secure communications or to performance.

Settings	Description	Default	Update timing
Normal Speed	By checking the UID code during communications with an RF Tag, the communications quality can be stabilized. Although some amount of RF communications time may be involved, mixing of data when multiple RF Tags enter the communications area can be prevented.	Standard	After the Unit is restarted
High Speed	By omitting the checking of the UID code during communications with an RF Tag, the RF communications time can be shortened.		

7-2-6 Write Verify

When writing data to an RF Tag, you can select whether to automatically check the accuracy of the written data.

Settings	Description	Default	Update timing
Enable	After data is written to an RF Tag, the data is read to verify the rewritten contents.*1	Enable	After the Unit is restarted
Disable	Verification is not performed after data is written to an RF Tag.		

*1. If verification shows that the read data is not the same as the write data, a *RF Tag Verification Error* response is returned. The written data will not be changed. Write the original data again.

7-2-7 RF Communications Timeout

When using Auto or Repeat as the RF communications option, you can monitor the time when the RF Tag moves and enters the communications area by specifying the upper limit for the wait time until the detection of the RF Tag.

Settings	Description	Default	Update timing
0 (Infinite)	Time monitoring is not performed.	0 (Infinite)	After the Unit is restarted
1 to 600,000 ms	Time monitoring is performed.		

The time period from when the RFID Unit starts executing a command until an RF Tag is detected is measured. If an RF Tag is not detected before the timeout time expires, or if communications is not complete, an *RF Tag missing error* response is returned.

7-2-8 Write Protect

By specifying the areas of an RF Tag memory in which it is not possible to write an RF Tag, data can be protected from unnecessary writing.

Settings	Description	Default	Update timing
Enable	Data is protected by the write protect function.	Enable	After the Unit is restarted
Disable	Data is not protected by the write protect function.		

7-3 Setting the Divided Data Size

In certain cases, the input/output data is divided into pieces and sent over multiple cycles between the CPU Unit or communications master and the RFID Unit. The size of data that is sent in one cycle is called the Divided data size. The specific meaning of the divided data size depends on the system configuration.

System Configuration	Specific meaning of divided data size
CPU Unit connection	I/O data size
EtherCAT Coupler Unit connection	PDO data size
EtherNet/IP Coupler Unit	Tag size of the tag data links

You can edit the I/O allocation settings on the Support Software to set the divided data size to between 16 and 128 bytes for both inputs and outputs. You can adjust the divided data sizes to improve communications performance.

8

Functions of the RFID Units

This section describes the functions of the RFID Units.

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8-1 Operation Modes

An RFID Unit has two operation modes, namely the Normal mode and the Test mode.

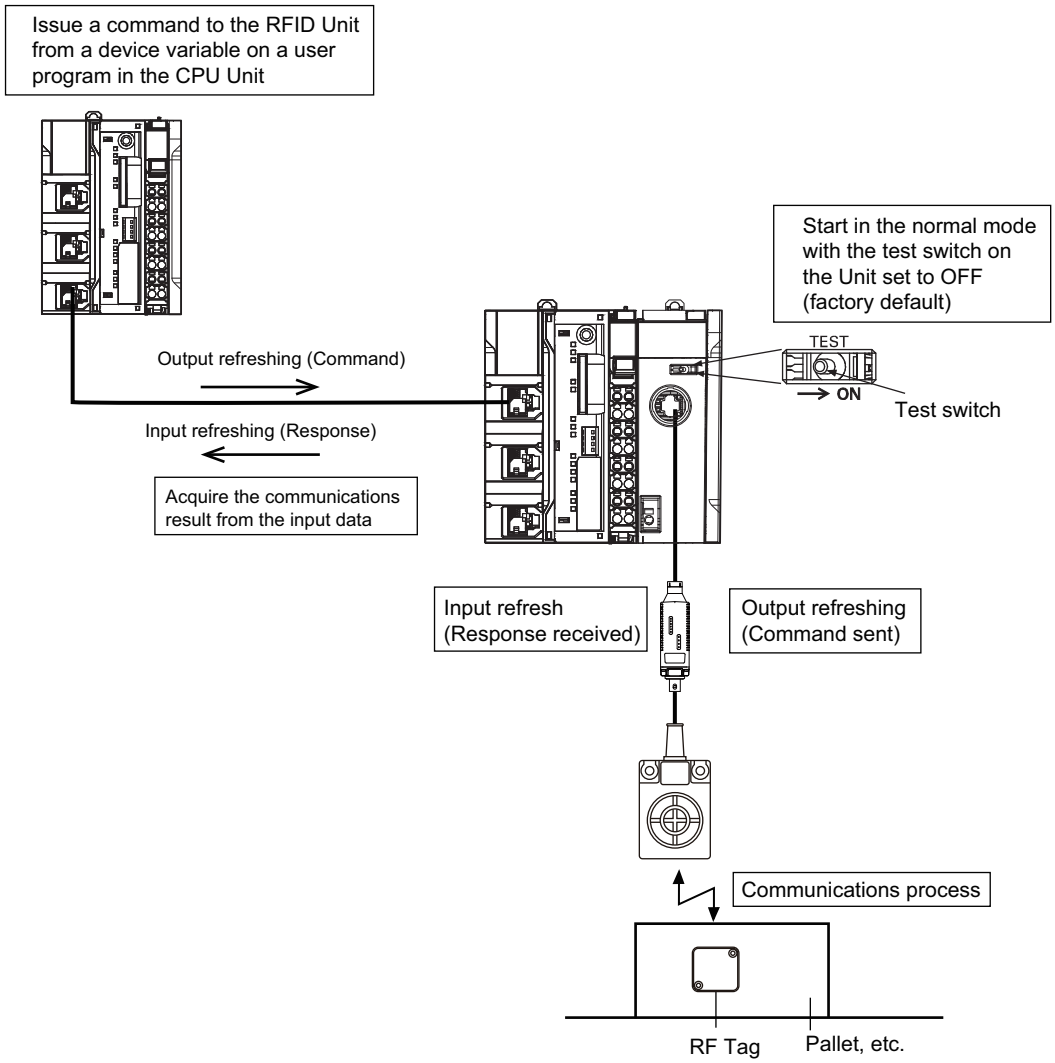
These operation modes are switched with the help of the test switch provided on the front side of the Unit.

The normal mode and the test mode are described below.

8-1-1 Normal Mode

This is an operation mode in which communications with an RF Tag are performed according to the command instructions from a user program by exchanging data with the CPU Unit with the help of I/O refreshing.

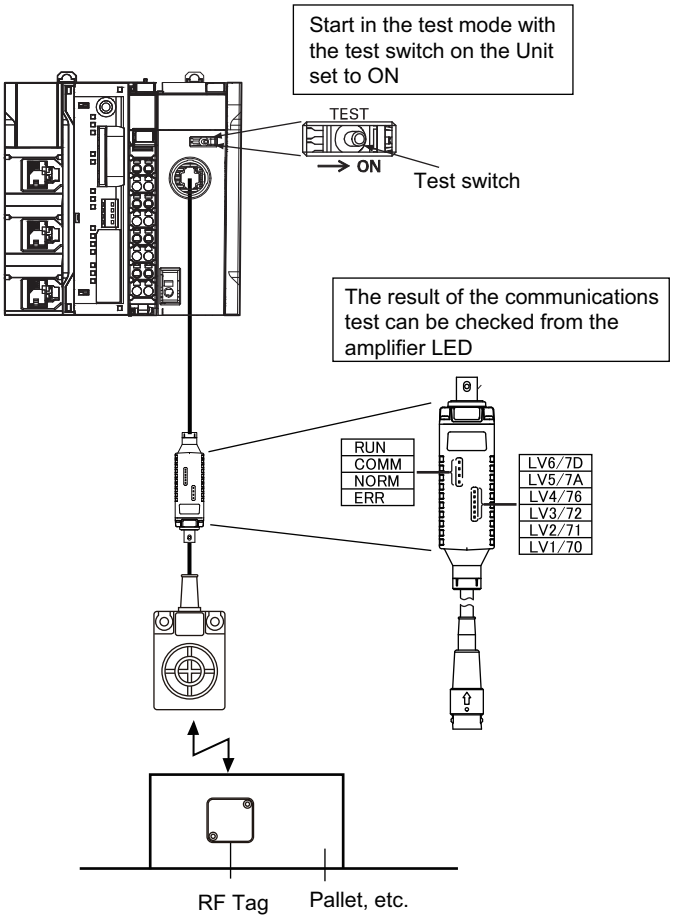
The RFID Unit can be switched to the normal mode by turning the test switch OFF.



8-1-2 Test Mode

This is a mode in which the RFID Unit autonomously tests (measures the communications distance level) communications with an RF Tag.

Communications with an RF Tag can be easily checked even in an environment in which there is no user program on the CPU Unit, and no support software This mode is useful in performing checks in an RFID Unit during the installation of an antenna or RF Tag. The RFID Unit can be switched to the test mode by turning the test switch ON.



Precautions for Correct Use

- If you turn ON the test switch while a command is being executed on the RFID Unit in the normal mode, the RFID Unit will switch to the test mode after the execution of the command has ended.
- In the test mode, the command operating instructions are not received through I/O communications. Since the status TEST (test being executed) is ON, execute the command after checking on the user program.

8-2 RF Communications Option Function

The RF communications option function is a function for specifying the operation sequence of the RFID Unit during communications.

The types of the RF communications option function and the functioning of each type is described below.

8-2-1 Types of the RF Communications Option Function

The RF communications option function is of the following eight types.

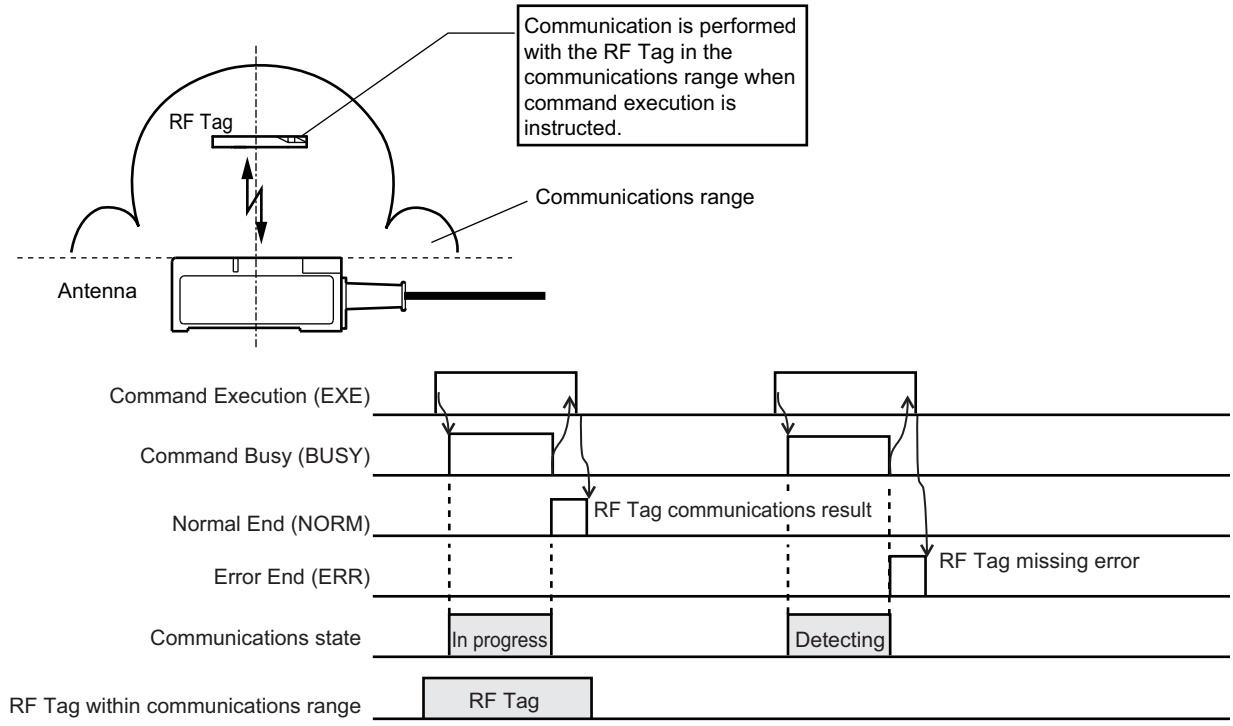
Option name	Description
Trigger	The RF Tag is stopped within the communications range, and communications are performed by an external trigger. Always one RF Tag is set in the communications range.
Auto	An RF Tag that moves into the antenna communications range is automatically detected and communications are performed. Always one RF Tag is set in the communications range.
Repeat	An RF Tag that moves into the antenna communications range is automatically detected and communications are performed. Communications are performed with the RF Tags that enter inside the communications range, one after another, until command execution is aborted. Always one RF Tag is set in the communications range.
FIFO trigger	The RF Tag is stopped within the communications range, and communications are performed by an external trigger. The operation of the RF Tags is prohibited after communications have ended. This RF communications option can be used when the interval between two RF Tags is small. Always one operable RF Tag is set in the communications range.
FIFO repeat	An RF Tag that moves into the antenna communications range is automatically detected and communications are performed. Communications are performed with the RF Tags that enter inside the communications range, one after another, until command execution is aborted. The operation of the RF Tags is prohibited after communications have ended. This RF communications option can be used when the interval between two RF Tags is small. Always one operable RF Tag is set in the communications range.
Multi trigger	Multiple RF Tags are stopped within the communications range, and communications are performed by an external trigger.
Multi repeat	Multiple RF Tags that move into the antenna communications range are automatically detected and communications are performed. Communications are performed with the RF Tags that enter inside the communications range, one after another, until command execution is aborted.
Selective	Multiple RF Tags are stopped within the communications range, and communications are performed by an external trigger. Among the RF Tags that exist in the communications range, communications are performed with only the RF Tag for which the UID is specified.

Precautions for Correct Use

- You cannot use the FIFO trigger/FIFO repeat, multi trigger, and multi repeat options during communications with an RF Tag (V680-D1KP□□).
- When the *Selective* RF communications option is used, acquire the communications target RF Tag by reading the UID of the RF Tag beforehand.

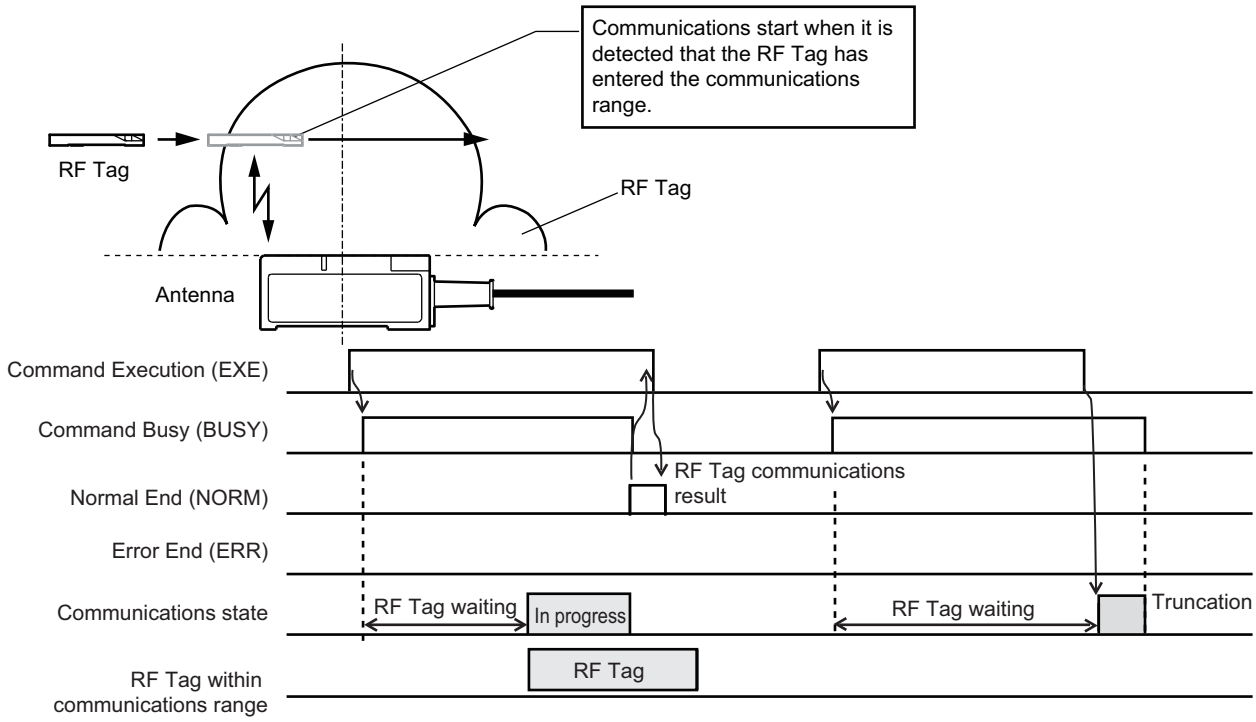
8-2-2 Trigger

In the *Trigger* RF communications option, communications are performed with the RF Tag by setting the *Command Execution* bit of the operation command from FALSE to TRUE. The command execution ends when communications with the RF Tag end. If there is no RF Tag in the antenna communications range, the command ends in an error, and the RF communications error *RF Tag Missing Error* is returned as a response. Operate the *Command Execution* bit by checking the existence of the RF Tag by a sensor, etc.



8-2-3 Auto

In the *Auto* RF communications option, communications are performed by the automatic detection of the existence of the RF Tag after setting the *Command Execution* bit of the operation command from FALSE to TRUE. Therefore, there is no need to detect the existence of an RF Tag as in the case of the *Trigger* RF communications option. The command execution ends when communications with the RF Tag end. Moreover, during the RF Tag waiting period, the command execution can be ended by setting the *Command Execution* bit from TRUE to FALSE.



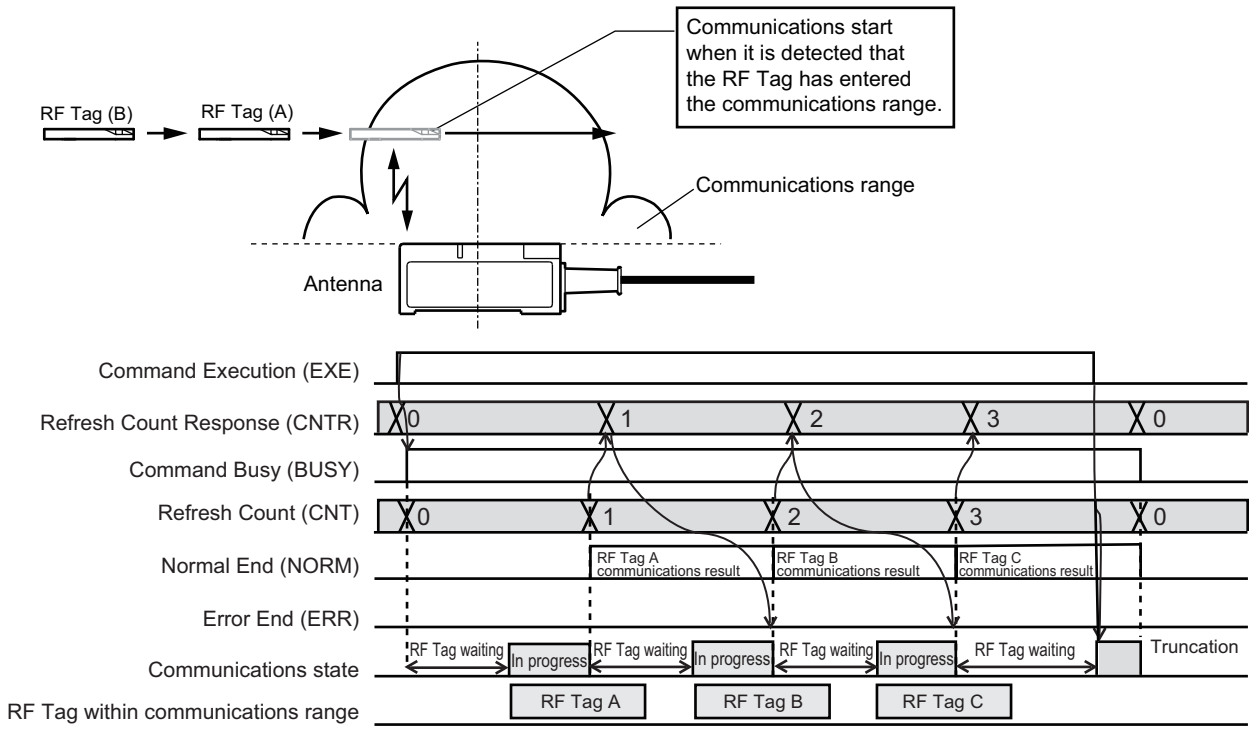
Precautions for Correct Use

In the *Auto* RF communications option, since the existence of an RF Tag is detected automatically, the RF communications error *RF Tag Missing Error* is not returned as a response. However, if the time is specified in the Unit operation setting *RF Communications Timeout*, then the *RF Tag Missing Error* is returned as a response when the timeout period gets over.

8-2-4 Repeat

In the *Repeat* RF communications option, communications are repeatedly performed by automatically detecting the entry of an RF Tag in the communications range after setting the *Command execution* bit of the operation command from FALSE to TRUE.

Unlike the *Auto* RF communications option, the entry of the next RF Tag is awaited after the communications with an RF Tag have ended. Communications are not performed until an RF Tag with which communications have already been performed moves out of the communications range. By changing the *Command Execution* bit from TRUE to FALSE, the command execution used for repeated communications is ended.



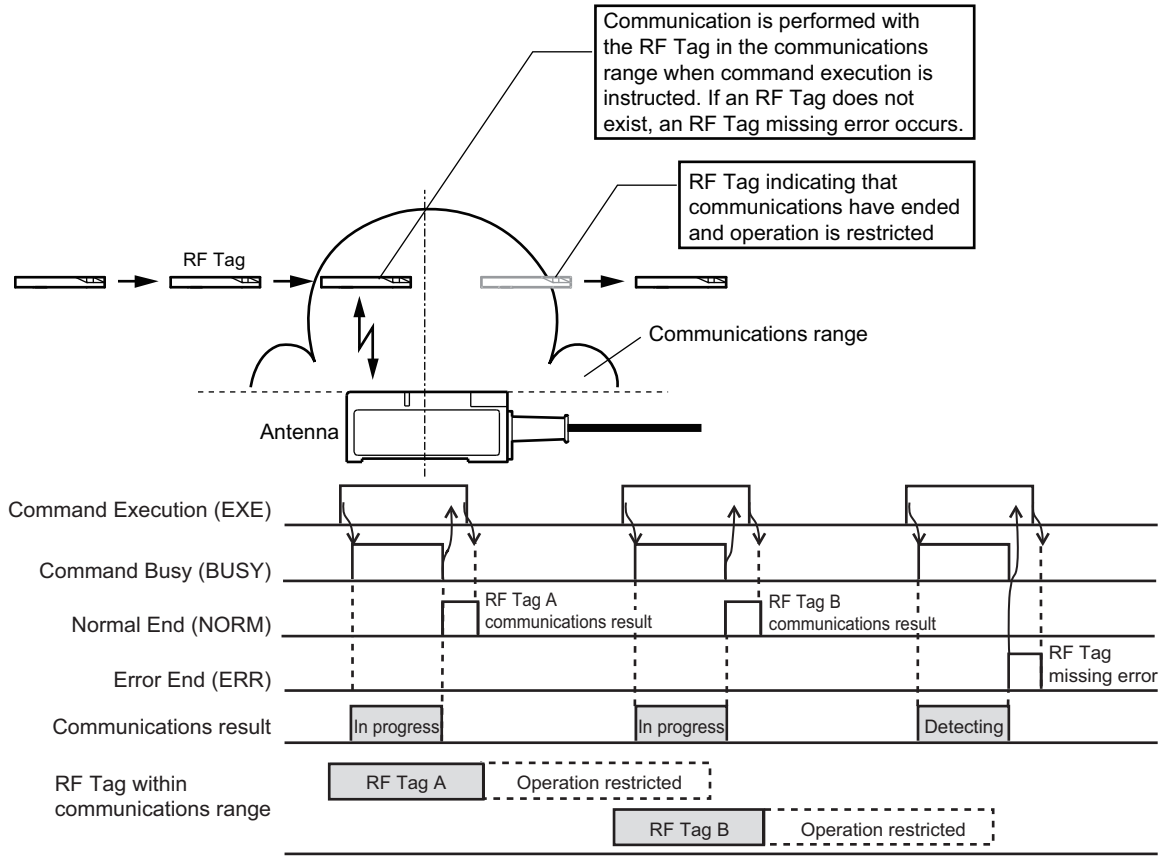
Precautions for Correct Use

In the *Repeat* RF communications option, since the existence of an RF Tag is detected automatically, the communications error *RF Tag Missing Error* is not returned as a response. However, if the time is specified in the Unit operation setting *RF Communications Timeout*, then the *RF Tag Missing Error* is returned as a response when the timeout period gets over.

8-2-5 FIFO Trigger

When the *FIFO trigger* RF communications option is specified, communications are performed with the RF Tag by setting the *Command Execution* bit of the operation command from FALSE to TRUE. The command execution ends when communications with the RF Tag end. Since an RF Tag with which communications have ended is in an operation-prohibited state, no operation is performed until it moves out of the communications range. Even if an RF Tag that is in the operation-prohibited state is present inside the communications range, it is possible to communicate with the next RF Tag.

If there is no RF Tag in the antenna communications range, the command ends in an error, and the RF communications error *RF Tag Missing Error* is returned as a response. Operate the *Command Execution* bit by checking the existence of the RF Tag by a sensor, etc.



Precautions for Correct Use

- If you are using the V680-D2KF□□ or the V680S-D□□F□□, the RF communications speed is standard during FIFO trigger regardless of the contents of the Unit operation settings.
- The *FIFO trigger* RF communications option cannot be used for communicating with the V680-D1KP□□.

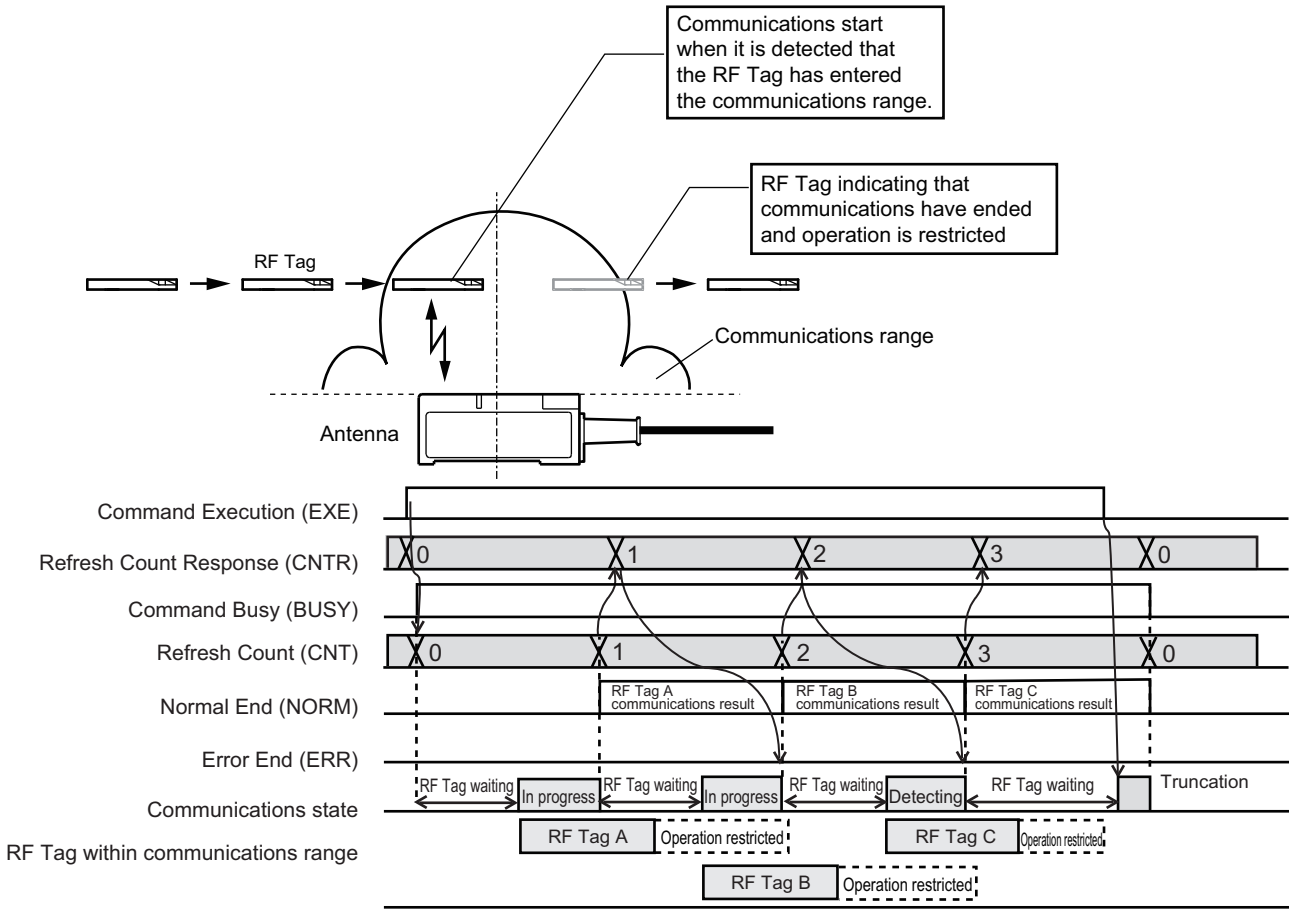
Additional Information

If you want to communicate with an RF Tag that is already in an operation-prohibited state, execute the communications command by setting the RF communications option to *Trigger* so that the antenna output stops and the operation-prohibited state is canceled, and communications can again be performed.

8-2-6 FIFO Repeat

In the *FIFO repeat* RF communications option, communications are repeatedly performed by automatically detecting the entry of an RF Tag in the communications range after setting the *Command Execution* bit of the operation command from FALSE to TRUE. Since an RF Tag with which communications have ended is in an operation-prohibited state, no operation is performed until it moves out of the communications range. Even if an RF Tag that is in the operation-prohibited state is present inside the communications range, it is possible to communicate with the next RF Tag.

Unlike the *FIFO trigger* RF communications option, the entry of the next RF Tag is awaited after the communications with an RF Tag have ended. By setting the *Command Execution* bit from TRUE to FALSE, the command execution used for repeated communications is ended.



Precautions for Correct Use

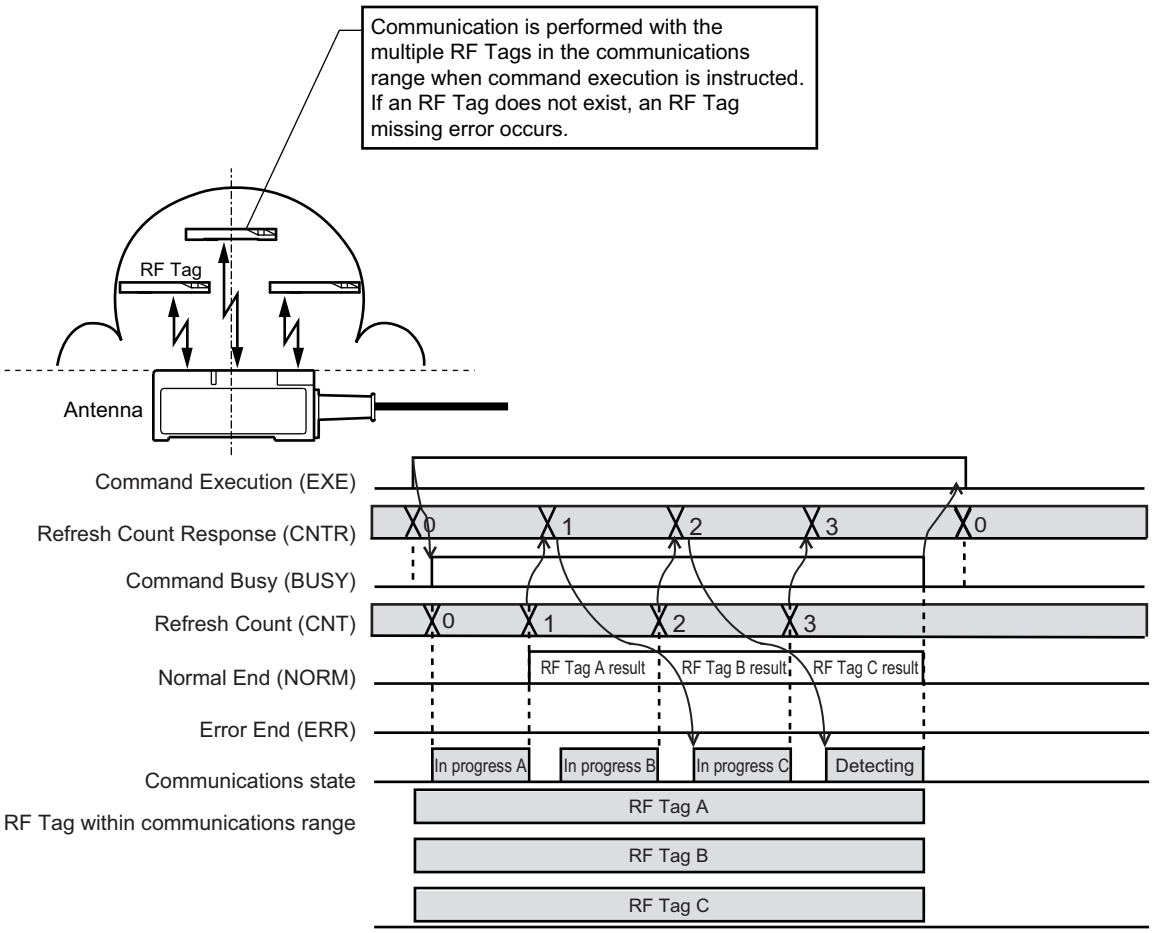
- If you are using the V680-D2KF□□ or the V680S-D□□F□□, the RF communications speed is standard during FIFO repeat regardless of the contents of the Unit operation settings.
- The *FIFO repeat* RF communications option cannot be used for communicating with the V680-D1KP□□.
- In the *FIFO repeat* RF communications option, since the existence of an RF Tag is detected automatically, the RF communications error *RF Tag Missing Error* is not returned as a response. However, if the time is specified in the Unit operation setting *RF Communications Timeout*, then the *RF Tag Missing Error* is returned as a response when the timeout period gets over.

Additional Information

If you want to communicate with an RF Tag that is already in an operation-prohibited state, execute the communications command by setting the RF communications option to *Trigger* so that the antenna output stops and the operation-prohibited state is canceled, and communications can again be performed.

8-2-7 Multi Trigger

When the *Multi trigger* RF communications option is specified, communications are performed with multiple RF Tags by setting the *Command Execution* bit of the operation command from FALSE to TRUE. A response is returned sequentially each time communications with an RF Tag present in the antenna communications range ends. The command execution ends when communications with all RF Tags in the communications range have ended.

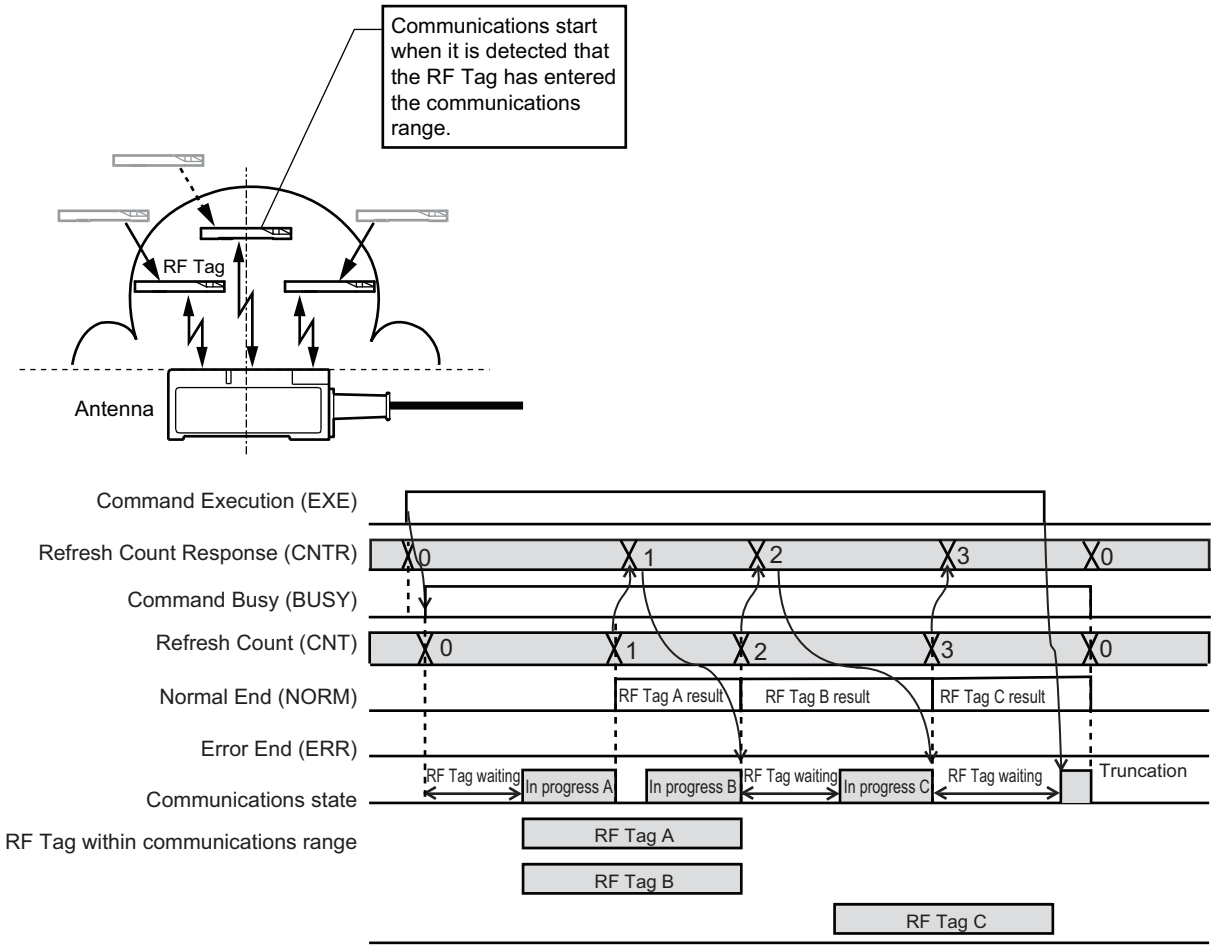


Precautions for Correct Use

- If you are using the V680-D2KF□□ or the V680S-D□□F□□, the RF communications speed is standard during multi trigger regardless of the contents of the Unit operation settings.
- The *Multi trigger* RF communications option cannot be used for communicating with the V680-D1KP□□.

8-2-8 Multi Repeat

In the *Multi repeat* RF communications option, communications are repeatedly performed by automatically detecting the entry of multiple RF Tags in the communications range after setting the *Command Execution* bit of the operation command from FALSE to TRUE. A response is returned sequentially each time communications with an RF Tag present in the antenna communications range ends. The command execution ends when communications with all RF Tags in the communications range have ended. Communications are not performed until an RF Tag with which communications have already been performed moves out of the communications range. By setting the *Command Execution* bit from TRUE to FALSE, the command execution used for repeated communications is ended.

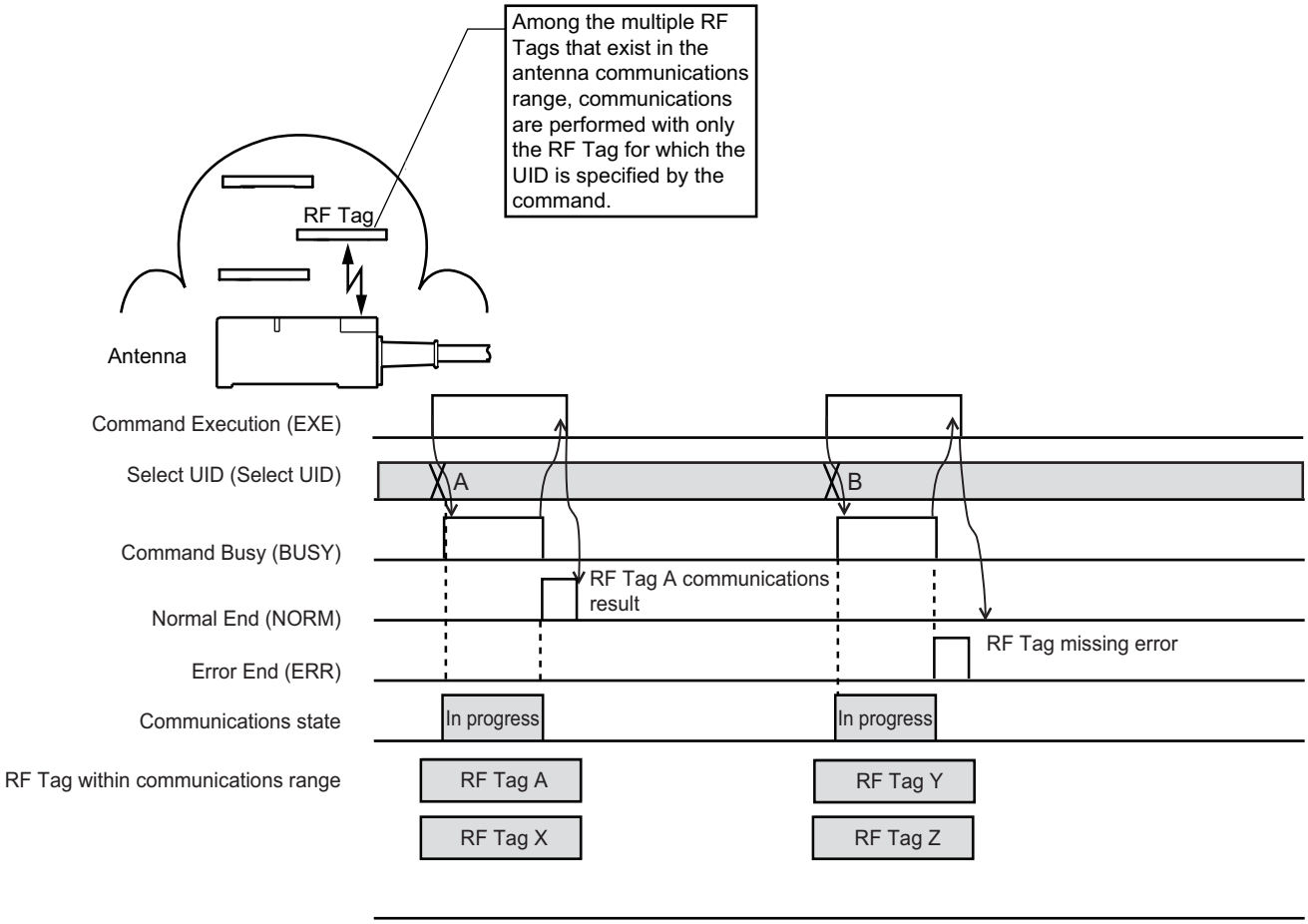


Precautions for Correct Use

- If you are using the V680-D2KF□□ or the V680S-D□□F□□, the RF communications speed is standard during multi repeat regardless of the contents of the Unit operation settings.
- The *Multi repeat* RF communications option cannot be used for communicating with the V680-D1KP□□.
- In the *Multi repeat* RF communications option, since the existence of an RF Tag is detected automatically, the communications error *RF Tag Missing Error* is not returned as a response. However, if the time is specified in the Unit operation setting *RF Communications Timeout,* then the *RF Tag Missing Error* is returned as a response when the timeout period gets over.

8-2-9 Selective

When the *Selective* RF communications option has been specified, communications are performed with only the RF Tag for which the UID is specified from among the multiple RF Tags that exist in the antenna communications range, after setting the *Command Execution* bit of the operation command from FALSE to TRUE. If the RF Tag having the specified UID is not present in the antenna communications range, the command ends in an error, and the RF communications error *RF Tag Missing Error* is returned as a response.



Precautions for Correct Use

The *Selective* RF communications option cannot be used for communicating with the V680-D1KP□□.

8-3 Communications Command Function

The communications command function is a function by which the RFID Unit reads or writes the memory for an RF Tag present in the antenna communications range. The RFID Unit is instructed to perform various read/write operations by the communications command.

A list of the communications commands and the details of each command are described below.

8-3-1 Communications Commands

The list of the communications commands is described below.

Classification	Command name	Command code	Description
Memory read	READ UID	0100	Reads the UID from the RF Tag.
	READ DATA (Normal)	0101	Reads the data from the RF Tag.
	READ DATA (With error detection)	0102	Reads the data and check code from the RF Tag, and detects errors in the data.
	READ DATA (With error correction)	0103	Reads the data and check code from the RF Tag, and detects errors in the data and also corrects 1-bit errors.
Memory write	WRITE DATA (Normal)	0201	Writes data to the RF Tag.
	WRITE DATA (With error detection)	0202	Writes data and the check code for error detection to the RF Tag.
	WRITE DATA (With error correction)	0203	Writes data and the check code for error correction to the RF Tag.
Memory initialization	DATA FILL (Bytes)	0301	Fills the memory of the RF Tag with the specified data.
	DATA FILL (Words)	0302	
Memory copy	COPY DATA	0400	Writes the data of the RF Tag read by the commanded antenna to an RF Tag present in the communications range of another channel antenna.
Bit operation	SET BIT	0500	Sets only the specified bit of the data of an RF Tag to “1”.
	CLEAR BIT	0501	Sets only the specified bit of the data of an RF Tag to “0”.
	MASK BIT WRITE	0502	Protects (masks) the data that is not to be rewritten from the data of the RF Tag, and then writes the data.
Data calculation	UNSIGNED INTEGER ADDITION	0600	Writes the added calculation results to the data of an RF Tag.
	SIGNED INTEGER ADDITION	0601	
	UNSIGNED INTEGER SUBTRACTION	0602	Writes the subtracted calculation results to the data of an RF Tag.
	SIGNED INTEGER SUBTRACTION	0603	

Classification	Command name	Command code	Description
Memory life management	REWRITE COUNT ADDITION	0701	Adds the rewrite count of the RF Tag, and judges if it has reached the maximum rewrite count. (The judgment is based upon whether the rewrite count of 100,000 times specified for an EEPROM RF Tag has been reached.)
	REWRITE COUNT SUBTRACTION	0702	Subtracts the rewrite count set in the RF Tag, and judges if it has reached the maximum rewrite count. (The judgment is based upon whether the remaining rewrite count has change to 0.)
Data Restoration	RESTORE DATA	0800	Restores the data of an RF Tag from which the data could have been lost.

8-3-2 Memory Read Commands

Each of the following memory read commands will be described below.

- READ UID
- READ DATA (Normal)
- READ DATA (With error detection)
- READ DATA (With error correction)

Furthermore, the case of reading data by performing division transfer of the input data is also described.

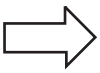
READ UID

Reads the UID from the RF Tag.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0100 hex	0 (Not used)	0 (Not used)
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 hex (Not used)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	UID data (8 bytes)	UID data (8 bytes)	0 to 65535 ms	0 to 99

RF Tag memory (UID area)

Offset	7bit 0bit
0	66
+1	55
+2	44
+3	33
+4	22
+5	11
+6	05
+7	E0



Input data

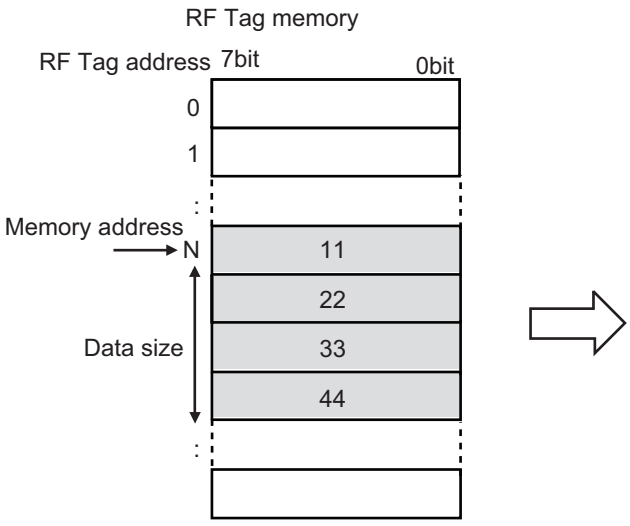
I/O data	Specification
Chn Input Data[0]	66
Chn Input Data[1]	55
Chn Input Data[2]	44
Chn Input Data[3]	33
Chn Input Data[4]	22
Chn Input Data[5]	11
Chn Input Data[6]	05
Chn Input Data[7]	E0

READ DATA (Normal)

Reads the data from the RF Tag.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0101 hex	0 to 65535	0 to 8192
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 to 512*1	00 hex (Not used)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 to 512*1
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	Read data (1 to 128 bytes)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. Used when data is read by performing division transfer of the input data.



Input data

I/O data	Contents
Chn Input Data[0]	11
Chn Input Data[1]	22
Chn Input Data[2]	33
Chn Input Data[3]	44

READ DATA (With Error Detection)

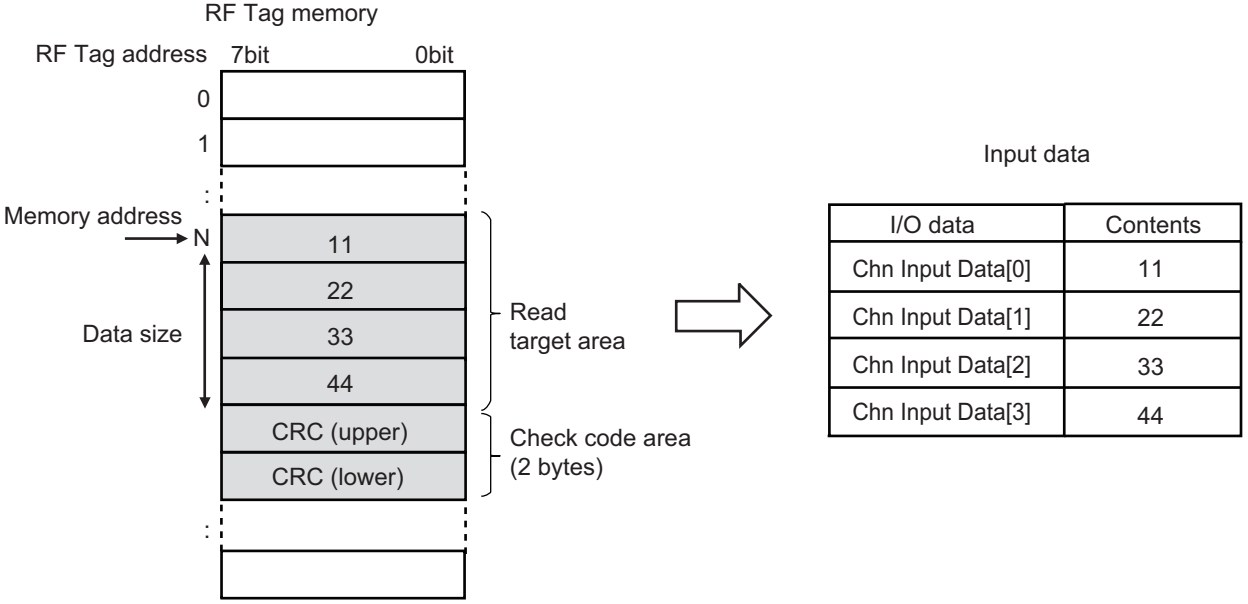
Reads the data and check code from the RF Tag, and detects errors in the data.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0102 hex	0 to 65533	1 to 8190
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 to 512*1	00 hex (Not used)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 to 512*1
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	Read data (1 to 128 bytes)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. Used when data is read by performing division transfer of the input data.

The two bytes after the area to be read are set as the check code (CRC code), which are verified during data reading.

If verification shows a mismatch, the RF communications error *RF Tag Data Error* is returned as a response.



READ DATA (With Error Correction)

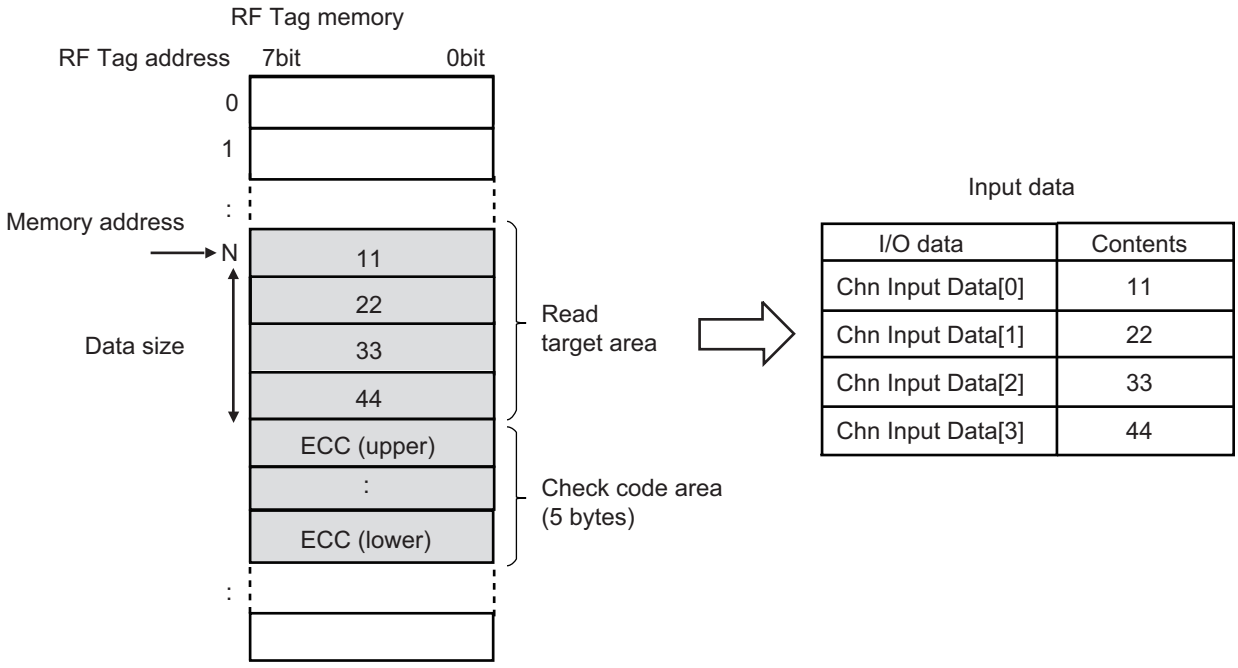
Reads the data and check code from the RF Tag, and detects errors in the data and also corrects 1-bit errors.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0103 hex	0 to 65530	1 to 510
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 to 32*1	00 hex (Not used)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 to 32*1
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	Read data (1 to 128 bytes)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. Used when data is read by performing division transfer of the input data.

The five bytes after the area to be read are set as the check code (ECC code), which are verified during data reading.

If verification shows a mismatch, or if 1-bit is garbled, error correction is performed. At this time, the data is read, and the RF communications warning *RF Tag Data Correction* is returned as a response. In the case of a 2-bit garbled error, the RF communications error *RF Tag Data Error* is returned as a response.



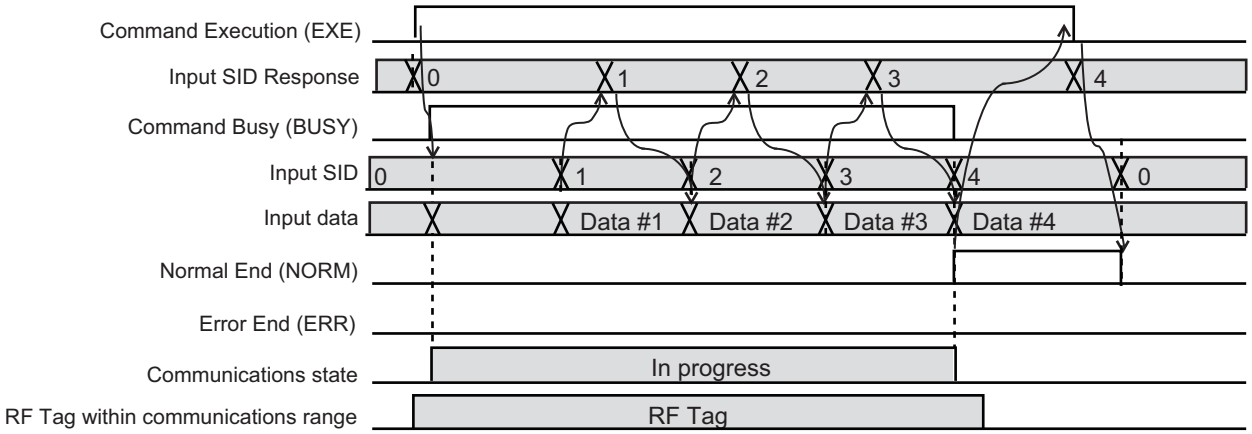
When Data Is Read by Performing Division Transfer of the Input Data

In order to read data that is larger in capacity than the I/O entry, the input data that is divided by using the input SID and input SID response is sequentially received. The RFID Unit must confirm that the transmitted input data has been properly received by the CPU Unit or the communications master. The I/O entries used for this purpose are *Input SID* and *Input SID Response*. The default value of these entries is 0. Confirm that the RFID unit has increment the *Input SID*, and then get the input data. Also, Increment the *Input SID Response*, and receive the next input data. During division transfer, the RFID Units communicate in parallel with the RF Tags.

● Communicating with One RF Tag (RF Communications Option: Trigger, Auto, FIFO trigger or Selective)

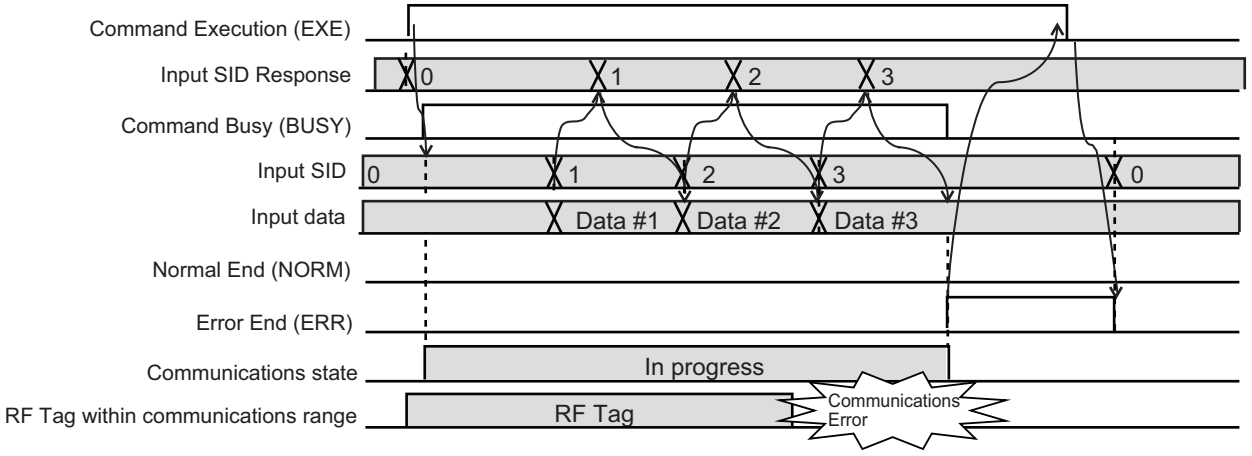
- Timing Chart for Normal End

  When receiving the last input data, the *Input SID* is incremented and the *Normal End (NORM)* bit changes to TRUE.



- Timing Chart for Error End

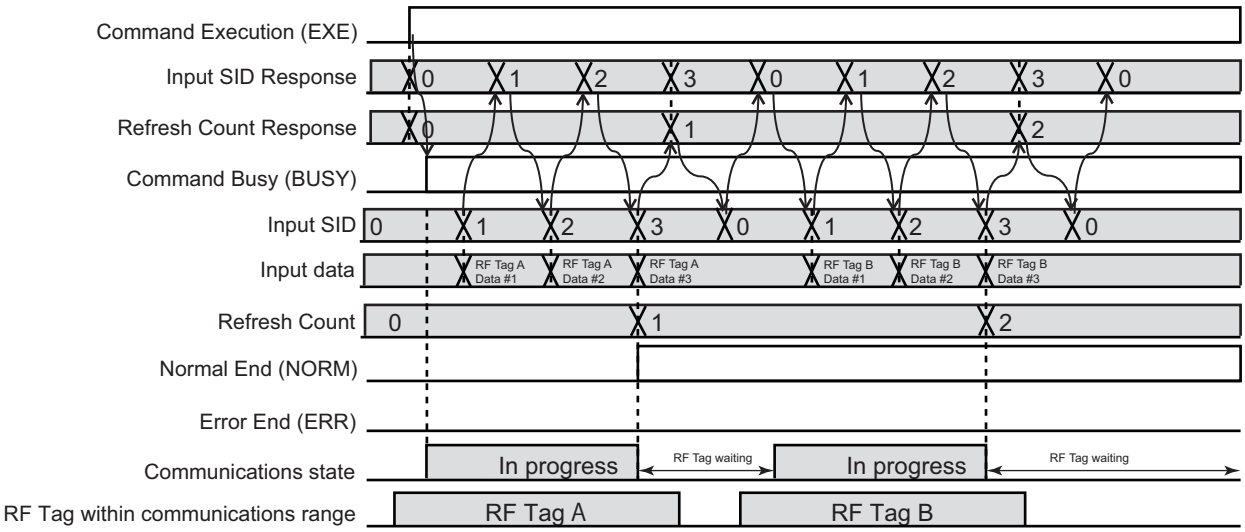
  If communications with the RF tag fail before receiving the last input data, the *Error End (ERR)* bit changes to TRUE. At this time, The *Input SID* will not be incremented.



● Communicating with Multiple RF Tag (RF Communications Option: Multi Trigger), Also Communicating Repeatedly with RF Tag (RF Communications Option: Repeat, FIFO Repeat or Multi Repeat)

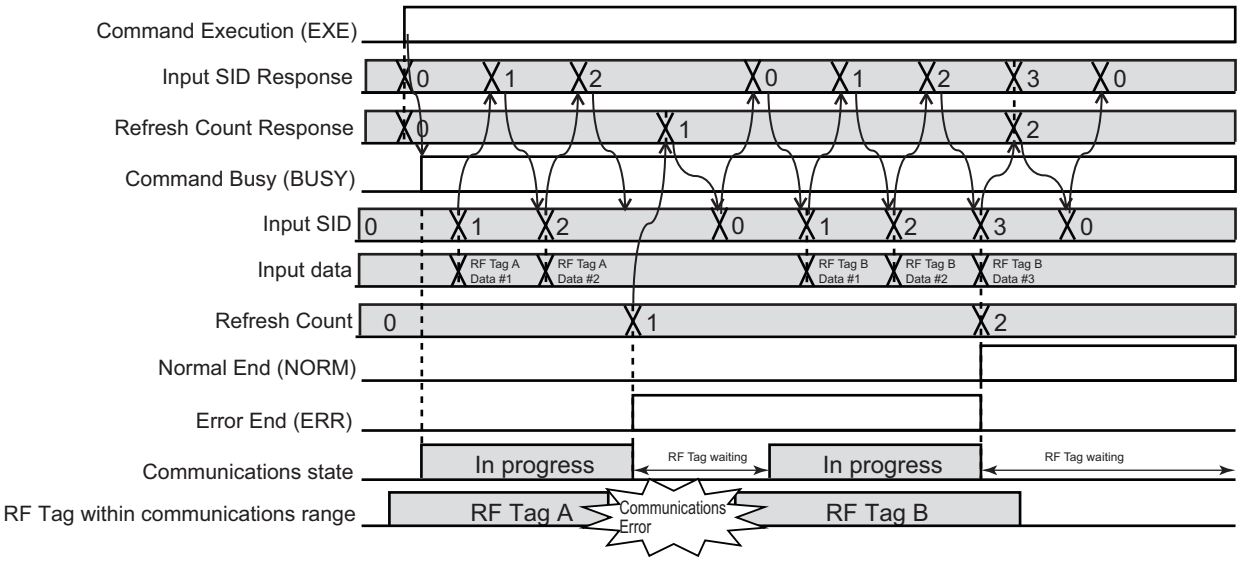
- Timing Chart for Normal End

  When receiving the last input data of an RF tag, the *Normal End (NORM)* bit changes to TRUE at the same time the *Input SID* and the *Refresh Count* are incremented. To receive the input data of the next RF tag, increment the *Refresh Count Response* and set the *Input SID Response* to 0.



- Timing Chart for Error End

  If communications with the RF tag fail before receiving the last input data of an RF tag, the *Error End (ERR)* bit changes to TRUE at the same time the *Refresh Count* is incremented. At this time, The *Input SID* will not be incremented. To receive the input data of the next RF tag, increment the *Refresh Count Response* and set the *Input SID Response* to 0.



8-3-3 Memory Write Commands

Each of the following memory write commands will be described below.

- WRITE DATA (Normal)
- WRITE DATA (With error detection)
- WRITE DATA (With error correction)

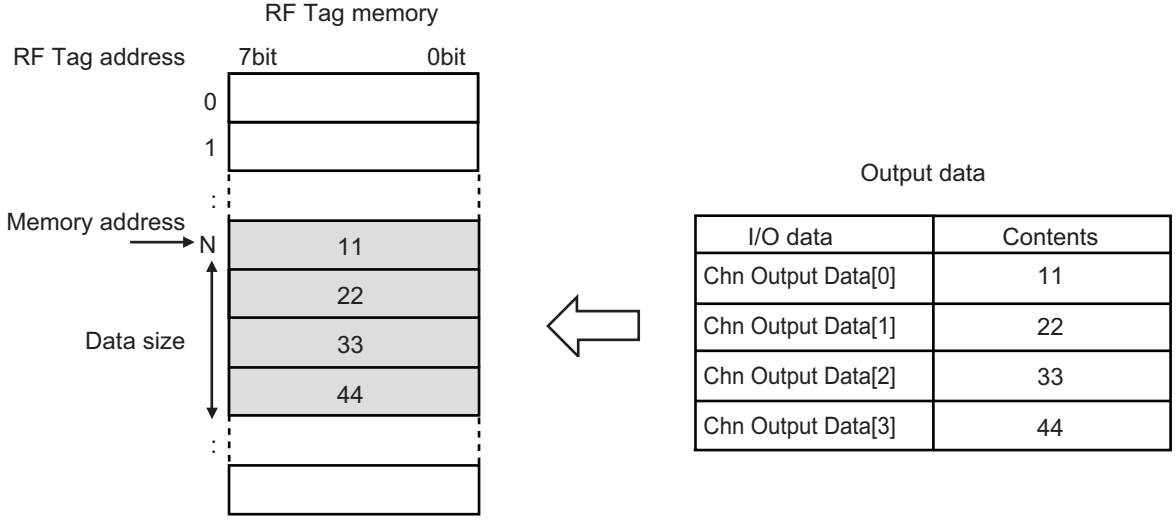
Furthermore, the case of writing data by performing division transfer of the output data is also described.

WRITE DATA (Normal)

Writes data to the RF Tag.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0201 hex	0 to 65535	1 to 8192 (Max. 8 kbytes)
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 to 512*1	0 (Not used)	Write data (1 to 128 bytes)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 to 512*1	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. Used when data is written by performing division transfer of the output data.



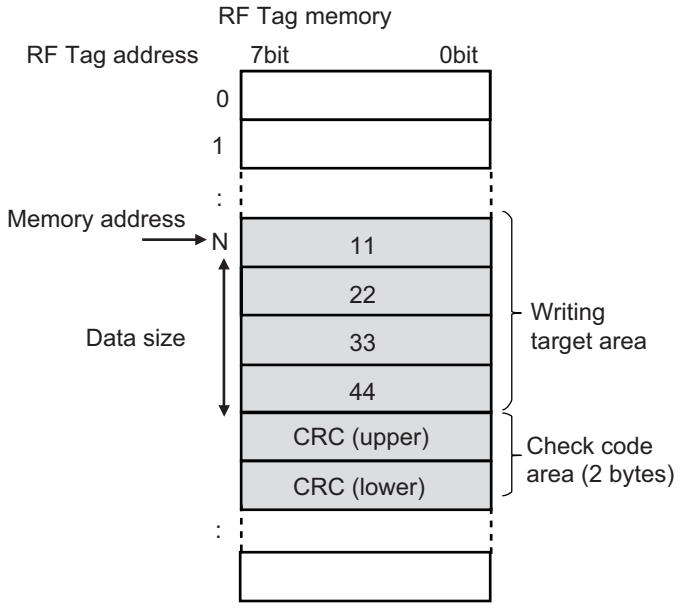
WRITE DATA (With Error Detection)

Writes data and the check code for error detection to the RF Tag.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0202 hex	0 to 65533	1 to 8190
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 to 512*1	0 (Not used)	Write data (1 to 128 bytes)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 to 512*1	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. Used when data is written by performing division transfer of the output data.

The two bytes after the area to be written are set as the check code (CRC code), and the check code is generated from the write data and written together.



Output data

I/O data	Contents
Chn Output Data[0]	11
Chn Output Data[1]	22
Chn Output Data[2]	33
Chn Output Data[3]	44

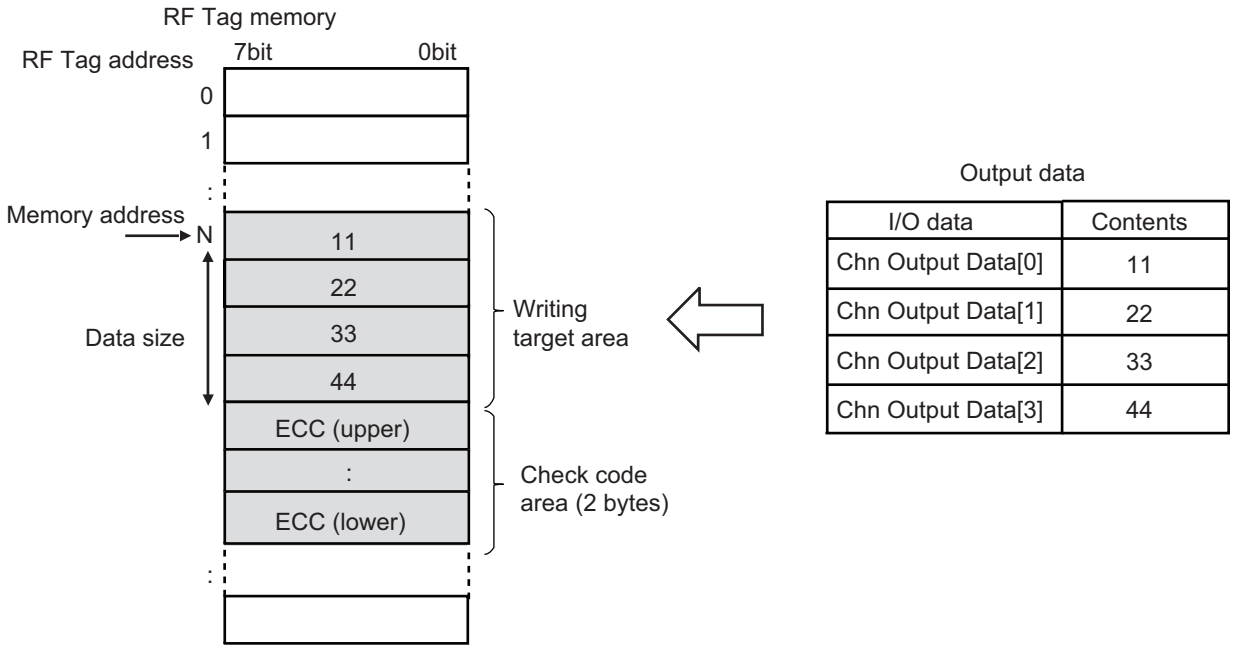
WRITE DATA (With Error Correction)

Writes data and the check code for error correction to the RF Tag.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0203 hex	0 to 65530	1 to 510
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 to 32*1	0 (Not used)	Write data (1 to 128 bytes)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 to 32*1	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. Used when data is written by performing division transfer of the output data.

The five bytes after the area to be written are set as the check code (ECC), and the check code is generated from the write data and written together.



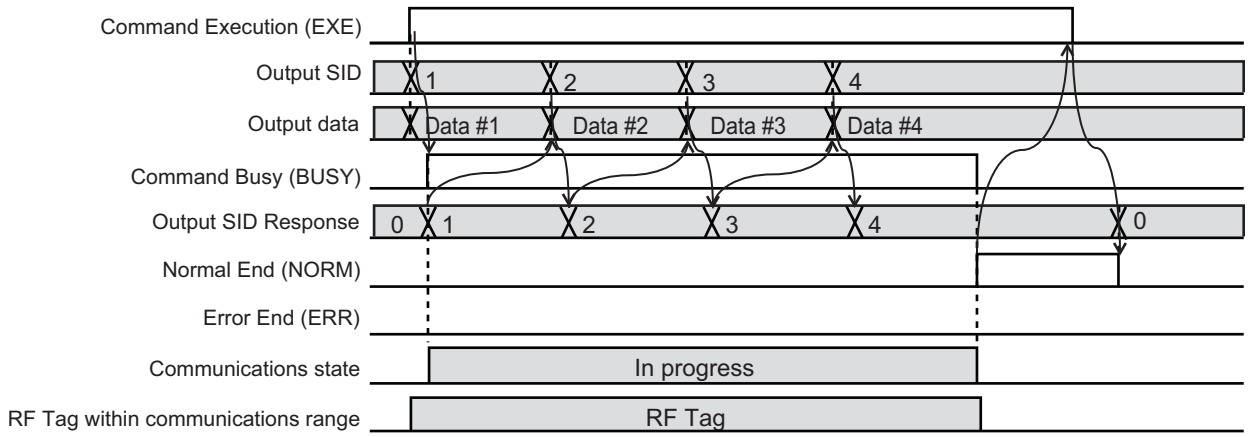
When Data Is Written by Performing Division Transfer of the Output Data

In order to write data that is larger in capacity than the I/O entry, the output data is divided by using the output SID and output SID response, and then sequentially transmitted. The CPU Unit or communications master must confirm that the transmitted output data has been properly received by the RFID Unit. The I/O entries used for this purpose are *Output SID* and *Output SID Response*. Increment the *Output SID* together with transfer of output data. Confirm that the RFID unit has incremented the *Output SID Response* and transmit the next *Output data*. During division transfer, the RFID Units communicate in parallel with the RF Tags.

● Communicating with One RF Tag (RF Communications Option: Trigger, Auto, FIFO trigger or Selective)

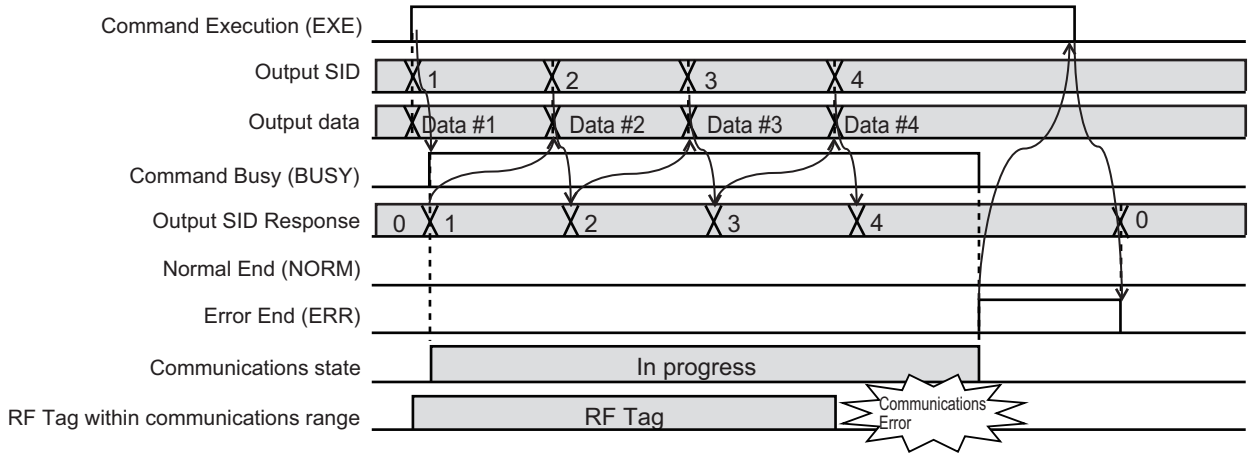
- Timing Chart for Normal End

  When writing of the last output data to the RF Tag has ended, the *Normal End (NORM)* bit changes to TRUE.



- Timing Chart for Error End

  If communications with the RF tag fail before writing the last output data, the *Error End (ERR)* bit changes to TRUE.



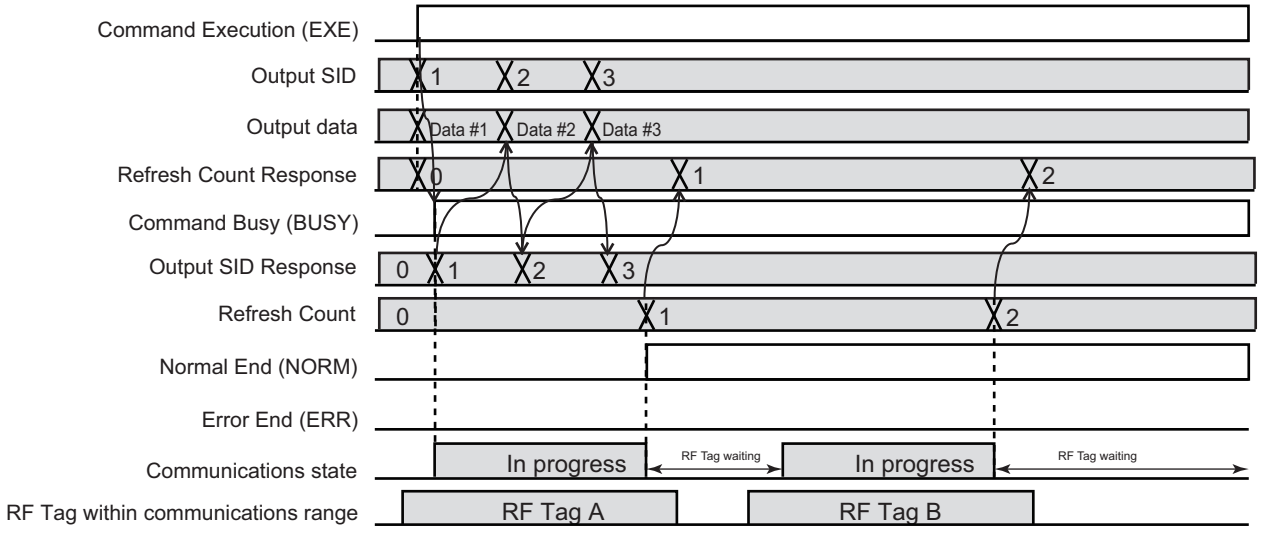
Precautions for Correct Use

- When the value of *Output SID* is other than 1 at the time of start of command execution, the *Error End* bit of the status changes to TRUE, and the error code *Invalid Command Parameter* is returned. Be sure to set the value to the default value of 1.
- Even if the RFID unit detects a communication error during the divided transfer of output data, it does not error ended. It error ends after transmission of all output data is completed. Be sure to transmit up to the last output data.

● Communicating with Multiple RF Tag (RF Communications Option: Multi Trigger), Also Communicating Repeatedly with RF Tag (RF Communications Option: Repeat, FIFO Repeat or Multi Repeat)

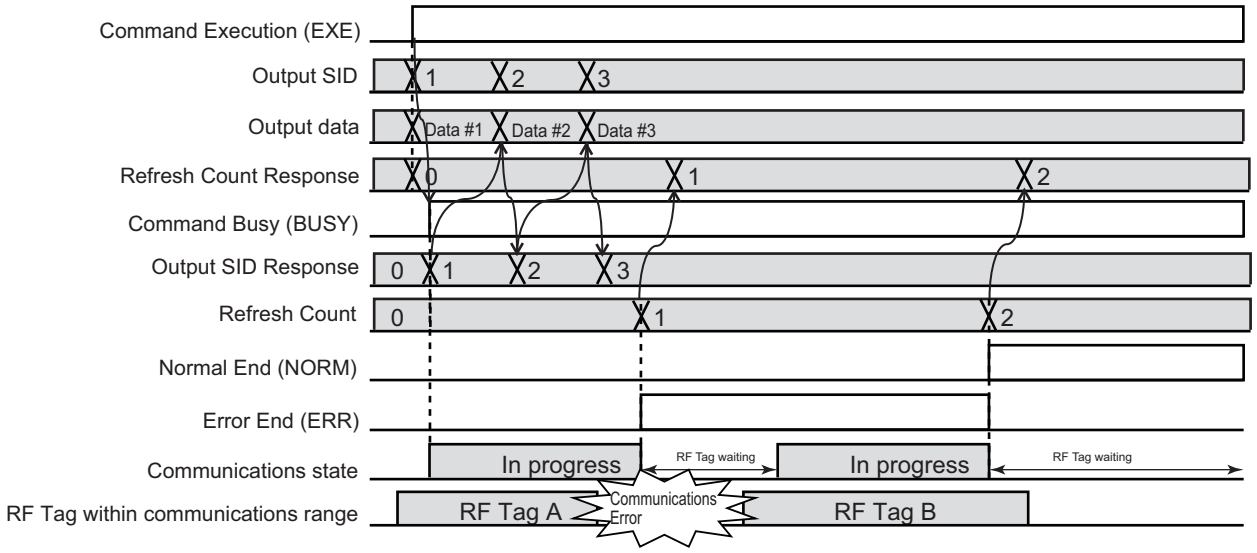
- Timing Chart for Normal End

  When writing of the last output data to the RF tag has ended, the *Normal End (NORM)* bit changes to TRUE at the same time the *Refresh Count* is incremented. In order to write output data to the next RF tag, increment the *Refresh Count Response*.



- Timing Chart for Error End

  If communications with the RF tag fail before writing the last output data, the *Error End (ERR)* bit changes to TRUE at the same time the *Refresh Count* is incremented. In order to write output data to the next RF tag, increment the *Refresh Count Response*.



Precautions for Correct Use

- When the value of *Output SID* is other than 1 at the time of start of command execution, the *Error End* bit of the status changes to TRUE, and the error code *Invalid Command Parameter* is returned. Be sure to set the value to the default value of 1.
- Even if the RFID unit detects a communication error during the divided transfer of output data, it does not error ended. It error ends after transmission of all output data is completed. Be sure to transmit up to the last output data.

8-3-4 Memory Initialization Commands

Each of the following memory initialization commands will be described below.

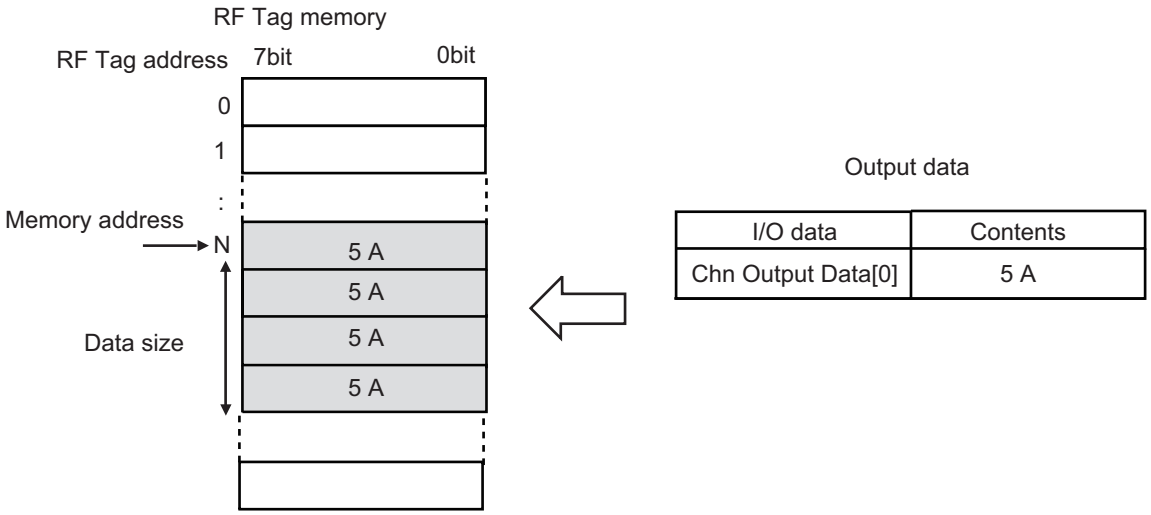
- DATA FILL (Bytes)
- DATA FILL (Words)

DATA FILL (Bytes)

Fills the memory of the RF Tag with the specified byte data.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0301 hex	0 to 65535	0 or 1 to 8192*1 (Max. 8 kbytes)
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Fill data)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. When 0 is specified, all addresses after the address specified in Memory address are filled with the fill data.

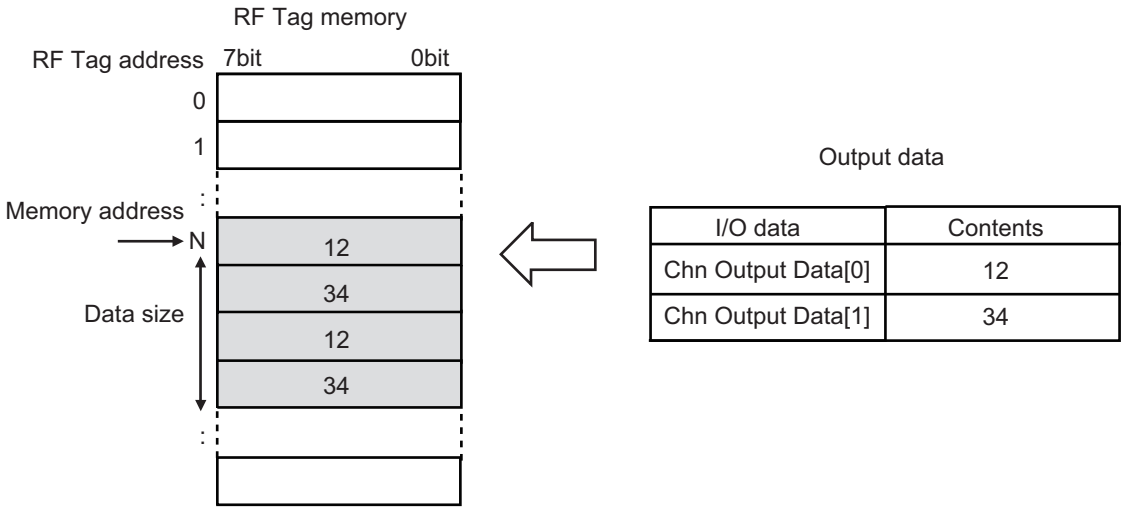


DATA FILL (Words)

Fills the memory of the RF Tag with the specified word data.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0302 hex	0 to 65534	0 or 1 to 8192*1 (Max. 8 kbytes)
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	0000 to FFFF hex (Fill data)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. When 0 is specified, all addresses after the address specified in Memory address are filled with the fill data.



8-3-5 Memory Copy Command

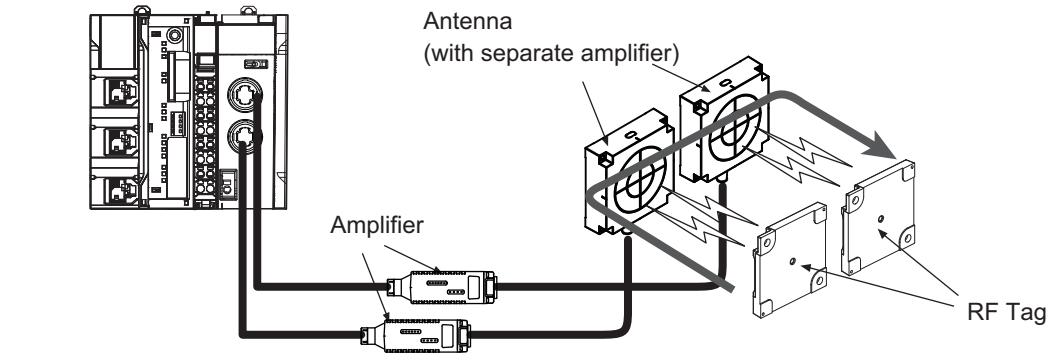
Here, COPY DATA, which is a memory copy command will be described.

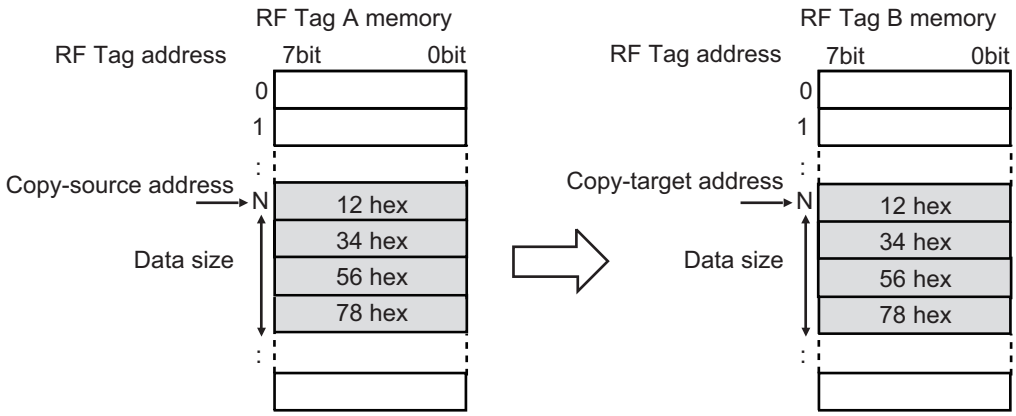
COPY DATA

Writes the data of the RF Tag read by the commanded channel antenna to an RF Tag present in the communications range of another channel antenna.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0400 hex	0 to 65535 (Copy-source address)	0 or 1 to 8192*1 (Max. 8 kbytes)
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 to 65535 (Copy-destination address)	0 (Not used)	00 hex (Not used)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

*1. When 0 is specified, the entire memory of the RF Tag is filled with the fill data.





8-3-6 Bit Operation Commands

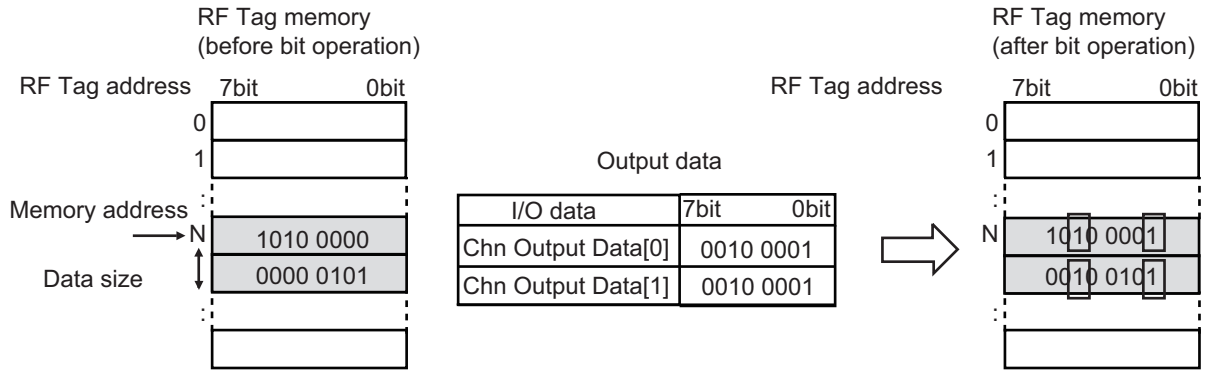
Each of the following bit operation commands will be described below.

- SET BIT
- CLEAR BIT
- MASK BIT WRITE

SET BIT

Sets only the specified bit of the data of an RF Tag to 1.

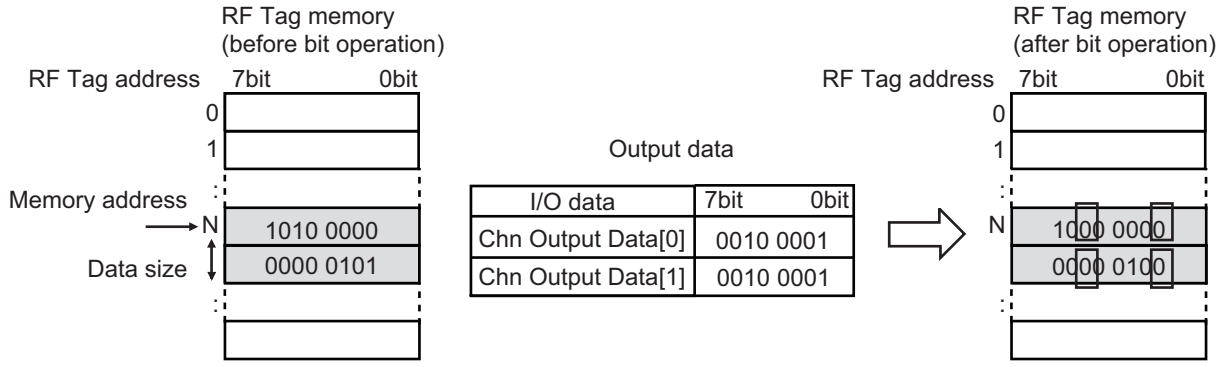
Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0500 hex	0 to 65535	1 to 4
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Max. 4 bytes)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99



CLEAR BIT

Sets only the specified bit of the data of an RF Tag to 0.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0501 hex	0 to 65535	1 to 4
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Max. 4 bytes)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99



MASK BIT WRITE

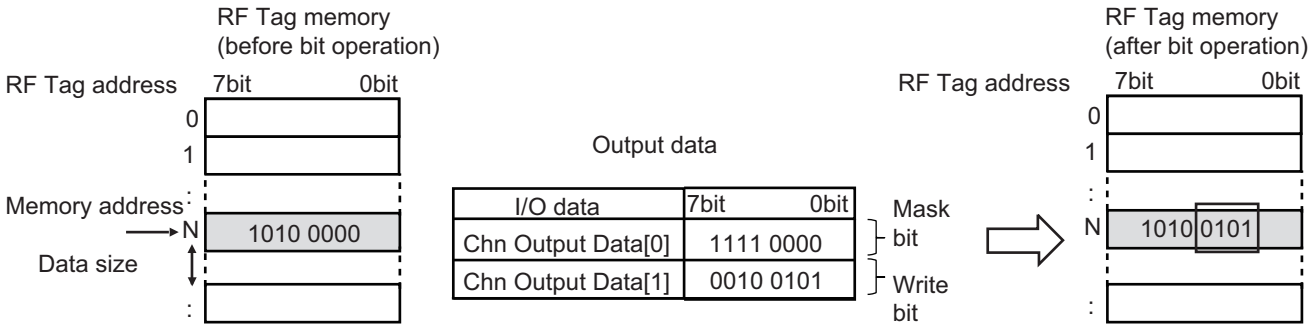
Protects (masks) the data that is not to be rewritten from the data of the RF Tag, and then writes the data.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0502 hex	0 to 65535	1 to 4
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Max. 4 bytes)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

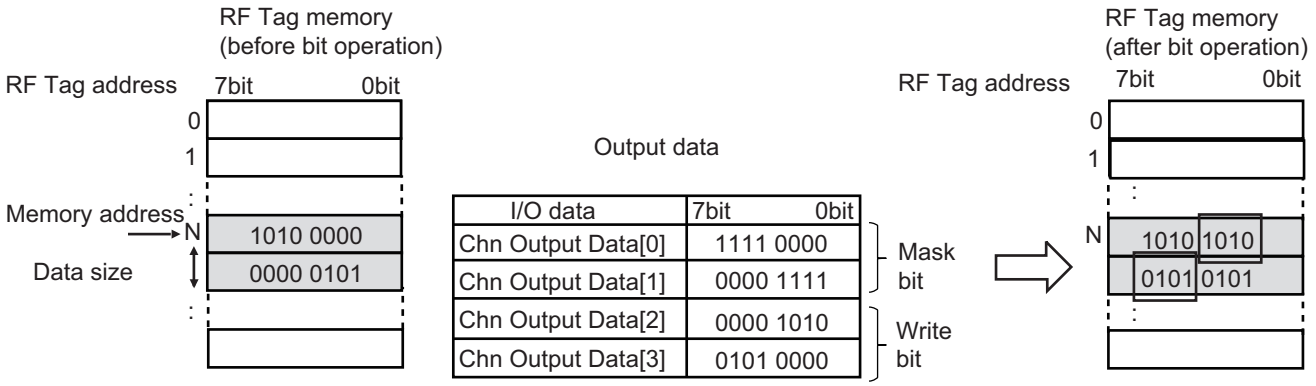
In the output data, the mask bit is stored in the beginning, and thereafter, the latter half stores the number of write bits specified in the data size.

The bit specifying 1 is protected by the mask bit and is not overwritten.

Example: When the Data size is 1:



Example: When the Data size is 2:



8-3-7 Data Calculation Commands

Each of the following data calculation commands will be described below.

- UNSIGNED INTEGER ADDITION
- SIGNED INTEGER ADDITION
- UNSIGNED INTEGER SUBTRACTION
- SIGNED INTEGER SUBTRACTION

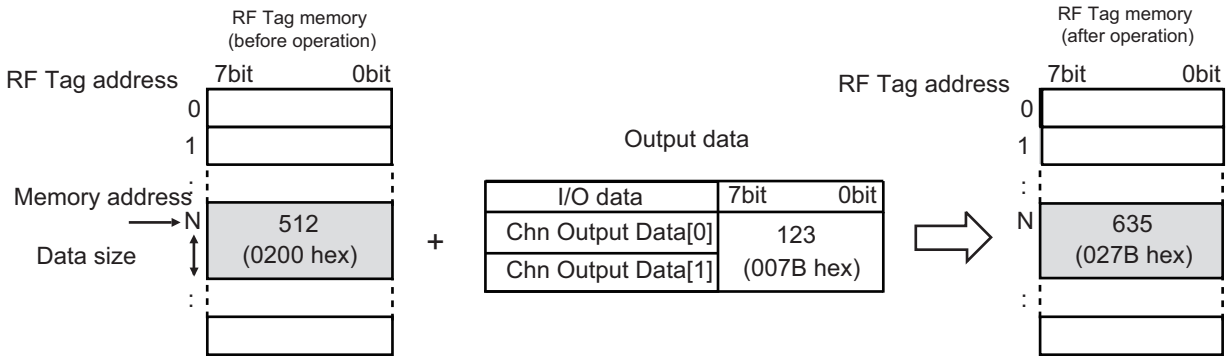
In the data calculation commands, specify the data size in accordance with the following data types.

Classification	Data types	Valid range	Data size
Unsigned	USINT	0 to 255	1
	UINT	0 to 65535	2
	UDINT	0 to 4294967295	4
	ULINT	0 to 18446744073709551615	8
Signed	SINT	-128 to 127	1
	INT	-32768 to 32767	2
	DINT	-2147483648 to 2147483647	4
	LINT	-9223372036854775808 to 9223372036854775807	8

UNSIGNED INTEGER ADDITION or SIGNED INTEGER ADDITION

Writes the added calculation results to the data of an RF Tag.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0600 hex (Unsigned) 0601 hex (Signed)	0 to 65535	1/2/4/8
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Addition value)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 to FF hex (Calculation result)	UID data (8 bytes)	0 to 65535 ms	0 to 99



Additional Information

When the calculation result exceeds the valid range of the data type, it is referred to as an overflow or underflow.

If an overflow or underflow occurs as a result of addition, the *Normal End* bit and *RF Communications Warning* bit of the status change to TRUE.

When an overflow or underflow occurs, the value that can be expressed by the number of bits of the data type is written as the addition result.

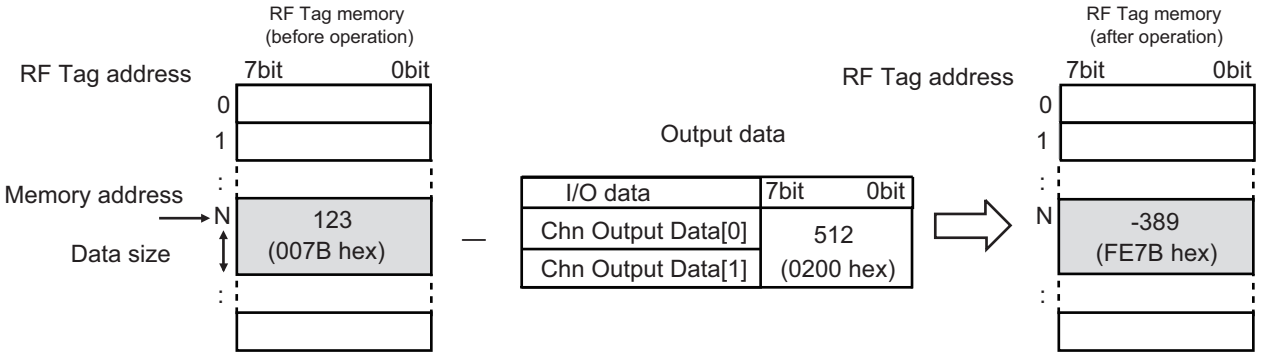
Example: When the data type is INT

The value of the addition result of INT#32767 + INT#3 will be the lower 16 bits of the sum 32,770 of both, i.e., INT#-32766.

UNSIGNED INTEGER SUBTRACTION or SIGNED INTEGER SUBTRACTION

Writes the subtracted calculation results to the data of an RF Tag.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0602 hex (Unsigned) 0603 hex (Signed)	0 to 65535	1/2/4/8
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Subtracted value)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 to FF hex (Calculation result)	UID data (8 bytes)	0 to 65535 ms	0 to 99



Additional Information

When the calculation result exceeds the valid range of the data type, it is referred to as an overflow or underflow.

If an overflow or underflow occurs as a result of subtraction, the *Normal End* bit and *RF Communications Warning* bit of the status change to TRUE.

When an overflow or underflow occurs, the value that can be expressed by the number of bits of the data type is written as the subtraction result.

Example: When the data type is INT

The value of the subtraction result of INT#32767 - INT#-3 will be the lower 16 bits of the difference 32,770 of both, i.e., INT#-32766.

8-3-8 Memory Life Management Commands

Each of the following memory life management commands will be described below.

- REWRITE COUNT ADDITION
- REWRITE COUNT SUBTRACTION

REWRITE COUNT ADDITION

Adds the rewrite count of the RF Tag, and judges if it has reached the maximum rewrite count. (The judgment is based upon whether the rewrite count of 100,000 times specified for an EEPROM RF Tag has been reached.)

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0701 hex	0 to 65533	0 (Not used) * Fixed as 1 byte
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Rewrite count)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used) * Fixed as 1 byte
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

REWRITE COUNT SUBTRACTION

Subtracts the rewrite count set in the RF Tag, and judges if it has reached the maximum rewrite count. (The judgment is based upon whether the remaining rewrite count has change to 0.)

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0702 hex	0 to 65533	0 (Not used) * Fixed as 1 byte
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 to FF hex (Rewrite count)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

Additional Information

Refer to *8-5 RF Tag Service Life Detection Function* on page 8-49 for details on how to use the rewrite addition/subtraction commands.

8-3-9 Data Restoration Command

Here, the data restore command described below.

RESTORE DATA

Restores the data of an RF Tag from which the data could have been lost.

Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	Used	0800 hex	0 (Not used)	0 (Not used)
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	Used by the RF communications option	0 (Not used)	0 (Not used)	00 hex (Not used)	Used by the RF communications option
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	Used	Used by the RF communications option	Error code	0 (Not used)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**Additional information (UID)**	**Additional information (RF communications time)**	**Additional information (Noise level)**
	0 (Not used)	00 hex (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

Additional Information

If the RFID Unit detects the RF communications error *RF Tag Data Loss* while writing to the memory of the RF Tag, it retains the UID and data block of the RF Tag that is likely to be lost. The data restore command compares the retained UID and the UID of the RF Tag in the communications range, and only if the UIDs are matching, restores the retained data block to the original area.

Application method

(1) During operation, the RF communications error *RF Tag Data Loss* is detected in the RFID Unit used in the process of writing data to the RF Tag.

(2) The RF Tag is installed in a stable manner at a position where communications can be performed in the communications range of the antenna of the RFID in which the error is detected.

(3) Execute the command for restoring data and recover the data. (The corresponding block returns to the state before data writing.)

(4) Repeat data writing.

8-3-10 Combining with the RF Communications Options

The combinations of the RF communications options that can be specified by the communications command are shown below.

Yes: Supported combination, ---: Unsupported combination

Classification	Command name	Trigger	Auto	Repeat	FIFO Trigger	FIFO Repeat	Multi Trigger	Multi Repeat	Selective
Memory read	READ UID	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	READ DATA (Normal/With error detection/With error correction)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory write	WRITE DATA (Normal/With error detection/With error correction)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory initialization	DATA FILL	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory copy	DATA COPY	Yes	Yes	---	---	---	---	---	---
Bit operation	SET BIT/CLEAR BIT/MASK WRITE	Yes	Yes	Yes	Yes	Yes	---	---	Yes
Data calculation	INTEGER ADDITION/ INTEGER SUBTRACTION	Yes	Yes	Yes	Yes	Yes	---	---	Yes
Life management	REWRITE COUNT ADDITION/SUBTRACTION	Yes	Yes	---	---	---	---	---	Yes
Data recovery	RESTORE DATA	Yes	---	---	---	---	---	---	Yes

8-3-11 Error Code Details

The list of error codes that are returned as a response in the execution results of the communications commands is described below.

Error classification	Error code	Error name	Description	Level
Antenna Error	A0	Antenna Configuration Error	An unsupported antenna is connected. * Combination of the NX-V680C2 Unit and the V680-H01-V2 Unit	Minor
	A1	Amplifier Power Supply Error	No power is supplied to drive the amplifier.	Minor
	A2	Amplifier Disconnection Detection	An amplifier disconnection is detected. The amplifier could not be recognized.	Minor
Command Error	C0	Undefined Command	The command cannot be executed because it is an undefined command.	Monitor
	C1	Invalid Command Parameter	The command cannot be executed because the command parameter is erroneous.	Monitor
	C2	Command Execution Failure	The command could not be executed because another operation is in progress.	Monitor
RF Communications Error	70	RF Tag Communications Failure	An error occurred during communications with the RF Tag, preventing a normal end.	Monitor
	71	RF Tag Verification Error	The correct data could not be written to the RF Tag.	Monitor
	72	RF Tag Missing Error	There is no RF Tag in the communications range.	Monitor
	73	RF Tag Data Loss	Correct data is not written to the RF Tag, and there is a possibility that the data has been lost.	Monitor
	76	RF Tag Data Error	An RF Tag data error has been detected.	Monitor
	77	RF Tag Lifetime Warning	The RF Tag rewrite count has exceeded the specified count.	Monitor
	7A	RF Tag Address Error	The address of the RF Tag is incorrect.	Monitor
	7D	RF Tag Write Protect Error	An attempt was made to write to a write-protected area of the RF Tag.	Monitor
	79	RF Tag Response Error	The RF Tag returned an error response, preventing a normal end.	Monitor
	7E	RF Tag Lock Error	An attempt was made to write to a locked area of the RF Tag.	Monitor
	7F	RF Tag Customer Code Error	Communications were performed with an RF Tag that cannot be used.	Monitor
RF Communications Warning	D0	RF Tag Data Correction	An RF Tag data error was detected, and has been corrected.	Monitor
	D1	RF Tag Calculation Overflow/Underflow	An overflow or underflow occurred for a calculation value.	Monitor

8-4 Write Protection Function

The write protection function is a protection function provided to prevent the loss of important data such as the product format and model, etc. saved in an RF Tag from malicious writing.

It is recommended to write-protect important data after it has been written by the methods described below.

Depending on the RF tag memory map setting, write protection is performed by the standard method and the old method (V600 Method).

Each method is described below.

Precautions for Correct Use

The write protection function is available in the V680-series RFID reader/writer. The write protection function is not enabled on a reader/writer of any other company, or on the V680S-series.

Additional Information

- Use the standard write protection method during normal use.
- If you want to replace the equipment on which you are using the V600, you can set RF tag memory map to the V600 Method to be able to use the RF tag memory map that you are currently using as is without changing the programs on the equipment.

8-4-1 Standard Write Protection

The setting method, setting example, and cancellation method of the standard write protection are described below.

Write Protection Setting Method

Set the write protection range to four bytes of the address 0000 hex to 0003 hex of the RF Tag. Specify whether or not to perform write protection with the most significant bit of the address 0000 hex.

● Write protection setting area memory map of RF Tag

RF Tag address \ Bit	7	6	5	4	3	2	1	0
0000 hex	Enable/Disable	Upper two digits of start address (00 to 7F)						
0001 hex	Lower two digits of start address (00 to FF)							
0002 hex	Upper two digits of end address (00 to FF)							
0003 hex	Lower two digits of end address (00 to FF)							

- Write protection execution bit (Most significant bit of the address 0000 hex)
  1: Perform write protection (Yes)
  0: Do not perform write protection (No)
- Area in which write protection can be set
  Start address: 0000 hex to 7FFF hex
  End address: 0000 hex to FFFF hex

Additional Information

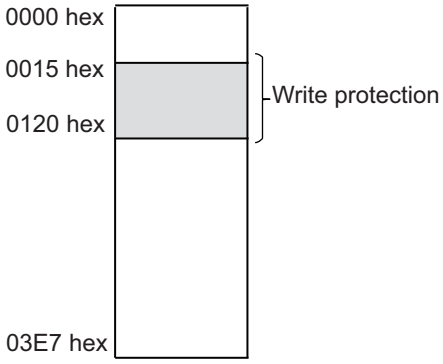
- When using the write protection function, you must write the write protection setting area of the RF Tag (address 0000 hex to 0003 hex) and the other area (address 0004 hex or later) by dividing into two. If writing is performed in excess of the write protection setting area of the RF Tag (address 0000 hex to 0003 hex) when the most significant bit of the address 0000 hex is 1, a write protection error will occur.
- If the write protection function is not used, the write protection setting area of the RF Tag (address 0000 hex to 0003 hex) can be used as the user memory. To use the write protection setting area of the RF Tag (address 0000 hex to 0003 hex) as the user memory, be sure to disable the write protection setting of the RFID Unit.

Write Protection Setting Example

● When start address < end address

The area from the start address to the end address is write-protected.

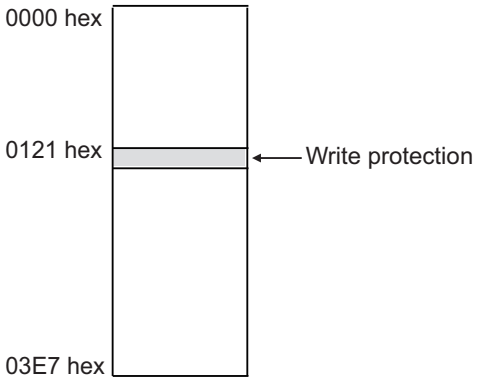
RF Tag address \ Bit	Upper digit				Lower digit			
0000 hex	1	0	0	0	0	0	0	0
	8				0			
0001 hex	0	0	0	1	0	1	0	1
	1				5			
0002 hex	0	0	0	0	0	0	0	1
	0				1			
0003 hex	0	0	1	0	0	0	0	0
	2				0			



● When start address = end address

Only a one-byte area of the set address is write-protected.

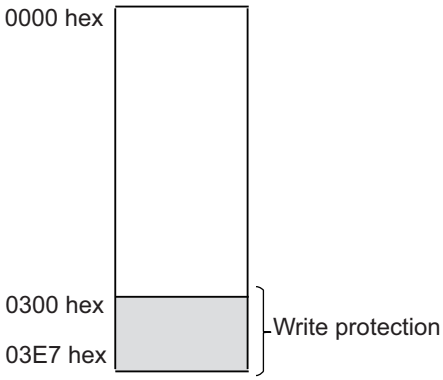
RF Tag address \ Bit	Upper digit				Lower digit			
0000 hex	1	0	0	0	0	0	0	0
	8				0			
0001 hex	0	0	1	0	0	0	0	1
	2				1			
0002 hex	0	0	0	0	0	0	0	0
	0				0			
0003 hex	0	0	1	0	0	0	0	1
	2				1			



When end address > last address of RF Tag

The area from the start address to the last address of the RF Tag is write-protected.

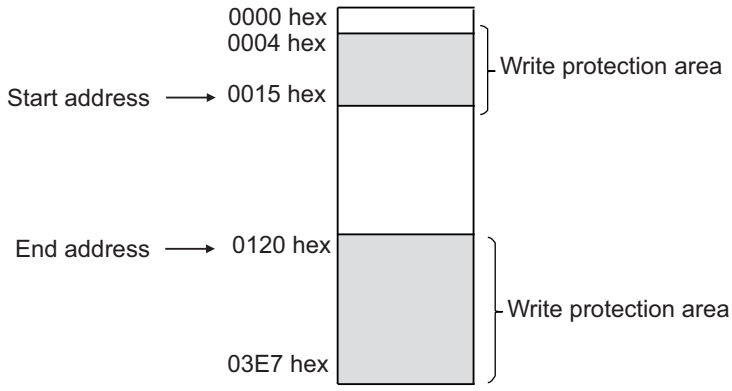
RF Tag address \ Bit	Upper digit				Lower digit			
0000 hex	1	0	0	0	0	0	1	1
	8				3			
0001 hex	0	0	0	0	0	0	0	0
	0				0			
0002 hex	0	0	0	0	0	0	1	1
	0				3			
0003 hex	1	1	1	1	1	1	1	1
	F				F			



When start address > end address

The area from the start address to the last address of the RF Tag, and the area from 0004 hex to the end address is write-protected.

RF Tag address \ Bit	Upper digit				Lower digit			
0000 hex	1	0	0	0	0	0	0	1
	8				1			
0001 hex	0	0	1	0	0	0	0	0
	2				0			
0002 hex	0	0	0	0	0	0	0	0
	0				0			
0003 hex	0	0	0	1	0	1	0	1
	1				5			



Additional Information

The write protection setting area of the RF Tag is out of scope of write protection.

Write Protection Cancellation Method

If you want to temporarily cancel write protection, such as when you want to overwrite data that has been protected by write protection, set the most significant bit of the address 0000 hex of the RF Tag memory to 0.

8-4-2 V600 Method Write Protection

In the V600-series, a write protection setting method was available for the EEPROM (battery-less) type data carrier: V600-D23P□□, and also for the S-RAM (with built-in battery) type data carrier.

When the V600 command is used in a V680-series RFID Unit, the same write protection setting method as in the past can be used by selecting the setting of the RF Tag memory map of the RFID Unit and the type of the RF Tag.

RF Tag used	Write protection
EEPROM: When V680-D1KP□□ is used	V600 EEPROM write protection method
FRAM: When V680-D2KF□□, V680S-D□□F□□ are used	V600 S-RAM write protection method

The EEPROM write protection method and the S-RAM write protection method are described below.

Additional Information

In the V600 EEPROM write protection method and the V600 S-RAM write protection method, since the RFID Unit switches automatically depending on the RF Tag used, the customer need not make the settings.

EEPROM Write Protection Method

The setting method, setting example, and cancellation method used in the EEPROM write protection are described below.

● Write protection setting method

When the write protection end address is written to the address 0000 hex of the RF Tag, the area from the address 0001 hex to the end address is write-protected. Whether or not to perform write protection is specified with the most significant bit of the address 0000 hex. Therefore, address 0080 hex to 03E7 hex cannot be set as the end address. If the end address is set as 00 hex, address 0001 hex to 03E7 hex will be write-protected.

Write protection setting area memory map

RF Tag address \ Bit	7	6	5	4	3	2	1	0
0000 hex	Enable/Disable	End address						

- Setting the most significant bit of the address 0000 hex
  1: Perform write protection (Enabled)
  0: Do not perform write protection (Disabled)
- Range in which the end address can be set
  End address: 00 hex, 01 to 7F hex

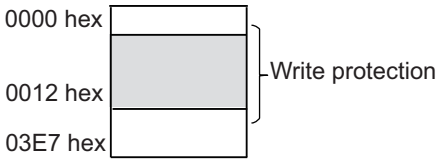
Precautions for Correct Use

When using the write protection function, you must write the write protection setting area of the RF Tag (address 0000 hex) and the other area (address 0001 hex or later) by dividing into two. If writing is performed in excess of the write protection setting area of the RF Tag (address 0000 hex) when the most significant bit of the address 0000 hex is 1, a write protection error will occur.

Write protection setting example

- When address 0001 hex to 0012 hex is write-protected

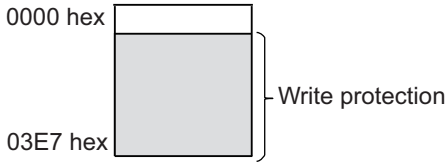
RF Tag address \ Bit	7	6	5	4	3	2	1	0
0000 hex	1	0	0	1	0	0	1	0
	9				2			



- When the end address is set to 00 hex

  The area excluding the address 0000 hex is write-protected.

RF Tag address \ Bit	7	6	5	4	3	2	1	0
0000 hex	1	0	0	0	0	0	0	0
	8				0			



Additional Information

The write protection setting area of the RF Tag is out of scope of write protection.

Write protection cancellation method

If you want to temporarily cancel write protection, such as when you want to overwrite data that has been protected by write protection, set the most significant bit of the address 0000 hex of the RF Tag memory to 0.

S-RAM Write Protection Method

The setting method, setting example, and cancellation method used in the S-RAM write protection are described below.

● Write protection setting method

If you write the start address and end address for write protection to the address 0002 hex to 0005 hex of the RF Tag, the area from the start address to the end address will be write-protected. Specify whether or not to perform write protection with the most significant bit of the address 0002 hex.

Note that with V600 S-RAM write protection method, when the write protect setting is enabled on the RFID Unit, addresses 0000 hex and 0001 hex are always write-protected regardless of whether or not the RF Tag write protection function is enabled.

Write protection setting area memory map

RF Tag address \ Bit	7	6	5	4	3	2	1	0
0002 hex	Enable/Disable	Upper two digits of start address (00 to 7F)						
0003 hex	Lower two digits of start address (00 to FF)							
0004 hex	Upper two digits of end address (00 to FF)							
0005 hex	Lower two digits of end address (00 to FF)							

- Setting the most significant bit of the address 0002 hex
  1: Perform write protection (Enabled)
  0: Do not perform write protection (Disabled)
- Range of the RF Tag for which write protection can be set
  Start address: 0006 hex to 7FFF hex
  End address: 0006 hex to FFFF hex

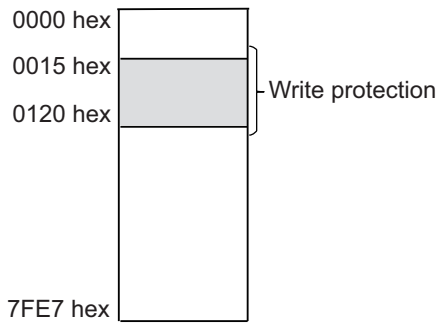
Precautions for Correct Use

When using the write protection function, you must write the write protection setting area of the RF Tag (address 0002 hex to 0005 hex) and the other area (address 0006 hex or later) by dividing into two. If writing is performed in excess of the write protection setting area of the RF Tag (address 0002 hex to 0005 hex) when the most significant bit of the address 0002 hex is 1, a write protection error will occur.

● Write protection setting example

- When start address < end address
  The area from the start address to the end address is write-protected.

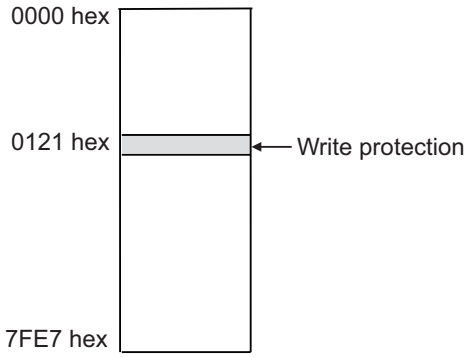
RF Tag address \ Bit	Upper digit				Lower digit			
0002 hex	1	0	0	0	0	0	0	0
	8				0			
0003 hex	0	0	0	1	0	1	0	1
	1				5			
0004 hex	0	0	0	0	0	0	0	1
	0				1			
0005 hex	0	0	1	0	0	0	0	0
	2				0			



- When start address = end address

  Only a one-byte area of the set address is write-protected.

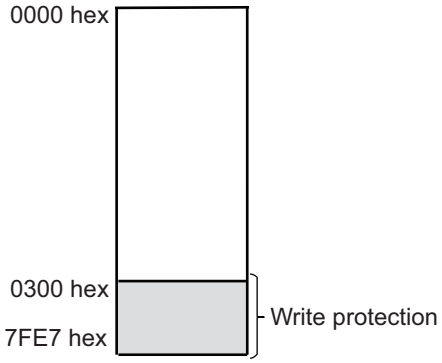
RF Tag address \ Bit	Upper digit				Lower digit			
0002 hex	1	0	0	0	0	0	0	1
	8				1			
0003 hex	0	0	1	0	0	0	0	1
	2				1			
0004 hex	0	0	0	0	0	0	0	1
	0				1			
0005 hex	0	0	1	0	0	0	0	1
	2				1			



- When end address > last address of RF Tag

  The area from the start address to the last address of the RF Tag is write-protected.

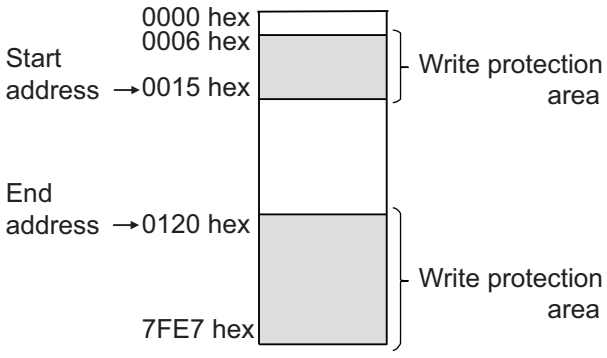
RF Tag address \ Bit	Upper digit				Lower digit			
0002 hex	1	0	0	0	0	0	1	1
	8				3			
0003 hex	0	0	0	0	0	0	0	0
	0				0			
0004 hex	0	0	0	0	0	0	1	1
	F				F			
0005 hex	1	1	1	1	1	1	1	1
	F				F			



- When start address > end address

  The area from the start address to the last address of the RF Tag, and the area from 0006 hex to the end address is write-protected.

RF Tag address \ Bit	Upper digit				Lower digit			
0002 hex	1	0	0	0	0	0	0	1
	8				1			
0003 hex	0	0	1	0	0	0	0	0
	2				0			
0004 hex	0	0	0	0	0	0	0	0
	0				0			
0005 hex	0	0	0	1	0	1	0	1
	1				5			



Additional Information

- The write protection setting area of the RF Tag is out of scope of write protection.
- Regardless of whether the write protection setting is enabled or disabled, write protection is always enabled for address 0000 hex and 0001 hex.

Write protection cancellation method

If you want to temporarily cancel write protection, such as when you want to overwrite data that has been protected by write protection, set the most significant bit of the address 0002 hex of the RF Tag memory to 0.

8-5 RF Tag Service Life Detection Function

The RF Tag Service Life Detection function is used to manage the number of times the memory of an RF tag can be rewritten.

There is an upper limit to the rewrite count of an RF Tag (EEPROM), and if this count is exceeded, a write error may occur. OMRON recommends replacing an RF Tag that has exceeded its maximum rewrite count.

There are the following two types of RF Tag service life detection methods.

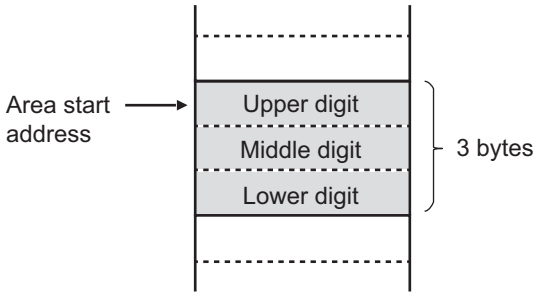
Service life detection method	Description
Rewrite count addition	The rewrite count of the RF Tag is added, and if the total count reaches the predetermined maximum rewrite count (100,000 times), it is judged that the rewrite count has been exceeded.
Rewrite count subtraction	The rewrite count of the RF Tag is subtracted from the maximum rewrite count specified by the user, and if the value is 0, it is judged that the rewrite count has been exceeded.

Each service life detection method is described below.

8-5-1 Rewrite Count Addition Method

According to the addition method, the service life of an RF Tag is managed based on the maximum rewrite count specified in the RF Tag (EEPROM) specifications. The rewrite count control area consists of three bytes from the start address. The value obtained by adding the rewrite count is written in this area, and if this value is 100,000 times (0186A0 hex) or more, it is judged that the rewrite count has been exceeded.

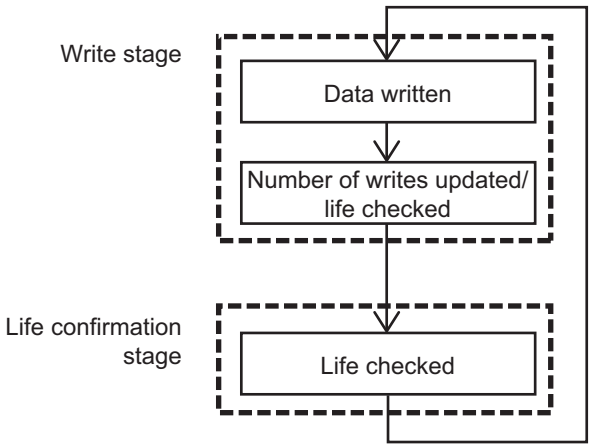
If the rewrite count is exceeded, the *Error End* bit of the status change to TRUE, and the error code *RF Tag Lifetime Warning* is returned as a response. If the data in the control area already exceeds 100,000 times, the value of the control area is not updated.



Application Method

The maximum rewrite count can be checked by writing data to the address on which data is rewritten most frequently, and then updating the rewrite count.

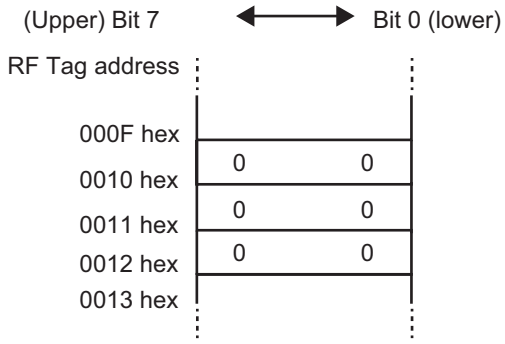
Since the maximum rewrite count of an EEPROM RF Tag is specified to be 100,000 times for each block (8 bytes), there is a need to count the number of times data is rewritten to an address on which data is rewritten most frequently. You can also simply check the rewrite count without updating the rewrite count.



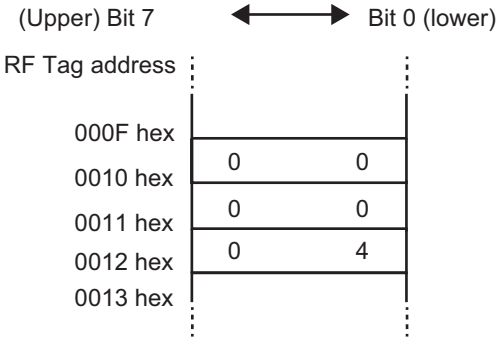
Application Example

The three bytes from the address 0010 hex constitute the rewrite count control area.

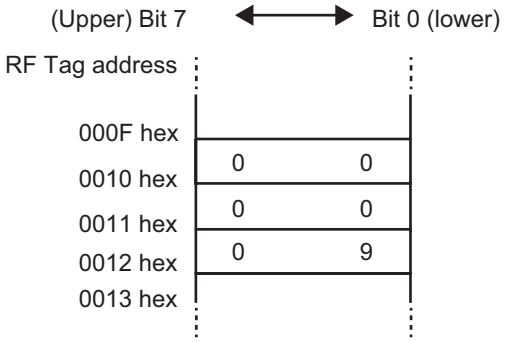
1 Clear the control area with the write command.



2 Execute the rewrite count control command by specifying addition, with the rewrite count as 4.

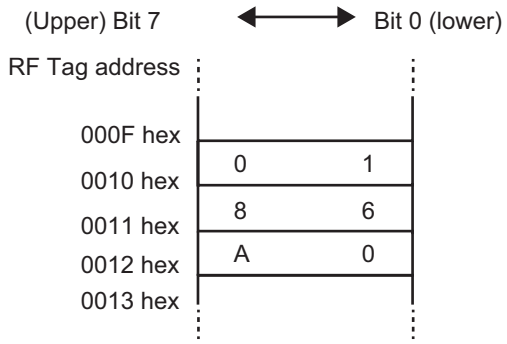


3 Next, execute the rewrite count control command by specifying addition, with the rewrite count as 5.



4 The cumulative rewrite count will become 100,000 times.

If the rewrite count is exceeded, the *Error End* bit of the status becomes TRUE, and the error code *RF Tag Lifetime Warning* is returned as a response.



Additional Information

Use only either one of addition or subtraction for maximum rewrite count control of one RF Tag. Otherwise it will not be possible to perform maximum rewrite count control.

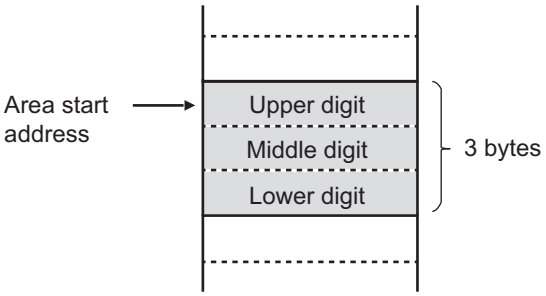
8-5-2 Rewrite Count Subtraction Method

According to the subtraction method, the service life of an RF Tag (EEPROM) is managed based on the optional rewrite count set by the user.

The rewrite count control area consists of three bytes from the start address. The value obtained by subtracting the rewrite count is written in this area, and if this value is smaller than 0, it is judged that the rewrite count has been exceeded.

If the rewrite count is exceeded, the *Error end* bit of the status changes to TRUE, and the error code *RF Tag Lifetime Warning* is returned as a response.

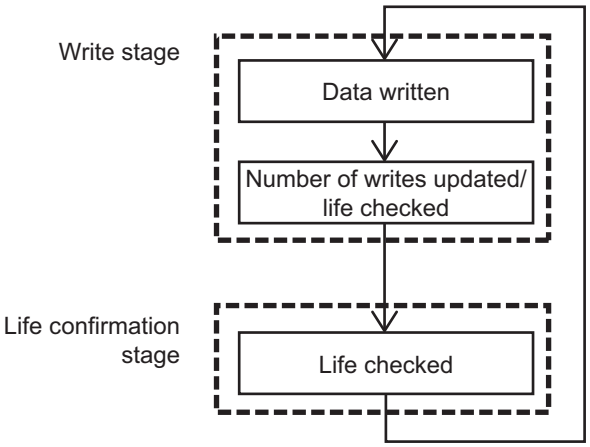
Therefore, the maximum rewrite count must be set beforehand in the control area in order to control the rewrite count. While an optional rewrite count of up to 16,700,000 times is supported, the maximum rewrite count specification of an EEPROM RF Tag is 100,000 times (0186A0 hex) at 25 or below. If the data in the control area is already 0 times, the value of the control area is not updated.



Application Method

An optional maximum rewrite count is written beforehand in the rewrite count control area of the RF Tag.

The maximum rewrite count can be checked by writing data to the address on which data is rewritten most frequently, and then updating the rewrite count (Since the maximum rewrite count is determined beforehand for each block (8 bytes), there is a need to count the number of times data is rewritten to an address on which data is rewritten most frequently.) You can also simply check the maximum rewrite count without updating the rewrite count.



Application Example

The three bytes from the address 0010 hex constitute the rewrite count control area.

1 Write the maximum rewrite count of 100,000 times in the control area by executing the write command.

2 Execute the rewrite count control command by specifying subtraction, with the rewrite count as 5.

3 The cumulative count will become 100,000 times.

If the rewrite count is exceeded, the *Error End* bit of the status becomes TRUE, and the error code *RF Tag Lifetime Warning* is returned as a response.

Additional Information

Use only either one of addition or subtraction for maximum rewrite count control of one RF Tag. Otherwise it will not be possible to perform maximum rewrite count control.

8-6 RF Tag Memory Error Detection Function

The RF Tag memory error detection function is used to check the appropriateness of the memory contents of an RF Tag.

The check code (2 bytes) of CRC (Cyclic Redundancy Check) is generated, written, and verified in the data block unit specified by the user.

Additional Information

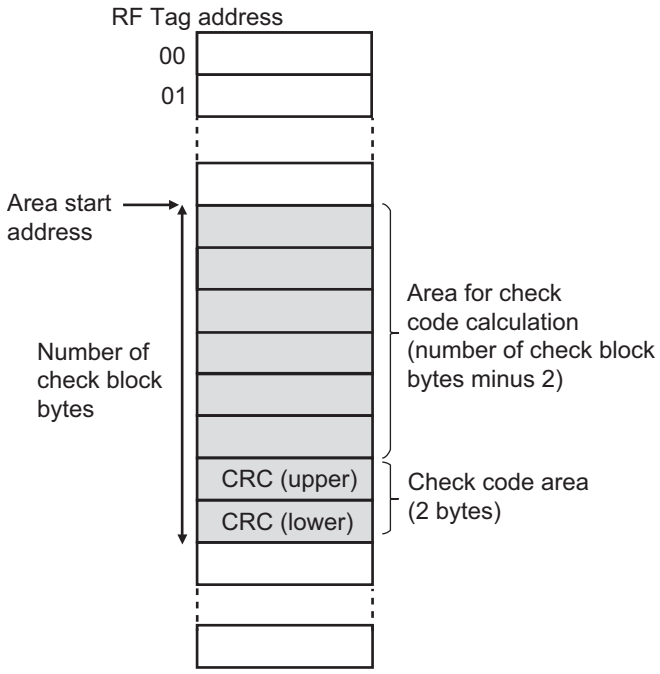
The CRC code is calculated by the generating polynomial X16 + X12 + X5 + 1.

With the data write (with error detection) command, write the two bytes of the check code of the RF Tag in continuation after the write data.

With the data read (with error detection) command, perform a memory check.

The data write (with error detection) command generates a CRC code from the write data specified in the output data, and with the area specified in the memory address and the data size as a data block, writes two bytes as the check code area in continuation after the end of the block.

The data read (with error detection) command calculates the CRC code of the read data with the area specified in the memory address and the data size as the data block, and compares it with the data of the check code area. If the data matches, the *Normal End* bit of the status changes to TRUE. If the check codes do not match, the *Error End* bit of the status changes to TRUE, and the error code *RF Tag Data Error* is returned as a response. The fact that a memory error occurred is notified, and the read data is not returned.



8-7 RF Tag Memory Error Correction Function

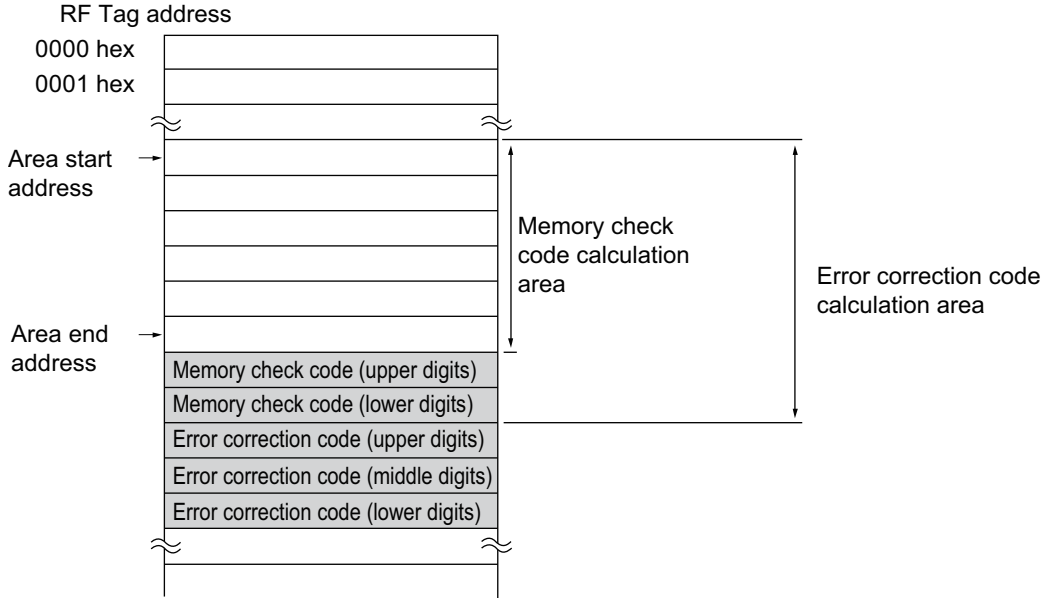
The RF Tag memory error correction function is used to check the appropriateness of the memory contents of an RF Tag. And correct one-bit errors The check code (5 bytes) of ECC (Error-Correcting Code) is generated, written, and verified in the data block unit specified by the user.

With the data write (with error correction) command, write the RF Tag data check and the five bytes of the error correction code in continuation after the write data.

With the data read (with error correction) command, perform a memory check and one-bit error correction.

If a one-bit memory error is corrected, the *Normal End* bit and *RF Communications Warning* bit of the status change to TRUE. The fact that a one-bit memory error has occurred is notified, and the normal read data after error correction is returned.

If a memory error of 2 bits or more is detected, the *Error End* bit of the status changes to TRUE, and the error code *RF Tag Data Error* is returned as a response. The fact that a memory error that cannot be corrected is notified, and the read data is not returned.



8-8 Test Command Function

The test command function checks the margin in communications with an RF Tag, and measures the surrounding noise in the environment of the work site.

The RFID Unit is instructed to perform various test operations by the test command.

A list of the test commands and the details of each command are described below.

8-8-1 Test Commands

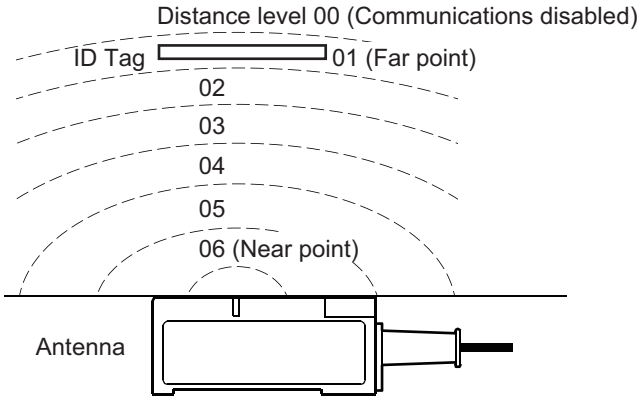
The list of the test commands is described below.

Classification	Command name	Command code	Description
Test	MEASURE COMMUNICATIONS DISTANCE LEVEL	0A01	Measures the approximate distance of the antenna from the RF Tag present in the antenna communications range.
	MEASURE COMMUNICATIONS SUCCESS RATE	0A02	Communicates 100 times with the RF Tag present in the antenna communications range, and measures the success rate.
	MEASURE TRAVELING READING	0A03	Communicates with the RF Tags passing through the antenna communications range, and measures up to how many bytes can be read.
	MEASURE TRAVELING WRITING	0A04	Communicates with the RF Tags passing through the antenna communications range, and measures up to how many bytes can be written.
Maintenance	MEASURE NOISE LEVEL	0B01	Measures the ambient noise level around the antenna.

8-8-2 MEASURE COMMUNICATIONS DISTANCE LEVEL

Measures the approximate distance (level) of the RF Tag with respect to the antenna communications range. The measurement results are notified in the seven levels of 00 to 06.

Use this command to check the margin in the communications distance of the RF Tag with respect to the antenna output during adjustment of the installation location of the antenna and the RF Tag.

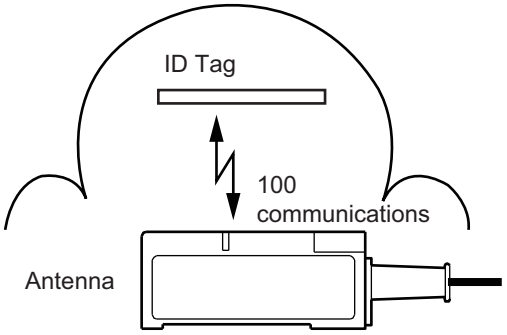


Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	0 (Not used)	0A01 hex	0 (Not used)	0 (Not used) * Fixed as 1 byte
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	0 (Not used)	0 (Not used)	0 (Not used)	00 hex (Not used)	0 (Not used)
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	The command status and test mode change to TRUE The other statuses change to FALSE	0 to 65535 Incremented with each measurement	Error code	0 to 6 (Distance level)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**UID**	**RF Communications time**	**Noise level**
	0 (Not used)	0 (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

8-8-3 MEASURE COMMUNICATIONS SUCCESS RATE

Communicates 100 times when the RF Tag has been stopped in the antenna communications range, and measures the communications success rate. The measurement results are notified in the range of 0 to 100%.

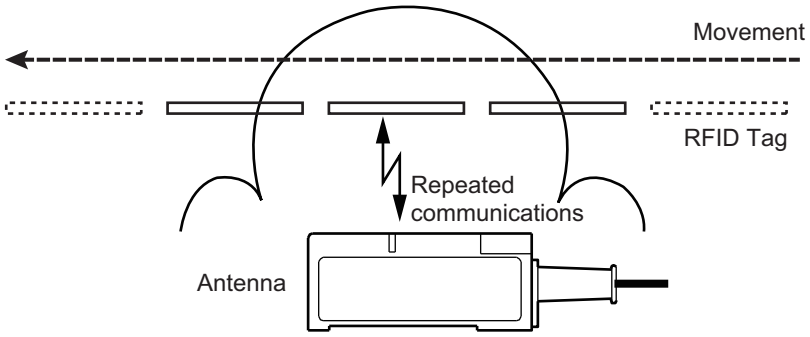
Use this command to check the communications margin in the application communicating with the stopped RF Tag.



Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	0 (Not used)	0A02 hex	0 (Not used)	0 (Not used) * Fixed as 1 byte
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	0 (Not used)	0 (Not used)	0 (Not used)	00 hex (Not used)	0 (Not used)
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	The command status and test mode change to TRUE The other statuses change to FALSE	0 to 65535 Incremented with each measurement	Error code	0 to 100 (Success rate (%))	0 (Not used)
	Output SID response	**Input data 1 to 8**	**UID**	**RF Communications time**	**Noise level**
	0 (Not used)	0 (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

8-8-4 MEASURE TRAVELING READING

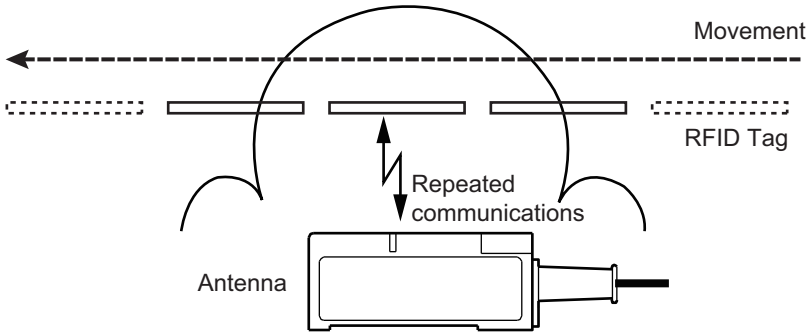
Moves an RF Tag so that it passes through the antenna communications range, and measures up to how many bytes of the data of the RF Tag can be read. Notifies the measurement result in terms of the number of actually read bytes. Use this command to consider the movement speed and the number of bytes that can be read in the application communicating with the moved RF Tag.



Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	0 (Not used)	0A03 hex	0 (Not used)	0 (Not used) * Fixed as 8192 bytes max.
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	0 (Not used)	0 (Not used)	0 (Not used)	00 hex (Not used)	0 (Not used)
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	The command status and test mode change to TRUE The other statuses change to FALSE	0 to 65535 Incremented with each measurement	Error code	1 to 8192 (Actual read size)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**UID**	**RF Communications time**	**Noise level**
	0 (Not used)	0 (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

8-8-5 MEASURE TRAVELING WRITING

Moves an RF Tag so that it passes through the antenna communications range, and measures up to how many bytes of the data of the RF Tag can be written. Notifies the measurement result in terms of the number of actually written bytes. Use this command to consider the movement speed and the number of bytes that can be written in the application communicating with the moved RF Tag.



Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	0 (Not used)	0A04 hex	0 (Not used)	0 (Not used) * Fixed as 8192 bytes max.
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	0 (Not used)	0 (Not used)	0 (Not used)	00 hex (Not used)	0 (Not used)
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	The command status and test mode change to TRUE The other statuses change to FALSE	0 to 65535 Incremented with each measurement	Error code	1 to 8192 (Actual write size)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**UID**	**RF Communications time**	**Noise level**
	0 (Not used)	0 (Not used)	UID data (8 bytes)	0 to 65535 ms	0 to 99

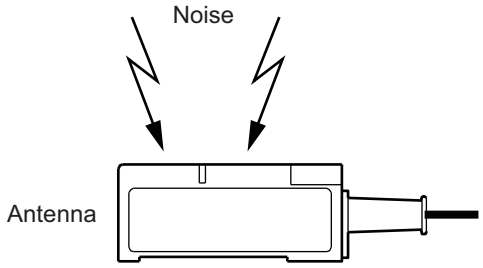
Precautions for Correct Use

When you execute the MEASURE TRAVELING WRITING command, data is actually written to the RF Tag.

However, as for the data to be written, since the values before measurement are written, there is no change in the contents of the memory.

8-8-6 MEASURE NOISE LEVEL

Measures the ambient noise level around the antenna. The measurement results are notified in the 100 levels of 00 to 99. Use this command to check the level of noise that affects the communications performance at a workplace with unstable communications during startup operation or actual operation.

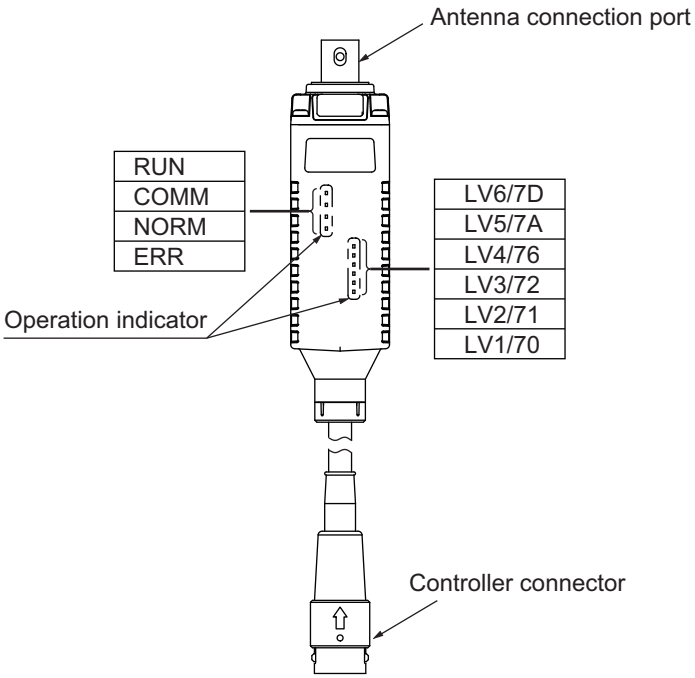


Output area	**Operation command**	**RF communications option**	**Command code**	**Memory address**	**Data size**
	Used	0 (Not used)	0B01 hex	0 (Not used)	0 (Not used)
	Refresh Count Response	**Output SID**	**Input SID response**	**Output data 1 to 8**	**Select UID**
	0 (Not used)	0 (Not used)	0 (Not used)	00 hex (Not used)	0 (Not used)
Input area	**Status**	**Refresh Count**	**Response code**	**Measurement result**	**Input SID**
	The command status and test mode change to TRUE The other statuses change to FALSE	0 to 65535 Incremented with each measurement	Error code	0 to 99 (Noise level)	0 (Not used)
	Output SID response	**Input data 1 to 8**	**UID**	**RF Communications time**	**Noise level**
	0 (Not used)	0 (Not used)	0 (Not used)	0 (Not used)	0 to 99

8-8-7 Notification of Test Results by the Amplifier Indicator

When the RFID Unit is operating during a test command, the test results are notified by the LED indicators on the connected amplifier.

When the installation is adjusted at the workplace, or when the installation of the RF Tag and antenna is adjusted, the test results can be visually checked by the LED display on the amplifier even from a workplace that is away from the control panel.



Indicator	Color	Description
RUN	Green	Lights when power is turned ON.
COMM	Yellow	Lights when communications are in progress.
NORM	Green	Lights when communications end normally.
ERR	Red	Lights when communications end in an error.
LV1 to LV6	Yellow	MEASURE COMMUNICATIONS DISTANCE LEVEL: The distance level is displayed in 6 stages MEASURE COMMUNICATIONS SUCCESS RATE: The success rate is displayed in 6 stages MEASURE TRAVELING READING: The actually read data size is displayed in 6 stages MEASURE TRAVELING WRITING: The actually written data size is displayed in 6 stages MEASURE NOISE LEVEL: The noise level is displayed in 5 stages * See the table below for details

Test type	Not lit	LV1	LV2	LV3	LV4	LV5	LV6
MEASURE COMMUNICATIONS DISTANCE LEVEL	0 (Communications disabled)	1 (Far point)	2	3	4	5	6 (Near point)
MEASURE COMMUNICATIONS SUCCESS RATE	0% (Communications disabled)	1% to 19%	20% to 39%	40% to 59%	60% to 79%	80% to 99%	100%

Test type	Not lit	LV1	LV2	LV3	LV4	LV5	LV6
MEASURE TRAVELING WRITING	0 byte	1 byte or more	64 bytes or more	128 bytes or more	256 bytes or more	512 bytes or more	1024 bytes or more
MEASURE TRAVELING WRITING	0 byte	1 byte or more	64 bytes or more	128 bytes or more	256 bytes or more	512 bytes or more	1024 bytes or more
MEASURE NOISE LEVEL	0 (No noise)	1 to 19 (Low noise)	20 to 39	40 to 59	60% to 79%	80 to 99 (High noise)	-

9

Troubleshooting

This section provides error information and corrections for errors that can occur when the RFID Units are used.

9-1 How to Check for Errors 9-2

9-2 Checking for Errors with the Indicators 9-3

9-3 Troubleshooting with Support Software 9-4

9-3-1 Checking for Errors from the Sysmac Studio 9-4

9-3-2 Checking for Errors from Support Software Other Than the Sysmac Studio 9-5

9-3-3 Error Table 9-5

9-3-4 Error Descriptions 9-11

9-3-5 Resetting Errors 9-31

9-3-6 Troubleshooting Flowcharts 9-31

9-1 How to Check for Errors

Use one of the following error checking methods.

- Checking the indicators
- Troubleshooting with Support Software

Refer to the user's manual for the CPU Unit or Communications Coupler Unit that the NX Units are connected to for details on troubleshooting with the Support Software.

9-2 Checking for Errors with the Indicators

The [TS] indicator on an RFID Unit tells you the status and level of any errors in the RFID Unit.

This section describes the meanings of errors that the TS indicator shows and the troubleshooting procedures for them.

Here, the following abbreviations are used to describe the status of the indicators.

Abbreviation	Indicator status
Lit	Lit
Not Lit	Not lit
FS ()	Flashing. The numeric value in parentheses is the flashing interval.
-	Undefined.

Main Errors and Corrections

TS indicator		Cause	Action
Green	Red		
Lit	Not Lit	---	Status is normal.
FS (2s)	Not Lit	• Initializing • Restarting is in progress for the Unit. • Downloading	Status is normal. Wait until processing is completed.
Lit	Lit	This status does not exist.	
Not Lit	Not Lit	The Unit power supply is not supplied.	Check the following items and make sure that power is correctly supplied from the Unit power supply. Checks Related to the Power Supply • Make sure that the power supply cable is wired correctly. • Make sure that the power supply cable is not disconnected. • Make sure that the power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that power supply has not failed.
		• Waiting for initialization to start • Restarting is in progress for the Unit.	Status is normal. Wait until processing is completed.
		If you cannot resolve the problem after you check the above items and cycle the Unit power supply, the Unit may have a hardware failure. If this happens, replace the Unit. If this happens, replace the Unit.	
Not Lit	Lit	Hardware failure	If this error occurs after you cycle the Unit power supply, replace the Unit.
Not Lit	Lit	Non-volatile Memory Hardware Error	Refer to *9-3-3 Error Table* on page 9-5 for details.
Not Lit	Lit	Control Parameter Error in Master	
Not Lit	Lit	NX Unit Processing Error	
Not Lit	FS (1s)	NX Unit I/O Communications Error	
Not Lit	Lit	Antenna Configuration Error	
Not Lit	Lit	Amplifier Power Supply Error	
Not Lit	Lit	Amplifier Disconnection Detection	
The indicator status is held immediately before the event occurred.		Other	

9-3 Troubleshooting with Support Software

Error management on the NX series is based on the methods used for the NJ/NX/NY-series Controllers. This allows you to use the Support Software to check the meanings of errors and troubleshooting procedures. The confirmation method depends on the Support Software that you use.

9-3-1 Checking for Errors from the Sysmac Studio

When an error occurs, you can place the Sysmac Studio online to the Controller or the Communications Coupler Unit to check current Controller errors and the log of past Controller errors.

Current Errors

Open the Sysmac Studio's Controller Error Tab Page to check the current error's level, source, source details, event name, event code, details, attached information 1 to 4, actions, and corrections. Observations are not displayed as errors.

Additional Information

Number of Current Errors

The following table gives the number of errors that are reported simultaneously as current errors in the RFID Unit.

Units	Number of simultaneous error notifications
RFID Unit	15 errors

If the number of errors exceeds the maximum number of reportable current errors, errors are reported with a priority given to the oldest and highest-level errors. Errors that exceed the limit on simultaneous error notifications are not reported.

Log of Past Errors

You can check the following information on past errors on the Controller Event Log Tab Page in the Sysmac Studio: times, levels, sources, source details, event names, event codes, details, attached information 1 through 4, and corrections.

Additional Information

Number of Logs of Past Errors

Event logs of the RFID Unit are stored in the RFID Unit itself.

The system event log can record 15 events. The access event log can record 2 events.

9-3-2 Checking for Errors from Support Software Other Than the Sysmac Studio

You can check the error descriptions and logs with Support Software other than the Sysmac Studio. For the error checking methods, refer to the user's manual for the Communications Coupler Unit and the operation manual for the Support Software.

9-3-3 Error Table

The errors (events) that can occur in the RFID Units are given on the following pages.

The following abbreviations are used in the event *Level* column.

Abbreviation	Series
Maj	Major fault level
Part	Partial fault level
Min	Minor fault level
Obs	Observation
Info	Information

Letter	Meaning
S	Event levels that are defined by the system.
U	Event levels that can be changed by the user.*1

*1. This symbol appears only for events for which the user can change the event level.

Refer to the troubleshooting manual for the connected CPU Unit or Industrial PC for all NJ/NX/NY-series event codes.

Event codes	Event name	Description	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
00200000 hex	Non-volatile Memory Hardware Error	An error occurred in the non-volatile memory.	Non-volatile memory failure			S			P. 9-12
10410000 hex	Control Parameter Error in Master	An error occurred in the control parameters that are saved in the master.	For the NX bus of CPU Units • The power supply to the CPU Unit was turned OFF while writing the Unit operation settings was in progress. Or there is an error in the area of the non-volatile memory in the CPU Unit in which the Unit operation settings for the relevant NX Unit are saved. For Communications Coupler Units • The power supply to the Communications Coupler Unit was turned OFF while writing the Unit operation settings was in progress. Or there is an error in the area of the non-volatile memory in the Communications Coupler Unit in which the Unit operation settings for the relevant NX Unit are saved.			S			P. 9-13

Event codes	Event name	Description	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
40200000 hex	NX Unit Processing Error	A fatal error occurred in an NX Unit.	An error occurred in the software.			S			P. 9-14
6AA00000 hex	Antenna Configuration Error	An unsupported antenna is connected. * Combination of the NX-V680C2 Unit and the V680-H01-V2 Unit is not supported.	The V680-H01-V2 was connected to the NX-V680C2.			S			P. 9-15
6AA10000 hex	Amplifier Power Supply Error	An error was detected in the power supply supplied to the amplifier.	I/O power supply is not supplied.			S			P. 9-15
6AA20000 hex	Amplifier Disconnection Detection	Disconnection of the amplifier was detected. The amplifier was not recognized.	• The amplifier is not connected. • The amplifier has failed. • The RFID Unit has failed.			S	U		P. 9-16
6AC00000 hex	Undefined Command	It cannot be executed because it is an undefined command.	The command code is incorrect.				S		P. 9-16
6AC10000 hex	Invalid Command Parameter	The command cannot be executed because the command parameter is incorrect.	The command parameters are incorrect.				S		P. 9-17
6AC20000 hex	Command Execution Not Possible	The command cannot be executed because the command execution conditions have not been established.	• An RF communications option that cannot be executed has been specified for the command. • There is no data to perform data restore.				S		P. 9-17
6A700000 hex	RF Tag Communications Failure	An error occurred during communications with the RF Tag and it was not successfully completed.	• The communications distance between the antenna and the RF Tag is outside the specification range. • The moving speed of the RF Tag is too fast. • Influence of surrounding environment (e.g., noise interference and surrounding metal) • Multiple RF Tags exist in the communications range when the communications option is other than *Multi trigger* or *Multi repeat*.			U	S		P. 9-18

Event codes	Event name	Description	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
6A710000 hex	RF Tag Verification Error	Data could not be correctly written to the RF Tag.	• The communications distance between the antenna and the RF Tag is outside the specification range. • The moving speed of the RF Tag is too fast. • Influence of surrounding environment (e.g., noise interference and surrounding metal)			U	S		P. 9-19
6A720000 hex	RF Tag Missing Error	The RF Tags do not exist in the communications area.	• The RF communications option is set to *Trigger*, and the RF Tag does not exist in the communications area when the trigger occurs. • The RF communications option is set to *Auto* or *Repeat*, and the wait time has reached the *RF Communications Timeout*. • The amplifier is connected but the antenna is not connected.			U	S		P. 9-20
6A730000 hex	RF Tag Data Loss	Data could not be correctly written to the RF Tag. There is a possibility that the data has been lost.	• The communications distance between the antenna and the RF Tag is outside the specification range. • The moving speed of the RF Tag is too fast. • Influence of surrounding environment (e.g., noise interference and surrounding metal)			U	S		P. 9-21
6A760000 hex	RF Tag Data Error	A data error in the RF Tag was detected.	• Noise in the environment where RF Tags are used. • RF Tag individual failure.			U	S		P. 9-22
6A770000 hex	RF Tag Lifetime Warning	The number of writing to the RF Tag was written exceeded the specified value.	The number of writing to the RF Tag has reached the end of its life.				S		P. 9-22
6A790000 hex	RF Tag Response Error	The RF Tag responded with an error and it was not successfully completed.	Unsupported RF Tags are used.				S		P. 9-23
6A7A0000 hex	RF Tag Address Error	The address of the RF Tag is incorrect.	The address of the RF Tag specified in a command is incorrect.				S		P. 9-23
6A7D0000 hex	RF Tag Write Protect Error	An attempt was made to write in the write protected area of the RF Tag.	The memory area of the RF Tag to be written is included in the write protect range.				S		P. 9-24

Event codes	Event name	Description	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
6A7E0000 hex	RF Tag Lock Error	An attempt was made to write to the locked area of RF Tag.	• The address of the RF Tag specified in a command is incorrect. • The memory area to be written to the RF Tag is locked.				S		P. 9-24
6A7F0000 hex	RF Tag Customer Code Error	An RF Tag not permitted to use was communicated.	An RF Tag that cannot be used for security is used.				S		P. 9-25
6AD00000 hex	RF Tag Data Correction	Data error of the RF Tag was detected and corrected.	• Noise in the environment where RF Tags are used. • RF Tag individual failure					S	P. 9-25
6AD10000 hex	RF Tag Calculation Overflow or Underflow	Overflow or underflow occurred in calculated value.	Calculation data that were attempted to write to the RF Tag exceeded the valid range of the data type.					S	P. 9-26

Event codes	Event name	Description	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
80200000 hex	NX Unit I/O Communications Error	An I/O communications error occurred in an NX Unit.	For the NX bus of CPU Units • An error that prevents normal NX bus communications occurred in a CPU Unit. • An NX Unit is not mounted properly. • The power cable for the Unit power supply is disconnected, or the wiring from the Unit power supply to the NX Units is incorrect. • The power cable for the Unit power supply is broken. • The voltage of the Unit power supply is outside the specified range, or the capacity of the Unit power supply is insufficient. • There is a hardware error in an NX Unit. For Communications Coupler Units • An error that prevents normal NX bus communications occurred in a Communications Coupler Unit. • The NX Unit is not mounted properly. • The power cable for the Unit power supply is disconnected. Or, the wiring from the Unit power supply to the NX Units is incorrect. • The power cable for the Unit power supply is broken. • The voltage of the Unit power supply is outside the specified range. Or, the capacity of the Unit power supply is insufficient. • There is a hardware error in the NX Unit.			S			P. 9-26

Event codes	Event name	Description	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
80220000 hex	NX Message Communications Error	An error was detected in message communications and the message frame was discarded.	For the NX bus of CPU Units • The message communications load is high. For Communications Coupler Units • The message communications load is high. • The communications cable is disconnected or broken. • Message communications were cutoff in communications.				S		P. 9-28
80240000 hex	NX Unit Clock Not Synchronized Error	A time information error occurred in an NX Unit.	For the NX bus of CPU Units • There is a hardware error in an NX Unit. • There is a hardware error in a CPU Unit. For Communications Coupler Units • There is a hardware error in an NX Unit. • There is a hardware error in an EtherCAT Coupler Unit.			S			P. 9-29
90400000 hex	Event Log Cleared	The event log was cleared.	The event log was cleared by the user.					S	P. 9-30

9-3-4 Error Descriptions

This section describes the information that is given for individual errors.

How to Read Error Descriptions

The items that are used to describe individual errors (events) are described in the following copy of an error table.

<table>
<tr><td>Event name</td><td colspan="3">Gives the name of the error.</td><td>Event code</td><td colspan="2">Gives the code of the error.</td></tr>
<tr><td>Description</td><td colspan="6">Gives a short description of the error.</td></tr>
<tr><td>Source</td><td colspan="2">Gives the source of the error.</td><td>Source details</td><td>Gives details on the source of the error.</td><td>Detection timing</td><td>Tells when the error is detected.</td></tr>
<tr><td rowspan="2">Error attributes</td><td>Level</td><td colspan="2">Tells the level of influence on control.*1</td><td>Log category</td><td colspan="2">Tells which log the error is saved in.*2</td></tr>
<tr><td>Recovery</td><td colspan="5">Gives the recovery method.*3</td></tr>
<tr><td>Effects</td><td>User program</td><td>Tells what will happen to execution of the user program.*4</td><td>Result</td><td colspan="3">Provides special information on the operation that results from the error.</td></tr>
<tr><td>Indicators</td><td colspan="6">Gives the status of the built-in EtherNet/IP port and built-in EtherCAT port indicators. Indicator status is given only for errors in the EtherCAT Master Function Module and the EtherNet/IP Function Module.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable name</td><td colspan="2">Data types</td><td colspan="2">Series</td></tr>
<tr><td colspan="6">Lists the variable names, data types, and meanings for system-defined variables that provide direct error notification, that are directly affected by the error, or that contain settings that cause the error.</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="6">Lists the possible causes, corrections, and preventive measures for the error.</td></tr>
<tr><td>Attached information</td><td colspan="6">This is the attached information that is displayed by the Support Software or an HMI. *5, *6</td></tr>
<tr><td>Precautions/Remarks</td><td colspan="6">Provides precautions, restrictions, and supplemental information. If the user can set the event level, the event levels that can be set, the recovery method, operational information, and other information is also provided.</td></tr>
</table>

*1. One of the following:
Major fault: Major fault level
Partial fault: Partial fault level
Minor fault: Minor fault level
Observation
Information

*2. One of the following:
System: System event log
Access: Access event log

*3. One of the following:
Automatic recovery: Normal status is restored automatically when the cause of the error is removed.
Error reset: Normal status is restored when the error is reset after the cause of the error is removed.
Cycle the power supply: Normal status is restored when the power supply to the Controller is turned OFF and then back ON after the cause of the error is removed.
Controller reset: Normal status is restored when the Controller is reset after the cause of the error is removed.
Depends on cause: The recovery method depends on the cause of the error.

*4. One of the following:
Continues: Execution of the user program will continue.
Stops: Execution of the user program stops.
Starts: Execution of the user program starts.

*5. “System information” indicates internal system information that is used by OMRON.

*6. Refer to the appendices of the troubleshooting manual for the connected CPU Unit or Industrial PC for the applicable range of the HMI Troubleshooter.

Error Descriptions

Event name	Non-volatile Memory Hardware Error			**Event code**	00200000 hex	
Meaning	An error occurred in non-volatile memory.					
Source	Depends on where the Support Software is connected and the system configuration.		**Source details**	NX Unit	**Detection timing**	When power is turned ON to the NX Unit
Error attributes	**Level**	Minor fault		**Log category**	System	
	Recovery	For the NX bus of CPU Units Cycle the power supply to the Unit or restart the NX bus. For Communications Coupler Units Cycle the power supply to the Unit or restart the Slave Terminal. If the errors are detected in the Controller, reset all of the errors in the Controller.				
Effects	**User program**	Continues.	**Operation**	I/O refreshing for the NX Unit stops. Messages cannot be sent to the NX Unit.		
System-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	Non-volatile memory failure.		For the NX bus of CPU Units Cycle the power supply to the Unit or restart the NX bus. If the error persists even after you make the above correction, replace the relevant NX Unit. For Communications Coupler Units Cycle the power supply to the Unit or restart the Slave Terminal. If the error persists even after you make the above correction, replace the relevant NX Unit.		None	
Attached information	None					
Precautions/ Remarks	None					

<table>
<tr><td>Event name</td><td colspan="2">Control Parameter Error in Master</td><td>Event code</td><td colspan="2">10410000 hex</td></tr>
<tr><td>Meaning</td><td colspan="5">An error occurred in the control parameters that are saved in the master.</td></tr>
<tr><td>Source</td><td colspan="2">Depends on where the Support Software is connected and the system configuration.</td><td>Source details</td><td>NX Unit</td><td>Detection timing</td><td>When power is turned ON to the NX Unit</td></tr>
<tr><td rowspan="8">Error attributes</td><td>Level</td><td colspan="2">Minor fault</td><td>Log category</td><td colspan="2">System</td></tr>
<tr><td rowspan="7">Recovery</td><td colspan="5">For the NX bus of CPU Units</td></tr>
<tr><td colspan="5">When Fail-soft Operation Is Set to Stop
Restart the NX Unit and then reset the error in the NX Bus Function Module.
When Fail-soft Operation Is Set to Fail-soft
Restart the NX Unit and then reset the error in the NX Unit.</td></tr>
<tr><td colspan="5">For Communications Coupler Units</td></tr>
<tr><td colspan="5">When Fail-soft Operation Is Set to Stop
If the errors are detected in the Controller, restart the NX Unit and then reset all of the errors in the Controller.
If the errors are not detected in the Controller, restart the NX Unit and then reset the error in the Communications Coupler Unit.
When Fail-soft Operation Is Set to Fail-soft
Restart the NX Unit and then reset the error in the Communications Coupler Unit.</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="2">I/O refreshing for the NX Unit stops.</td></tr>
<tr><td>System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td>Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td>---</td></tr>
<tr><td rowspan="5">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td>Prevention</td></tr>
<tr><td colspan="5">For the NX bus of CPU Units</td></tr>
<tr><td colspan="2">The power supply to the CPU Unit was turned OFF while writing the Unit operation settings was in progress. Or there is an error in the area of the non-volatile memory in the CPU Unit in which the Unit operation settings for the relevant NX Unit are saved.</td><td colspan="2">Download the Unit operation settings of the NX Unit again. If the error persists even after you make the above correction, replace the CPU Unit.</td><td>Do not turn OFF the power supply to the CPU Unit while transfer of the Unit operation settings for the NX Unit or save of NX Unit parameters by a message is in progress.</td></tr>
<tr><td colspan="5">For Communications Coupler Units</td></tr>
<tr><td colspan="2">The power supply to the Communications Coupler Unit was turned OFF while writing the Unit operation settings was in progress. Or there is an error in the area of the non-volatile memory in the Communications Coupler Unit in which the Unit operation settings for the relevant NX Unit are saved.</td><td colspan="2">Download the Unit operation settings of the NX Unit again. If the error occurs again even after you make the above correction, replace the Communications Coupler Unit.</td><td>Do not turn OFF the power supply to the Communications Coupler Unit while transfer of the Unit operation settings for the NX Unit by the Support Software or save of NX Unit parameters by a message is in progress.</td></tr>
<tr><td>Attached information</td><td colspan="5">None</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="5">None</td></tr>
</table>

<table>
<tr><td>Event name</td><td colspan="2">NX Unit Processing Error</td><td>Event code</td><td colspan="2">40200000 hex</td></tr>
<tr><td>Meaning</td><td colspan="5">A fatal error occurred in an NX Unit.</td></tr>
<tr><td>Source</td><td>Depends on where the Support Software is connected and the system configuration.</td><td>Source details</td><td>NX Unit</td><td>Detection timing</td><td>Continuously</td></tr>
<tr><td rowspan="2">Error attributes</td><td>Level</td><td colspan="2">Minor fault</td><td>Log category</td><td>System</td></tr>
<tr><td>Recovery</td><td colspan="4">For the NX bus of CPU Units
Cycle the power supply to the NX Unit and then reset the error in the NX Bus Function Module.
For Communications Coupler Units
Cycle the power supply to the NX Unit and then reset the error in the Communications Coupler Unit.</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="2">I/O refreshing for the NX Unit stops. Messages cannot be sent to the NX Unit.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td>Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td>---</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td>Prevention</td></tr>
<tr><td colspan="2">An error occurred in the software.</td><td colspan="2">For the NX bus of CPU Units
Turn ON the Unit power supply again, restart the NX Unit, or restart the NX bus. If this error occurs again even after the above measures are taken, contact your OMRON representative.
For Communications Coupler Units
Turn ON the Unit power supply again, restart the NX Unit, or restart the slave terminal. If this error occurs again even after the above measures are taken, contact your OMRON representative.</td><td>None</td></tr>
<tr><td>Attached information</td><td colspan="5">Attached information 1: System information
Attached information 2: System information
Attached information 3: System information
Attached information 4: System information</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="5">None</td></tr>
</table>

Event name	Antenna Configuration Error			Event code	6AA00000 hex	
Meaning	An unsupported antenna is connected. * Combination of the NX-V680C2 Unit and the V680-H01-V2 Unit is not supported.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	Continuously
Error attributes	Level	Minor fault		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	The V680-H01-V2 was connected to the NX-V680C2.		Connect the antenna other than V680-H01-V2 to the NX-V680C2.		Check the combination of usable RFID devices and then design the system configuration.	
			Use the NX-V680C1.			
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	Amplifier Power Supply Error			Event code	6AA10000 hex	
Meaning	An error was detected in the power supply supplied to the amplifier.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	Continuously
Error attributes	Level	Minor fault		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	I/O power supply is not supplied.		Correctly supply the I/O power supply.		Confirm that input of I/O power supply is correct.	
	The RFID Unit has failed.		If this error occurs even after making the above correction, replace the RFID Unit.			
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	Amplifier Disconnection Detection			**Event code**	6AA20000 hex	
Meaning	Disconnection of the amplifier was detected. The amplifier was not recognized.					
Source	Depends on where the Support Software is connected and the system configuration.		**Source details**	NX Unit	**Detection timing**	When a command is executed
Error attributes	**Level**	Minor fault		**Log category**	System	
	Recovery	Reset error in the NX Unit.				
Effects	**User program**	Continues.	**Operation**	Operation continues.		
System-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	The amplifier is not connected.		Connect the amplifier.		Make sure that the amplifier is connected.	
	The amplifier has failed.		Replace the amplifier.		None	
	The RFID Unit has failed.		If the amplifier does not operate properly even after you replace it, replace the RFID Unit.		None	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	Undefined Command			**Event code**	6AC00000 hex	
Meaning	It cannot be executed because it is an undefined command.					
Source	Depends on where the Support Software is connected and the system configuration.		**Source details**	NX Unit	**Detection timing**	When the command is executed
Error attributes	**Level**	Observation		**Log category**	System	
	Recovery	Reset error in the NX Unit.				
Effects	**User program**	Continues.	**Operation**	Operation continues. Communications with the RF Tag are not performed.		
System-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	The command code is incorrect.		Correct the command code as defined.		Check the command specifications and then create the user program.	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	Invalid Command Parameter			Event code	6AC10000 hex	
Meaning	The command cannot be executed because the parameter is incorrect.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When the command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Communications with the RF Tag are not performed.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	The command parameters are incorrect.		Correct the command parameter to the value within the range.		Check the command specifications and then create the user program.	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	Command Execution Not Possible			Event code	6AC20000 hex	
Meaning	The command cannot be executed because the command execution condition is not satisfied.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When the command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Communications with the RF Tag are not performed.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	Communications options that cannot be executed for the command are specified.		Correct the options to the executable communications options for the command.		Check the command specifications and then create the user program.	
	There is no data to be restored.		Writing data to the RF Tag has failed. Data restoration should be executed after *RF Tag data loss* is detected.		None	
	The communications option *Selective* is specified while *Select UID* of the I/O entry is not entered.		Enter the *Select UID* of the I/O entry.		Check the command specifications and then create the user program.	
	A copy command was executed while either Channel 1 or Channel 2 antenna was operating.		Stop the operation of both Channel 1 and Channel 2 antennas.		Check the command specifications and then create the user program.	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

<table>
<tr><td>Event name</td><td colspan="3">RF Tag Communications Failure</td><td>Event code</td><td colspan="2">6A700000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">An error occurred during communications with the RF Tag and it was not successfully completed.</td></tr>
<tr><td>Source</td><td colspan="2">Depends on where the Support Software is connected and the system configuration.</td><td>Source details</td><td>NX Unit</td><td>Detection timing</td><td>When the command is executed</td></tr>
<tr><td rowspan="2">Error attributes</td><td>Level</td><td colspan="2">Observation</td><td>Log category</td><td colspan="2">System</td></tr>
<tr><td>Recovery</td><td colspan="5">Reset error in the NX Unit.</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">Operation continues.
Communications with the RF Tag may not be performed normally.</td></tr>
<tr><td>System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td></td><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td rowspan="5">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="2">The communications distance between the antenna and the RF Tag is outside the specification range.</td><td colspan="2">Check the influence of noise and metal and secure communications distance.</td><td colspan="2" rowspan="2">Check the communications characteristics between the antenna and the RF Tag and adjust the installation.</td></tr>
<tr><td colspan="2">The moving speed of the RF Tag is too fast.</td><td colspan="2">Adjust the moving speed of the RF Tag.</td></tr>
<tr><td colspan="2">Influence of surrounding environment (e.g., noise interference and surrounding metal)</td><td colspan="2">Perform noise level measurement and implement noise countermeasures. Alternatively, keep a distance from the surrounding metal object.</td><td colspan="2">Check the influence of noise and metal and secure communications distance.</td></tr>
<tr><td colspan="2">Multiple RF Tags exist in the communications range when the communications option is other than Multi trigger or Multi repeat.</td><td colspan="2">Set one RF Tag in the communications range.
To communicate with multiple RF Tags, set the communications option to Multi trigger or Multi repeat.</td><td colspan="2">Create a user program with reference to the communications option specifications.</td></tr>
<tr><td>Attached information</td><td colspan="6">Attached information 1: Channel where error occurs
0001 hex: occurred in Channel 1
0010 hex: occurred in Channel 2</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

Event name	RF Tag Verification Error			Event code	6A710000 hex	
Meaning	Data could not be correctly written to the RF Tag.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When a command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Incorrect data may have been written to the RF Tag.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	The communications distance between the antenna and the RF Tag is outside the specification range.		Check the influence of noise and metal and secure communications distance.		Check the communications characteristics between the antenna and the RF Tag and adjust the installation.	
	The moving speed of the RF Tag is too fast.		Adjust the moving speed of the RF Tag.			
	Influence of surrounding environment (e.g., noise interference and surrounding metal)		Perform noise level measurement and implement noise countermeasures. Alternatively, keep a distance from the surrounding metal object.		Check the influence of noise and metal and secure communications distance.	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

<table>
<tr><td>Event name</td><td colspan="3">RF Tag Missing Error</td><td>Event code</td><td colspan="2">6A720000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">The RF Tags do not exist in the communications area.</td></tr>
<tr><td>Source</td><td colspan="2">Depends on where the Support Software is connected and the system configuration.</td><td>Source details</td><td>NX Unit</td><td>Detection timing</td><td>When a command is executed</td></tr>
<tr><td rowspan="2">Error attributes</td><td>Level</td><td colspan="2">Observation</td><td>Log category</td><td colspan="2">System</td></tr>
<tr><td>Recovery</td><td colspan="5">Reset error in the NX Unit.</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">Operation continues.
Communications with the RF Tag are not performed.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td rowspan="4">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="2">The communications option is Trigger, and any RF Tags do not exist in the communications area when the trigger is executed.</td><td colspan="2">Adjust so that the RF Tag is in the communications area when the trigger is instructed.</td><td colspan="2" rowspan="2">Design the equipment so that the RF Tag enters the communications area when you execute the command.</td></tr>
<tr><td colspan="2">The communications option is Auto or Repeat, and the waiting time has reached RF Communications Timeout.</td><td colspan="2">Adjust so that the RF Tag is within the communications area within RF Communications Timeout.</td></tr>
<tr><td colspan="2">The amplifier is connected but the antenna is not connected.</td><td colspan="2">Connect the antenna.</td><td colspan="2">Make sure that the antenna is connected.</td></tr>
<tr><td>Attached information</td><td colspan="6">Attached information 1: Channel where error occurs
0001 hex: occurred in Channel 1
0010 hex: occurred in Channel 2</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

<table>
<tr><td>Event name</td><td colspan="3">RF Tag Data Loss</td><td>Event code</td><td colspan="2">6A730000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">Data could not be correctly written to the RF Tag. There is a possibility that the data has been lost.</td></tr>
<tr><td>Source</td><td colspan="2">Depends on where the Support Software is connected and the system configuration.</td><td>Source details</td><td>NX Unit</td><td>Detection timing</td><td>When a command is executed</td></tr>
<tr><td rowspan="2">Error attributes</td><td>Level</td><td colspan="2">Observation</td><td>Log category</td><td colspan="2">System</td></tr>
<tr><td>Recovery</td><td colspan="5">Reset error in the NX Unit.</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">Operation continues.
Memory data of the RF Tag may have been lost. Restoring is required.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td rowspan="4">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="2">The communications distance between the antenna and the RF Tag is outside the specification range.</td><td colspan="2">Check the influence of noise and metal and secure communications distance.</td><td colspan="2" rowspan="2">Check the communications characteristics between the antenna and the RF Tag and then adjust the installation.</td></tr>
<tr><td colspan="2">The moving speed of the RF Tag is too fast.</td><td colspan="2">Adjust the moving speed of the RF Tag.</td></tr>
<tr><td colspan="2">Influence of surrounding environment (e.g., noise interference and surrounding metal)</td><td colspan="2">Perform noise level measurement and implement noise countermeasures. Alternatively, keep a distance from the surrounding metal object.</td><td colspan="2">Check the influence of noise and metal and secure communications distance.</td></tr>
<tr><td>Attached information</td><td colspan="6">Attached information 1: Channel where error occurs
0001 hex: occurred in Channel 1
0010 hex: occurred in Channel 2</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

Event name	RF Tag Data Error		**Event code**	6A760000 hex	
Meaning	A data error in the RF Tag was detected.				
Source	Depends on where the Support Software is connected and the system configuration.	**Source details**	NX Unit	**Detection timing**	When a command is executed
Error attributes	**Level**	Observation	**Log category**	System	
	Recovery	Reset error in the NX Unit.			
Effects	**User program**	Continues.	**Operation**	Operation continues. Information read from RF Tag is incorrect.	
System-defined variables	**Variable**		**Data type**	**Name**	
	None		---	---	
Cause and correction	**Assumed cause**		**Correction**	**Prevention**	
	Noise in the environment where RF Tags are used		Rewrite the RF Tag data and take measures against noise.	Check the effect of noise and take measures against noise.	
	RF Tag individual failure		Rewrite the RF Tag data. If this error still occurs, replace the RF Tag.	None	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2				
Precautions/ Remarks	None				

Event name	RF Tag Lifetime Warning		**Event code**	6A770000 hex	
Meaning	The number of writing to the RF Tag was written exceeded the specified value.				
Source	Depends on where the Support Software is connected and the system configuration.	**Source details**	NX Unit	**Detection timing**	When a command is executed
Error attributes	**Level**	Observation	**Log category**	System	
	Recovery	Reset error in the NX Unit.			
Effects	**User program**	Continues.	**Operation**	Operation continues.	
System-defined variables	**Variable**		**Data type**	**Name**	
	None		---	---	
Cause and correction	**Assumed cause**		**Correction**	**Prevention**	
	The number of writing to the RF Tag has reached the end of its life.		Replace the RF Tag.	(Since it is a purpose to detect write life, no prevention measures are necessary.)	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2				
Precautions/ Remarks	None				

Event name	RF Tag Response Error			Event code	6A790000 hex	
Meaning	The RF Tag responded with an error and it was not successfully completed.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When a command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Failed to communicate with the RF Tag.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	Unsupported RF Tags are used.		Replace the RF Tag.		None	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	RF Tag Address Error			Event code	6A7A0000 hex	
Meaning	The address of the RF Tag is incorrect.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When a command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Failed to communicate with the RF Tag.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	The RF Tag address specified by the command is incorrect.		Check the memory capacity of the RF Tag to be used and correct it so that the specified address is within the memory range.		Check the specifications of the RF Tag to be used, and then create the user program.	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	RF Tag Write Protect Error			Event code	6A7D0000 hex	
Meaning	An attempt was made to write in the write protected area of the RF Tag.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When a command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Failed to communicate with the RF Tag.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	The memory area of the RF Tag to be written is included in the write protect range.		Correct the address of the specified RF Tag to be outside the write protect.		Check the write protect area set for the RF Tag to be used, and then create the user program.	
			Cancel Write Protect.			
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	RF Tag Lock Error			Event code	6A7E0000 hex	
Meaning	An attempt was made to write to the locked area of RF Tag.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When a command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Failed to communicate with the RF Tag.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	The address of the RF Tag specified in a command is incorrect.		Correct the address of the specified RF Tag to be outside the lock range		Check the specifications of the RF Tag to be used, and then create the user program.	
	The memory area to be written to the RF Tag is locked.		Replace the RF Tag.		None	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	RF Tag Customer Code Error			Event code	6A7F0000 hex	
Meaning	An RF Tag not permitted to use was communicated.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When a command is executed
Error attributes	Level	Observation		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Failed to communicate with the RF Tag.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	An RF Tag that cannot be used for security is used.		Replace the RF Tag.		Contact your OMRON representative.	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	RF Tag Data Correction			Event code	6AD00000 hex	
Meaning	Data error of the RF Tag was detected and corrected.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	When a command is executed
Error attributes	Level	Information		Log category	System	
	Recovery	Reset error in the NX Unit.				
Effects	User program	Continues.	Operation	Operation continues. Data garbled in the memory of the RF Tag.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	Noise in the environment where RF Tags are used		Rewrite the RF Tag data and take measures against noise		Check the effect of noise and take measures against noise.	
	RF Tag individual failure		Rewrite the RF Tag data. If this error still occurs, replace the RF Tag.		None	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2					
Precautions/ Remarks	None					

Event name	RF Tag Calculation Overflow or Underflow		**Event code**	6AD10000 hex	
Meaning	Overflow or underflow occurred in calculated value.				
Source	Depends on where the Support Software is connected and the system configuration.	**Source details**	NX Unit	**Detection timing**	When a command is executed
Error attributes	**Level**	Information	**Log category**	System	
	Recovery	Reset error in the NX Unit.			
Effects	**User program**	Continues.	**Operation**	Operation continues.	
System-defined variables	**Variable**		**Data type**	**Name**	
	None		---	---	
Cause and correction	**Assumed cause**		**Correction**	**Prevention**	
	Calculation data that were attempted to write to the RF Tag exceeded the valid range of the data type.		Correct the value to be written so that it is within the effective range of the data type of the calculation result data.	Check the effective range of the calculation result data type, and then create the user program.	
Attached information	Attached information 1: Channel where error occurs 0001 hex: occurred in Channel 1 0010 hex: occurred in Channel 2				
Precautions/ Remarks	None				

Event name	NX Unit I/O Communications Error		**Event code**	80200000 hex	
Meaning	An I/O communications error occurred in an NX Unit.				
Source	Depends on where the Support Software is connected and the system configuration.	**Source details**	NX Unit	**Detection timing**	Continuously
Error attributes	**Level**	Minor fault	**Log category**	System	
	Recovery	For the NX bus of CPU Units When Fail-soft Operation Is Set to *Stop* Reset the error in the NX Bus Function Module. When Fail-soft Operation Is Set to *Fail-soft* **Reset the error in the NX Unit.** For Communications Coupler Units When Fail-soft Operation Is Set to *Stop* If the errors are detected in the Controller, reset all of the errors in the Controller. If the errors are not detected in the Controller, reset errors in the Communications Coupler Unit and NX Unit. When Fail-soft Operation Is Set to *Fail-soft* Reset errors in the Communications Coupler Unit and NX Unit.			
Effects	**User program**	Continues.	**Operation**	The NX Unit will continue to operate. Input data: Updating input values stops. Output data: The output values depend on the Load Rejection Output Setting.	
System-defined variables	**Variable**		**Data type**	**Name**	
	None		---	---	

	Assumed cause	Correction	Prevention
Cause and correction	For the NX bus of CPU Units		
	An error that prevents normal NX bus communications occurred in a CPU Unit.	Check the error that occurred in the CPU Unit and perform the required corrections.	Take preventive measures against the error that occurred in the CPU Unit.
	An NX Unit is not mounted properly.	Mount the NX Units and End Cover securely and secure them with End Plates.	Mount the NX Units and End Cover securely and secure them with End Plates.
	The power cable for the Unit power supply is disconnected, or the wiring from the Unit power supply to the NX Units is incorrect.	Wire the Unit power supply to the NX Units securely.	Wire the Unit power supply to the NX Units securely.
	The power cable for the Unit power supply is broken.	If the power cable between the Unit power supply and the NX Units is broken, replace it.	None
	The voltage of the Unit power supply is outside the specified range, or the capacity of the Unit power supply is insufficient.	Configure the power supply system configuration correctly according to the power supply design method.	Configure the power supply system configuration correctly according to the power supply design method.
	There is a hardware error in an NX Unit.	If the error persists even after you make the above correction, replace the NX Unit.	None
	For Communications Coupler Units		
	An error that prevents normal NX bus communications occurred in a Communications Coupler Unit.	Check the error that occurred in the Communications Coupler Unit and perform the required corrections.	Take preventive measures against the error that occurred in the Communications Coupler Unit.
	The NX Unit is not mounted properly.	Mount the NX Units and End Cover securely and secure them with End Plates.	Mount the NX Units and End Cover securely and secure them with End Plates.
	The power cable for the Unit power supply is disconnected. Or, the wiring from the Unit power supply to the NX Units is incorrect.	Correctly wire the Unit power supply to the NX Units.	Correctly wire the Unit power supply to the NX Units.
	The power cable for the Unit power supply is broken.	If the power cable between the Unit power supply and the NX Units is broken, replace it.	None
	The voltage of the Unit power supply is outside the specified range. Or, the capacity of the Unit power supply is insufficient.	Correctly configure the power supply system according to the power supply design methods.	Correctly configure the power supply system according to the power supply design methods.
	There is a hardware error in the NX Unit.	If the error occurs again even after you make the above correction, replace the NX Unit.	None
Attached information	None		
Precautions/ Remarks	None		

Event name	NX Message Communications Error		**Event code**	80220000 hex	
Meaning	An error was detected in message communications and the message frame was discarded.				
Source	Depends on where the Support Software is connected and the system configuration.	**Source details**	NX Unit	**Detection timing**	During NX message communications
Error attributes	**Level**	Observation	**Log category**	System	
	Recovery	---			
Effects	**User program**	Continues.	**Operation**	Not affected.	
System-defined variables	**Variable**		**Data type**	**Name**	
	None		---	---	
Cause and correction	**Assumed cause**		**Correction**	**Prevention**	
	For the NX bus of CPU Units				
	The message communications load is high.		Reduce the number of times that instructions are used to send NX messages.	Reduce the number of times that instructions are used to send NX messages.	
	For Communications Coupler Units				
	The message communications load is high.		Reduce the number of times that instructions are used to send NX messages.	Reduce the number of times that instructions are used to send NX messages.	
	The communications cable is disconnected or broken. This cause does not apply if attached information 2 is 0 (NX bus).		Connect the communications cable securely.	Connect the communications cable securely.	
	Message communications were cutoff by executing the followings in message communications. • Transfer of parameters by the Support Software • Restoration of the backup data (if this error occurred in the EtherCAT Slave Terminal) • Disconnection of an EtherCAT slave (if this error occurred in the EtherCAT Slave Terminal)		---	---	
Attached information	Attached information 1: System information Attached information 2: Type of communications where error occurred 0: NX bus 1: EtherCAT 2: Serial communications (USB) 3: EtherNet/IP 65535: Internal Unit communications (routing)				
Precautions/ Remarks	None				

Event name	NX Unit Clock Not Synchronized Error			Event code	80240000 hex	
Meaning	A time information error occurred in an NX Unit.					
Source	Depends on where the Support Software is connected and the system configuration.		Source details	NX Unit	Detection timing	Continuously
Error attributes	Level	Minor fault		Log category	System	
	Recovery	For the NX bus of CPU Units Cycle the power supply to the Unit. For Communications Coupler Units Cycle the power supply to the Unit and then reset all of the errors in the Controller.				
Effects	User program	Continues.	Operation	The NX Unit will continue to operate. Input data: Updating input values stops. Output data: The output values depend on the Load Rejection Output Setting.		

System-defined variables	Variable	Data type	Name
	None	---	---

Cause and correction	Assumed cause	Correction	Prevention
	For the NX bus of CPU Units		
	There is a hardware error in an NX Unit.	If the error occurs only in a specific NX Unit, replace the relevant NX Unit.	None
	There is a hardware error in a CPU Unit.	If the error occurs in all of the NX Units mounted on a CPU Unit, replace the CPU Unit.	None
	For Communications Coupler Units		
	There is a hardware error in an NX Unit.	If the error occurs only in a specific NX Unit, replace the relevant NX Unit.	None
	There is a hardware error in an EtherCAT Coupler Unit.	If the error occurs in all of the NX Units mounted on a Communications Coupler Unit, replace the Communications Coupler Unit.	None

Attached information	None
Precautions/ Remarks	None

Event name	Event Log Cleared			**Event code**	90400000 hex	
Meaning	The event log was cleared.					
Source	Depends on where the Support Software is connected and the system configuration.		**Source details**	NX Unit	**Detection timing**	When commanded from user
Error attributes	**Level**	Information		**Log category**	Access	
	Recovery	---				
Effects	**User program**	Continues.	**Operation**	Not affected.		
System-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	The event log was cleared by the user.		---		---	
Attached information	Attached information 1: Events that were cleared 1: The system event log was cleared. 2: The access event log was cleared.					
Precautions/ Remarks	None					

9-3-5 Resetting Errors

Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for information on how to reset errors.

9-3-6 Troubleshooting Flowcharts

Refer to the user’s manual for the connected CPU Unit or Communications Coupler Unit for the standard flow for troubleshooting.

10

Maintenance and inspection

This section describes how to clean, inspect, and maintain the RFID Unit.

10-1 Cleaning and Maintenance 10-2
10-1-1 Cleaning 10-2
10-1-2 Periodic Inspections 10-2
10-2 Maintenance Procedures 10-4

10-1 Cleaning and Maintenance

This section describes daily maintenance and the cleaning and inspection methods.

Make sure to perform daily or periodic inspections in order to maintain the RFID Unit's functions in the best operating condition.

10-1-1 Cleaning

Perform the following cleaning procedures periodically to ensure the RFID Units are maintained in the best operating condition.

- Wipe the network over with a soft, dry cloth when doing daily cleaning.
- If dirt remains even after wiping with a soft, dry cloth, wipe with a cloth that has been wet with a sufficiently diluted detergent (2%) and wrung dry.
- Units will become stained if items such as rubber, vinyl products, or adhesive tape are left on the NX Unit for a long period. Remove the smudge when cleaning.

Precautions for Correct Use

- Never use volatile solvents, such as paint thinner, benzene, or chemical wipes.
- Do not touch the NX bus connectors.

10-1-2 Periodic Inspections

RFID Units do not have parts with a specific life. However, its elements can deteriorate under improper environmental conditions. Periodic inspections are thus required to ensure that the required conditions are being maintained.

Inspection is recommended at least once every six months to a year, but more frequent inspections will be necessary in adverse environments.

Take immediate steps to correct the situation if any of the conditions in the following table are not met.

Periodic Inspection Points

No.	Inspection Item	Details	Criteria	Corrective action
1	External power supplies	Is the power supply voltage measured at the terminal block within standards?	The voltage must be within the power supply voltage range.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring the power supply within the power supply voltage range.
2	Ambient environment	Check that the ambient operating temperature is within the criteria.	0 to 55°C	Use a thermometer to check the temperature and ensure that the ambient temperature remains within the allowed range of 0 to 55°C.
		Check that the ambient operating humidity is within the criteria.	10% to 95% RH Relative humidity must be with no condensation.	Use a hygrometer to check the humidity and ensure that the ambient humidity remains between 10% and 95%. Make sure that condensation does not occur due to rapid changes in temperature.
		Check that the EtherNet/IP Coupler Unit is not in direct sunlight.	Not in direct sunlight	Protect the Controller if necessary.

No.	Inspection Item	Details	Criteria	Corrective action
2	Ambient environment	Check for accumulation of dirt, dust, salt, or metal powder.	No significant noise sources	Clean and protect the Controller if necessary.
		Check for water, oil, or chemical sprays hitting the EtherNet/IP Coupler Unit.	No spray	Clean and protect the Controller if necessary.
		Are there corrosive or flammable gases in the area of the Controller?	No significant noise sources	Check by smell or use a sensor.
		Check that the EtherNet/IP Coupler Unit is not subject to direct vibration or shock.	Vibration resistance and shock resistance must be within specifications.	Install cushioning or other vibration and shock absorbing equipment if necessary.
		Check for noise sources nearby the EtherNet/IP Coupler Unit.	No significant noise sources	Either separate the Controller and noise source or protect the Controller.
3	Installation and wiring	Are the DIN track mounting hooks for each NX Unit securely locked?	No looseness	Securely lock the DIN track mounting hooks.
		Are the cable connectors fully inserted and locked?	No looseness	Correct any improperly installed connectors.
		Are there any loose screws on the End Plates (PFP-M)?	No looseness	Tighten loose screws with a Phillips-head screwdriver.
		Are the NX Units connected to each other along the hookup guides and until they touch the DIN track?	You must connect and fix the NX Units to the DIN track.	Connect the NX Units to each other along the hookup guides and until they touch the DIN track.
		Check for damaged external wiring cables.	No visible damage	Check visually and replace cables if necessary.

Tools Required for Inspections

Required Tools

- Phillips screwdriver
- Flat-blade screwdriver
- Voltage tester or digital voltmeter
- Industrial alcohol and clean cotton cloth

Tools Required Occasionally

- Oscilloscope
- Thermometer and hygrometer (humidity meter)

10-2 Maintenance Procedures

Refer to the description on *Maintenance and inspection* in the user's manual for the connected CPU Unit or Communications Coupler Unit for information on how to take a data backup on an RFID Unit, and how to replace the RFID Unit.

A

Appendices

The appendices provide datasheets, dimensions, and other information for RFID Units.

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A-1 Datasheet

The specifications of the RFID Units are described below.

A-1-1 Model List

RFID Units

Model	Amplifier and antenna		
	Amplifier model	Antenna model	Number of antennas connected
NX-V680C1	V680-series HA63□	V680-HS□□ Antenna with Separate Amplifier	1
	---	V680-H01-V2 Antenna with Built-in Amplifier	
NX-V680C2	V680-series HA63□	V680-HS□□ Antenna with Separate Amplifier	2

A-1-2 Detailed Specifications

Description of Items on Data Sheet of the RFID Unit

The meanings of the items on the data sheet of the RFID Units are explained in the table below.

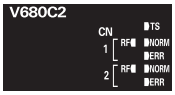
Item	Description
Unit name	The name of the Unit
Model	The model of the Unit.
Number of antennas connected	The number of antennas to which the Unit can connect.
External connection terminal	The type of terminal block that is used for connecting the Unit.
I/O refreshing method	The I/O refreshing methods that are used by the Unit. Only Free-Run refreshing is supported.
Indicators	The type and layout of the indicators on the Unit.
Communications protocol	The air interface protocol standard of RFID that is used by the Unit.
Connectable Antennas	The type of the antenna that can be connected to the Unit.
Applicable RF Tags	The type of RF Tag that the Unit can communicate with.
RF Tag reading/writing size	The data size in the RF Tag that can be read and written by the Unit.
Divided data size	The data size of input or output that can be sent at one time between the RFID Unit and the CPU Unit or communications master. It can be changed with the Support Software.
Backup function	The setting data of the Unit can be saved in the memory of the CPU Unit or the Communications Coupler Unit by the backup function of the Controller.
Dimensions	The dimensions of the Unit. The dimensions are given in the form W × H × D. The dimensions are given in millimeters.
Isolation method	The isolation method between the input circuit and internal circuit of the Unit
Insulation resistance	The insulation resistance between the insulated circuits in the Unit.
Dielectric strength	The dielectric strength between the insulated circuits in the Unit.

Item	Description
I/O power supply method	The method for supplying I/O power to the Unit. The supply method is determined for each Unit. The power is supplied from the NX bus or the external source.
Current capacity of I/O power supply terminals	The current capacity of the I/O power supply terminals (IOV and IOG) on the Unit. When I/O power is supplied to external devices connected to this Unit, do not supply a voltage that exceeds this value.
NX Unit power consumption	The NX Unit power consumption of this Unit. Shows the power consumption when the NX Unit is connected to a CPU Unit and when connected to a Communications Coupler Unit.
Weight	The weight of the Unit.
Installation orientation and restrictions	The installation orientation of the CPU Unit and the Slave Terminal, including this Unit Any restrictions to specifications that result from the installation orientation are also given.

NX-V680C1

Unit name	One-channel RFID Unit	**Model**	NX-V680C1
Number of antennas connected	1	**External connection terminal**	FG terminal block (1 terminal)
I/O refreshing method	Free-Run Refreshing		
Indicators	TS indicator, RF indicator, NORM indicator, and ERR indicator 	**Communications protocol**	ISO/IEC18000-3(15693)
		Connectable Antennas	V680-series Antenna with Separate Amplifier : V680-HS☐☐ Antenna with Built-in Amplifier : V680-H01-V2
		Applicable RF Tags	V680S-series RF or V680-series RF Tags
		RF Tag reading/writing size	8,192 bytes max.
		Divided data size	16 to 128 bytes
		Backup function	Supported.
Dimensions	30 mm (W) x 100 mm (H) x 71 mm (D)	**Isolation method**	Digital isolator isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**	510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method	Supplied from the NX bus	**Current consumption from I/O power supply**	• V680-H01-V2 connection 250 mA max. • V680-HA63☐ connection 210 mA max.
NX Unit power consumption	• Connected to a CPU Unit 1.00 W max. • Connected to Communications Coupler Unit 0.90 W max.	**Weight**	120 g max.
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations Restrictions: No restrictions		

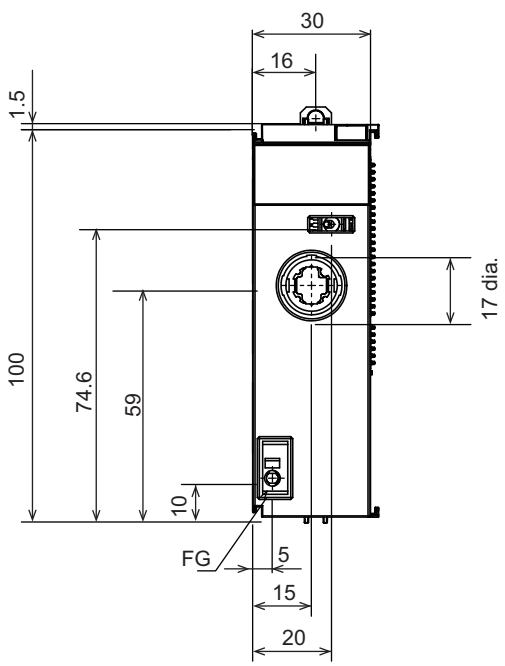
NX-V680C2

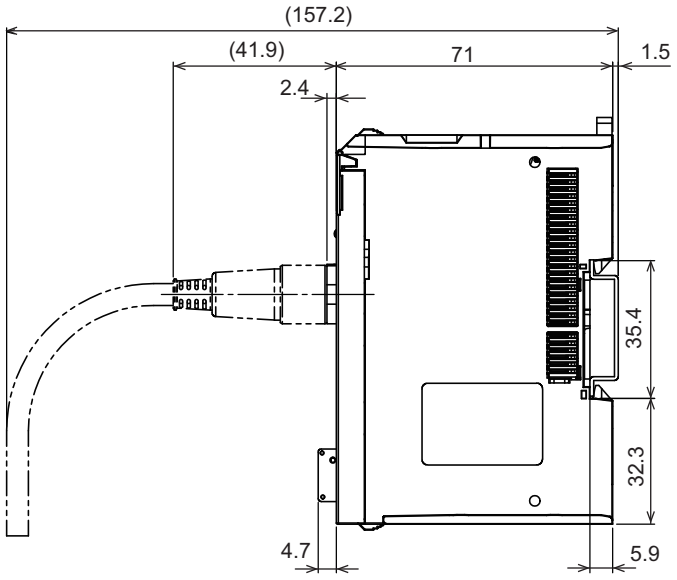
Unit name	Two-channels RFID Unit	**Model**	NX-V680C2
Number of antennas connected	2	**External connection terminal**	FG terminal block (1 terminal)
I/O refreshing method	Free-Run Refreshing		
Indicators	[TS] LED, [RF] LED, [NORM] LED, [ERR] LED TS indicator, RF indicator, NORM indicator, and ERR indicator 	**Communications protocol**	ISO/IEC18000-3(15693)
		Connectable Antennas	V680-series Antenna with Separate Amplifier : V680-HS☐☐
		Applicable RF Tags	V680S-series RF or V680-series RF Tags
		RF Tag reading/writing size	8,192 bytes max.
		Divided data size	16 to 128 bytes
		Backup function	Supported.
Dimensions	30 mm (W) x 100 mm (H) x 71 mm (D)	**Isolation method**	Digital isolator isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**	510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method	Supplied from the NX bus.	**Current consumption from I/O power supply**	V680-HA63☐ connection 380 mA max
NX Unit power consumption	• Connected to a CPU Unit 1.00 W max. • Connected to Communications Coupler Unit 0.90 W max.	**Current consumption from I/O power supply**	130 g max.
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations Restrictions: No restrictions		

A-2 Dimensions

This section describes the dimensions of each model of the RFID Unit.

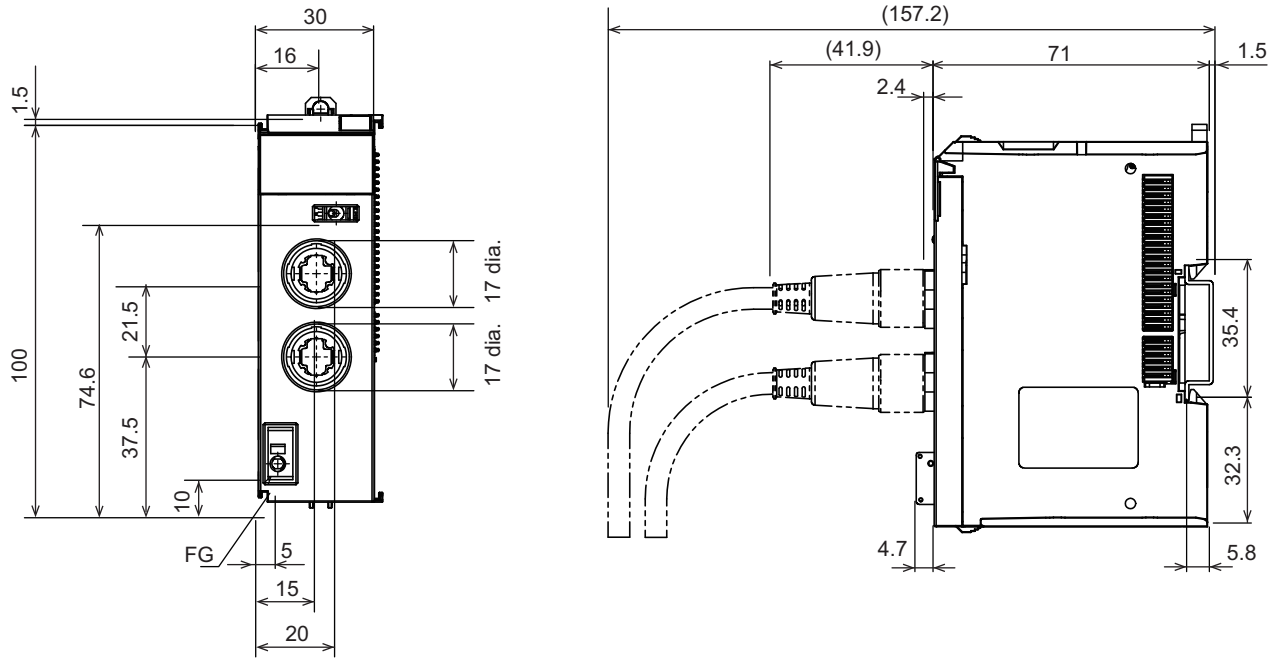
NX-V680C1 (One-channel)





(Unit: mm)

NX-V680C2 (Two-channels)

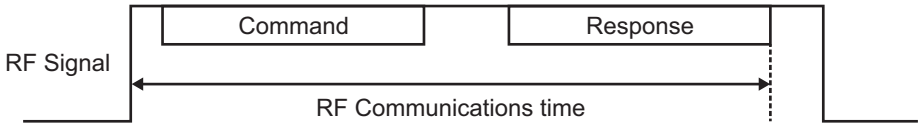


(Unit: mm)

A-3 RF Tag Communications Performance

A-3-1 RF Communications Time (for Reference Only)

The communications time specifies the time period during which the RFID Unit and an RF Tag perform wireless communications with each other. Specifically, it indicates the time period from when the RF signal from the antenna connected to the RFID Unit turns ON up to the receipt of a response (final bit) from the RF Tag.



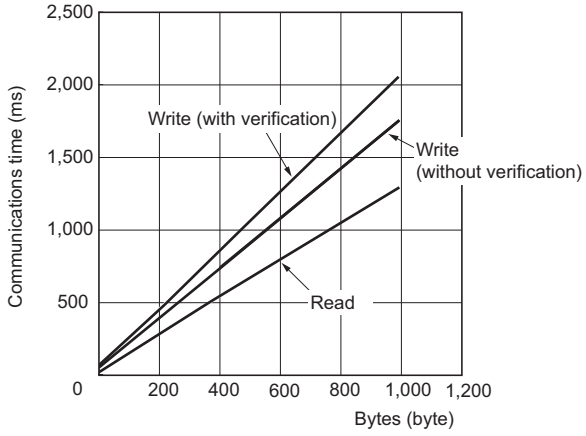
RF signal	:	Radio waves transmitted by the RFID Unit to the RF Tag. Before starting communications with the RF Tag, the RFID Unit turns on the RF signal and sends a command. Once communications with the RF Tag have ended, the RFID Unit turns off the RF signal.
Transmitted command	:	The command sent from the RFID Unit to the RF Tag.
Received response	:	The response returned from the RF Tag to the RFID Unit.

RF Communications Time with RF Tag

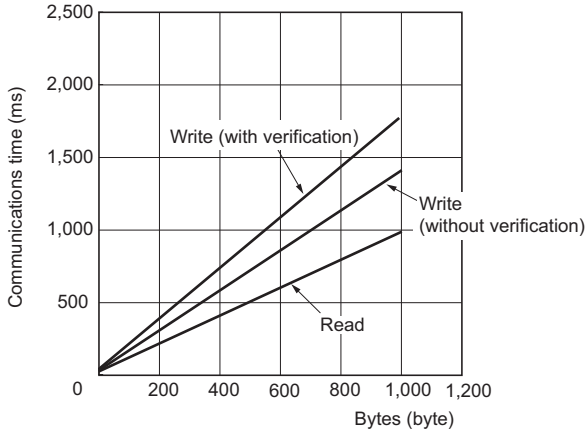
- **V680-HA63A: V680-HS□□: V680-D1KP□□**
  V680-H01-V2: V680-D1KP□□

Communications speed setting	Command	Communications time Number of bytes
Normal Speed Mode	Read	T = 1.3N + 31
	Write (with verification)	T = 2.1N + 58
	Write (without verification)	T = 1.8N + 56
High Speed Mode	Read	T = 1.0N + 29
	Write (with verification)	T = 1.8N + 51
	Write (without verification)	T = 1.5N + 47

Communications speed: Normal Speed Mode



Communications speed: High Speed Mode

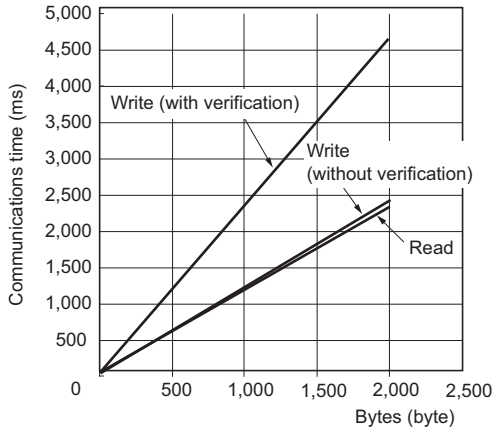


● V680-HA63B: V680-HS□□: V680-D2KF□□, V680S-D2KF□□

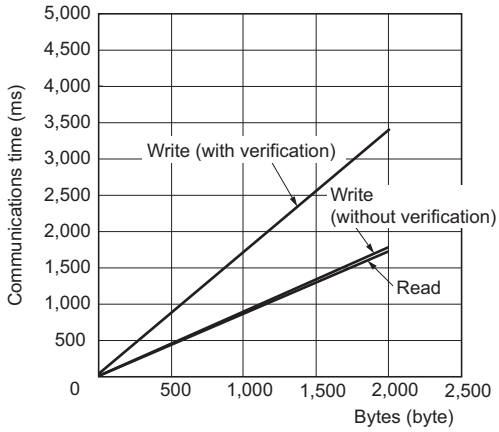
Communications speed setting	Command	Communications time N: Number of bytes processed
Normal Speed Mode	Read	T = 1.2N + 30
	Write (with verification)	T = 2.4N + 49
	Write (without verification)	T = 1.2N + 49
High Speed Mode *1	Read	T = 0.9N + 27
	Write (with verification)	T = 1.7N + 49
	Write (without verification)	T = 0.9N + 41

*1. When using multi-access or FIFO RF communications options, Normal Speed Mode communications speed will be used regardless of the High Speed Mode setting.

RF Communications speed: Normal Speed Mode



RF Communications speed: High Speed Mode

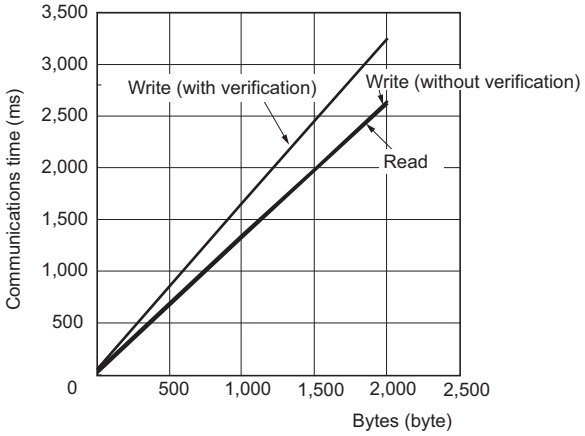


● V680-HA63B: V680-HS□□: V680-D8KF□□, V680-D32KF□□

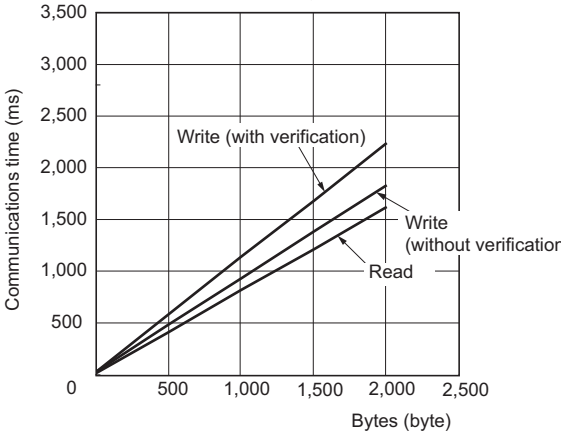
Communications speed setting	Command	Communications time N: Number of bytes processed
Normal Speed Mode	Read	T = 1.3N + 30
	Write (with verification)	T = 1.6N + 59
	Write (without verification)	T = 1.3N + 50
High Speed Mode *1	Read	T = 0.8N + 25
	Write (with verification)	T = 1.1N + 41
	Write (without verification)	T = 0.9N + 40

*1. When using multi-access or FIFO RF communications options, Normal Speed Mode communications speed will be used regardless of the High Speed Mode setting.

Communications speed: Normal Speed Mode



Communications speed: High Speed Mode

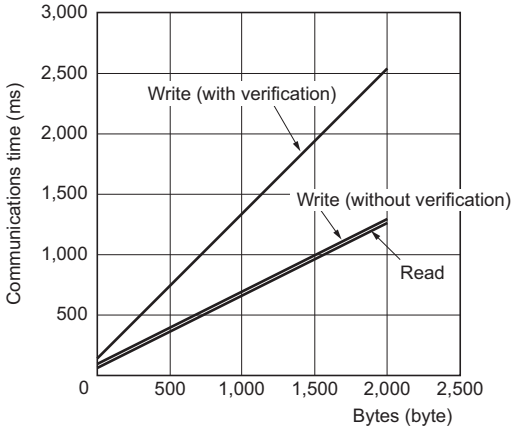


● V680-HA63B: V680-HS□□: V680S-D8KF□□

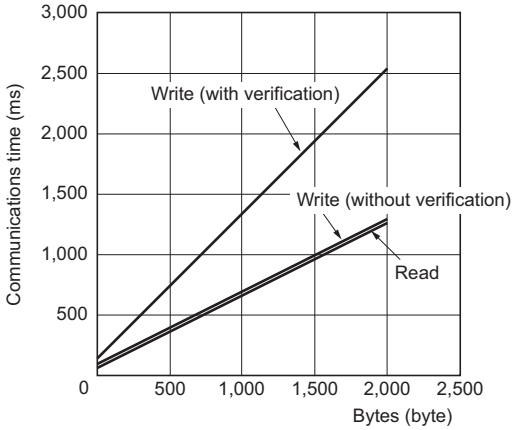
Communications speed setting	Command	Communications time N: Number of bytes processed
Normal Speed Mode	Read	T = 0.6N + 58
	Write (with verification)	T = 1.2N + 137
	Write (without verification)	T = 0.6N + 91
High Speed Mode *1	Read	T = 0.6N + 58
	Write (with verification)	T = 1.2N + 137
	Write (without verification)	T = 0.6N + 91

*1. When using an RF Tag of the V680S-D8KF□□, the communications time does not differ from that during the Normal Speed Mode communications speed even if the High Speed Mode has been selected.

Communications speed: Normal Speed Mode



Communications speed: High Speed Mode



A-3-2 Method of Calculating the RF Tag Speed (for Reference Only)

When communicating with an RF Tag that is passing through the antenna communications area, use the RF Tag at a speed at which there is enough surplus in the communications time.

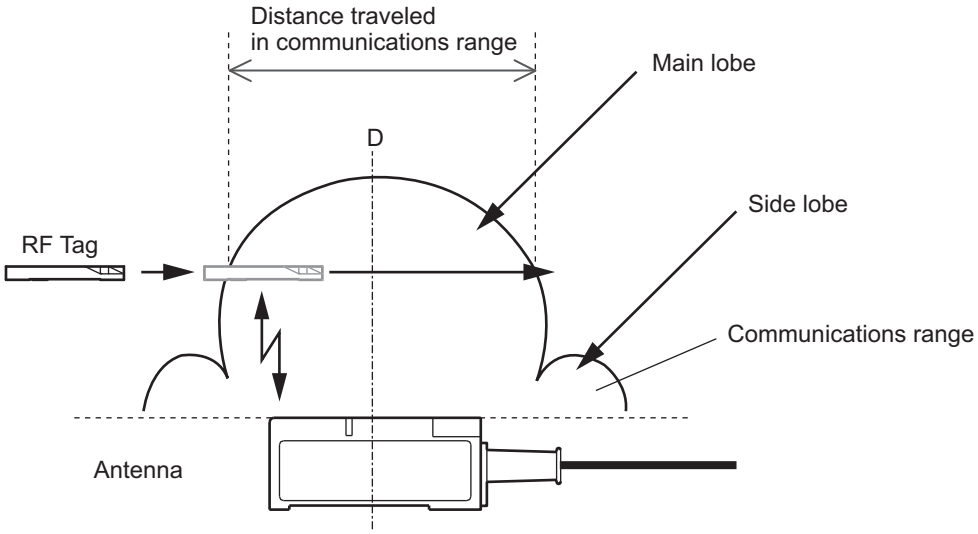
The maximum speed of an RF Tag can be easily calculated by the formula given below.

$$\text{Maximum speed} = \frac{\text{D (Distance traveled in communications range)}}{\text{T (Communications time)}}$$

The distance traveled within the communications range (D) is calculated from the communications range diagram between your amplifier or antenna and the RF Tag, or from the actual measurement.

Note that this calculation formula is only for reference, and the operation must be sufficiently checked in advance.

The communications times are values given in the table on the previous page. The distance traveled within the communications range varies depending on the combination of your antenna and RF Tag. Refer to the User's Manual for RF Tags and Amplifiers.



Additional Information

- We recommend that you calculate the communications time over two cycles in consideration of surplus time.
- Make sure that when using the RF Tag, the widest region of the communications range through which the RF Tag passes is the width of the main lobe. We recommend that you arrange the RF Tag such that it does not pass through the area of the side lobe.
- Refer to the following manuals for details on the communications ranges.
  - When you are using an FRAM RF Tag
    V680-series User's Manual for RF Tags and Amplifiers (FRAM Type) (Z248)
  - When you are using an EEPROM RF Tag
    User's Manual for RF Tags and Amplifiers (EEPROM Type) (Z262)

A-3-3 Method of Calculating the Response Time of a Communications Command

The turnaround time from when the CPU Unit or an industrial PC sends an instruction for operating a communications command to the RFID Unit, up to the reception of the results of communications with the RF Tag can be calculated by the following calculation formula.

When the Memory of the RF Tag Is Read or Written Without Division Transfer (Read/Write Data Size < Input/Output Size of I/O Entry)

TAT [ms] = I/O refresh cycle × 5 + Communications time

When the Memory of the RF Tag Is Read or Written with Division Transfer (Read/Write Data Size > Input/Output Size of I/O Entry)

(a) TAT [ms] = I/O refresh cycle × 5 + Communications time

(b) TAT [ms] = (I/O refresh cycle × 5) + (I/O refresh cycle × 3 × (Read/write data size / Division data size)

The turnaround time is the longer of the TAT times in (a) and (b).

A-4 NX Objects

This section describes the NX objects of the RFID Units.

The method to access NX objects through instructions or other messages depends on where the NX Unit is connected.

If the NX Unit is connected to a CPU Unit, access is possible with the Read NX Unit Object instruction and the Write NX Unit Object instruction. When the NX Unit is connected to a Communications Coupler Unit, the method depends on the connected communications master and Communications Coupler Unit.

Refer to the user's manual for the connected Communications Coupler Unit for method to use messages to access NX objects on Slave Terminals.

A-4-1 Format of NX Object Descriptions

In this manual, NX objects are described with the following format.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute

Index (hex)	:	The index of the NX object expressed by a 4-digit hexadecimal number.
Subindex (hex)	:	The subindex of the NX object expressed by a 2-digit hexadecimal number.
Object name	:	This is the name of the object. For a subindex, this is the name of the subindex.
Default value	:	This is the value that is set by default.
Data range	:	For a read-only (RO) NX object, this is the range of the data you can read. For a read-write (RW) NX object, this is the setting range of the data.
Unit	:	The unit is the physical units.
Data type	:	This is the data type of the object.
Access	:	This data tells if the object is read-only or read/write. RO: Read only RW: Read/write
I/O allocation	:	This tells whether I/O allocation is allowed.
Data attribute	:	This is the timing when changes to writable NX objects are enabled. Y: Effective after restart N: Effective immediately ---: Write-prohibited

A-4-2 Unit Information Objects

This object gives the product information.

Index (hex)	Subin-dex (hex)	Object name	Defaul t value	Data range	Unit	Data type	Acc ess	I/O allocation	Data attri-bute
1000	---	NX Bus Identity	---	---	---	---	---	---	---
	00	Number of Entries	7	7	---	USINT	RO	Not possible	---
	02	Model	*1	---	---	ARRAY [0..11] OF BYTE	RO	Not possible	---
	03	Device Type	*2	---	---	UDINT	RO	Not possible	---
	05	Vendor Code	00000001 hex*3	---	---	UDINT	RO	Not possible	---
	06	Unit Version	*4	---	---	UDINT	RO	Not possible	---
	07	Serial Number	*5	00000000 to FFFF hex	---	UDINT	RO	Not possible	---
1001	---	Production Info	---	---	---	---	---	---	---
	00	Number of Entries	4	4	---	USINT	RO	Not possible	---
	01	Lot Number	*6	00000000 to FFFF hex	---	UDINT	RO	Not possible	---
	02	Hardware Version	*7	---	---	ARRAY [0..19] OF BYTE	RO	Not possible	---
	03	Software Version	*7	---	---	ARRAY [0..19] OF BYTE	RO	Not possible	---

*1. The Unit product models are assigned in ASCII code. If not all 12 bytes are used, the remainder elements are filled with spaces ($20).

*2. The product codes are assigned for each product models.
Bits 0 to 31:Product code

*3. OMRON vendor code

*4. Bits 24 to 31: Integer part of the Unit version

Bits 16 to 23: Fractional part of the Unit version
Bits 0 to 15: Reserved
(Example) 0100□□□□ hex for Ver. 1.0

*5. A unique serial number is assigned for each product Unit.

Bits 0 to 31: Serial number

*6. The year, month, and day of production are assigned to the *Lot Number*.

Bits 24 to 31: Production date
Bits 16 to 23: Production month
Bits 8 to 15: Production year
Bits 0 to 7: Reserved

*7. The version is returned in ASCII code. It is given as follows: V ($56), integer part of version, period ($2E), decimal part of version. If all 20 bytes are not required, the remaining bytes are filled with spaces ($20).

Example for version 1.00:$56$31$2E$30$30$20$20$20$20$20$20$20$20$20$20$20$20$20

A-4-3 Objects That Accept I/O Allocations

Objects that accept I/O allocations

These objects accept I/O allocations. If you assign any of the objects that are described below to I/O, you can no longer access those objects with the Read NX Unit Object instruction, Write NX Unit Object instruction, or other messages.

Index numbers 6002 to 601D hex and 7002 to 701C hex are reserved data areas. As they are for reserved data, explanation of these data is omitted.

Precautions for Correct Use

Do not access the reserved data. If functions are assigned to the reserved data by version upgrade, accessing the reserved data could result in unexpected operations.

Refer to the *NJ/NX-series Instructions Reference Manual* (Cat. No. W502) for details on the Read NX Unit Object instruction or the Write NX Unit Object instruction.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
6000	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch1 Status*2	0000 hex	---	---	WORD	RO	Possible	---
		Ch1 Command Status	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 Normal End	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 Error End	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 Command Error	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 Antenna Error	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 RF Communications Error	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 RF Communications Warning	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 Test Mode	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch1 Reserved	---	---	---	BIT8	RO	Possible	---
	02	Ch1 Refresh Count	0	0 to 65535	---	UINT	RO	Possible	---

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
6000	03	Ch1 Response Code	0000 hex	---	---	WORD	RO	Possible	---
	04	Ch1 Measurement Result	0	0 to 8192	---	UINT	RO	Possible	---
	05	Ch1 Input SID	0	0 to 65535	---	UINT	RO	Possible	---
	06	Ch1 Output SID Response	0	0 to 65535	---	UINT	RO	Possible	---
	07	Ch1 Input Data 1	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	08	Ch1 Input Data 2	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	09	Ch1 Input Data 3	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0A	Ch1 Input Data 4	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0B	Ch1 Input Data 5	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0C	Ch1 Input Data 6	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0D	Ch1 Input Data 7	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
6000	0E	Ch1 Input Data 8	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0F	Ch1 UID	00 hex × 8	---	---	ARRAY [0..7] OF BYTE	RO	Possible	---
	10	Ch1 RF Communications Time	0	---	---	UINT	RO	Possible	---
	11	Ch1 Noise Level	0	---	---	UINT	RO	Possible	---

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	7	1 to 17
NX-V680C2	7	1 to 17

*2. Aggregated data for status of commands executed in Ch1 of the RFID Unit. Refer to *6-2-1 Status* on page 6-6 for details on the status.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
6001	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch2 Status*2	0000 hex	---	---	WORD	RO	Possible	---
		Ch2 Command Status	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 Normal End	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 Error End	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 Command Error	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 Antenna Error	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 RF Communications Error	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 RF Communications Warning	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 Test Mode	FALSE	FALSE/TRUE	---	BOOL	RO	Possible	---
		Ch2 Reserved	---	---	---	BIT8	RO	Possible	---
	02	Ch2 Refresh Count	0	0 to 65535	---	UINT	RO	Possible	---
	03	Ch2 Response Code	0000 hex	---	---	WORD	RO	Possible	---
	04	Ch2 Measurement Result	0	0 to 8192	---	UINT	RO	Possible	---
	05	Ch2 Input SID	0	0 to 65535	---	UINT	RO	Possible	---
	06	Ch2 Output SID Response	0	0 to 65535	---	UINT	RO	Possible	---
	07	Ch2 Input Data 1	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	08	Ch2 Input Data 2	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	09	Ch2 Input Data 3	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0A	Ch2 Input Data 4	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0B	Ch2 Input Data 5	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0C	Ch2 Input Data 6	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
6001	0D	Ch2 Input Data 7	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0E	Ch2 Input Data 8	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RO	Possible	---
	0F	Ch2 UID	00 hex × 8	---	---	ARRAY [0..7] OF BYTE	RO	Possible	---
	10	Ch2 RF Communications Time	0	---	---	UINT	RO	Possible	---
	11	Ch2 Noise Level	0	---	---	UINT	RO	Possible	---

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	---	---
NX-V680C2	7	1 to 17

*2. Aggregated data for status of commands executed in Ch2 of the RFID Unit. Refer to *6-2-1 Status* on page 6-6 for details on the status.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
7000	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch1 Operation Command*2	0	---	---	BYTE	RW	Possible	---
		Ch1 Command Execution	FALSE	FALSE/TRUE	---	BOOL	RW	Possible	---
		Ch1 Reserved	---	---	---	BIT7	RO	Possible	---
	02	Ch1 RF Communications Option	00 hex	---	---	USINT	RW	Possible	---
	03	Ch1 Command Code	0000 hex	---	---	WORD	RW	Possible	---
	04	Ch1 Memory Address	0	---	---	UINT	RW	Possible	---
	05	Ch1 Data Size	0	---	---	UINT	RW	Possible	---
	06	Ch1 Refresh Count Response	0	0 to 65535	---	UINT	RW	Possible	---
	07	Ch1 Output SID	0	0 to 65535	---	UINT	RW	Possible	---
	08	Ch1 Input SID Response	0	0 to 65535	---	UINT	RW	Possible	---
	09	Ch1 Output Data 1	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
7000	0A	Ch1 Output Data 2	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0B	Ch1 Output Data 3	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0C	Ch1 Output Data 4	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0D	Ch1 Output Data 5	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0E	Ch1 Output Data 6	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0F	Ch1 Output Data 7	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	10	Ch1 Output Data 8	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	11	Ch1 Select UID	00 hex × 8	---	---	ARRAY [0..7] OF BYTE	RW	Possible	---

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	9	1 to 17
NX-V680C2	9	1 to 17

*2. Aggregated data for operation command bits of Ch1 of the RFID Unit. Refer to *6-2-11 Operation Command* on page 6-10 for details about operation commands.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data types	Access	I/O allocation	Data attribute
7001	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch2 Operation Command*2	0	---	---	BYTE	RW	Possible	---
		Ch2 Command Execution	FALSE	FALSE/TRUE	---	BOOL	RW	Possible	---
		Ch2 Reserved	---	---	---	BIT7	RO	Possible	---
	02	Ch2 RF Communications Option	00 hex	---	---	USINT	RW	Possible	---
	03	Ch2 Command Code	0000 hex	---	---	WORD	RW	Possible	---
	04	Ch2 Memory Address	0	---	---	UINT	RW	Possible	---

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data types	Access	I/O allocation	Data attribute
7001	05	Ch2 Data Size	0	---	---	UINT	RW	Possible	---
	06	Ch2 Refresh Count Response	0	0 to 65535	---	UINT	RW	Possible	---
	07	Ch2 Output SID	0	0 to 65535	---	UINT	RW	Possible	---
	08	Ch2 Input SID Response	0	0 to 65535	---	UINT	RW	Possible	---
	09	Ch2 Output Data 1	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0A	Ch2 Output Data 2	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0B	Ch2 Output Data 3	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0C	Ch2 Output Data 4	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0D	Ch2 Output Data 5	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0E	Ch2 Output Data 6	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	0F	Ch2 Output Data 7	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	10	Ch2 Output Data 8	00 hex × 16	---	---	ARRAY [0..15] OF BYTE	RW	Possible	---
	11	Ch2 Select UID	00 hex × 8	---	---	ARRAY [0..7] OF BYTE	RW	Possible	---

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	---	---
NX-V680C2	7	1 to 17

*2. Aggregated data for operation command bits of Ch1 of the RFID Unit. Refer to *6-2-11 Operation Command* on page 6-10 for details about operation commands.

A-4-4 Other Objects

This section lists other objects.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
0x4001	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	-
	01	Event 1	0x6AA20000	DT0820EN32	---	ENUM	RO	Not possible	Y
	02	Event 1 Level Setting	3	DT0806EN08	---	ENUM	RW	Not possible	Y
	03	Event 2	0x6A700000	DT0821EN32	---	ENUM	RO	Not possible	Y
	04	Event 2 Level Setting	4	DT0806EN08	---	ENUM	RW	Not possible	Y
	05	Event 3	0x6A710000	DT0822EN32	---	ENUM	RO	Not possible	Y
	06	Event 3 Level Setting	4	DT0806EN08	---	ENUM	RW	Not possible	Y
	07	Event 4	0x6A720000	DT0823EN32	---	ENUM	RO	Not possible	Y
	08	Event 4 Level Setting	4	DT0806EN08	---	ENUM	RW	Not possible	Y
	09	Event 5	0x6A730000	DT0824EN32	---	ENUM	RO	Not possible	Y
	0A	Event 5 Level Setting	4	DT0806EN08	---	ENUM	RW	Not possible	Y
	0B	Event 6	0x6A760000	DT0825EN32	---	ENUM	RO	Not possible	Y
	0C	Event 6 Level Setting	4	DT0806EN08	---	ENUM	RW	Not possible	Y

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	12	12
NX-V680C2	12	12

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
5000	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	-
	01	Test Switch	1	DT0802EN08	---	ENUM	RW	Not possible	Y
	02	RF Tag Memory Map	0	DT0801EN08	---	ENUM	RW	Not possible	Y
	03	Data Storage Order	0	DT0807EN08	---	ENUM	RW	Not possible	Y

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	3	3
NX-V680C2	3	3

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
5001	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch1 RF Communications Speed	0	DT0803EN08	---	ENUM	RW	Not possible	Y
	02	Ch2 RF Communications Speed*2	0	DT0803EN08	---	ENUM	RW	Not possible	Y

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	1	1
NX-V680C2	2	2

*2. This object does not exist on the NX-V680C1.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
5002	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch1 Write Verify	1	DT0808EN08	---	ENUM	RW	Not possible	Y
	02	Ch2 Write Verify*2	1	DT0808EN08	---	ENUM	RW	Not possible	Y

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	1	1
NX-V680C2	2	2

*2. This object does not exist on the NX-V680C1.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
5003	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch1 RF Communications Timeout	0	0 to 600000	ms	UDINT	RW	Not possible	Y
	02	Ch2 RF Communications Timeout*2	0	0 to 600000	ms	UDINT	RW	Not possible	Y

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	1	1
NX-V680C2	2	2

*2. This object does not exist on the NX-V680C1.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
5004	00	Number of Entries	*1	*1	---	USINT	RO	Not possible	---
	01	Ch1 Write Protection	1	DT0802EN08	---	ENUM	RW	Not possible	Y
	02	Ch2 Write Protection*2	1	DT0802EN08	---	ENUM	RW	Not possible	Y

*1. The default value and data range for Number of Entries are as follows.

NX Unit	Default value	Data range
NX-V680C1	1	1
NX-V680C2	2	2

*2. This object does not exist on the NX-V680C1.

A-5 Sample Programming

This section describes a sample program of the ST language operated at the communications master side for communicating with the RF Tag using an RFID Unit.

It is assumed that the RFID Unit is connected to an EtherCAT Coupler Unit with an NJ/NX-series CPU Unit as the communications master.

The sample program is of the following two types.

- RF Tag data read
- RF Tag data write

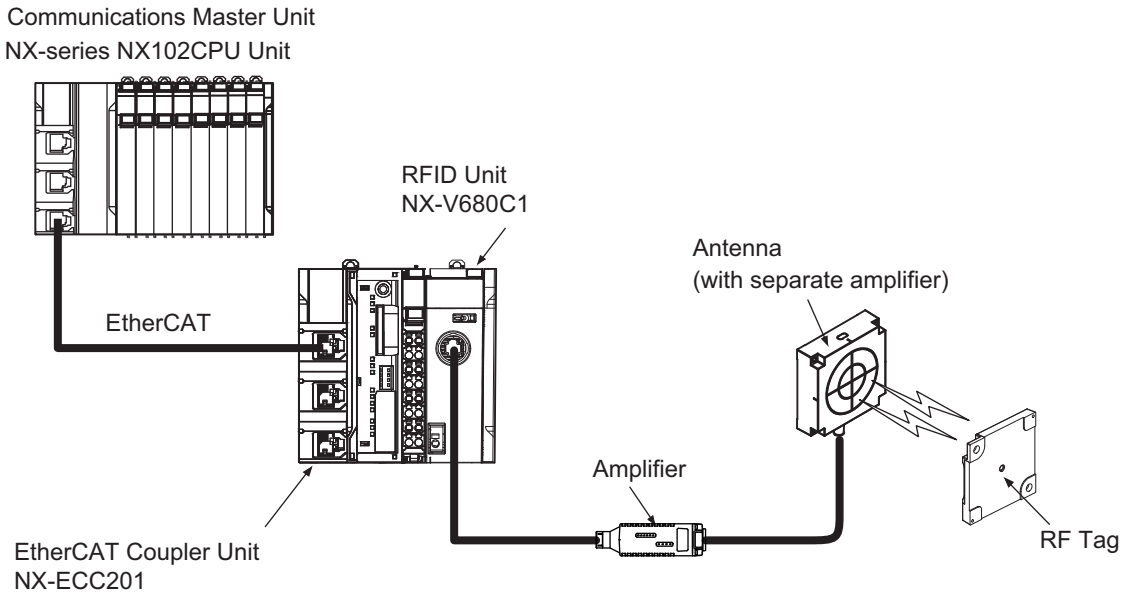
A-5-1 Items Common to Each Program

This section describes the contents common to both sample programs.

System Configuration

The NX Series supports the following system configurations.

Item	Specifications
Communications master	NX102
Communications Coupler Unit	NX-ECC201
RFID Unit	NX-V680C1
NX Unit number of the RFID Unit	1



Unit Operation Settings for the RFID Unit

The following operation settings are made for the RFID Unit from the Support Software. Refer to *Section 7 Setting RFID Units* for details on the meaning of the setting items and the setting procedures.

Item	Settings
Event level setting	Default
Test Switch	Enable
RF Tag Memory Map	Standard
Data Storage Order	Ascending
RF Communications Speed (1Ch/2Ch)	Normal Speed
Write Verification (1Ch/2Ch)	Enable
RF Communications Timeout (1Ch/2Ch)	Infinite
Write Protection (1Ch/2Ch)	Enable

Setting the Divided Data Size

The following divided data sizes are set from the Support Software as the default values. Refer to *Section 7 Setting RFID Units* for details on the setting procedures.

Data	I/O entry name	Size (bytes)
Input data	Ch1 Input Data Data1	16
Output data	Ch1 Output Data Data1	16

I/O Map

The variables to be allocated to the I/O map are set from the Support Software as shown below.

Units	I/O ports	Description	Variable
NX-ECC201	NX Unit I/O Data Active Status 125	NX Unit I/O Data Active Status	E001_NX_Unit_I_O_Data_Active_Status_125
NX-V680C1	Ch1 Status	Ch1 Status	N1_Ch1_Status
	Ch1 Refresh Count	Ch1 Refresh Count	N1_Ch1_Refresh_Count
	Ch1 Response Code	Ch1 Response Code	N1_Ch1_Response_Code
	Ch1 Measurement Result	Ch1 Measurement Result	N1_Ch1_Measurement_Result
	Ch1 Input SID	Ch1 Input SID	N1_Ch1_Input_SID
	Ch1 Output SID response	Ch1 Output SID Response	N1_Ch1_Output_SID_Response
	Ch1 Input Data1	Ch1 Input Data 1	N1_Ch1_Input_Data_1
	Ch1 Operation Command	Ch1 Operation Command	N1_Ch1_Operation_Command
	Ch1 RF Communications Option	Ch1 RF Communications Option	N1_Ch1_RF_Communications_Option
	Ch1 Command Code	Ch1 Command Code	N1_Ch1_Command_Code
	Ch1 Memory Address	Ch1 Memory Address	N1_Ch1_Memory_Address
	Ch1 Data Size	Ch1 Data Size	N1_Ch1_Data_Size
	Ch1 Refresh Count Response	Ch1 Refresh Count Response	N1_Ch1_Refresh_Count_Response
	Ch1 Output SID	Ch1 Output SID	N1_Ch1_Output_SID
	Ch1 Input SID Response	Ch1 Input SID Response	N1_Ch1_Input_SID_Response
	Ch1 Output Data1	Ch1 Output Data 1	N1_Ch1_Output_Data_1

A-5-2 Reading the Data of an RF Tag (Without Division Transfer)

Read the 16-byte “00112233445566778899AABBCCDDEEFF” data from memory address 8 of the RF Tag.

Procedure

Operate the sample program according to the procedure described in the table below.

● Stage table

Stage name	No.	Processing
Idle	0	Waiting for the issue of the command execution request
Acquisition of read execution result	1	Receiving results from the V680 Unit and performing an operation in accordance with the results
Unit operation stop wait	2	Waiting for the V680 Unit to stop operating

● Operating procedures

Step	Stage No.	CPU Unit or communications master processing	Communications direction	V680 Unit processing
---	---	Checks the establishment of communications with the coupler unit and transits to stage 0.	---	---
1	0	Sets the following output objects when the command execution request flag is set to TRUE, and passes them to the V680 Unit. NX object name / Value: RF Communications option: 00 hex Communications command: 0101 hex Communications destination address: 0008 hex Communications data size: 0010 hex Command execution flag: TRUE -> Transit to stage 2	->	Receives the output objects on the left and executes the command.

<table>
<tr><th>Step</th><th>Stage No.</th><th>CPU Unit or communications master processing</th><th>Communications direction</th><th>V680 Unit processing</th></tr>
<tr><td>2</td><td>1</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects after command execution has ended, and passes them to the communications master.*1
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Normal end or Error end</td><td>TRUE</td></tr><tr><td>Response code</td><td>For normal end
0000 hex
For error end
E0xx hex*2</td></tr><tr><td>Input Data</td><td>00 hex
11 hex
:
FF hex</td></tr></table></td></tr>
<tr><td>3</td><td>1</td><td>Identifies normal/error, sets the following output objects, and passes them to the V680 Unit.
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command execution flag</td><td>FALSE</td></tr></table>
-> Transit to stage 2</td><td>-></td><td>Receives the output objects on the left.</td></tr>
<tr><td>4</td><td>2</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects and passes them to the communications master.*1
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command status flag</td><td>FALSE</td></tr><tr><td>Normal end or Error end</td><td>FALSE</td></tr></table></td></tr>
<tr><td>5</td><td>2</td><td>-> Transit to stage 0</td><td>---</td><td>---</td></tr>
</table>

*1. Only a part of the setting data has been described, and the remaining input data is not specified.

*2. For details, refer to *8-3-11 Error Code Details* on page 8-40.

Variable table

The following variable table is set from the Support Software. All of the variables that you registered in the I/O map are registered as global variables.

● Internal variables

Series	Data types	Default value	Comment
CommandStage	UINT	UINT#9	Command execution stage
ReadDataBuffer	ARRAY[0..16] OF BYTE	[16(16#0)] *1	Read data storage buffer
InitialRequestTrigger	BOOL	FALSE	Communications establishment condition
CommandRequest	BOOL	FALSE	Command execution request flag
CommandRequestTrigger	BOOL	FALSE	Command execution condition
InitialRequestTrigger_R_TRIG_instance	R_TRIG	---	Instance of R_TRIG instruction
RequestExecution_R_TRIG_instance	R_TRIG	---	Instance of R_TRIG instruction

*1. Set the size of the *ReadDataBuffer* array to (Read data size [bytes]) + (1 [byte]) or more. In this sample, since the read data size = 16 [bytes], the array size is 17 [bytes].

ST programming

```
// Once communications is established, the program status transition returns to the
default value
InitialRequestTrigger_R_TRIG_instance(
E001_NX_Unit_I_O_Data_Active_Status_125[1],
InitialRequestTrigger);
IF( InitialRequestTrigger = TRUE ) THEN
    CommandStage := UINT#0;//Return to default state
END_IF;


CASE CommandStage OF
    (*Idle*)
    0 :
       //If IO communications is enabled and
       // RequestExecution becomes TRUE, the command is executed
       RequestExecution_R_TRIG_instance(
           RequestExecution,
           RequestExecutionTrigger);
       IF( ( RequestExecutionTrigger = TRUE ) AND
           ( E001_NX_Unit_I_O_Data_Active_Status_125[1] = TRUE ) ) THEN
              //RF Communications option setting
              N1_Ch1_RF_Communications_Option := USINT#0;
              //Communications command setting
              N1_Ch1_Command_Code := 16#0101;
              //Communications destination address setting
              N1_Ch1_Memory_Address := UINT#0008;
              //Communications data size setting
              N1_Ch1_Data_Size := UINT#16;

              //Set command execution flag to TRUE
              N1_Ch1_Command_Execution := TRUE;
              //Transit to read execution result acquisition
              CommandStage := UINT#1;
       END_IF;

    (*Acquisition of read execution result*)
    1 :
       IF N1_Ch1_Normal_End = TRUE  THEN//Normal end
           //Copy read data to internal variable
           AryMove(N1_Ch1_Input_Data_1[0], ReadDataBuffer[0], UINT#16);

           (* --------------------↓Specify normal processing↓--------------------- *)

           (* ↑-------------------------------------------------------------↑ *)

           //Set execution flag to FALSE
           N1_Ch1_Command_Execution := FALSE;
           //Transit to Unit operation stop wait
           CommandStage := UINT#2;
       END_IF;

       IF N1_Ch1_Error_End = TRUE  THEN//Error end

           (* --------------------↓Specify error processing↓---------------------- *)

           (* ↑-------------------------------------------------------------↑ *)

           //Set execution flag to FALSE
```

```
            N1_Ch1_Command_Execution := FALSE;
            //Transit to Unit operation stop wait
            CommandStage := UINT#2;
        END_IF;

    (*Unit operation stop wait*)
    2 :
        IF (N1_Ch1_Normal_End=FALSE) AND
            (N1_Ch1_Error_End=FALSE) AND
            (N1_Ch1_Command_Busy = FALSE) THEN
            //Transit to idle
            CommandStage := UINT#0;
        END_IF;

END_CASE;
```

A-5-3 Writing Data to an RF Tag (Without Division Transfer)

Write the 16-byte “00112233445566778899AABBCCDDEEFF” data to memory address 8 of the RF Tag.

Procedure

Operate the sample program according to the procedure described in the table below.

● Stage table

Stage name	No.	Processing
Idle	0	Waiting for the issue of the command execution request
Acquisition of read execution result	1	Receiving results from the V680 Unit and performing an operation in accordance with the results
Unit operation stop wait	2	Waiting for the V680 Unit to stop operating

● Procedure

<table>
<tr><th>Step</th><th>Stage No.</th><th>CPU Unit or communications master processing</th><th>Communications direction</th><th>V680 Unit processing</th></tr>
<tr><td>---</td><td>---</td><td>Checks the establishment of communications with the coupler unit and transits to stage 0.</td><td>---</td><td>---</td></tr>
<tr><td>1</td><td>0</td><td>Sets the following output objects when the command execution request flag is set to TRUE, and passes them to the V680 Unit.

<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>RF Communications option</td><td>00 hex</td></tr><tr><td>Communications command</td><td>0201 hex</td></tr><tr><td>Communications destination address</td><td>0008 hex</td></tr><tr><td>Communications data size</td><td>0010 hex</td></tr><tr><td>Output data</td><td>00 hex
11 hex
:
FF hex</td></tr><tr><td>Command execution flag</td><td>TRUE</td></tr></table>
-> Transit to stage 1</td><td>-></td><td>Receives the output objects on the left and executes the command.</td></tr>
</table>

<table>
<tr><th>Step</th><th>Stage No.</th><th>CPU Unit or communications master processing</th><th>Communications direction</th><th>V680 Unit processing</th></tr>
<tr><td>2</td><td>1</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects after command execution has ended, and passes them to the communications master.*1

<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Normal end or Error end</td><td>TRUE</td></tr><tr><td>Response code</td><td>For normal end
0000 hex
For error end
E0xx hex*2</td></tr></table></td></tr>
<tr><td>3</td><td>1</td><td>Identifies normal/error from the received input objects, sets the following output objects, and passes them to the V680 Unit.

<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command execution flag</td><td>FALSE</td></tr></table>
-> Transit to stage 2.</td><td>-></td><td>Receives the output objects on the left.</td></tr>
<tr><td>4</td><td>2</td><td>Receives the input objects on the right.</td><td><-</td><td><table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command status flag</td><td>FALSE</td></tr><tr><td>Normal end or Error end</td><td>FALSE</td></tr></table></td></tr>
<tr><td>5</td><td>2</td><td>Transit to stage 0.</td><td>---</td><td>---</td></tr>
</table>

*1. Only a part of the setting data has been described, and the remaining input data is not specified.

*2. For details, refer to *8-3-11 Error Code Details* on page 8-40.

Variable table

The following variable table is set from the Support Software. All of the variables that you registered in the I/O map are registered as global variables.

● Internal variables

Series	Data types	Default value	Comment
CommandStage	UINT	UINT#9	Command execution stage
WriteDataBuffer	ARRAY[0..16] OF BYTE	[16(16#0)] *1	Write data storage buffer
InitialRequestTrigger	BOOL	FALSE	Communications establishment condition
CommandRequest	BOOL	FALSE	Command execution request flag
CommandRequestTrigger	BOOL	FALSE	Command execution condition
InitialRequestTrigger_R_TRIG_instance	R_TRIG	---	Instance of R_TRIG instruction
RequestExecution_R_TRIG_instance	R_TRIG	---	Instance of R_TRIG instruction

*1. Set the size of the *WriteDataBuffer* array to (Write data size [bytes]) + (1 [byte]) or more. In this sample, since the write data size = 16 [bytes], the array size is 17 [bytes].

ST programming

```
// Once communications is established, the program status transition returns to the
default value
InitialRequestTrigger_R_TRIG_instance(
    E001_NX_Unit_I_O_Data_Active_Status_125[1],
    InitialRequestTrigger);
IF( InitialRequestTrigger = TRUE ) THEN
    CommandStage := UINT#0;//Return to default state
END_IF;

CASE CommandStage OF
        (*Idle*)
    0 :
       // If the state is idle and
       // RequestExecution becomes TRUE, the command is executed
       RequestExecution_R_TRIG_instance(
           RequestExecution,
           RequestExecutionTrigger);
       IF( ( RequestExecutionTrigger = TRUE ) AND
           ( E001_NX_Unit_I_O_Data_Active_Status_125[1] = TRUE ) ) THEN
              //RF Communications option setting
             N1_Ch1_RF_Communications_Option := USINT#0;
              //Communications command setting
              N1_Ch1_Command_Code := 16#0201;
              //Communications destination address setting
              N1_Ch1_Memory_Address := UINT#8;
              //Communications data size setting
              N1_Ch1_Data_Size := UINT#16;
              //Save the output data (Write data)
              WriteDataBuffer[0] := 16#00;
              WriteDataBuffer[1] := 16#11;
              WriteDataBuffer[2] := 16#22;
              WriteDataBuffer[3] := 16#33;
              WriteDataBuffer[4] := 16#44;
              WriteDataBuffer[5] := 16#55;
              WriteDataBuffer[6] := 16#66;
              WriteDataBuffer[7] := 16#77;
              WriteDataBuffer[8] := 16#88;
              WriteDataBuffer[9] := 16#99;
              WriteDataBuffer[10] := 16#AA;
              WriteDataBuffer[11] := 16#BB;
              WriteDataBuffer[12] := 16#CC;
              WriteDataBuffer[13] := 16#DD;
              WriteDataBuffer[14] := 16#EE;
              WriteDataBuffer[15] := 16#FF;

              AryMove(WriteDataBuffer[0], N1_Ch1_Output_Data_1[0], UINT#16);
              //Set command execution flag to TRUE
              N1_Ch1_Command_Execution := TRUE;
              //Transit to write execution result acquisition
              CommandStage := UINT#1;
       END_IF;

    (* Write execution result acquisition *)
    1 :
       IF N1_Ch1_Normal_End=TRUE  THEN

           (* --------------------↓Specify normal processing↓--------------------- *)
```

```
            (* ↑-------------------------------------------------------------↑ *)

            //Set execution flag to FALSE
            N1_Ch1_Command_Execution := FALSE;
            //Transit to Unit operation stop wait
            CommandStage := UINT#2;
        END_IF;
        IF N1_Ch1_Error_End =TRUE  THEN

            (* --------------------↓Specify error processing↓--------------------- *)

            (* ↑-------------------------------------------------------------↑ *)

            //Set execution flag to FALSE
            N1_Ch1_Command_Execution := FALSE;
            //Transit to Unit operation stop wait
            CommandStage := UINT#2;
        END_IF;

    (*Unit operation stop wait*)
    2 :
        IF (N1_Ch1_Normal_End=FALSE) AND
            (N1_Ch1_Error_End=FALSE) AND
            (N1_Ch1_Command_Busy = FALSE) THEN
            //Transit to idle
            CommandStage := UINT#0;
        END_IF;

END_CASE;
```

A-5-4 Reading the Data of an RF Tag (With Division Transfer)

Read the 256-byte (00112233445566778899AABBCCDDEEFF × 16) data from memory address 8 of the RF Tag.

Procedure

Operate the sample program according to the procedure described in the table below.

● Stage table

Stage name	No	Processing
Idle	0	Waiting for the issue of the command execution request
Division read data acquisition	1	Receiving the entire division read data
Command execution result acquisition	2	Receiving results from the V680 Unit and performing an operation in accordance with the results
Unit operation stop wait	3	Waiting for the V680 Unit to stop operating

● Operating procedures

<table>
<tr><th>Step</th><th>Stage No.</th><th>CPU Unit or communications master processing</th><th>Communications direction</th><th>V680 Unit processing</th></tr>
<tr><td>---</td><td>---</td><td>Checks the establishment of communications with the coupler unit and transits to stage 0.</td><td>---</td><td>---</td></tr>
<tr><td>1</td><td>0</td><td>Sets the following output objects when the command execution request flag is set to TRUE, and passes them to the V680 Unit.
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>RF Communications option</td><td>00 hex</td></tr><tr><td>Communications command</td><td>0101 hex</td></tr><tr><td>Communications destination address</td><td>0008 hex</td></tr><tr><td>Communications data size</td><td>0100 hex</td></tr><tr><td>Input SID Response</td><td>00 hex</td></tr><tr><td>Command execution flag</td><td>TRUE</td></tr></table>-> Transit to stage 1.</td><td>-></td><td>Receives the output objects on the left and executes the command.</td></tr>
</table>

<table>
<tr><th>Step</th><th>Stage No.</th><th>CPU Unit or communications master processing</th><th>Communications direction</th><th>V680 Unit processing</th></tr>
<tr><td>2</td><td>1</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects and passes them to the communications master.*1
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Normal end or Error End*3</td><td>TRUE</td></tr><tr><td>Response code*3</td><td>For normal end
0000 hex
For error end
E0xx hex*2</td></tr><tr><td>Input data</td><td>00 hex
11 hex
:
FF hex</td></tr><tr><td>Input SID</td><td>Input SID + 01 hex</td></tr></table></td></tr>
<tr><td>3</td><td>1</td><td>Compares the value of input SID and input SID response, and if normal, retains the input data in an internal buffer.
Also, sets the following output objects.
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Input SID Response</td><td>Input SID</td></tr></table></td><td>-></td><td>Receives the output objects on the left.</td></tr>
<tr><td>4</td><td>1</td><td>Repeats steps 2 to 3 and detects the read data terminal.
-> Transit to stage 2.</td><td>---</td><td>---</td></tr>
<tr><td>5</td><td>2</td><td>Identifies normal/error, sets the following output objects, and passes them to the V680 Unit.
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command execution flag</td><td>FALSE</td></tr></table>-> Transit to stage 3.</td><td>-></td><td>Receives the output objects on the left.</td></tr>
<tr><td>6</td><td>3</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects and passes them to the communications master.*1
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command status flag</td><td>FALSE</td></tr><tr><td>Normal end or Error end</td><td>FALSE</td></tr></table></td></tr>
<tr><td>7</td><td>3</td><td>-> Transit to stage 0.</td><td>---</td><td>---</td></tr>
</table>

*1. Only a part of the setting data has been described, and the remaining input data is not specified.

*2. For details, refer to *8-3-11 Error Code Details* on page 8-40.

*3. Values are stored only in the terminal data.

Variable table

The following variable table is set from the Support Software. All of the variables that you registered in the I/O map are registered as global variables.

● Internal variables

Series	Data types	Default value	Comment
CommandStage	UINT	UINT#0	Command execution stage
ReadDataBuffer	ARRAY[0..256] OF BYTE	[256(16#0)] *1	Read data storage buffer
BufferOffset	UDINT	UDINT#0	Read data buffer offset
DataLength	DINT	DINT#0	Read data remaining data length
MovLength	UINT	UINT#0	Transfer data length
InitialRequestTrigger	BOOL	FALSE	Communications establishment condition
CommandRequest	BOOL	FALSE	Command execution request flag
CommandRequestTrigger	BOOL	FALSE	Command execution condition
InitialRequestTrigger_R_TRIG_instance	R_TRIG	-	Instance of R_TRIG instruction
RequestExecution_R_TRIG_instance	R_TRIG	-	Instance of R_TRIG instruction

*1. Set the size of the *ReadDataBuffer* array to (Read data size [bytes]) + (1 [byte]) or more. In this sample, since the read data size = 256 [bytes], the array size is 257 [bytes].

ST programming

```
// Once communications is established, the program status transition returns to the
default value
InitialRequestTrigger_R_TRIG_instance(
    E001_NX_Unit_I_O_Data_Active_Status_125[1],
    InitialRequestTrigger);
IF( InitialRequestTrigger = TRUE ) THEN
    CommandStage := UINT#0;//Return to default state
END_IF;

CASE CommandStage OF
    (*Idle*)
    0 :
       //If IO communications is enabled and
       // RequestExecution becomes TRUE, the command is executed
       RequestExecution_R_TRIG_instance(
           RequestExecution,
           RequestExecutionTrigger);
       IF( ( RequestExecutionTrigger = TRUE ) AND
           ( E001_NX_Unit_I_O_Data_Active_Status_125[1] = TRUE ) ) THEN
           //RF Communications option setting
           N1_Ch1_RF_Communications_Option := USINT#0;
           //Communications command setting
           N1_Ch1_Command_Code := 16#0101;
           //Communications destination address setting
           N1_Ch1_Memory_Address := UINT#0008;
           //Communications data size setting
           N1_Ch1_Data_Size := UINT#256;
           //Initialization of input SID response
           N1_Ch1_Input_SID_response := 0;

           //Initialization of read data buffer offset
           BufferOffset := UINT#0;
           //Set the remaining data length of read data
           DataLength := N1_Ch1_Data_Size;
           //Set the transfer data length
           MovLength := UINT#16;
           //Read data buffer clear
           Clear(ReadDataBuffer);

           //Set command execution flag to TRUE
           N1_Ch1_Command_Execution := TRUE;
           //Transit to division read data acquisition
           CommandStage := 1;
       END_IF;

    (*Division read data acquisition*)
    1 :
       IF N1_Ch1_Input_SID_response <> N1_Ch1_Input_SID THEN
           IF N1_Ch1_Input_SID_response+1 =  N1_Ch1_Input_SID THEN
               IF( DataLength - UINT_TO_DINT(MovLength) < DINT#0 ) THEN
                   MovLength := DINT_TO_UINT(DataLength);
               END_IF;
               //Copy read data to internal variable
               AryMove(N1_Ch1_Input_Data_1[0], ReadDataBuffer[BufferOffset], Mov-
Length);
               DataLength := DataLength - MovLength;
               BufferOffset := BufferOffset + MovLength;
               N1_Ch1_Input_SID_response := N1_Ch1_Input_SID;
           END_IF;
```

```
        END_IF;

        //Notify command execution end
        IF ( N1_Ch1_Normal_End=TRUE ) OR
            ( N1_Ch1_Error_End=TRUE ) THEN
            //Transit to command execution result acquisition
            CommandStage := UINT#2;
        END_IF;

    (*Command execution result acquisition*)
    2 :
        IF N1_Ch1_Normal_End = TRUE  THEN//Normal end

            (* --------------------↓Specify normal processing↓--------------------- *)

            (* ↑-------------------------------------------------------------↑ *)

            N1_Ch1_Command_Execution := FALSE;
            //Transit to Unit operation stop wait
            CommandStage := UINT#3;
        END_IF;

        IF N1_Ch1_Error_End = TRUE  THEN//Error end

            (* --------------------↓Specify error processing↓---------------------- *)

            (* ↑-------------------------------------------------------------↑ *)

            N1_Ch1_Command_Execution := FALSE;
            //Transit to Unit operation stop wait
            CommandStage := UINT#3;
        END_IF;

    (*Unit operation stop wait*)
    3 :
        IF (N1_Ch1_Normal_End=FALSE) AND
            (N1_Ch1_Error_End=FALSE) AND
            (N1_Ch1_Command_Busy = FALSE) THEN
            //Transit to idle
            CommandStage := UINT#0;
        END_IF;

END_CASE;
```

A-5-5 Writing Data to an RF Tag (With Division Transfer)

Write the 256-byte (00112233445566778899AABBCCDDEEFF × 16) data to memory address 8 of the RF Tag.

Procedure

Operate the sample program according to the procedure described in the table below.

● Stage table

Stage name	No.	Processing
Idle	0	Waiting for the issue of the command execution request
Division write data transmission	1	Transferring the division write data
Command execution result acquisition	2	Receiving results from the V680 Unit and performing an operation in accordance with the results
Unit operation stop wait	3	Waiting for the V680 Unit to stop operating

● Operating procedures

<table>
<tr><th>Step</th><th>Stage No.</th><th>CPU Unit or communications master processing</th><th>Communications direction</th><th>V680 Unit processing</th></tr>
<tr><td>---</td><td>---</td><td>Checks the establishment of communications with the coupler unit and transits to stage 0.</td><td>---</td><td>---</td></tr>
<tr><td>1</td><td>0</td><td>Sets the following output objects when the command execution request flag is set to TRUE, and passes them to the V680 Unit.
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>RF Communications option</td><td>00 hex</td></tr><tr><td>Communications command</td><td>0201 hex</td></tr><tr><td>Communications destination address</td><td>0008 hex</td></tr><tr><td>Communications data size</td><td>0100 hex</td></tr><tr><td>Output data</td><td>00 hex
11 hex
:
FF hex</td></tr><tr><td>Output SID</td><td>01 hex</td></tr><tr><td>Command execution flag</td><td>TRUE</td></tr></table>-> Transit to stage 1.</td><td>-></td><td>Receives the output objects on the left and executes the command.</td></tr>
<tr><td>2</td><td>1</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects and passes them to the communications master.[*1]
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Output SID Response</td><td>Output SID Response + 01 hex</td></tr></table></td></tr>
</table>

<table>
<tr><th>Step</th><th>Stage No.</th><th>CPU Unit or communications master processing</th><th>Communications direction</th><th>V680 Unit processing</th></tr>
<tr><td>3</td><td>1</td><td>Compares the values of output SID and output SID response, and if the values are matching, sets the following output objects.
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Output data</td><td>00 hex
11 hex
:
FF hex</td></tr><tr><td>Output SID</td><td>Output SID + 01 hex</td></tr></table></td><td>-></td><td>Receives the output objects on the left.</td></tr>
<tr><td>4</td><td>1</td><td>Repeats steps 2 to 3 and detects the write data terminal.
-> Transit to stage 2.</td><td>---</td><td>---</td></tr>
<tr><td>5</td><td>2</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects after command execution has ended, and passes them to the communications master.* 1
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Normal end or Error end</td><td>TRUE</td></tr><tr><td>Response Codes</td><td>For normal end
0000 hex
For error end
E0xx hex*2</td></tr></table></td></tr>
<tr><td>6</td><td>2</td><td>Identifies normal/error, and performs the processing.
Also, sets the following output objects, and passes them to the V680 Unit.
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command execution flag</td><td>FALSE</td></tr></table>-> Transit to stage 3.</td><td>-></td><td>Receives the output objects on the left.</td></tr>
<tr><td>7</td><td>3</td><td>Receives the input objects on the right.</td><td><-</td><td>Sets the following input objects and passes them to the communications master.* 1
<table><tr><th>NX object name</th><th>Value</th></tr><tr><td>Command status flag</td><td>FALSE</td></tr><tr><td>Normal end or Error end</td><td>FALSE</td></tr></table></td></tr>
<tr><td>8</td><td>3</td><td>-> Transit to stage 0.</td><td>---</td><td>---</td></tr>
</table>

*1. Only a part of the setting data has been described, and the remaining input data is not specified.

*2. For details, refer to *8-3-11 Error Code Details* on page 8-40.

Variable table

The following variable table is set from the Support Software. All of the variables that you registered in the I/O map are registered as global variables.

● Internal variables

Series	Data types	Default value	Comment
CommandStage	UINT	UINT#0	Current state
WriteDataBuffer	ARRAY[0..256] OF BYTE	[256(16#0)] *1	Write data storage buffer
BufferOffset	UDINT	UDINT#0	Write data buffer offset
DataLength	DINT	DINT#0	Write data remaining data length
MovLength	UINT	UINT#0	Transfer data length
InitialRequestTrigger	BOOL	FALSE	Communications establishment condition
CommandRequest	BOOL	FALSE	Command execution request flag
CommandRequestTrigger	BOOL	FALSE	Command execution condition
InitialRequestTrigger_R_TRIG_instance	R_TRIG	---	Instance of R_TRIG instruction
RequestExecution_R_TRIG_instance	R_TRIG	---	Instance of R_TRIG instruction

*1. Set the size of the *WriteDataBuffer* array to (Write data size [bytes]) + (1 [byte]) or more. In this sample, since the write data size = 256 [bytes], the array size is 257 [bytes].

ST programming

```
// Once communications is established, the program status transition returns to the
default value
InitialRequestTrigger_R_TRIG_instance(
    E001_NX_Unit_I_O_Data_Active_Status_125[1],
    InitialRequestTrigger);
IF( InitialRequestTrigger = TRUE ) THEN
    CommandStage := UINT#0;//Return to default state
END_IF;

CASE CommandStage OF
    (*Idle*)
    0 :
       //If IO communications is enabled and
       // RequestExecution becomes TRUE, the command is executed
       RequestExecution_R_TRIG_instance(
           RequestExecution,
           RequestExecutionTrigger);
       IF( ( RequestExecutionTrigger = TRUE ) AND
           ( E001_NX_Unit_I_O_Data_Active_Status_125[1] = TRUE ) ) THEN
           //RF Communications option setting
           N1_Ch1_RF_Communications_Option := USINT#0;
           //Communications command setting
           N1_Ch1_Command_Code := 16#0201;
           //Communications destination address setting
           N1_Ch1_Memory_Address := UINT#0008;
           //Communications data size setting
           N1_Ch1_Data_Size := UINT#256;
           //Initialization of write data buffer offset
           BufferOffset := UINT#0;
           //Set write data to WriteDataBuffer
           WriteDataBuffer[0] := 16#00;
           WriteDataBuffer[1] := 16#11;
           WriteDataBuffer[2] := 16#22;
           //                    :
           WriteDataBuffer[255] := 16#FF;
           //Set the remaining data length of write data
           DataLength := N1_Ch1_Data_Size;
           //Set the transfer data length
           MovLength := UINT#16;
           //Set the write data in output data
           AryMove(WriteDataBuffer[BufferOffset], N1_Ch1_Output_Data_1[0], Mov-
Length);
           DataLength := DataLength - MovLength;
           BufferOffset := BufferOffset + MovLength;
           //Set Output SID
           N1_Ch1_Output_SID := 1;

           N1_Ch1_Command_Execution := TRUE;
           //Transit to division write data transfer
           CommandStage := UINT#1;
       END_IF;

    (*Division write data transfer*)
    1:
      IF N1_Ch1_Output_SID = N1_Ch1_Output_SID_response THEN

          IF ( DataLength - UINT_TO_DINT(MovLength) < DINT#0 )THEN
              MovLength := DINT_TO_UINT(DataLength);
          END_IF;
```

```
            //Copy write data from internal buffer to output data
            AryMove(WriteDataBuffer[BufferOffset], N1_Ch1_Output_Data_1[0], MovLength);
            DataLength := DataLength - MovLength;
            BufferOffset := BufferOffset + MovLength;

            N1_Ch1_Output_SID := N1_Ch1_Output_SID + 1;
        END_IF;

        //Division data transfer complete
        IF (DataLength = DINT#0) THEN
            //Transit to command execution result acquisition
            CommandStage := UINT#2;
        END_IF;

    (*Command execution result acquisition*)
    2 :
       IF N1_Ch1_Normal_End=TRUE  THEN

            (* --------------------↓Specify normal processing↓--------------------- *)

            (* ↑-------------------------------------------------------------↑ *)

            N1_Ch1_Command_Execution := FALSE;
            //Transit to Unit operation stop wait
            CommandStage := UINT#3;
       END_IF;
       IF N1_Ch1_Error_End=TRUE  THEN

            (* --------------------↓Specify error processing↓---------------------- *)

            (* ↑-------------------------------------------------------------↑ *)

            N1_Ch1_Command_Execution := FALSE;
            //Transit to Unit operation stop wait
            CommandStage := UINT#3;
       END_IF;

    (*Unit operation stop wait*)
    3 :
       IF (N1_Ch1_Normal_End=FALSE) AND
            (N1_Ch1_Error_End=FALSE) AND
            (N1_Ch1_Command_Busy = FALSE) THEN
            //Transit to idle
            CommandStage := UINT#0;
       END_IF;

END_CASE;
```

A-6 Version Information with CPU Units

This section provides version-related information when connecting Units to a CPU Unit. This section describes the relationship between the unit versions of each Unit and the CPU Unit, and Sysmac Studio version, and the specification changes for each unit version of each Unit

A-6-1 Relationship between Unit Versions of Units

The relationship between the unit versions of each Unit and the CPU Unit, and Sysmac Studio version are shown below.

Version Combination Tables

The version corresponding table for functions is as follows.

Refer to the user's manual for the CPU Unit for the models of CPU Unit to which RFID Units can be connected.

NX Units,		Corresponding unit versions/versions	
Model	Units Versions	CPU Units	Sysmac Studio
NX-V680C1	Ver.1.0	Ver.1.13	Ver.1.25
NX-V680C2			

A-7 Version Information with Communications Coupler Units

This section provides version-related information when connecting Units to a Communications Coupler Unit.

Version information is provided separately for each Communications Coupler Unit that an NX Unit is connected to.

A-7-1 Connection to the EtherCAT Coupler Unit

This section describes the relationship between the unit versions of each Unit, EtherCAT Coupler Unit, CPU Unit and Industrial PC, versions of the Sysmac Studio, and the specification changes for each unit version.

Relationship between Unit Versions of Units

The items that are used in the version combination table are given below.

NX Unit		Corresponding unit versions/versions		
Model	Unit Version	EtherCAT Couplers Units	CPU Unit or Industrial PC	Sysmac Studio
NX-V680C1	Ver.1.0	Ver.1.0*1	Ver.1.05	Ver.1.25
NX-V680C2				

*1. When connecting with other manufacturer's master, use the EtherCAT Coupler Unit with unit version Ver.1.5 or later.

A-7-2 Connection to the EtherNet/IP Coupler Unit

This section describes the relationship between the unit versions of each Unit, EtherNet/IP Coupler Unit, CPU Unit and Industrial PC, versions of the Sysmac Studio and NX-IO Configurator, and the specification changes for each unit version.

Relationship between Unit Versions of Units

The items that are used in the version combination table are given below.

NX Unit		Corresponding unit versions/versions					
		Use with an NJ/NX/NY-series Controller*1			Use with an CS/CJ/CP-series PLC*2		
Model	Unit Version	EtherNet/IPCoupler Unit	CPU Unit or Industrial PC	Sysmac Studio	EtherNet/IP Coupler Unit	Sysmac Studio	NX-IO Configurator
NX-V680C1	Ver.1.0	Ver.1.2	Ver.1.14	Ver.1.25	Ver.1.2	Ver.1.25	Ver.1.13
NX-V680C2							

*1. Refer to the user's manual of the EtherNet/IP Coupler Unit for the unit versions of EtherNet/IP Units corresponding to EtherNet/IP Coupler Units.

*2. Refer to the user's manual of the EtherNet/IP Coupler Unit for the unit versions of CPU Units and EtherNet/IP Units corresponding to EtherNet/IP Coupler Units.

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