OMRON

Inverter

MX2/RX Series

CompoNet Communications Unit

User's Manual

3G3AX-MX2-CRT-E
3G3AX-RX-CRT-E

I582-E1-04

Introduction

Thank you for purchasing a CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E/ 3G3AX-RX-CRT-E). This User's Manual describes the installation and wiring of the 3G3AX-MX2-CRT-E/3G3AX-RX-CRT-E and parameter setting method which is required for the operation, as well as troubleshooting and inspection methods.

Intended Audience

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 the control equipment
- Personnel in charge of designing the control systems
- Personnel in charge of installing and maintaining the control equipment
- Personnel in charge of managing the control systems and facilities

Notice

This manual contains information you need to know to correctly use the CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E/3G3AX-RX-CRT-E).

Before using the CompoNet Communications Unit, read this manual and gain a full understanding of the information provided herein.

After you finished reading this manual, keep it in a convenient place so that it can be referenced at any time.

Make sure this manual is delivered to the end user.

Manual Configuration

This User's Manual is compiled section by section for user's convenience as follows.

		Outline
Section 1	Outline	This section provides an outline, features, and specifications of the CompoNet Communications Unit.
Section 2	CompoNet Communications Unit Mounting and Wiring	This section provides the part names of the CompoNet Communications Unit and mounting/wiring methods.
Section 3	Network Startup	This section describes inverter parameter settings and CompoNet settings/startup.
Section 4	Remote I/O	This section describes the configuration method and function of Remote I/O (CompoNet assembly I/O).
Section 5	Message Communications	This section describes how to read/write inverter parameters by the Message communications function (CompoNet Explicit Message).
Section 6	Troubleshooting	This section describes the troubleshooting for various problems which may occur in CompoNet, the inverter, and the CompoNet Communications Unit.
Appendices		This section contains the general object specifications and AC drive object specifications.

Manual Structure

Page Structure and Symbol Icons

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

Level 1 heading

Level 2 heading

Note,
Supplementary
Information,
Reference Target

A note, supplementary information, reference target, etc. are provided with difference icons.

Level 3 heading

Manual Name

Level 2 heading
Shows which sub-section the content of the current page belongs to.

Section Number of Level 1 heading
Shows which section the content of the current page belongs to.

Level 3 heading
Shows which paragraph the content of the current page belongs to.

Operation Steps
Describes the operation steps.

Note The above page is only a sample for illustrative purposes. It is not the actual content of the 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.

Sections in this Manual

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Section 6   Troubleshooting

Appendices

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Read and Understand this Manual

Warranty and Limitations of Liability

WARRANTY
OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NONIN-FRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY
OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted. IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HAN-DLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

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

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

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

• Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.

• Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.

• Systems, machines, and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

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

Disclaimers

CHANGE IN SPECIFICATIONS
Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS
Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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

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

Safety Precautions

To ensure that the CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E/3G3AX-RX-CRT-E) is used safely and correctly, be sure to read this Safety Precautions section and the main text before using the product.

Learn all items you should know before use, regarding the equipment as well as required safety information and precautions.

Make an arrangement so that this manual also gets to the end user of this product.

After reading this manual, keep it in a convenient place so that it can be referenced at any time.

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of a CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E/3G3AX-RX-CRT-E). 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.

Meaning of Warning Indication

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or may result in death. Additionally there may be severe property damage.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
⚠ Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Explanation of Symbols

🚫	⊘ This symbol indicates a prohibited item (an item you must not do). The specific instruction is indicated using an illustration or text inside or near ⊘ . The symbol shown to the left indicates "disassembly prohibited."
⚡	△ This symbol indicates danger and caution. The specific instruction is indicated using an illustration or text inside or near △ . The symbol shown to the left indicates "beware of electric shock."
❗	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.

⚠ DANGER

Do not attempt to remove the terminal block cover or disconnect and reconnect the CompoNet Communications Unit during power on or within 10 minutes after power off.
Doing so may result in severe injury due to electric shock.

Security Measures

⚠ WARNING

Anti-virus protection
Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up-to-date.

Security measures to prevent unauthorized access
Take the following measures to prevent unauthorized access to our products.
• Install physical controls so that only authorized personnel can access control systems and equipment.
• Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
• Install firewalls to shut down unused communications ports and limit communications hosts and isolate control systems and equipment from the IT network.
• Use a virtual private network (VPN) for remote access to control systems and equipment.
• Adopt multifactor authentication to devices with remote access to control systems and equipment.
• Set strong passwords and change them frequently.
• Scan virus to ensure safety of USB drives or other external storages before connecting them to control systems and equipment.

Data input and output protection
Validate backups and ranges to cope with unintentional modification of input/output data to control systems and equipment.
• Checking the scope of data
• Checking validity of backups and preparing data for restore in case of falsification and abnormalities
• Safety design, such as emergency shutdown and fail-soft operation in case of data tampering and abnormalities

Data recovery
Backup data and keep the data up-to-date periodically to prepare for data loss.

When using an intranet environment through a global address, connecting to an unauthorized terminal such as a SCADA, HMI or to an unauthorized server may result in network security issues such as spoofing and tampering. You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.

When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment. Take adequate measures, such as restricting physical access to network devices, by means such as locking the installation area.

When using a device equipped with the SD Memory Card function, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing the removable media or unmounting the removable media.
Please take sufficient measures, such as restricting physical access to the Controller or taking appropriate management measures for removable media, by means of locking the installation area, entrance management, etc., by yourself.

⚠ **Caution**	
❗	Inverters contain high voltage parts and short-circuits may sometimes cause product damage or property damage. Measures must be taken to prevent chips, lead-wire pieces, or other metal waste from entering the product, for example, by installing a cover.
🚫	Do not attempt to disassemble, repair, or modify the CompoNet Communications Unit. Doing so may result in injury.

Precautions for Safe Use

Installation and Storage

Do not store or use the CompoNet Communications Unit in the following environment:
• Locations subject to direct sunlight
• Locations subject to ambient temperatures outside the range specified in the specifications
• Locations subject to relative humidity outside the range specified in the specifications
• Locations subject to condensation as the result of severe temperature fluctuations
• Locations subject to corrosive or flammable gases
• Locations near flammable materials
• Locations subject to dust, salt spray, or iron powder
• Locations subject to water, oil, or chemical splashes
• Locations subject to direct shock or vibration

Transportation, Installation, and Wiring

• Do not drop or apply strong impact on the product. Doing so may result in damaged parts or malfunction.
• When transporting the inverter with a mounted CompoNet Communications Unit, do not hold the CompoNet Communications Unit.
• Do not remove the cover of the CompoNet Communications Unit. Tighten an Unit fixation screw to the specified torque.
• Install an appropriate stopping device to ensure safety. In particular, if configured to operate continuously even in the event of a communications error, the inverter may not stop, resulting in equipment damage.
• If the CompoNet Communications Unit is used in the following locations, provide sufficient shielding measures. Using the CompoNet Communications Unit in any of these locations may result in equipment damage.
　Locations subject to static electricity or other forms of noise
　Locations subject to strong electromagnetic fields
　Locations close to power lines
• During installation, wiring, and network setting on the CompoNet Communications Unit, please refer to applicable sections of this manual to ensure the correct connection and configuration procedures.
• When removing the CompoNet Communications Unit, do not pull the flat cable.
• When mounting the CompoNet Communications Unit, be sure that the flat cable is not pinched.
• When mounting the CompoNet Communications Unit, be careful about burrs of the break-outs on the inverter.

Operation and Adjustment

• Be sure to confirm the permissible range of motors and machines before operation because the speed can be set from low to high.
• Before starting the CPU Unit and inverter programs, check the program contents as well as the interactions between these programs.

Maintenance and Inspection

- Be sure to confirm safety before conducting maintenance, inspection or parts replacement.
- Invalid parameter configuration may result in a communications error, interrupting the communications function of other units. Before participating in the network, make sure that the communications configuration parameters are set properly.
- Using a support tool to write all inverter parameters causes the CompoNet configuration parameters to be overwritten. Before reconnecting to CompoNet, make sure that the address and I/O allocations are correct.

Precautions for Correct Use

Installation

Be sure to meet the constraints on the mounting direction of the inverter.

Modbus-RTU Communication

Mounting the CompoNet Communications Unit disables the Inverter's Modbus-RTU communication capability.

Product Disposal

Comply with the local ordinance and regulations when disposing of the product.

Warning Labels

- The product's warning label is located in the following position when the CompoNet Communications Unit is mounted on the inverter.
- For the model 3G3AX-RX-CRT-E, the warning label is attached to the inverter.
- Be sure to follow the instructions.

Note The appearance differs depending on the capacity of the inverter.
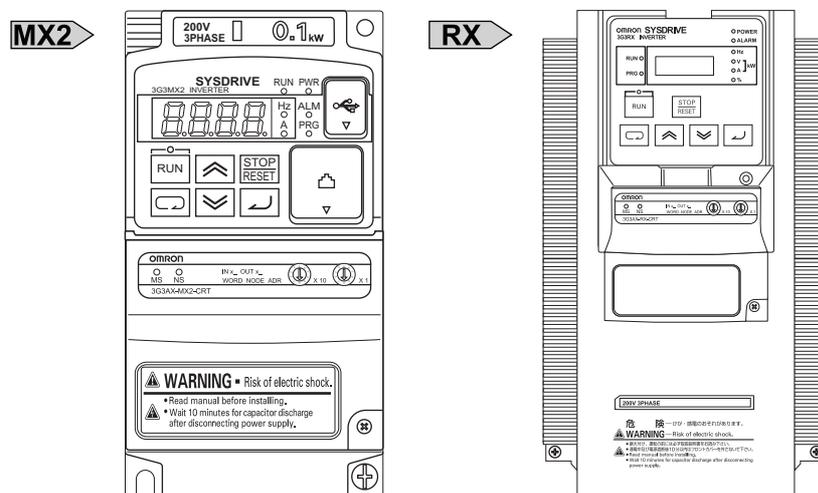
Warning Description

The model 3G3AX-MX2-CRT-E (for the MX2-series) has an English warning label attached when shipped from the factory.

Affix an appropriate language label included with the product on it if necessary.
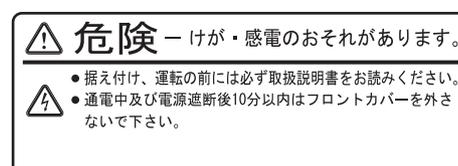
Supported Inverter Versions

There is a restriction on the unit version of the inverter that can be used with the CompoNet Communications Unit.

MX2 Make sure that your inverter's unit version is 1.1 or later.

RX Make sure that your inverter is 3G3RX-V1 series (unit version 2.0 or later).

Note The inverter unit version is indicated on the nameplate attached to the inverter.

Regulations and Standards

To export (or provide to nonresident aliens) any part of this product that falls under the category of goods (or technologies) for which an export certificate or license is mandatory according to the Foreign Exchange and Foreign Trade Control Law of Japan, an export certificate or license (or service transaction approval) according to this law is required.

Therefore, for the CompoNet Communications Unit which is an EC-compliant product, it is the user's responsibility to check and ensure the compliance of the equipment and the entire system with the applicable EC Directives.

EC Directives

EC Directives	Applicable Standard
EMC Directive	EN61800-3
Low Voltage Directive	EN61800-5-1

UL and cUL Standards

Standard	Applicable standards
UL/cUL	UL508

Machinery Directive

Mounting the CompoNet Communications Unit to an inverter will void the certification of the inverter under Machinery Directive.

Trademarks

- CompoNet is a registered trademark of the Open DeviceNet Vendor Association (ODVA).
- Windows is a registered trademark of Microsoft Corporation in the United States and other countries.
- Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

Items to Check After Unpacking

On delivery, be sure to check that the delivered product is what you ordered. In case that you find any problems with the product, immediately contact your nearest local sales representative or OMRON sales office.

Checking the Nameplate

The product has a nameplate on its rear face.

OMRON 3G3AX-MX2-CRT-E
CompoNet Slave Unit
Unit Source: 24V DC, 20mA

Lot No.   Ver.1.0   Batch No.
OMRON MANUFACTURING OF THE NETHERLANDS B.V.
MADE IN THE NETHERLANDS

OMRON 3G3AX-RX-CRT-E
CompoNet Slave Unit
Unit Source: 24V DC, 20mA

Lot No.   Ver.1.0   Batch No.
OMRON MANUFACTURING OF THE NETHERLANDS B.V.
MADE IN THE NETHERLANDS

Checking the Model

3 G 3 A X - M X 2 - C R T - E

CompoNet Communications Unit

For MX2 Series

3 G 3 A X - R X - C R T - E

CompoNet Communications Unit

For RX Series
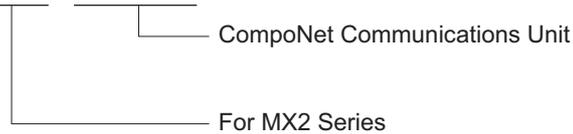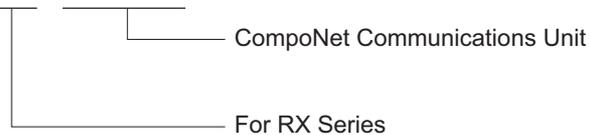
Checking the Accessories

The CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E and 3G3AX-RX-CRT-E) comes with the following accessories.

CompoNet Communications Unit

OMRON

CompoNet Communications Unit
3G3AX-MX2-CRT-E
(For MX2 Series)

Manual

Thank you for purchasing an OMRON product.
Please check that this is the one you intended and
read this manual carefully before use.
Always keep this manual in a safe and handy place.

Catalog Type	Catalog Number
3G3AX-MX2-CRT-E/3G3AX-RX-CRT-E User's Manual	I582-E1

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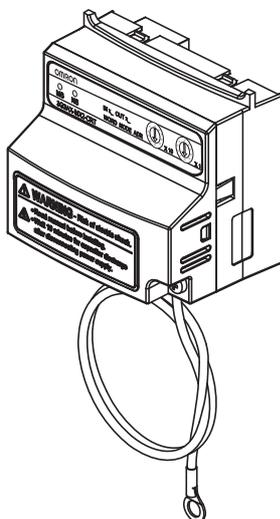
Instruction Sheet

Warning Labels

CompoNet Communications Unit

OMRON

CompoNet Communications Unit
3G3AX-RX-CRT-E
(For RX Series)

Manual

Thank you for purchasing an OMRON product.
Please check that this is the one you intended and
read this manual carefully before use.
Always keep this manual in a safe and handy place.

Catalog Type	Catalog Number
3G3AX-MX2-CRT-E/3G3AX-RX-CRT-E User's Manual	I582-E1

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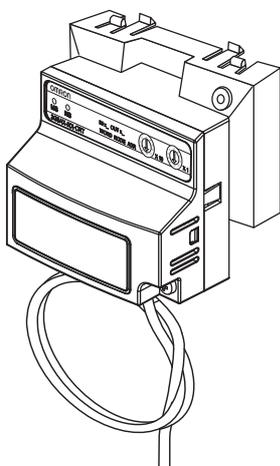
Instruction Sheet

CompoNet Communications Unit fixation screw (M3x40)

Related Manuals

To operate this CompoNet Communications Unit, you must be familiar with the equipment connected to it. Please refer to the following manuals for information on the related products.

Inverter Manuals

Model and Name	Catalog No.
Multi-function Compact Inverter MX2 User's Manual	I570
High-function General-purpose Inverter 3G3RX-□-V1 User's Manual	I578

Note For inverter operation, please refer to the manual for the inverter.

CompoNet Communications Unit Manuals

Model and Name	Catalog No.
CS/CJ-series CompoNet Master Units Operation Manual	W456
CS/CJ/CP/NSJ-series Communications Commands Reference Manual	W342

Revision History

The manual revision code is a number appended to the end of the catalog number found in the bottom right-hand corner of the front and back covers.

Example

Cat.No.　I582-E1-04

Revision code

Revision Code	Revision Date	Revised Content
01	January 2012	Original production
02	April 2012	Corrected mistakes.
03	October 2012	Descriptions about 3G3AX-RX-CRT-E were added. The revised parts are marked with RX.
04	September 2022	Revisions for adding safety precautions regarding security.

1

Outline

This section provides an outline, features, and specifications of the CompoNet Communications Unit.

1-1   Outline of CompoNet Communications Unit

The CompoNet Communications Unit (Model:3G3A-MX2-CRT-E) is used in conjunction with a multi-function compact inverter, the MX2-series. On the other hand, the CompoNet Communications Unit (Model:3G3A-RX-CRT-E) is intended for high-function general-purpose inverter, the RX-series. The CompoNet Communications Unit is an interface unit that realizes data communications between an inverter and a CS/CJ-series Programmable Controller.

By connecting the CompoNet Communications Unit to your inverter, you can start and stop the inverter, monitor its operation status, and change various settings from a CS/CJ-series to support a wide range of applications.

Precautions for Correct Use

Connecting the CompoNet Communications Unit disables the RS-422/485 communications function of the inverter.

Communications Functions as if using I/O Function

In CompoNet Communications with a CS/CJ-series and inverters, the following two communications functions can be used concurrently.

● Remote I/O

Remote I/O is a function that enables a Slave (Inverter) to exchange I/O data with the CPU Unit that has no program running. For example, you can send inverter control inputs such as run/stop automatically from the CS/CJ-series to your inverter and return the operation status, output frequency monitor, or other data from the inverter to the CS/CJ-series.

● Messaging

Messaging is a function that enables you to use specific instructions such as CMND and IOWR in a program to exchange data between a CPU Unit with the Master Unit and Slaves (Inverters). These specific instructions vary depending on the CS/CJ-series model.

Unless you configure certain parameters, monitor the output frequency, output voltage, output current, or other parameter data of the inverter, or use Remote I/O communications, you can also use the Messaging function to send inverter control inputs such as run/stop.

The Remote I/O function of the CompoNet Communications Unit communicates via the I/O area word address 4 to 16 of the CS/CJ-series. Because the Remote I/O function offers the basic control input and output, frequency setting, and output frequency monitor functions, you can control your inverter as if you were handling ordinary I/O control data.

Communications with CS/CJ-series

A CompoNet communications system can be used in conjunction with a CS/CJ-series programmable controller. You can connect up to 32 inverters to a CompoNet communications system and control them.

Precautions for Correct Use

- The maximum number of inverter connections depends on the operating conditions. Refer to *1-2-4 Maximum Number of Inverter Connections* on page 1-10.
- Specifically, "CS/CJ-series" represents the following models of programmable controllers. CS1G/H-CPU☐☐H, CS1G/H-CPU☐☐ (-V1), CJ1G/H-CPU☐☐H, CJ1M-CPU☐☐, CJ1G-CPU☐☐, CJ2H-CPU6☐ (-EIP), CJ2M-CPU☐☐

Global Standard Open Network

CompoNet is the latest sensor & actuator layer open network, which is introduced and given its specifications by ODVA in 2006.

It is also released as the international standard IEC/PA62026-7 in August 2009.

CompoNet attains the industry's fastest class of communications, 1,000 signals per ms between connected devices and the controller and provides a high-performance network environment never seen before.

Options for Communications Functions

The CompoNet Communications Unit offers a wide range of communications options that address your inverter application.

● Remote I/O

The Remote I/O function is available in one of the following eight types. Configure the function that suits your application.

Function Name	Description
Basic Speed I/O	Remote I/O function included as standard in CompoNet.
Extended Speed I/O	Remote I/O function included as standard in CompoNet. This is the default of this CompoNet Communications Unit.
Extended Speed and Acceleration Control	Extended Speed I/O function with an additional acceleration/deceleration time configuration function.
Extended Speed and Torque Control	Extended Speed I/O function with an additional torque control function.
Extended Control I/O	Remote I/O optimized for the actual input/output functions of the inverter. It includes a torque control function.
Extended Control I/O and Multi function I/O Monitor	Extended Control I/O function with an additional Multi-function Input Monitor function. It enables you to use the inverter inputs as general-purpose PLC inputs by configuring an appropriate parameter.
Special I/O	Remote I/O function that provides functions similar to those available in Modbus communication.
Flexible Format	Remote I/O function that allows you to select and allocate up to 10 words of parameter data for input and output.

● **Messaging**

You can use the Explicit Message function of CompoNet to control and monitor your inverter. It supports messages that conform to the AC/DC drive object defined in the CompoNet specifications.
In addition, you can use the Parameter Read/Write message object (Class 64), a unique enhancement by OMRON, to read/write the parameter settings and monitor values stored in the inverter.
Using the Explicit Message function in conjunction with Remote I/O enables the use of data not allocated to Remote I/O because these function can be used independent of each other.

Support for a Wide Range of System Configurations

The CompoNet Communications Unit provides two communications functions, Remote I/O and Messaging. You can use the Remote I/O function for control inputs normally and the Messaging function as required to monitor each inverter. These communications functions also allow you to control whether to enable the control inputs from the communications line or the local control inputs.

Automatic Baud Rate Recognition

The CompoNet Communications Unit automatically detects the Master Unit's communication baud rate, so no user configuration is required.

📝 **Precautions for Correct Use**

To change the CompoNet Master Unit's baud rate, be sure to reset the Master Unit first. Then, turn power supply OFF and ON the inverter (CompoNet Communications Unit) to have the new bard rate detected.

Parameter Edit Using CX-Drive via CompoNet

Connecting the Inverter/Servo parameter support tool CX-Drive via CompoNet communications enables editing of inverter parameters. You can change parameters for all Slaves without switching the software connection.

📝 **Precautions for Correct Use**

This CompoNet Communications Unit is supported in CX-Drive Ver. 2.6 or higher.

1-2 Overview of CompoNet Communications

1-2-1 Functions

CompoNet network is a component-level network system between a PLC and on-site I/O devices, which features the ease of operation and installation.

The PLC and CompoNet Slave Units cyclically exchange I/O information through a CompoNet Master Unit, and refresh I/O in synchronization with the PLC scan.

In addition, the Message communications function enables the host PC or Master Unit (CPU Unit) to read/write data from/to CompoNet Slave Units.

CompoNet communications are broadly divided into the following two types.

Communications Function	Description
Remote I/O communications	Enable automatic data exchange between a PLC (Master Unit/CPU Unit) and Slave Units in a cyclic manner.
Explicit Message communications	Enable low-priority communications where messages are sent from a PLC to Slave Units. It enables you to read/write parameters, read the operation status, or perform other operations.

1-2-2 Features

Programless Communications

Simply connecting communication cables enables cyclic data exchange (Remote I/O communications) between the Master Unit and multiple Slave Units.

There are four types of communications cables available: Round Cable I (2-core), Round Cable II (4-core), Flat Cable I (without sheath), and Flat Cable II (with sheath).

High-speed Multi-point Processing

Remote I/O communications for up to 2,560 I/O points can be achieved at approximately 1,000 points per millisecond (at 4 Mbps[1]). This enables configuration of a CompoNet network system that replaces a system previously configured with Basic I/O Units.

[1] There are restrictions on the use of branching to branch lines and Flat Cable II.
For details, refer to Section 1-2-2 Branch Line Support for Cable Types and Baud Rates and Notes on the availability of Multidrop connections of the CS/CJ-series CompoNet Master Units Operation Manual (W456).

Easy Startup

Remote I/O communications can be started merely by connecting the Master Unit and Slave Units via communications cables, setting the switches on the Master Unit and configuring the node address for each Slave Unit, and turning ON the power.

Repeater Units for Greater Flexibility

Repeater Units can be used in a network to enable the following network expansions.

- Extending the cable length
- Increasing the number of nodes
- Branching from the trunk line
- Changing the type of cable

Repeater Units can be used to extend up to two segment layers (called subtrunk lines) from the trunk line. Up to 64 Repeater Units can be connected per Master Unit and up to 32 Repeater Units can be connected per segment layer.

> **Additional Information**
>
> Network power supply must be supplied to a sub-trunk line from the Repeater Unit.

Bit-level Distribution

Slave Units compatible with industry-standard e-CON connectors, clamping terminal blocks, or compact connectors can be distributed at the bit level. This enables distributed control in distributed devices, such as sensors and other devices located over a wide area on conveyors or in warehouses. Bit Slave Units are available in two types: IP20 and IP54.

Five Communications Modes according to Number of Nodes, I/O Points, and Allocated Memory

There are five communications modes that can be used according to the number of Slave Units, the number of I/O points, and the location of allocated memory. Slave Units can be allocated in the Special I/O Unit Relay Area or, if the CX-Integrator is used, in any part of the CIO, DM, WR, and HR areas. This enables efficient use of memory according to the size of the system.

Data Exchange with Message Communications

Message communications can be used from the CX-Integrator running on a host computer or from the CPU Unit of the PLC to access Slave Units and Repeater Units on a CompoNet network. This enables easily to improve network and system maintenance.

Complete Maintenance Functions with System Monitoring Capability

The CompoNet network system is constantly monitored to enable to confirm system safety by quickly isolating errors and checking communications status.

● CX-Integrator

The CX-Integrator provides the following network functionality.
- Uploading the network system configuration
- Editing and transferring software setting tables
- Editing and transferring registration tables
- Setting Input Data Zero Clear Mode in case of a communications error
- Setting I/O Communications Manual Startup Mode
- Monitoring the Master Unit status
- Monitoring the Master Unit error log
- Monitoring each Slave Unit's network participation status
- Setting and transferring Slave Unit parameters
- Monitoring Slave Unit information
- Managing files
- Managing hardware (EDS files)

● Smart Slave Function

Some Slave Unit models provide the Smart Slave function that can store various value-added information in addition to the ON/OFF signals (I/O data). This enables preventive system maintenance by operation time monitoring and contact operation count monitoring and aids in quicker system startup by communications power voltage monitoring and I/O power status monitoring. Various function settings are possible from either the CX-Integrator or through message communications.

Additional Information

The Smart Slave function is not implemented in this CompoNet Communications Unit.

● Master Unit Detection of Network Participation, Errors, and Status

When a Slave Unit joins the network, the bit corresponding to the node address (Participation Flag) will turn ON. If a Slave Unit that participates in the network leaves the network due to an error, the bit corresponding to the node address (Error Flag) will turn ON.
Network status, such as communications errors and overlapping Slave Unit node address, and Slave Unit diagnostic results are detected by the Master Unit. The ditection is displayed on the 7-segment LED display on the front panel and reflected in the Status Flags.

● **Registration Tables**

The Registration Table registers each node address and corresponding model of Slave Units, which should participate in the network, from CX-Integrator. This function checks the participating Slave Units and prevents unregistered Slave Units from participating in the network. After the power supply is turned ON, the monitoring time until registered Slave Units participate in the network can also be set.

The Registered Slave Unit Participation Standby Mode function stops Remote I/O communications until all registered Slave Units are participating in the network. Remote I/O communications can be started once all registered Slave Units participate.

Additional Information

To use the Registration Tables function on this CompoNet Communications Unit, select one of the eight types of Remote I/O. The function is enabled only when a type of Remote I/O that occupies IN 2/OUT 2 words is selected.

● **Stopping Communications at Communications Errors**

The DIP switches on the front of the Master Unit can be set to stop communications when a communications error occurs. When the setting is enabled, the function will stop the entire I/O communications if a communications error occurs in any of the Slave Units.

● **I/O Communications Manual Startup Mode**

I/O Communications Manual Startup Mode can be set from CX-Integrator to disable remote I/O communications when the power is turned ON. Remote I/O communications will start once the Remote I/O Communications Start Switch is turned ON.

● **Communications Error Input Data Zero Clear Mode**

Input Data Zero Clear Mode can be set from CX-Integrator for communications errors. If a communications error occurs for a Slave Unit in this mode, all input (IN) data for that Slave Unit will be cleared to zeros. This can be used to suppress triggering operations when communications errors occur in systems where ON input data signals are used as triggers for operation.

1-2-3   Configuration

Configuration (Example)

CompoNet Slave	CompoNet Slave
MX2 Series CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E)	RX-V1 Series CompoNet Communications Unit (Model: 3G3AX-RX-CRT-E)
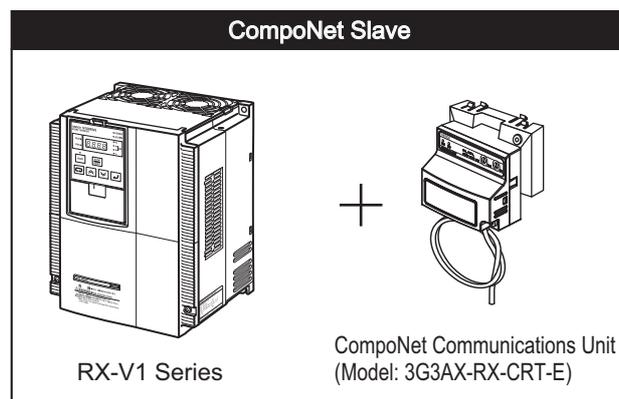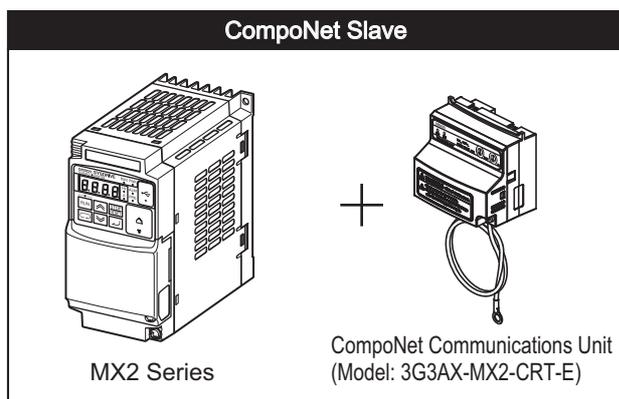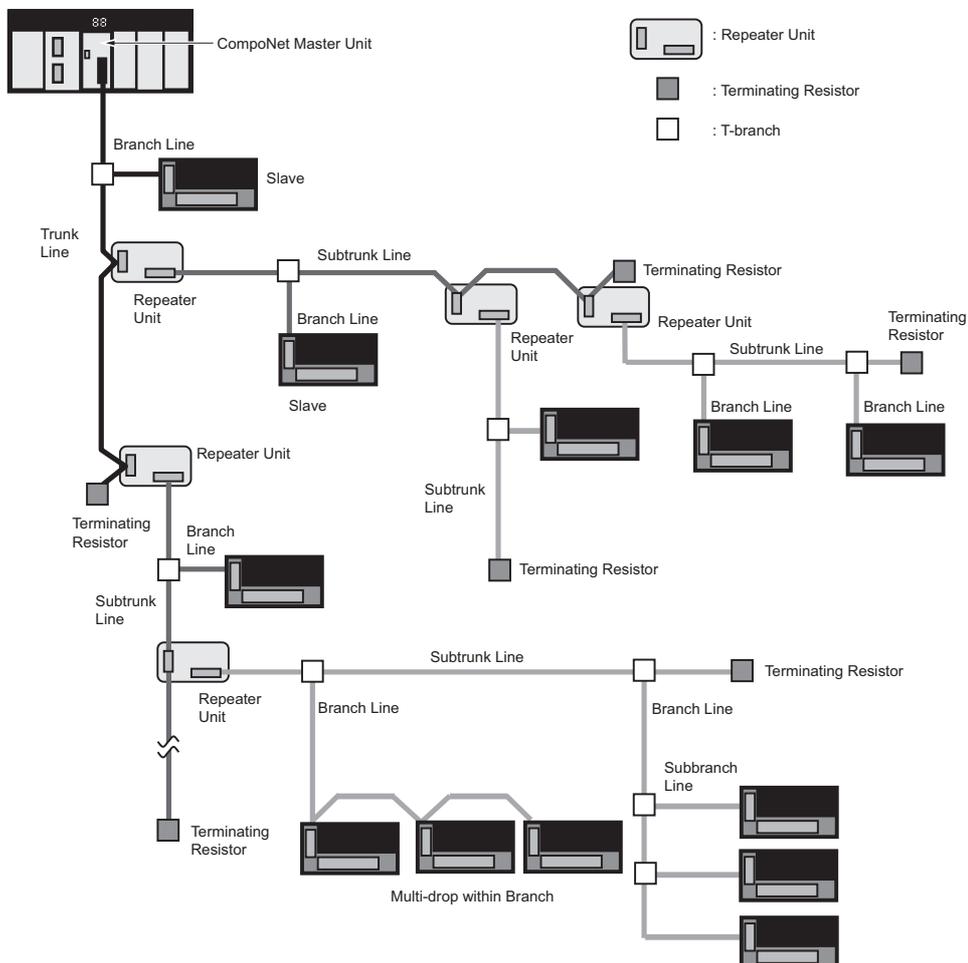
1-2-4   Maximum Number of Inverter Connections

The following list shows the maximum number of inverter connections in each communications mode.

Communications Mode No.	Mode Name	Node Addresses of Slaves Connectable per Master Unit	Control Points per Master Unit	Occupied Unit Number per Master Unit	Allocation Area	I/O Memory Area Allocation Size		Max. No. of Inverter Connections	
						OUT Area Allocation Size	IN Area Allocation Size	Remote I/O 2 IN/2 OUT Words	Remote I/O 8 IN/8 OUT Words
0	Communications Mode No. 0	Word Slave: IN 8/OUT 8 node addresses	IN 128/ OUT 128 points (Word Slave)	2	Special I/O Unit Allocation Relay Area	Word Slave 8 words	Word Slave 8 words	4	1
1	Communications Mode No. 1	Word Slave: IN 16/OUT 16 node addresses	IN 256/ OUT 256 points (Word Slave)	4		Word Slave 16 words	Word Slave 16 words	8	2
2	Communications Mode No. 2	Word Slave: IN 32/OUT 32 node addresses	IN 612/ OUT 612 points (Word Slave)	8		Word Slave 32 words	Word Slave 32 words	16	4
3	Communications Mode No. 3	Word Slave: IN 16/OUT 16 node addresses Bit Slave: IN 64/OUT 64 node addresses	IN 256/ OUT 256 points (Word Slave) IN 128/ OUT 128 points (Word Slave)	8		Word Slave 16 words + Bit Slave 8 words	Word Slave 16 words + Bit Slave 8 words	8	2
8	Software Setting Mode	Word Slave: IN 64/OUT 64 node addresses Bit Slave: IN 128/OUT 128 node addresses	IN 1024/ OUT 1024 points (Word Slave) IN 256/ OUT 256 points (Word Slave)	1	Word Slave OUT, Word Slave IN, and Bit Slave IN: The first address of each area can be set.[1]	Max. 64 words for Word Slave + 16 words for Bit Slave[2]	Max. 64 words for Word Slave + 16 words for Bit Slave[2]	32	8

*1   This depends on the software setting from CX-Integrator (CIO, WE, HE, or DM).
*2   This depends on the software setting from CX-Integrator.

1-3 Specifications

● CompoNet Communications Unit

Item		Specification
Installation **MX2**	Unit type	MX2-series CompoNet Communications Unit
	Model	3G3AX-MX2-CRT-E
	Dimensions (W x H x D)	68 x 60 x 45 mm
	Weight	100 g or less (Shipping weight: Approx. 170 g)
Installation **RX**	Unit type	RX-series CompoNet Communications Unit
	Model	3G3AX-RX-CRT-E
	Dimensions (W x H x D)	80 x 67 x 49 mm
	Weight	100 g or less (Shipping weight: Approx. 170 g)
Environment	Ambient operating temperature	-10 to 50°C
	Ambient operating humidity	20 to 90%RH (No condensation)
	Ambient storage temperature	-20 to 65°C
	Vibration resistance	5.9 m/s^2 (0.6G) at 10 to 55 Hz
	Dielectric strength	500 VAC (between isolated circuits)
	Location of use	1,000 m above sea level, indoor (No corrosive gas or dust)
	EC Directives	EN61800-3: 2004 (2004/108/EC) Second environment, Category C3
		EN61800-5-1: 2007 (2006/95/EC) SELV
	UL and cUL Standards	UL508
	Internal power supply	Supplied by inverter
	Enclosure rating	IP 20
CompoNet Interface	Communications protocol	CompoNet
	Certification	CompoNet conformance test
	CompoNet profile	AC Drive (0x02)
	Supported connections	Remote I/O: Master-Slave connection Poll Bitstrobe Change of state Cyclic Expricit Message Conform to the CompoNet specifications
	Communications power supply	- (External power supply not required)
	Unit device address range	Node address MAC ID 0 to 63, set with inverter parameter P190 or the rotary switches
	Supported baud rates	4 Mbps, 3 Mbps, 1.5 Mbps, 93.75 kbps. Automatically detects baud rate of Master Unit.

Item		Specification
CompoNet Configura-tion	Default connection path	Supported, set with inverter parameter P046
	Supported assemblies	Basic Speed I/O (Output assembly 20, Input assembly 70) Extended Speed I/O (21, 71) Extended Speed and Torque Control (123, 173) Special I/O (100, 150) Extended Control I/O (101, 151) Extended Control I/O and Multi function I/O Monitor (101, 153) Flexible Format (139, 159) Extended Speed and Acceleration Control (110, 111)[*1]
	EDS file	Depends on the inverter model. (See the below.)

*1   Use the specified output and input assembly pair.

Precautions for Correct Use

When the CompoNet Communications Unit is connected to the inverter, the RS485 (Modbus) interface of the inverter is disabled.

MX2 When the CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E) is connected to the MX2 Inverter, it is not supported to connect the RJ45 port (external Digital Operator) of the MX2 Inverter.

The required EDS file for the CompoNet Communications Unit depends on the model of the MX2/RX-series Inverter.

● MX2-series Device List

Inverter Model	Product Name	ID Code	Name of EDS File
3G3MX2-AB001 3G3MX2-A2001	3G3AX-MX2-CRT-AB001_A2001	1840	3G3AX-MX2-CRT-AB001_A2001.eds
3G3MX2-AB002 3G3MX2-A2002	3G3AX-MX2-CRT-AB002_A2002	1841	3G3AX-MX2-CRT-AB002_A2002.eds
3G3MX2-AB004 3G3MX2-A2004	3G3AX-MX2-CRT-AB004_A2004	1842	3G3AX-MX2-CRT-AB004_A2004.eds
3G3MX2-AB007 3G3MX2-A2007	3G3AX-MX2-CRT-AB007_A2007	1844	3G3AX-MX2-CRT-AB007_A2007.eds
3G3MX2-AB015 3G3MX2-A2015	3G3AX-MX2-CRT-AB015_A2015	1846	3G3AX-MX2-CRT-AB015_A2015.eds
3G3MX2-AB022 3G3MX2-A2022	3G3AX-MX2-CRT-AB022_A2022	1847	3G3AX-MX2-CRT-AB022_A2022.eds
3G3MX2-A2037	3G3AX-MX2-CRT-A2037	1849	3G3AX-MX2-CRT-A2037.eds
3G3MX2-A2055	3G3AX-MX2-CRT-A2055	1851	3G3AX-MX2-CRT-A2055.eds
3G3MX2-A2075	3G3AX-MX2-CRT-A2075	1852	3G3AX-MX2-CRT-A2075.eds
3G3MX2-A2110	3G3AX-MX2-CRT-A2110	1853	3G3AX-MX2-CRT-A2110.eds
3G3MX2-A2150	3G3AX-MX2-CRT-A2150	1854	3G3AX-MX2-CRT-A2150.eds
3G3MX2-A4004	3G3AX-MX2-CRT-A4004	1862	3G3AX-MX2-CRT-A4004.eds
3G3MX2-A4007	3G3AX-MX2-CRT-A4007	1864	3G3AX-MX2-CRT-A4007.eds
3G3MX2-A4015	3G3AX-MX2-CRT-A4015	1866	3G3AX-MX2-CRT-A4015.eds
3G3MX2-A4022	3G3AX-MX2-CRT-A4022	1867	3G3AX-MX2-CRT-A4022.eds
3G3MX2-A4030	3G3AX-MX2-CRT-A4030	1868	3G3AX-MX2-CRT-A4030.eds
3G3MX2-A4040	3G3AX-MX2-CRT-A4040	1870	3G3AX-MX2-CRT-A4040.eds
3G3MX2-A4055	3G3AX-MX2-CRT-A4055	1871	3G3AX-MX2-CRT-A4055.eds

Inverter Model	Product Name	ID Code	Name of EDS File
3G3MX2-A4075	3G3AX-MX2-CRT-A4075	1872	3G3AX-MX2-CRT-A4075.eds
3G3MX2-A4110	3G3AX-MX2-CRT-A4110	1873	3G3AX-MX2-CRT-A4110.eds
3G3MX2-A4150	3G3AX-MX2-CRT-A4150	1874	3G3AX-MX2-CRT-A4150.eds

● RX-series Device List

Inverter Model	Product Name	ID Code	Name of EDS File
3G3RX-A2004	3G3AX-RX-CRT-A2004-V1	2095	3G3AX-RX-CRT-A2004-V1.eds
3G3RX-A2007	3G3AX-RX-CRT-A2007-V1	2096	3G3AX-RX-CRT-A2007-V1.eds
3G3RX-A2015	3G3AX-RX-CRT-A2015-V1	2097	3G3AX-RX-CRT-A2015-V1.eds
3G3RX-A2022	3G3AX-RX-CRT-A2022-V1	2098	3G3AX-RX-CRT-A2022-V1.eds
3G3RX-A2037	3G3AX-RX-CRT-A2037-V1	2099	3G3AX-RX-CRT-A2037-V1.eds
3G3RX-A2055	3G3AX-RX-CRT-A2055-V1	2100	3G3AX-RX-CRT-A2055-V1.eds
3G3RX-A2075	3G3AX-RX-CRT-A2075-V1	2101	3G3AX-RX-CRT-A2075-V1.eds
3G3RX-A2110	3G3AX-RX-CRT-A2110-V1	2102	3G3AX-RX-CRT-A2110-V1.eds
3G3RX-A2150	3G3AX-RX-CRT-A2150-V1	2103	3G3AX-RX-CRT-A2150-V1.eds
3G3RX-A2185	3G3AX-RX-CRT-A2185-V1	2104	3G3AX-RX-CRT-A2185-V1.eds
3G3RX-A2220	3G3AX-RX-CRT-A2220-V1	2105	3G3AX-RX-CRT-A2220-V1.eds
3G3RX-A2300	3G3AX-RX-CRT-A2300-V1	2106	3G3AX-RX-CRT-A2300-V1.eds
3G3RX-A2370	3G3AX-RX-CRT-A2370-V1	2107	3G3AX-RX-CRT-A2370-V1.eds
3G3RX-A2450	3G3AX-RX-CRT-A2450-V1	2108	3G3AX-RX-CRT-A2450-V1.eds
3G3RX-A2550	3G3AX-RX-CRT-A2550-V1	2109	3G3AX-RX-CRT-A2550-V1.eds
3G3RX-A4004	3G3AX-RX-CRT-A4004-V1	2122	3G3AX-RX-CRT-A4004-V1.eds
3G3RX-A4007	3G3AX-RX-CRT-A4007-V1	2123	3G3AX-RX-CRT-A4007-V1.eds
3G3RX-A4015	3G3AX-RX-CRT-A4015-V1	2124	3G3AX-RX-CRT-A4015-V1.eds
3G3RX-A4022	3G3AX-RX-CRT-A4022-V1	2125	3G3AX-RX-CRT-A4022-V1.eds
3G3RX-A4037	3G3AX-RX-CRT-A4037-V1	2126	3G3AX-RX-CRT-A4037-V1.eds
3G3RX-A4055	3G3AX-RX-CRT-A4055-V1	2127	3G3AX-RX-CRT-A4055-V1.eds
3G3RX-A4075	3G3AX-RX-CRT-A4075-V1	2128	3G3AX-RX-CRT-A4075-V1.eds
3G3RX-A4110	3G3AX-RX-CRT-A4110-V1	2129	3G3AX-RX-CRT-A4110-V1.eds
3G3RX-A4150	3G3AX-RX-CRT-A4150-V1	2130	3G3AX-RX-CRT-A4150-V1.eds
3G3RX-A4185	3G3AX-RX-CRT-A4185-V1	2131	3G3AX-RX-CRT-A4185-V1.eds
3G3RX-A4220	3G3AX-RX-CRT-A4220-V1	2132	3G3AX-RX-CRT-A4220-V1.eds
3G3RX-A4300	3G3AX-RX-CRT-A4300-V1	2133	3G3AX-RX-CRT-A4300-V1.eds
3G3RX-A4370	3G3AX-RX-CRT-A4370-V1	2134	3G3AX-RX-CRT-A4370-V1.eds
3G3RX-A4450	3G3AX-RX-CRT-A4450-V1	2135	3G3AX-RX-CRT-A4450-V1.eds
3G3RX-A4550	3G3AX-RX-CRT-A4550-V1	2136	3G3AX-RX-CRT-A4550-V1.eds
3G3RX-B4750	3G3AX-RX-CRT-B4750-V1	2137	3G3AX-RX-CRT-B4750-V1.eds
3G3RX-B4900	3G3AX-RX-CRT-B4900-V1	2138	3G3AX-RX-CRT-B4900-V1.eds
3G3RX-B411K	3G3AX-RX-CRT-B411K-V1	2139	3G3AX-RX-CRT-B411K-V1.eds
3G3RX-B413K	3G3AX-RX-CRT-B413K-V1	2140	3G3AX-RX-CRT-B413K-V1.eds

Dimensions of CompoNet Communications Unit

MX2
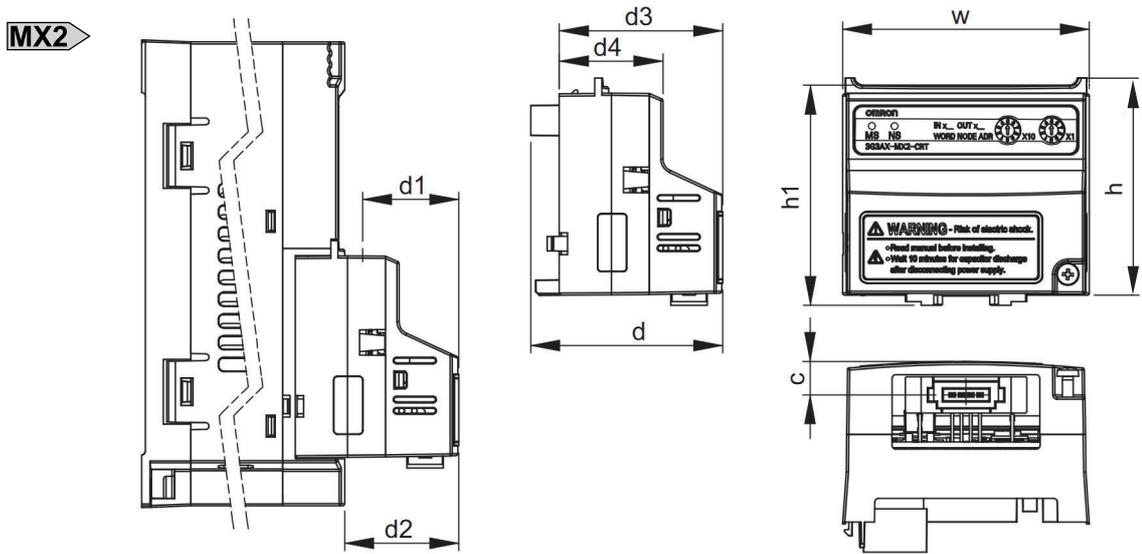
● **Dimensions of CompoNet Communications Unit (when Mounted on MX2-series Inverter)**

Item	Dimension	Item	Dimension	Item	Dimension
h	60.0 mm	c	9.4 mm	d2	31.3 mm
h1	60.7 mm	d	52.6 mm	d3	44.8 mm
w	67.6 mm	d1[*1]	26.4 mm	d4	28.4 mm

*1   Dimension d1 gives the increase in the depth of the MX2-series Inverter when the CompoNet Communications Unit is mounted.

RX
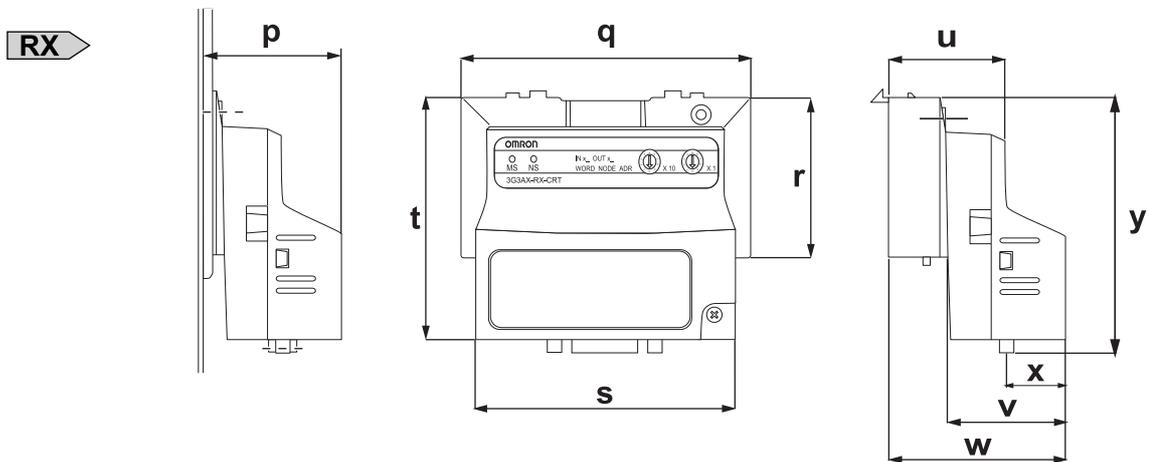
● **Dimensions of CompoNet Communications Unit (when Mounted on RX-series Inverter)**

Item	Dimension	Item	Dimension	Item	Dimension
p[*2]	35.1 mm	r	43.9 mm	u	31.7 mm
q	79.8 mm	s	66.5 mm	v	32.7 mm
		t	66.1 mm	w	48.1 mm
				x	9.4 mm
				y	68.9 mm

*2   Dimension p gives the increase in the depth of the RX-series Inverter when the CompeNet Communications Unit is mounted.

1-4   Restrictions on Use

1-4-1   Supported Inverters

MX2 The CompoNet Communications Unit (Model: 3G3AX-MX2-CRT-E) supports the MX2-series Inverters with Ver. 1.1 or later. The MX2-series Inverter version can be identified by the inverter type label. Please check that your inverter type label indicates Ver. 1.1 or later in the position displayed in this illustration.

```
OMRON INVERTER 3G3MX2-A2001
INPUT:50Hz, 60Hz          V 1Ph          A
INPUT:50Hz, 60Hz 200-240V 3Ph   1.2/1.0A
OUTPUT:0.1-1000Hz
                  200-240V 3Ph   1.2/1.0A
LOT NO. :10609            Ver. 1.1 ←——————— Inverter Version
S/N: 16213600000046              NE18027-007
OMRON Corporation        MADE IN JAPAN
```
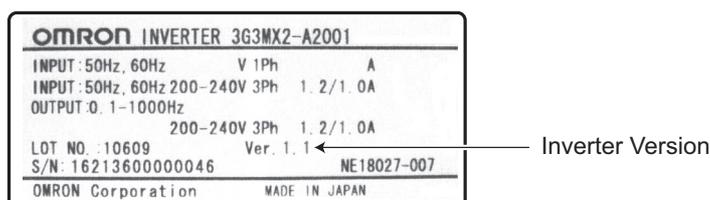
RX The CompoNet Communications Unit (Model: 3G3AX-RX-CRT-E) supports the RX-series Inverters with Ver. 2.0 or later. The RX-series Inverter version can be identified by the inverter type label. Please check that your inverter type label indicates Ver. 2.0 or later in the position displayed in this illustration.

```
OMRON INVERTER 3G3RX-A2055
KW/(HP):5.5/(7.5)
INPUT:50Hz, 60Hz          V 1Ph          A
INPUT:50Hz, 60Hz 200-240V 3Ph   26 A
OUTPUT:0.5-400Hz 200-240V 3Ph   24 A
LOT NO:*****              Ver. 2.0 ←——————— Inverter Version
S/N: ****************            NE*****-**
OMRON Corporation        MADE IN JAPAN
```
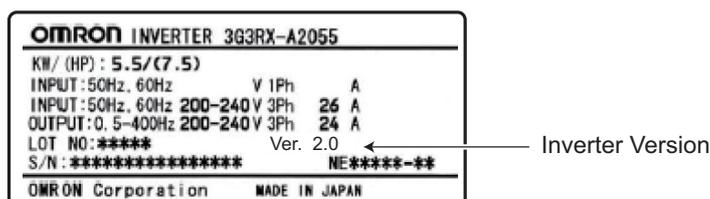
1-4-2   Inverter Safety (ISO13849-1)

The MX2-series Inverters provide a safety function to perform a safe stop according to EN60204, stop category 0. Note that the inverters are not covered by this safety standard when connected to a CompoNet Communications Unit.

◁· Precautions for Safe Use

The built-in safety function of the MX2-series Inverter does not meet (accurately, is not certified by any third-party body regarding) the safety standard ISO13849-1 when combined with this option unit.

Precautions for Correct Use

The 3G3AX-MX2-CRT-E is not a safety device and does not implement any safety protocols.

1-4-3   Restrictions

■ Restriction on Inverter Control Mode

The following modes are disabled when the CompoNet Communications Unit is used with an inverter.
- PM Motor mode
- High Frequency mode

■ Restrictions on RS485 Communications and MX2-series Unit's RJ45 Connector

When the CompoNet Communications Unit is used, the MX2/RX-series RS485 communications (Modbus) port is disabled.

In addition, when the MX2-series is used with an inverter, the external Digital Operator is disabled with RJ45 connector function.

■ Restrictions on Inverter Light Load Mode

The MX2/RX-series Inverter can be set to the Heavy Load or Light Load mode.

Switching from the default Heavy Load mode to the Light Load mode disables the vector control and torque control.

As a result, in the Light Load mode, the following restrictions arise.

- The Light Load mode disallows writing of the torque reference, configuring a Remote I/O allocation that includes torque reference data results in an error.
- In CX-Integrator, editing of device parameters using the EDS file is disabled. Because the Light Load mode disallows writing of some parameter data, you cannot use the EDS file to download parameters. If you execute a download, an error will occur when a write-prohibit parameter is encountered, causing the process to be terminated.

> ☑ **Precautions for Correct Use**
>
> To edit parameters via network, use the Inverter/Servo support software CX-Drive to establish connection via an OMRON PLC and CompoNet.

■ Restrictions on Editing Device Parameters

If you use CX-Integrator to edit device parameters with an EDS file, you cannot edit the second and third control parameters of the inverter.

> ☑ **Precautions for Correct Use**
>
> To edit parameters via network, use the Inverter/Servo support software CX-Drive to establish connection via an OMRON PLC and CompoNet.

2

CompoNet Communications Unit Mounting and Wiring

This section provides the part names of the CompoNet Communications Unit and mounting/wiring methods.

2-1   Name and Setting of Each CompoNet Communications Unit Component

2-1-1   Name and Setting of Each Component

MX2

Rear face
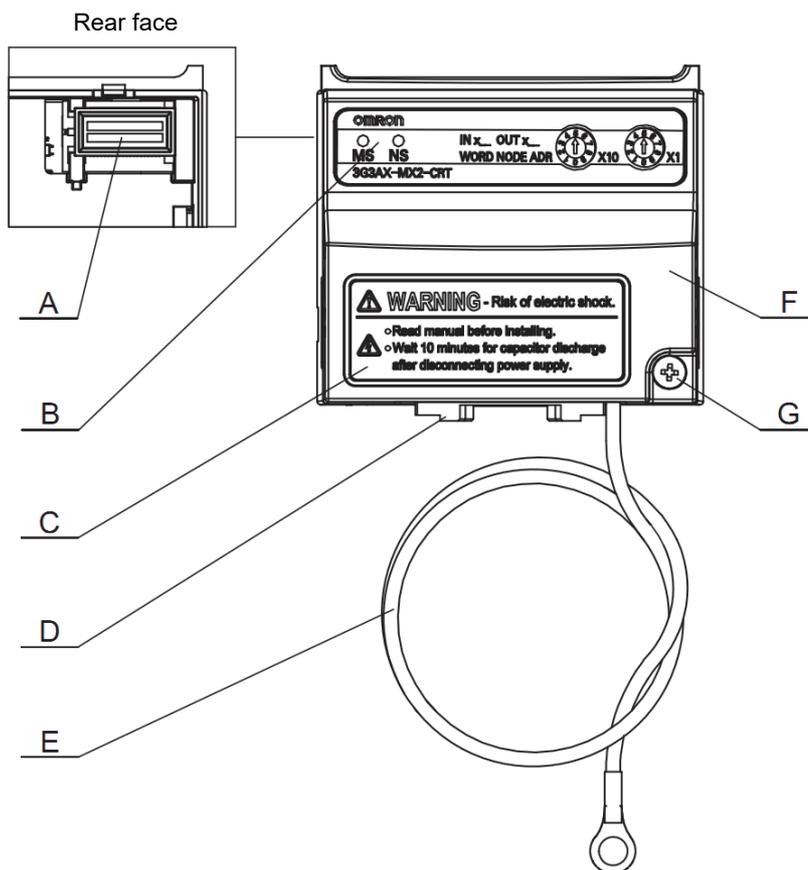
A - Inverter connector
B - LED indicators (MS, NS)
C - Warning label
D - CompoNet connector
E - Grounding cable
F - Housing
G - Mounting screw

RX
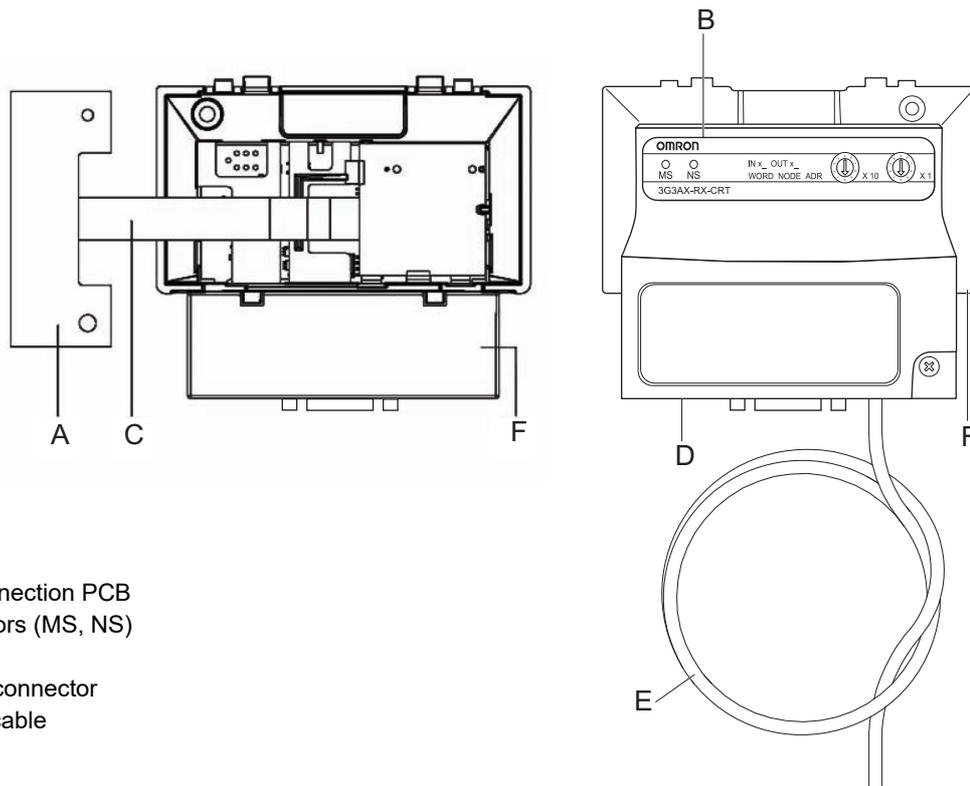
A - Inverter connection PCB
B - LED indicators (MS, NS)
C - Flat cable
D - CompoNet connector
E - Grounding cable
F - Housing

- Before use, cut the FG cable into an appropriate length for the distance to the inverter's ground terminal and the size of terminal block, and crimp the crimp terminal.
- For the position of ground terminal and the size of terminal block, refer to Arrangement of Main Circuit Terminal Block and External Dimensions in the user's manual for MX2 or RX-V1 Inverters.

2-1-2   LED Indicators

The LED indicators on the front face indicate the operational mode and status of the CompoNet Communications Unit and the network.

● **LED Indicators**

Indicator	Color	State	Meaning
MS (Module Status)	Green	Lit	Normal operation
	Red	Lit	Unrecoverable fault • CompoNet Communications Unit hardware error • Unsupported inverter version
		Flashing	Recoverable fault • Node address was changed. • Illegal Flexible Format configuration • CompoNet Communications Unit parameters are out of range or cannot be read. • CompoNet Communications Unit detected consecutive communication errors.
	–	Not lit	• Power is not supplied to CompoNet Communications Unit. • CompoNet Communications Unit is not properly connected with inverter. • CompoNet Communications Unit is reset.
NS (Network Status)	Green	Lit	Network is operating normally (communications established).
		Flashing	Network is operating normally, but communications have not been established.
	Red	Lit	CompoNet Communications Unit detects that network communications are disabled due to some communications error: • Node address duplication • Network error
		Flashing	CompoNet Communications Unit detected a communications timeout error.
	–	Not lit	• Power is not supplied to CompoNet Communications Unit. (Check Module Status LED.) • Checking for node address duplication (intermediate state)

📖 **Additional Information**

Refer to *Section 6 Troubleshooting* on page 6-1 for troubleshooting using LED indicators.

2-1-3   Rotary Switches

The rotary switches are used to set the node address of the CompoNet Communications Unit. Set the node address as a decimal number between 0 and 63.
Set the 10s digit on the left rotary switch and set the 1s digit on the right rotary switch. The setting of the switches is updated when the Unit power supply is cycled.
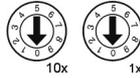
📑 Additional Information

There are two ways of configuring the CompoNet node address.
- Set the node address by the rotary switches to a valid value in the range 0 to 63.
- Set the node address by inverter parameter P190. Set the rotary switches to an invalid value (between 64 to 99) to use inverter parameter P190.

2-2   Installation

⚠ DANGER

Do not attempt to remove the terminal block cover or disconnect and reconnect the CompoNet Communications Unit during power on or within 10 minutes after power off.
Doing so may result in severe injury due to electric shock.

⚠ Caution

Inverters contain high voltage parts and short-circuits may sometimes cause product damage or property damage. Measures must be taken to prevent chips, lead-wire pieces, or other metal waste from entering the product, for example, by installing a cover.

Do not attempt to disassemble, repair, or modify the CompoNet Communications Unit.
Doing so may result in injury.

Installation and Storage

Do not store or use the CompoNet Communications Unit in the following environment:
- Locations subject to direct sunlight
- Locations subject to ambient temperatures outside the range specified in the specifications
- Locations subject to relative humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe temperature fluctuations
- Locations subject to corrosive or flammable gases
- Locations near flammable materials
- Locations subject to dust, salt spray, or iron powder
- Locations subject to water, oil, or chemical splashes
- Locations subject to direct shock or vibration

Transportation, Installation, and Wiring

- Do not drop or apply strong impact on the product. Doing so may result in damaged parts or malfunction.
- When transporting the inverter with a mounted CompoNet Communications Unit, do not hold the CompoNet Communications Unit.
- Do not remove the cover of the CompoNet Communications Unit. Tighten all unit fixation screws to the specified torque.
- Install an appropriate stopping device to ensure safety. In particular, if configured to operate continuously even in the event of a communications error, the inverter may not stop, resulting in equipment damage.

- If the CompoNet Communications Unit is used in the following locations, provide sufficient shielding measures. Using the CompoNet Communications Unit in any of these locations may result in equipment damage.
  Locations subject to static electricity or other forms of noise
  Locations subject to strong electromagnetic fields
  Locations close to power lines
- During installation, wiring, and network setting on the CompoNet Communications Unit, please refer to applicable sections of this manual to ensure the correct connection and configuration procedures.
- When removing the CompoNet Communications Unit, do not pull the flat cable.
- When mounting the CompoNet Communications Unit, be sure that the flat cable is not pinched.
- When mounting the CompoNet Communications Unit, be careful about burrs of the break-outs on the inverter.

2-2-1   Mounting Procedure of CompoNet Communications Unit on MX2-series Inverter

1   **Loosen the screw of the option cover.**
Remove the cover.
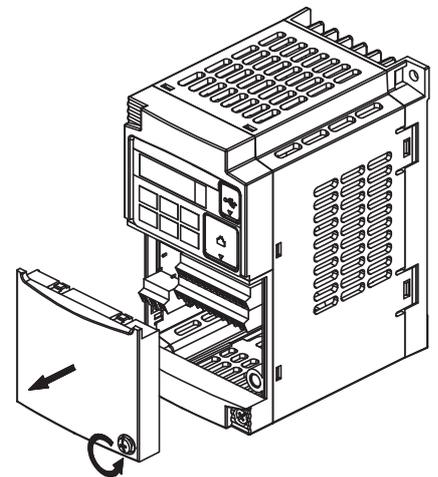
2   **For inverters up to 4.0 kW: Loosen the screws of the terminal block cover.**
This is for the ground terminal wiring.
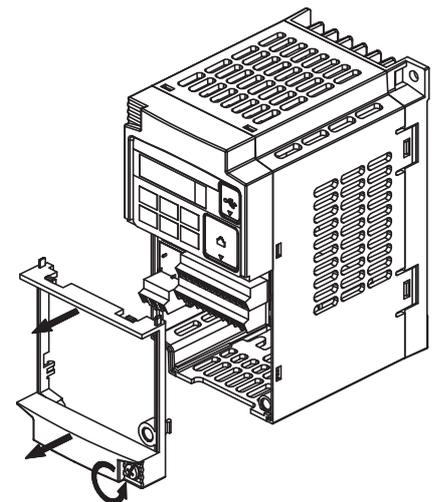
3   **Connect the CompoNet Communications Unit's grounding cable to inverter with a mounting screw.**

1-phase 200 V 0.1 to 2.2 kW
3-phase 200 V 0.1 to 3.7 kW
3-phase 400 V 0.4 to 4.0 kW

3-phase 200 V 5.5 to 15 kW
3-phase 400 V 5.5 to 15 kW
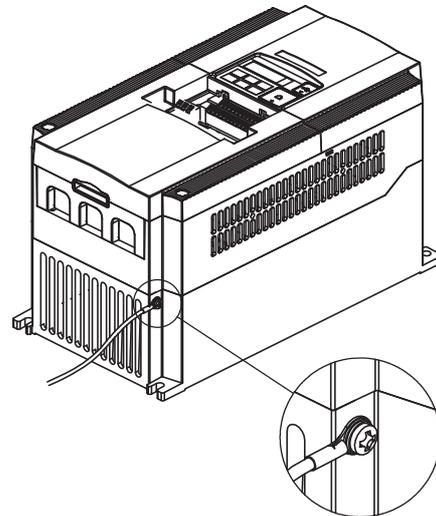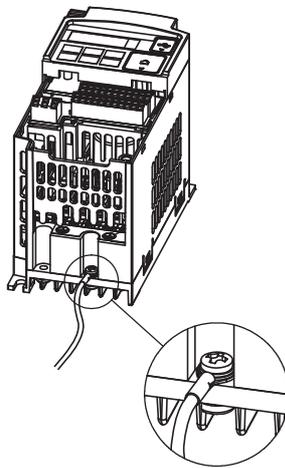
4   **If removed in Step 2, reinstall the terminal cover and tighten the screw.**
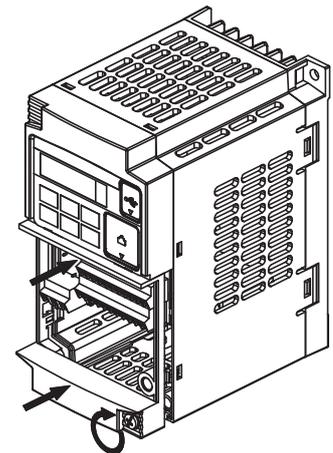
5   **Push the CompoNet Communications Unit into the previous location of the CompoNet Communications Unit cover until it clicks into place.**
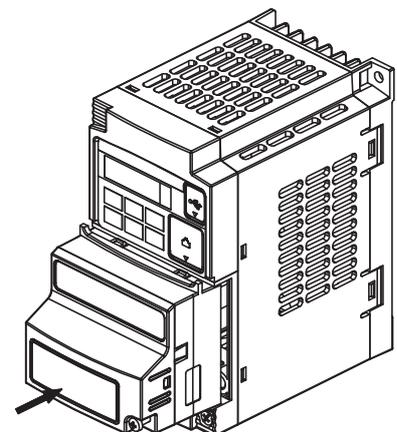
6 **Press down on the indicated corner of the Compo-Net Communications Unit housing to ensure proper connection of the CompoNet Communications Unit connector.**
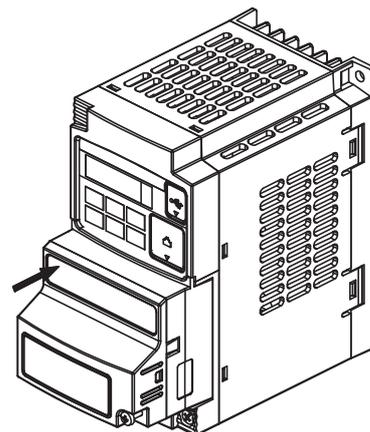
7 **Check that there is no gap between the top edges of the CompoNet Communications Unit and the inverter casing.**
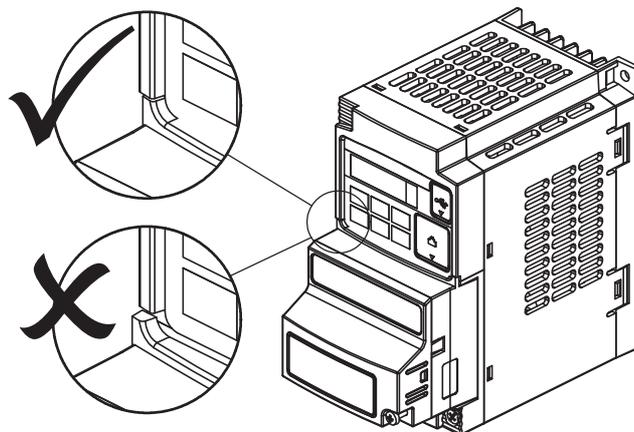
8 **Secure the CompoNet Communications Unit in place to the inverter with the mounting screw.**
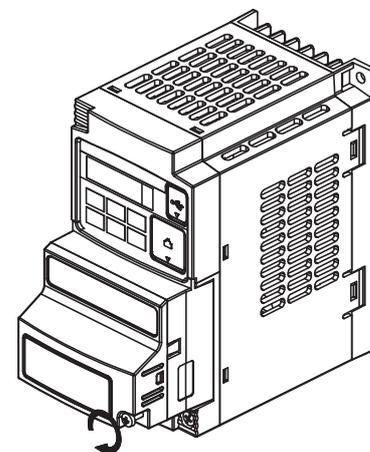
9 **Select the right warning language from the warning label sheet and replace the English warning if appropriate.**

> **Precautions for Correct Use**
>
> Some inverter models do not include a screw for the grounding cable. Please supply the recommended screw, lock-washer, and washer to attach the grounding cable.

- **Ground cable screw selection - MX2-series**

Inverter Model	Grounding Cable Attachment Screw
3-phase 200 V 5.5 to 7.5 kW	M4 x 6
3-phase 400 V 5.5 to 7.5 kW	
3-phase 200 V 11 to 15 kW	M5 x 6
3-phase 400 V 11 to 15 kW	

> **Additional Information**
>
> For how to remove the CompoNet Communications Unit, refer to *6-6 Removing CompoNet Communications Unit* on page 6-13.

2-2-2   Mounting Procedure of CompeNet Communications Unit on RX-series Inverter

[Preparation]
- Before use, cut the FG cable into an appropriate length for the distance to the inverter's ground terminal and the size of terminal block, and crimp the crimp terminal.
- For the position of ground terminal and the size of terminal block, refer to Arrangement of Main Circuit Terminal Block and External Dimensions in the user's manual for MX2 or RX-V1 Inverters.

1 **Remove the following parts from the RX-series Inverter:**
A. Digital Operator
B. Spacer cover
C. Terminal cover
D. Front cover
E. Operator connector
Remove the operator connector (E) only if you connect the LED operator via a cable.
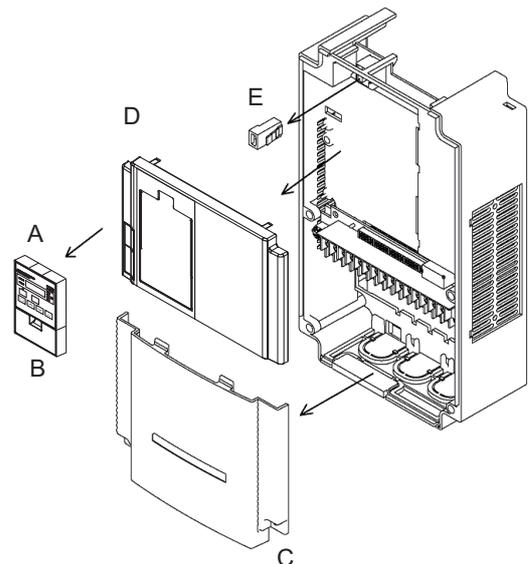
2 **Cut out the two plastic break-outs from the front cover.**

Make sure no sharp edges remain.
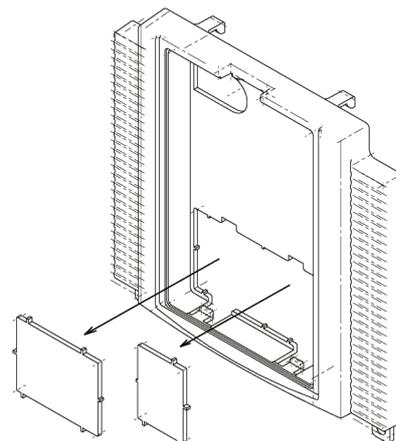
3 **Reinstall the front cover and tighten the screws.**
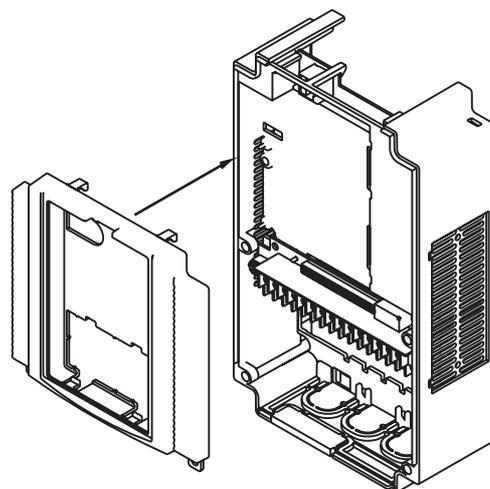
4 **Connect the connector of inverter connection PCB of CompoNet Communications Unit to the connector of inverter.**

Method:

First align the small hole (B) on the inverter connection PCB with the guide-post (D) in the inverter.
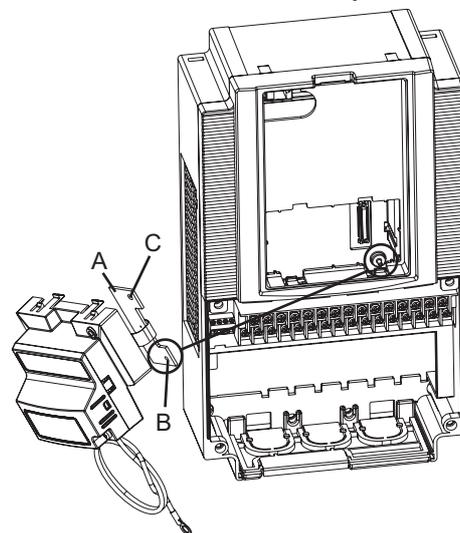
Then, align the larger hole on the inverter connection PCB (C) with the threaded hole (F) in the inverter.

Push the inverter connector into place.

2-2 Installation

2

2-2-2 Mounting Procedure of CompoNet Communications Unit on RX-series Inverter
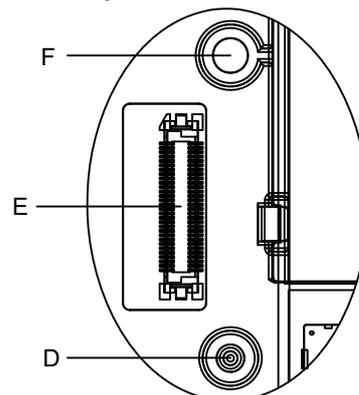
Precautions for Correct Use

The inverter connector is fixed with a sufficient binding force against vibration. It is not necessary to secure the inverter connection PCB with screws.

5   **Fold the flat cable (B) into the middle of the Unit so that the flat cable will not be pinched between the CompoNet Communications Unit and the front cover of inverter. (As shown with A)**

Precautions for Safe Use

- When mounting the CompoNet Communications Unit, be sure that the flat cable is not pinched.
- When mounting the CompoNet Communications Unit, be careful about burrs of the break-outs on the inverter.
- When removing the CompoNet Communications Unit, do not pull the flat cable.
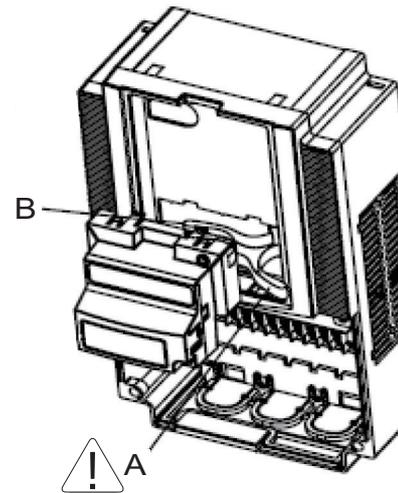
6   **Install CompoNet Communications Unit on the Inverter.**
   (a)   Insert two locking pins of the upper CompoNet Communications Unit in the break-outs and push it up.
   (b)   Insert the bottom part of the CompoNet Communications Unit while pushing it up.
   (c)   Push the CompoNet Communications Unit down and fix it.
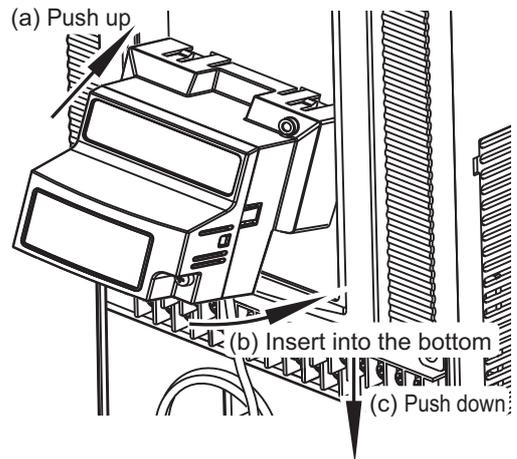
7 **Insert the CompoNet Communications Unit fixation screw into the hole shown in the right figure, and tighten it to fix the Unit.**
Be careful not to overtighten the screw.
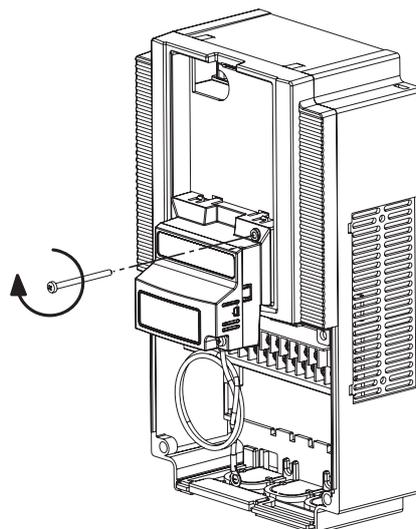
8 **Connect the grounding cable of the CompoNet Communications Unit to the ground terminal of the inverter.**
Make sure that the ground terminal is marked with grounding symbol.
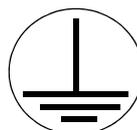
The position of grounding symbol differs depending on the capacity of inverter. The figure is just an example.
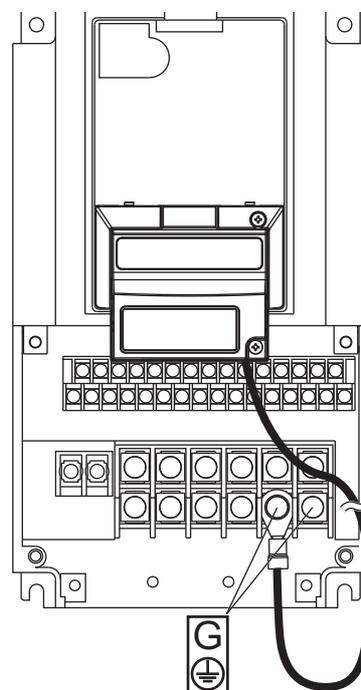
9 **Reinstall the terminal cover and tighten the two screws to fix it in position.**
Reinstall the terminal cover under the CompoNet Communications Unit onto the inverter (B).
Tighten the two screws (A).

2-2 Installation

2

2-2-2 Mounting Procedure of CompeNet Communications Unit on RX-series Inverter
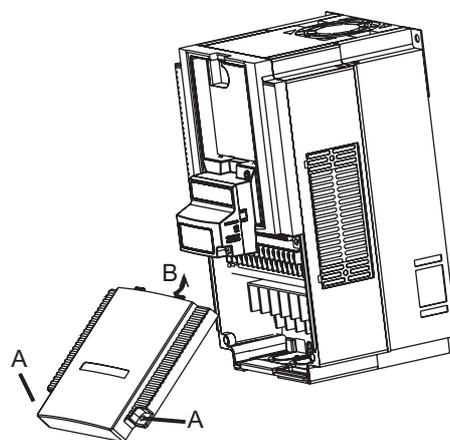
10 **Install the Digital Operator on the upper portion of the CompoNet Communications Unit.**

  • Keep the spacer cover you removed in a safe place.
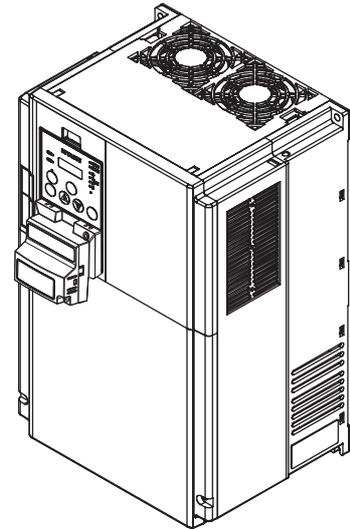
If You Use the LCD Digital Operator

11 **Connect the Digital Operator via a straight Ethernet cable to the RJ45 connector in the inverter.**
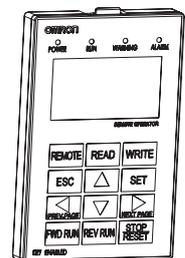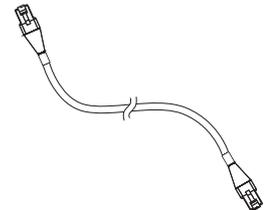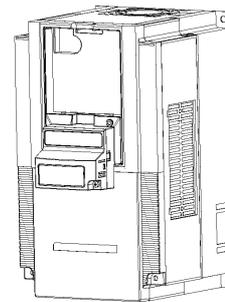
12 **Set the required inverter parameters.**

📝 **Additional Information**

Please refer to *Section 3 Network Startup* on page 3-1 and *Section 4 Remote I/O* on page 4-1.

13 **When the required inverter parameters are set properly, remove the straight Ethernet cable from the inverter.**

Additional Information

For how to remove the CompoNet Communications Unit, refer to *6-6 Removing CompoNet Communications Unit* on page 6-13.

2-2-3   Operating Environment

For information on the installation environment, refer to Section 2 Design of the MX2 User's Manual (Cat. No. I570) or RX User's Manual (Cat. No. I578). In addition to this, provide sufficient clearance to allow connection and removal of the CompoNet connector. When connecting a cable, provide a sufficient allowance to prevent it from being pulled or bent.

2-2-4   Connector Wiring

You can use several types of communications cables for CompoNet network. Choose a flat cable or round cable that fits your application.
For how to connect cables and prepare/mount cable connectors, refer to Section 4 Installation and Wiring of the CS/CJ-series CompoNet Master Units Operation Manual (W456).

● **CompoNet connector signals**

	Color	Signal	Description
BS+ BDH BDL BS-	Red	BS+	Communications power supply (24 VDC)
	White	BDH	Communications data lines (High)
	Blue	BDL	Communications data lines (Low)
	Black	BS-	Communications power supply (0 VDC)

Precautions for Correct Use

The BS+ (communications power supply +) and BS- (communications power supply -) signals are not used in the CompoNet Communications Unit, so no connections are necessary.

3

Network Startup

This section describes inverter parameter settings and CompoNet settings/startup.

3-1 Inverter Configuration

To use the CompoNet Communications Unit, you need to configure node addresses and the necessary Remote I/O and other functions.

The configuration of the CompoNet Communications Unit is done through the rotary switches or parameters built into the MX2/RX-series Inverter.

This section describes the inverter parameters that must be configured to use the CompoNet Communications Unit.

Because the settings of the CompoNet Communications Unit vary depending on the type of the Remote I/O function to be used, information in this section is described for each of the following three types of Remote I/O.

Section	Name	Applicable Remote I/O	Outline
3-1-1	Basic and Extended Speed I/O Settings	Basic Speed I/O Extended Speed I/O Extended Speed and Acceleration Control	Types of Remote I/O that support general speed control applications.
3-1-2	Remote I/O Settings Using Torque Reference	Extended Speed and Torque Control Extended Control I/O Extended Control I/O and Multi function I/O Monitor	Types of Remote I/O that include the Torque Reference and other interfaces related to torque control. These Remote I/O types can be configured even if the torque reference is not used.
3-1-3	Special I/O and Flexible Format Settings	Special I/O Flexible Format	Types of Remote I/O that utilize Modbus communication, allowing flexible function selection.

> **Precautions for Correct Use**
>
> • For details about the Remote I/O function, refer to *Section 4 Remote I/O* on page 4-1.
> • Be sure to set the rotary switches and parameters if you install the CompoNet Communications Unit to an MX2/RX-series Inverter.

3-1-1 Basic and Extended Speed I/O Settings

Normally, inverter operation can be controlled using the Basic Speed I/O or Extended I/O function included as standard in CompoNet.

To set the acceleration/deceleration time, however, you need to use OMRON's unique Extended Speed and Acceleration Control function.

This section explains how to configure these three types of Remote I/O.

Inverter parameters can be configured using the Digital Operator, CX-Drive, or CX-Integrator.

Complete Parameter Display

By default, you cannot view all parameters. To display all parameters, set Display Selection (b037) to 00: Complete display.

Parameter No.	Function Name	Monitor or Data Range
b037	Display Selection	00: Complete display 01: Individual display of functions 02: User setting + b037 03: Data comparison display 04: Basic display 05: Monitor display only

CompoNet Node Address Setting

There are two ways of configuring the node address of a CompoNet Communications Unit.
- Use the rotary switches on the front of the Unit to set the node address in the range 0 to 63.
- Setting the rotary switches on the front of the CompoNet Communications Unit to 64 to 99 enables inverter parameters. Configure the node address by setting inverter parameter P190.

Parameter	Description	Setting
P190	CompoNet Node Address	0 to 63 (Default: 0)

Remote I/O Setting

Inverter parameter P046 (Assembly Instance No.) sets the type of Remote I/O.
Select the combination of output and input that fits your application requirements.
The settings for Basic Speed I/O, Extended Speed I/O, and Extended Speed and Acceleration Control are shown below.
- Basic Speed I/O: P046 = 00
- Extended Speed I/O: P046 = 01
- Extended Speed and Acceleration Control: P046 = 07

Parameter	Description	Setting	Assembly No. (hex)		No. of occupied bytes (No. of words)	
			Output	Input	Output	Input
P046	Assembly Instance No.	00: Basic Speed I/O	20	70	4 (2)	4 (2)
		01: Extended Speed I/O	21	71	4 (2)	4 (2)
		07: Extended Speed and Acceleration Control	110	111	8 (4)	8 (4)

Reset Mode Setting

For the MX2/RX-series, by default, the Reset mode is set to Always enabled. This means that resetting the inverter also resets the CompoNet Communications Unit, which in turn causes the communication connection to be reset.

To prevent the communication connection from being reset when the inverter is reset, OMRON recommends the following setting.

For details about this parameter, refer to the MX2 User's Manual (Cat. No. I570) or RX User's Manual (Cat. No. I578).

Parameter	Description	Setting
C102	Reset Selection	03: Trip reset only (recommended setting)

Detailed CompoNet Communications Unit Settings

The CompoNet Communications Unit can be configured in more detail using inverter parameters P044, P045, P048, and P049.

Set these parameters according to the following explanation.

● Detailed CompoNet Communications Unit Settings

Parameter	Description	Setting
P044	Communications Error Detection Timer Setting	Monitors data exchange between the inverter and the CompoNet Communications Unit. Normally, this parameter is not required. 0 to 9999 in units of 0.01 s. (Default: 1.00) 0: Disabled
P045	Operation Selection at Host Communications Error	Sets the inverter operation if an error such as a network error occurs. 00: Trip (Default) 01: Trip after deceleration stop 02: Ignore 03: Free-run stop 04: Deceleration stop
P048	Operation at Idle Mode Detection Setting	Sets the inverter operation in Network Idle mode. OMRON's CompoNet Master Units do not support transition to the Network Idle mode and therefore this parameter is not required. 00: Trip (Default) 01: Trip after deceleration stop 02: Ignore 03: Free-run stop 04: Deceleration stop
P049	Number of Poles for Rotation Speed Setting (For conversion to the rpm unit used in CompoNet communications)	Sets the number of poles on the motor. Use this parameter to execute inverter commands on CompoNet in rpm. 0/2/4/6/8/10/12/14/16/18/20/22/24/26/28/30/34/36/38/40/42/44/46/48 0 (Default): Frequency setting (in units of 0.01 Hz) Not 0: rpm (in units of rpm) Conversion equation: rpm = 120 x Frequency (Hz) / P049

Frequency Reference/RUN Command Settings

Inverter parameters A001 and A002 set Frequency reference selection and RUN command selection. When P046 is set to 0 (Basic Speed I/O), 1 (Extended Speed I/O), or 7 (Extended Speed and Acceleration Control), set these parameters according to the following table.

MX2 ● **Destination Selection Parameter Settings**

Parameter	Description	Setting
A001	1st Frequency Reference Selection	04: Option
A002	1st RUN Command Selection	

RX ● **Destination Selection Parameter Settings**

Parameter	Description	Setting
A001	1st Frequency Reference Selection	05: Option 2
A002	1st RUN Command Selection	

Precautions for Correct Use

To switch the Control Method using the REF (Net.Ref.) or CTR (Net.Ctrl.) bit signal, set as follows.

Bit	Name	Description
CTR	Net.Ctrl.	0: Follow the setting of parameter A002.
		1: Follow the reference from network.
REF	Net.Ref.	0: Follow the setting of parameter A001.
		1: Follow the reference from network.

• Set the Control Method to which you want to switch in parameter A001/A002.

Restarting the Inverter

Be sure to cycle the power supply of the MX2/RX-series Inverter to enable the changes.

Precautions for Correct Use

• Be sure that the POWER LED indicator is not lit when cycling the power supply of the MX2/RX-series Inverter. Note that the time until the light turns off varies with the inverter model.
• Some CompoNet Master Units in market may send Idle messages during specific events (start-up, PLC program mode, etc). In this case, consider to set Operation at Idle Mode Detection Setting (P048) to 02 (Ignore).

3-1-2   Remote I/O Settings Using Torque Reference

The MX2/RX-series Inverter provides the torque control function.
To enable torque control, use OMRON's unique Extended Speed and Torque Control, Extended Control I/O, or Extended Control I/O and Multi function I/O Monitor.
This section explains how to configure the Remote I/O settings using the torque reference.
Inverter parameters can be configured using the Digital Operator, CX-Drive, or CX-Integrator.

CompoNet Node Address Setting

There are two ways of configuring the node address of a CompoNet Communications Unit.
- Use the rotary switches on the front of the Unit to set the node address in the range 0 to 63.
- Setting the rotary switches on the front of the CompoNet Communications Unit to 64 to 99 enables inverter parameters. Configure the node address by setting inverter parameter P190.

Parameter	Description	Setting
P190	CompoNet Node Address	0 to 63 (Default: 0)

Remote I/O Setting

Inverter parameter P046 (Assembly Instance No.) sets the type of Remote I/O.
Select the combination of output and input that fits your application requirements.
Here, you configure the settings of Extended Speed and Torque Control, Extended Control I/O, or Extended Control I/O and Multi function I/O Monitor
- Extended Speed and Torque Control: P046 = 02
- Extended Control I/O: P046 = 04
- Extended Control I/O and Multi function I/O Monitor:P046 = 05

Parameter	Description	Setting	Assembly No. (hex)		No. of occupied bytes (No. of words)	
			Output	Input	Output	Input
P046	Assembly Instance No.	02: Extended Speed and Torque Control	123	173	6 (3)	6 (3)
		04: Extended Control I/O	101	151	8 (4)	8 (4)
		05: Extended Control I/O and Multi function I/O Monitor	101	153	8 (4)	9 (4.5)

Reset Mode Setting

For the MX2/RX-series, by default, the Reset mode is set to Always enabled. This means that resetting the inverter also resets the CompoNet Communications Unit, which in turn causes the communication connection to be reset.
To prevent the communication connection from being reset when the inverter is reset, OMRON recommends the following setting.
For details about this parameter, refer to the MX2 User's Manual (Cat. No. I570) or RX User's Manual (Cat. No. I578).

Parameter	Description	Setting
C102	Reset Selection	03: Trip reset only (recommended setting)

Detailed CompoNet Communications Unit Settings

The CompoNet Communications Unit can be configured in more detail using inverter parameters P044, P045, P048, and P049.
Set these parameters according to the following explanation.

● Detailed CompoNet Communications Unit Settings

Parameter	Description	Setting
P044	Communications Error Detection Timer Setting	Monitors data exchange between the inverter and the CompoNet Communications Unit. Normally, this parameter is not required. 0 to 9999 in units of 0.01 s. (Default: 1.00) 0: Disabled
P045	Operation Selection at Host Communications Error	Sets the inverter operation if an error such as a network error occurs. 00: Trip (Default) 01: Trip after deceleration stop 02: Ignore 03: Free-run stop 04: Deceleration stop
P048	Operation at Idle Mode Detection Setting	Sets the inverter operation in Network Idle mode. OMRON's CompoNet Master Units do not support transition to the Network Idle mode and therefore this parameter is not required. 00: Trip (Default) 01: Trip after deceleration stop 02: Ignore 03: Free-run stop 04: Deceleration stop
P049	Number of Poles for Rotation Speed Setting (For conversion to the rpm unit used in CompoNet communications)	Sets the number of poles on the motor. Use this parameter to execute inverter commands on CompoNet in rpm. 0/2/4/6/8/10/12/14/16/18/20/22/24/26/28/30/34/36/38/40/42/44/46/48 0 (Default): Frequency setting (in units of 0.01 Hz) Not 0: rpm (in units of rpm) Conversion equation: rpm = 120 x Frequency (Hz) / P049

Frequency Reference/RUN Command Settings

Inverter parameters A001 and A002 set Frequency reference selection and RUN command selection. When P046 is set to 2 (Extended Speed and Torque Control), 4 (Extended Control I/O), or 5 (Extended Control I/O and Multi function I/O Monitor), set these parameters according to the following table.

MX2   ● **Destination Selection Parameter Settings**

Parameter	Description	Setting
A001	1st Frequency Reference Selection	04: Option
A002	1st RUN Command Selection	

RX   ● **Destination Selection Parameter Settings**

Parameter	Description	Setting
A001	1st Frequency Reference Selection	05: Option 2
A002	1st RUN Command Selection	

Precautions for Correct Use

To switch the Control Method using the REF (Net.Ref.) or CTR (Net.Ctrl.) bit signal, set as follows.

Bit	Name	Description
CTR	Net.Ctrl.	0: Follow the setting of parameter A002. 1: Follow the reference from network.
REF	Net.Ref.	0: Follow the setting of parameter A001. 1: Follow the reference from network.

• Set the Control Method to which you want to switch in parameter A001/A002.

Torque Control Settings

To use torque control, configure the parameters related to torque control according to the MX2/RX-series Inverter User's Manual.
Configure the torque control parameters as follows if you want to use the Torque Reference or Torque Bias Mode on CompoNet Remote I/O.

MX2   ● **Torque Control Parameter Settings**

Parameter	Description	Setting
P033	Torque Reference Input Selection	06: Option
P036	Torque Bias Mode	05: Option

RX   ● **Torque Control Parameter Settings**

Parameter	Description	Setting
P033	Torque Reference Input Selection	07: Option 2
P036	Torque Bias Mode	06: Option 2

Restarting the Inverter

Be sure to cycle the power supply of the MX2/RX-series Inverter to enable the changes.

Precautions for Correct Use

- Be sure that the POWER LED indicator is not lit when cycling the power supply of the MX2/RX-series Inverter. Note that the time until the light turns off varies with the inverter model.
- Some CompoNet Master Units in market may send Idle messages during specific events (start-up, PLC program mode, etc). In this case, consider to set Operation at Idle Mode Detection Setting (P048) to 02 (Ignore).

3-1-3 Special I/O and Flexible Format Settings

Special I/O and Flexible Format that utilize the Modbus communication method enable you to control various inverter functions and parameters through the Remote I/O function.
This section describes how to configure these types of Remote I/O.
Inverter parameters can be configured using the Digital Operator, CX-Drive, or CX-Integrator.

CompoNet Node Address Setting

There are two ways of configuring the node address of a CompoNet Communications Unit.
- Use the rotary switches on the front of the Unit to set the node address in the range 0 to 63.
- Setting the rotary switches on the front of the CompoNet Communications Unit to 64 to 99 enables inverter parameters. Configure the node address by setting inverter parameter P190.

Parameter	Description	Setting
P190	CompoNet Node Address	0 to 63 (Default: 0)

Remote I/O Setting

Inverter parameter P046 (Assembly Instance No.) sets the type of Remote I/O.
Select the combination of output and input that fits your application requirements.
The settings for Special I/O and Flexible Format are shown below.
- Special I/O: P046 = 03
- Flexible Format: P046 = 06

Parameter	Description	Setting	Assembly No. (hex)		No. of occupied bytes (No. of words)	
			Output	Input	Output	Input
P046	Assembly Instance No.	03: Special I/O[*1]	100	150	8 (4)	8 (4)
		06: Flexible Format	139	159	16 (8)[*2]	16 (8)[*2]

*1   Special I/O differs from the conventional Special I/O in the data format.
*2   If you select Flexible Format, the number of occupied bytes (words) will change depending on the number of Modbus registers set in parameters P160 to 179.

Additional Information

The CompoNet Communications Unit supports read/write of double-word data. *4-4-2 Special I/O (100/150)* on page 4-17

Reset Mode Setting

For the MX2/RX-series, by default, the Reset mode is set to Always enabled. This means that resetting the inverter also resets the CompoNet Communications Unit, which in turn causes the communication connection to be reset.

To prevent the communication connection from being reset when the inverter is reset, OMRON recommends the following setting.

For details about this parameter, refer to the MX2 User's Manual (Cat. No. I570) or RX User's Manual (Cat. No. I578).

Parameter	Description	Setting
C102	Reset Selection	03: Trip reset only (recommended setting)

Detailed CompoNet Communications Unit Settings

The CompoNet Communications Unit can be configured in more detail using inverter parameters P044, P045, P048, and P049.

Set these parameters according to the following explanation.

● Detailed CompoNet Communications Unit Settings

Parameter	Description	Setting
P044	Communications Error Detection Timer Setting	Monitors data exchange between the inverter and the CompoNet Communications Unit. Normally, this parameter is not required. 0 to 9999 in units of 0.01 s. (Default: 1.00) 0: Disabled
P045	Operation Selection at Host Communications Error	Sets the inverter operation if an error such as a network error occurs. 00: Trip (Default) 01: Trip after deceleration stop 02: Ignore 03: Free-run stop 04: Deceleration stop
P048	Operation at Idle Mode Detection Setting	Sets the inverter operation in Network Idle mode. OMRON's CompoNet Master Units do not support transition to the Network Idle mode and therefore this parameter is not required. 00: Trip (Default) 01: Trip after deceleration stop 02: Ignore 03: Free-run stop 04: Deceleration stop
P049	Number of Poles for Rotation Speed Setting (For conversion to the rpm unit used in CompoNet communications)	For other types of Remote I/O that use CompoNet communications, the number of poles on the motor is set for the Rotation Rotation Speed Reference. However, this setting is disabled for Remote I/O types that utilizes Modbus communication. This parameter is fixed to the frequency value (0.01 Hz) regardless of the value you set.

Frequency Reference/RUN Command Settings

Inverter parameters A001 and A002 set Frequency reference selection and RUN command selection. When P046 is set to 3: Special I/O or 6: Flexible Format, Modbus communication is used. Set these parameters according to the following table.

MX2 ● **Destination Selection Parameter Settings**

Parameter	Description	Setting
A001	1st Frequency Reference Selection	03: Modbus communication (Modbus-RTU)
A002	1st RUN Command Selection	

RX ● **Destination Selection Parameter Settings**

Parameter	Description	Setting
A001	1st Frequency Reference Selection	03: Modbus communication (Modbus-RTU)
A002	1st RUN Command Selection	

Torque Control Settings

To use torque control, configure the parameters related to torque control according to the MX2/RX-series User's Manual.
To configure the Torque Reference and Torque Bias Mode settings through the Remote I/O function, set torque control parameters as follows.

MX2 ● **Torque Control Parameter Settings**

Parameter	Description	Setting
P033	Torque Reference Input Selection	03: Operator To input the torque reference through Special I/O or Flexible Format, allocate P034 to the torque reference.
P036	Torque Bias Mode	01: Operator To input the Torque Bias mode through Special I/O or Flexible Format, allocate 037 to the torque bias.

RX ● **Torque Control Parameter Settings**

Parameter	Description	Setting
P033	Torque Reference Input Selection	03: Operator To input the torque reference through Special I/O or Flexible Format, allocate P034 to the torque reference.
P036	Torque Bias Mode	01: Operator To input the Torque Bias mode through Special I/O or Flexible Format, allocate 037 to the torque bias.

Flexible Format Settings

The Flexible Format (Assembly 139/159) gives you the freedom to allocate inverter Modbus registers to Remote I/O devices. A maximum of 8 words can be allocated for input and output.
Please refer to *4-4 Special I/O and Flexible Format* on page 4-17 for details.

Parameter	Description	Setting
P160	Output Register 1 Contents	Modbus register allocated to general-purpose output word 1
P161	Output Register 2 Contents	Modbus register allocated to general-purpose output word 2
P162	Output Register 3 Contents	Modbus register allocated to general-purpose output word 3
P163	Output Register 4 Contents	Modbus register allocated to general-purpose output word 4
P164	Output Register 5 Contents	Modbus register allocated to general-purpose output word 5
P165	Output Register 6 Contents	Modbus register allocated to general-purpose output word 6
P166	Output Register 7 Contents	Modbus register allocated to general-purpose output word 7
P167	Output Register 8 Contents	Modbus register allocated to general-purpose output word 8
P168	Output Register 9 Contents	Not available for CompoNet Communications Unit
P169	Output Register 10 Contents	Be sure to set zeros.
P170	Input Register 1 Contents	Modbus register allocated to general-purpose input word 1
P171	Input Register 2 Contents	Modbus register allocated to general-purpose input word 2
P172	Input Register 3 Contents	Modbus register allocated to general-purpose input word 3
P173	Input Register 4 Contents	Modbus register allocated to general-purpose input word 4
P174	Input Register 5 Contents	Modbus register allocated to general-purpose input word 5
P175	Input Register 6 Contents	Modbus register allocated to general-purpose input word 6
P176	Input Register 7 Contents	Modbus register allocated to general-purpose input word 7
P177	Input Register 8 Contents	Modbus register allocated to general-purpose input word 8
P178	Input Register 9 Contents	Not available for CompoNet Communications Unit
P179	Input Register 10 Contents	Be sure to set zeros.

Restarting the Inverter

Be sure to cycle the power supply of the MX2/RX-series Inverter to enable the changes.

Precautions for Correct Use

- Be sure that the POWER LED indicator is not lit when cycling the power supply of the MX2/RX-series Inverter. Note that the time until the light turns off varies with the inverter model.
- Some CompoNet Master Units in market may send Idle messages during specific events (start-up, PLC program mode, etc). In this case, consider to set Operation at Idle Mode Detection Setting (P048) to 02 (Ignore).

3-1-4   Utilizing Multi-function Inputs/Outputs for Host

The multi-function inputs and multi-function outputs built into the inverter can be used as general-purpose inputs and outputs for the host.
Configure a type of Remote I/O that includes the multi-function input monitor and multi-function output commands (Extended Control I/O, Extended Control I/O and Multi function I/O Monitor, Special I/O, or Flexible Format) and set parameters as follows.

Multi-function Input Settings

MX2 ● **Multi-function Input Monitor Settings**

Parameter	Description	Setting
C001	Multi-function Input 1 Selection	no (255): No allocation Set these parameters to use the inverter inputs as the PLC's inputs.
C002	Multi-function Input 2 Selection	
C003	Multi-function Input 3 Selection	
C004	Multi-function Input 4 Selection	
C005	Multi-function Input 5 Selection	
C006	Multi-function Input 6 Selection	
C007	Multi-function Input 7 Selection	

RX ● **Multi-function Input Monitor Settings**

Parameter	Description	Setting
C001	Multi-function Input 1 Selection	no (255): No allocation Set these parameters to use the inverter inputs as the PLC's inputs.
C002	Multi-function Input 2 Selection	
C003	Multi-function Input 3 Selection	
C004	Multi-function Input 4 Selection	
C005	Multi-function Input 5 Selection	
C006	Multi-function Input 6 Selection	
C007	Multi-function Input 7 Selection	
C008	Multi-function Input 8 Selection	

Multi-function Output Settings

MX2 ● **Multi-function Output Terminal Parameter Settings**

Parameter	Description	Setting
C021	Multi-function Output Terminal P1/EDM Selection	63: OPO (Option) Set these parameters to use the inverter outputs as the PLC's outputs.
C022	Multi-function Output Terminal P2 Selection	
C026	Multi-function Relay Output Selection	

RX ● **Multi-function Output Terminal Parameter Settings**

Parameter	Description	Setting
C021	Multi-function Output Terminal P1/EDM Selection	63: OPO (Option) Set these parameters to use the inverter outputs as the PLC's outputs.
C022	Multi-function Output Terminal P2 Selection	
C023	Multi-function Output Terminal P3 Selection	
C024	Multi-function Output Terminal P4 Selection	
C025	Multi-function Output Terminal P5 Selection	
C026	Multi-function Relay Output Selection	

3-2   Network Configuration

CompoNet communications start automatically just by connecting the communications wiring and turning ON the Master Unit (PLC) and inverters, and then the I/O Memory Areas of the CPU Unit and Slave Units start sharing the data.
Each Slave Unit is fixedly allocated to the Special I/O Unit allocation relay areas of the CPU Unit in order of node addresses.

For details about configuring the Master Units (Model: CJ1W-CRM21 and CS1W-CRM21), refer to the CompoNet Master Units Operation Manual (Cat. No. W456).

3-2-1   EDS File Installation

For each combination of the MX2/RX-series Inverter model and the CompoNet Communications Unit, a dedicated EDS file is required. EDS files provide the parameter data (defaults and ranges) for the inverter that CX-Integrator utilizes.
EDS files for CompoNet Communications Units are installed on a CX-Integrator with the following version or higher.
Note that EDS files are not installed on a CX-Integrator with a version lower than the following version. Please update CX-ONE or CX-Integrator.
• CX-One Ver. 4.26
• CX-Integrator Ver. 2.55

3-2-2   CompoNet Communications Network Configuration

CompoNet communications network can be configured by setting the allocation relay areas used by the Master Unit and the node address of each Slave Unit. The following provides information on the configuration of a CompoNet communications network.

Setting Allocation Relay Areas

The Master Unit's allocation relay areas are determined by settings of the Special I/O Unit number (Machine No.) and communications mode number (MODE) rotary switches.
When the communications mode is set to 0 to 3, Slave Units are allocated to the Special I/O Unit allocation relay area of the CPU Unit with the mounted CompoNet Master Unit.
When the communications mode is set to 8, Slave Units are allocated to the allocation relay areas which are configured with the network configuration tool CX-Integrator.

Master Unit MODE
Rotary Switch Setting
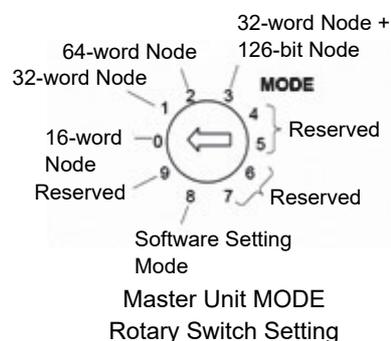
Communications Mode No.	Node Addresses of Word Slaves Connectable per Master Unit	First Allocation Address	Occupied Unit No.	Word Slave OUT Area	Word Slave IN Area	Bit Slave Support
0	IN8/OUT8	CIO 2000 + (10 x Unit No.)	2	CIO (First address + 0 to 7)	CIO (First address + 8 to 15)	Not available
1	IN16/OUT16	CIO 2000 + (10 x Unit No.)	4	CIO (First address + 0 to 15)	CIO (First address + 16 to 31)	Not available
2	IN32/OUT32	CIO 2000 + (10 x Unit No.)	8	CIO (First address + 0 to 31)	CIO (First address + 32 to 63)	Not available
3	IN16/OUT16	CIO 2000 + (10 x Unit No.)	8	CIO (First address + 0 to 15)	CIO (First address + 16 to 31)	Available[*1] (64 node addresses max.)
8	IN64/OUT64	CIO 2000 + (10 x Unit No.)	1	Configured via CX-Integrator (64 words max.)	Configured via CX-Integrator (64 words max.)	Available[*1] (128 node addresses max.)

*1   For the allocation relay areas for Bit Slave Units, refer to the CS/CJ-series CompoNet Master Units Operation Manual (W456).

Additional Information

For the maximum number of inverter connections, refer to *1-2-4 Maximum Number of Inverter Connections* on page 1-10.

Setting Slave Node Addresses

In CompoNet communications, each Slave's node address must be set according to the following rules.
- Slaves are allocated to the allocation relay areas in order starting with node address 0.
- If the maximum number of occupied input or output words is greater than 1 word, the Slave occupies more than one node address.
- If the maximum number of occupied input or output words is less than 1 word, the Slave occupies 1 word (node address).
- Node addresses can be distributed as long as the I/O area occupied by one Slave is not overlapping with the I/O area occupied by another Slave that occupies more than one node address.
- Bit Slaves can be used only in communications mode 3 or 8, where Bit Slave allocation areas are supported.

An example of configuring allocation relay areas in communication mode 1 is shown below. For each slave, set the node address enclosed in brackets [ ].

Allocation Address	Output Allocation Relay Area			Input Allocation Relay Area		
	Allocation Relay	15 to 0		Allocation Relay	15 to 0	
00	CIO 2000	32-point Output Unit [Node Address 0]		CIO 2016	– (Not allocatable)	
01	CIO 2001			CIO 2017	– (Not allocatable)	8-point Input Unit[*1] [Node Address 1]
02	CIO 2002	This CompoNet Communications Unit [Node address 2] Extended Speed I/O setting: Occupies 2 output words		CIO 2018	This CompoNet Communications Unit [Node address 2] Extended Speed I/O setting: Occupies 2 input words	
03	CIO 2003			CIO 2019		
04	CIO 2004	This CompoNet Communications Unit [Node address 4] Extended Control I/O setting: Occupies 4 output words		CIO 2020	This CompoNet Communications Unit [Node address 4] Extended Control I/O setting: Occupies 4 input words	
05	CIO 2005			CIO 2021		
06	CIO 2006			CIO 2022		
07	CIO 2007			CIO 2023		
08	CIO 2008	– (Not allocatable)		CIO 2024	32-point Input Unit [Node Address 8][*1]	
…	…	…		…	…	

*1   Node addresses are distributed because the area occupied by a 32-point Output Unit, which occupies more than one node address, is not overlapping with the area occupied by an 8-point Input Slave.

3-2-3   Allocation to Special I/O Unit Allocation Relay Area (Communications Mode No. 0 to 3)

Allocation to the Special I/O Unit allocation relay area can be performed without CX-Integrator. Follow the steps below.

1   **Power on the inverter(s) first and configure the following settings according to *3-1 Inverter Configuration* on page 3-2.**
   • Set the node address. According to *Setting Slave Node Addresses* on page 3-15, set the rotary switches or CompoNet node address (P190).
   • Set the type of Remote I/O. Set inverter parameter P046 (Assembly Instance No.) that suits your application.

Precautions for Correct Use

   • Be sure to set the type of Remote I/O at this point. No. of occupied words by the CompoNet Communications Unit varies with the Remote I/O type. Unless the Remote I/O type is set correctly, automatic network configuration cannot be completed successfully.
   • To connect additional CompoNet Slaves, set the node addresses for them simultaneously at this point.

2   **Set the Special I/O Unit number (Machine No.) and communications mode number (MODE) rotary switches on the Master Unit. Cycle the power supply of the inverter. Then, power on all network components (Master Unit, other Slaves, communications power supply, etc.).**

3   **Once the inverter(s) and all network components are powered on, check that the CompoNet Communications Unit's LED indicators indicate normal operation.**
   If everything is correctly configured, both the MS (Module Status) LED and the NS (Network Status) LED are lit green.
   If the LED indicators indicate a different pattern, please refer to *Section 6 Troubleshooting* on page 6-1 to take corrective action.

3-2-4   Allocation Using CX-Integrator (Communication Mode 8)

1 **At first, set the rotary switch on the front of the CompoNet Master Unit (CS/CJ-series) to 8 and power on the Master Unit.**

2 **Connect CX-Integrator to the CS/CJ-series and click the Auto Online icon [ ] in the CX-Integrator toolbar to establish Auto Online connection.**
When connected successfully, CX-Integrator displays the online status and the target PLC information in the [Online Connection Information window].

3 **In the Online Connection Information window, right-click the CompoNet Communications Unit under the target PLC and select [Connect].**
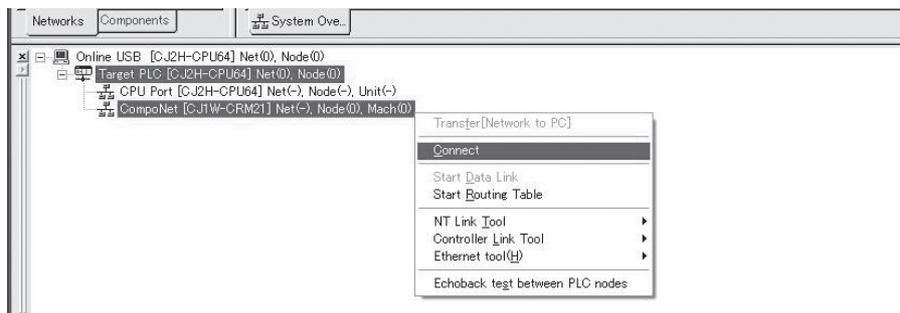
4 **When connected to the Master Unit, the Transfer dialog box is displayed, prompting you to select the data you want to transfer.**
Select the target data and click the [Transfer] button. Here, select [Network structure only].
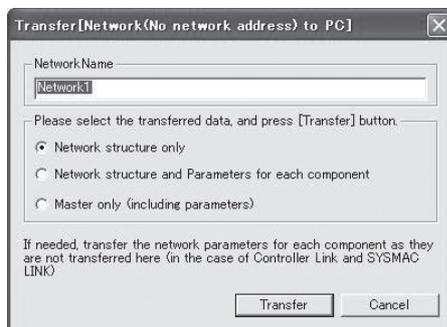
📝 **Precautions for Correct Use**

The [Network structure and Parameters for each component] option requires a parameter transfer time of approximately 15 seconds per node.
This means that it may take as much as approximately 100 minutes for the transfer process to complete.

5 **In the Network Configuration window, the network configuration transferred to the PC is displayed.**

6 **In the network configuration window, double-click the Master Unit, or right-click and select [Parameter] - [Edit].**

The Master Unit's Parameter dialog is displayed.
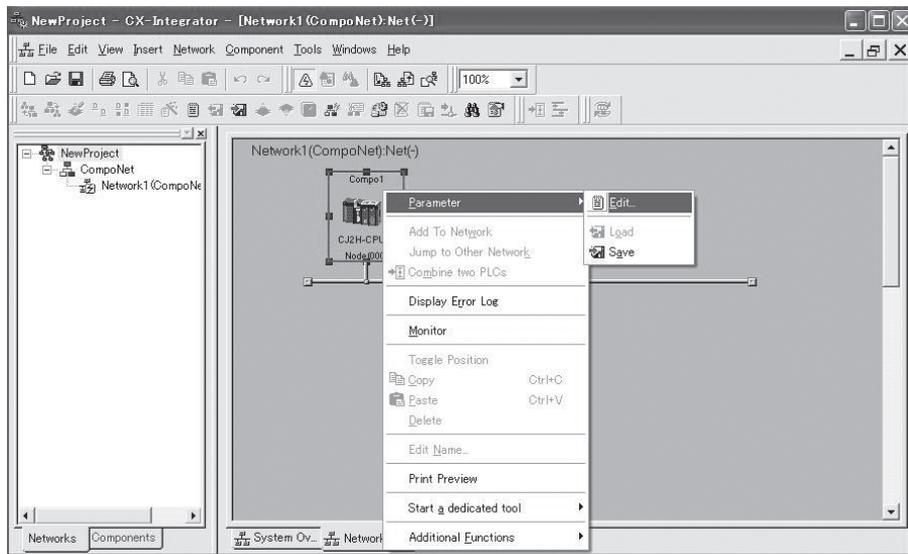
7 **On the [General] tab of the Parameter Configuration dialog box, select the [Edit Software Setting Table] check box.**

Select the [Software Setting Table] tab displayed.
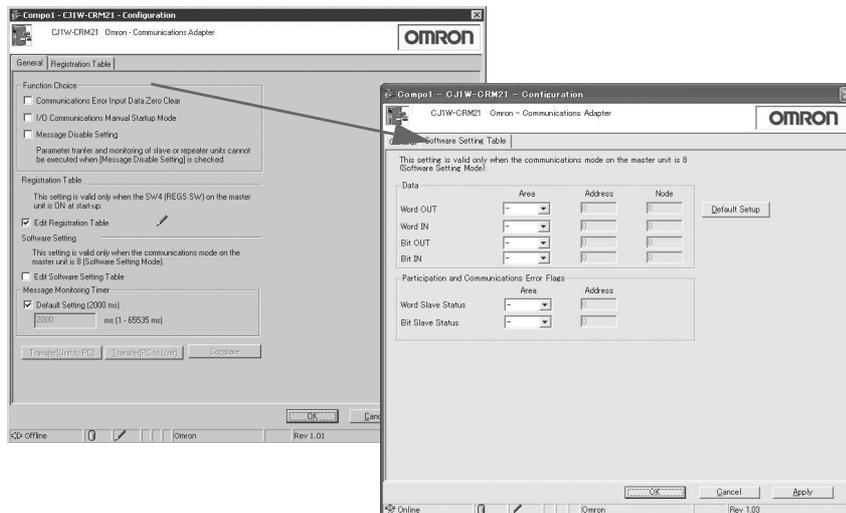
8 **Set the area type, first address, and allocation size for each allocation area.**
- Area type: In [Area], select the memory type of the CPU Unit.
- First address: In [Address], select the first address of the area.
- Allocation size: In [Node], set the number of occupied node addresses.
  For the CompoNet Communications Unit, the number of occupied node addresses can be calculated as No. of I/O words occupied by Remote I/O x No. of Units.
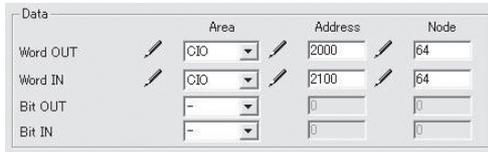
Data and Participation Flags/Communications Error Flags can be allocated to the following areas.

Data	Area (I/O Memory Area Type)	Address (First allocation address for each specified area type)	Number of Nodes (No. of occupied node addresses)
WORD OUT	CIO, DM, WR, or HR area	Any address can be set for each area type.	64 max.
WORD IN			64 max.
BIT OUT			128 max.
BIT IN			128 max.

Participation Flags/ Communications Error Flags	Area (I/O Memory Area Type)	Address (First allocation address for each specified area type)	Allocated Contents
Word Unit	CIO, DM, WR, or HR area	Any address can be set for each area type.	Word slave status (1 word), Setting parameter (1 word), Participation/Communications Error Flags (16 words)
Bit Unit			Bit Slave Participation Flags/Communications Error Flags (32 words)

9 **Click the [Apply] button.**
The settings are saved and you return to the [General] tab.

10 **On the [General] tab, click the [Transfer [PC to Unit]] button.**
The settings are transferred to the Master Unit.

11 **Set CX-Integrator offline and power off the CompoNet Communications Unit (CS/CJ-series).**

12 **Power on the inverter(s) and configure the following settings according to *3-1 Inverter Configuration* on page 3-2.**
- Set the node address. According to *Setting Slave Node Addresses* on page 3-15, set the rotary switches or CompoNet node address (P190).
- Set the type of Remote I/O. Set inverter parameter P046 (Assembly Instance No.) that suits your application.

Precautions for Correct Use

- Be sure to set the type of Remote I/O at this point. The number of words occupied by the CompoNet Communications Unit varies with the Remote I/O type. Unless the Remote I/O type is set correctly, automatic network configuration cannot be completed successfully.
- To connect additional CompoNet Slaves, set the node addresses for them simultaneously.

13 Cycle the power supply of the inverter. Then, power on all network components (Master Unit and other Slaves).

14 Once the network is restarted with the new settings, check that the CompoNet Communications Unit's LED indicators indicate normal operation.

If everything is correctly configured, both the MS (Module Status) LED and the NS (Network Status) LED are lit green.

If the LED indicators indicate a different pattern, please refer to *Section 6 Troubleshooting* on page 6-1 to take corrective action.

Precautions for Correct Use

- When downloading inverter parameters in the [Parameter Dialog] in CX-Integrator, always check that the Remote I/O setting parameter P046 (Assembly Instance No.) is set correctly. If a different parameter setting is transferred, the number of words occupied by the CompoNet Communications Unit will be changed, which affects the network configuration.
- For a third-party Master, configure the network according to the Master Unit's configuration steps.

Additional Information

The Master Unit checks the connection information on each slave and automatically allocates the output and input data of the Slaves to the data areas of the CS/CJ-series.

3-2-5   Registration Table Configuration

The Registration Table function registers each node address of Slave Units which should participate in the network, and checks the participating Slave Units.

The function is enabled only when a type of Remote I/O that occupies IN 2/OUT 2 words (Basic Speed I/O or Standard I/O) is selected. The Register Table function is used in the following cases.

- Checking the Slaves participating in the network against the Slaves you configured.
- Preventing unregistered Slaves or Slaves with unmatched node addresses or models from participating in the network.

The Registration Table function is enabled only when the REGA switch on the Master Unit is ON and the CompoNet communications network operates normally.

The following explains how to configure the Registration Table function using CX-Integrator.

Precautions for Correct Use

The Registration Table function is enabled when a type of Remote I/O that occupies other than IN 2/OUT 2 words (Basic Speed I/O or Standard I/O) is selected on the CompoNet Communications Unit. In this case, registering and enabling a Registration Table causes the NS LED indicator on the CompoNet Communications Unit to remain flashing and therefore CompoNet communications cannot be established.

1 **Power on the inverter(s) first and configure the following settings according to *3-1 Inverter Configuration* on page 3-2.**

- Set the node address. According to *Setting Slave Node Addresses* on page 3-15, set the rotary switches or CompoNet node address (P190).
- Set the type of Remote I/O. Set inverter parameter P046 (Assembly Instance No.) to 0 (Basic Speed I/O) or 1 (Extended Speed I/O).

Precautions for Correct Use

- Be sure to set the type of Remote I/O at this point. The number of words occupied by the CompoNet Communications Unit varies with the Remote I/O type. Unless the Remote I/O type is set correctly, automatic network configuration cannot be completed successfully.
- To connect additional CompoNet Slaves, set the node addresses for them simultaneously.

2 **With the REGA switch on the front of the Master Unit set to ON, cycle the power supply of the inverter. Then, power on all network components (Master Unit, other Slaves, and Communications power supply). Then, to configure the network, start the network configuration tool CX-Integrator.**

3 **Click the Auto Online icon [🔍] in the CX-Integrator toolbar to establish Auto Online connection.**

When connected successfully, CX-Integrator displays the online status and the target PLC information in the [Online Connection Information window].

4 **In the Online Connection Information window, right-click the CompoNet Communications Unit under the target PLC and select [Connect].**
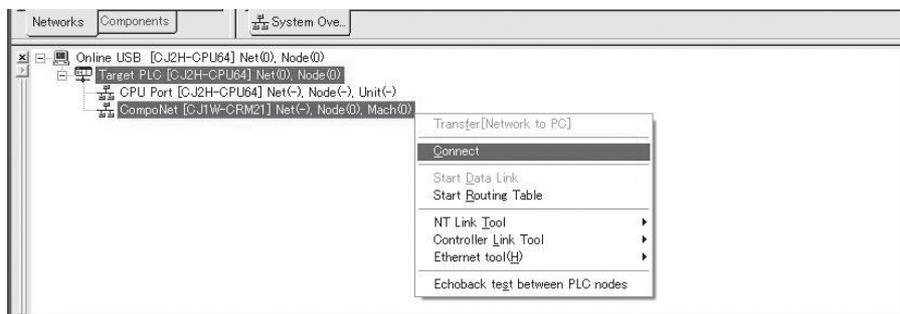
5 **The Transfer dialog box is displayed, prompting you to select the data you want to transfer.**

Select the target data and click the [Transfer] button. Here, select [Network structure only].
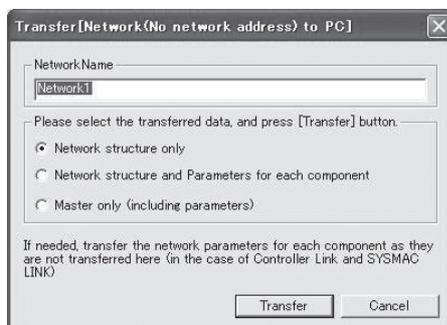
Precautions for Correct Use

The [Network structure and Parameters for each component] option requires a parameter transfer time of approximately 15 seconds per node.
This means that it may take as much as approximately 100 minutes for the transfer process to complete.

6 **In the Network Configuration window, the network configuration transferred to the PC is displayed.**
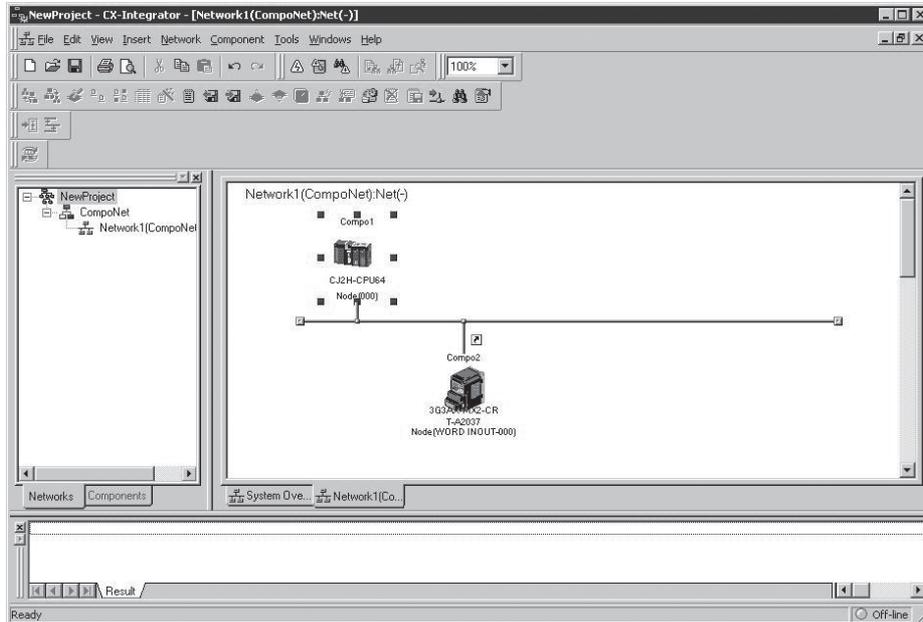

7 **In the Network Configuration window, double-click the Master Unit, or right-click and select [Parameter] - [Edit].**
The Master Unit's Parameter dialog is displayed.
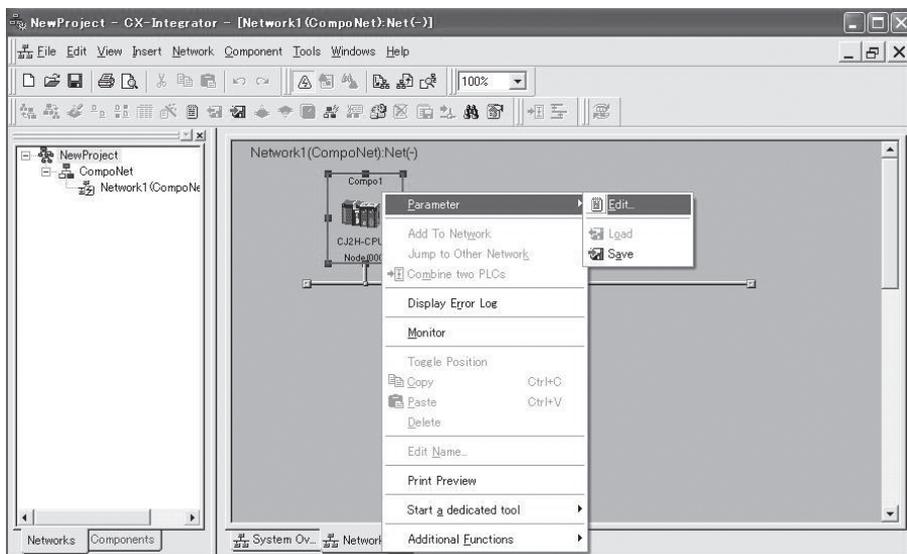
8 **On the [General] tab of the Parameter Configuration dialog box for the Master Unit, select the [Edit Registration Table] check box.**
When you select the [Registration Table] tab, the Slaves in the Network Configuration window are displayed in the [Unregistered Device List].
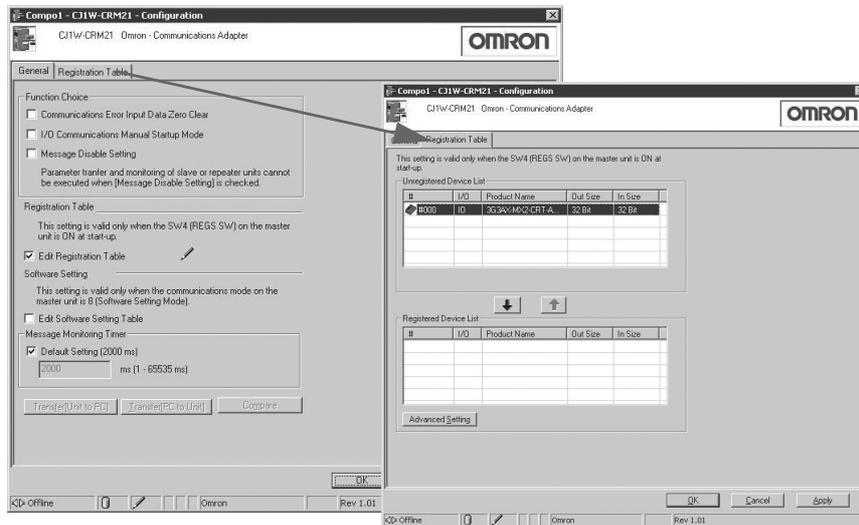
9 **Select the Slave you want to register from the [Unregistered Device List] and click the Register [↓] button.**
The Slave Units will be registered and displayed in order of node address in the Registered Device List.

10 **To unregister a Slave, select the Slave you want to unregister from the [Registered Device List], and click the Unregister [↑] button.**
Slave Units you unregister will be displayed again in the [Unregistered Device List].

11 **Click the [Apply] button to save the Registration Table.**
You return to the [General] tab.

12 **On the [General] tab, click the [Transfer [PC to Unit]] button.**
The settings are now transferred to the Master Unit.

13 **At the end of the configuration steps, restart the network (cycle the power supply) and check the MS and NS LED indicators on the Master Unit and on each Slave Unit to verify that the network is established successfully.**
If everything is correctly configured, both the MS (Module Status) LED and the NS (Network Status) LED are lit green.
If the LED indicators indicate a different pattern, please refer to *Section 6 Troubleshooting* on page 6-1 to take corrective action.

Precautions for Correct Use

- When downloading inverter parameters in the [Parameter Dialog] in CX-Integrator, always check that the Remote I/O setting parameter P046 (Assembly Instance No.) is set correctly. If a different parameter setting is transferred, the number of words occupied by the CompoNet Communications Unit will be changed, affecting the network configuration.
- For a third-party Master, configure the network according to the Master Unit's configuration steps.

3-3   Editing Parameters in Parameter Dialog with EDS File

In CompoNet communications, EDS files are used to establish communication connection.
EDS files for CompoNet Communications Units are installed with CX-Integrator (Ver. 2.55 or higher).
Using a correct EDS file, you can edit inverter parameters in the [Parameter Dialog].
This section describes how to use an EDS file for editing device parameters and the functional restrictions applied when using it.

3-3-1   How to Edit Parameters in Parameter Dialog with EDS File

In CX-Integrator, double-click the CompoNet Communications Unit displayed in the Network Configuration window. Then, the [Parameter Dialog] opens. The [Parameter Dialog] provides the following functions.

Function	Detailed Description
Parameter group selection	Inverter parameters are divided into groups A to P. You can select the parameter group that is displayed in the Parameter Edit window.
Parameter Edit window	The window where you can edit the set inverter parameter values. To edit a currently set parameter value, double-click the Value area for that parameter. However, you cannot edit the value of any read-only parameter.
Upload inverter parameters	When CX-Integrator is connected online, clicking the [Transfer [Unit to PC]] button causes all the inverter parameter settings to be uploaded via CompoNet communications. Remember that the uploaded settings will overwrite the parameter values displayed in the Parameter Edit window. Before uploading, be sure to save the edited data.[1]
Download inverter parameters	When CX-Integrator is connected online, clicking the [Transfer [PC to Unit]] button causes all the inverter parameter settings to be downloaded via CompoNet communications.[2]
Compare inverter parameters	When CX-Integrator is connected online, clicking the [Compare] button causes all the current inverter parameter settings to be compared against the set values displayed in the Parameter Edit window via CompoNet communications. Any mismatch parameters detected in the comparison process will be displayed in a pop-up window.[3]
Reset CompoNet Communications Unit	When CX-Integrator is connected online, clicking the [Restart] button causes the CompoNet Communications Unit to be hard reset. Note that this also causes the CompoNet Communications Unit to be once disconnected from the network.
Reset edited data to default settings	Clicking the [Default Setup] button causes the edited parameter data in the Parameter Edit window to revert to the initial values. However, this operation does not affect the parameters stored in inverters connected via CompoNet.
Save edited data	When you finished editing data in the [Edit Device Parameter] screen, click [OK] and then save the project. This saves not only the project settings, but also the edited data.

*1 When the data was uploaded, the value of the parameter 0406 (Write to EEPROM) is 0. When you download the parameter data next time, change this value to 2. Otherwise, your changes will not be saved in the inverter EEPROM.

*2 The download process may be stopped if a problem occurs when downloading inverter parameters.
To be able to save the downloaded data into the inverter EEPROM, make sure that parameter 0406 (Write to EEPROM) is set to 2.

*3   Parameters with dXXX indicate monitor functions. These parameters cause no problem even if detected in the comparison process.
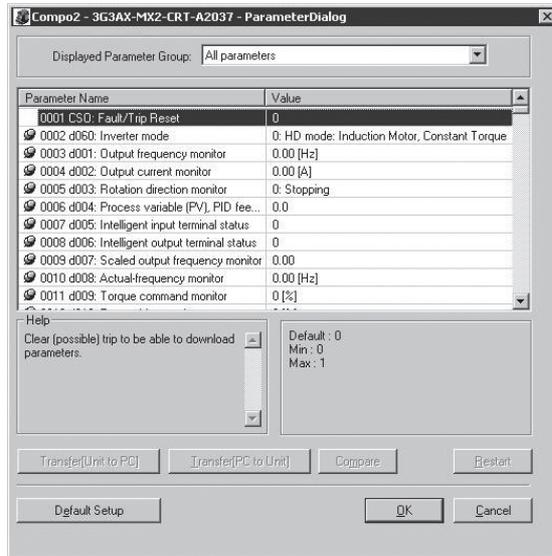
3-3-2   Restrictions of Edit Device Parameters Function with EDS File

Each function in the [Parameter Dialog] is accomplished by using the EDS file and Explicit Message functions defined in the CompoNet Communications.

This means that, if an error occurs in sending/receiving an Explicit Message, [Parameter Dialog] cannot function. In particular, the upload/download function sends Explicit Messages in order of the parameters list in EDS files. An error affects significantly these functions to read and write inverter parameters. If an error occurs in sending/receiving an Explicit Message, the upload/download process will be interrupted.

An error occurs due to environmental factors such as noise in the transmission path as well as due to the restrictions on inverter parameters as shown below.

If the upload/download process is interrupted, try to avoid the following causes.

If these are hardly unavoidable, change to editing parameters from CX-Drive according to *3-4 Editing Parameters with CX-Drive* on page 3-28.

Error contents	Detailed Description
Error due to restrictions between parameters	Some inverter parameters put restrictions on other inverter parameters. These restrictions are shown in the following table. Change the parameter settings to avoid the restrictions. If this is not possible, edit the parameter settings from CX-Drive.
Parameter setting range error	The download process will be interrupted if the data contains a set value that exceeds the upper or lower limit of the parameter setting range. This occurs, for example, if the parameter setting range is set by another parameter. Check the restriction in the following table and change the parameter setting accordingly. [1]
Writing to a write-prohibit parameter.	The download process will be interrupted if you write a set value to a write-prohibit parameter. Check if the following conditions exist and take corrective action.[1] • Downloading while the inverter operates. • Soft Lock Selection (b031) is set to write-prohibit parameter.

Error contents	Detailed Description
Reading from a read-prohibit parameter.	When using the Light Load mode, some parameters are write-prohibited or read-only. Therefore, in the Light Load mode, you cannot use the functions provided in the [Parameter Dialog]. Always use CX-Drive to edit the inverter parameters.
Set values are not stored in EEPROM.	In order to download parameters in the [Parameter Dialog], you need to set the last parameter Write to EEPROM to a correct value.[2] 0: Recalculate motor parameters (Data not saved to EEPROM). 1: Store set values (Data saved to EEPROM). 2: Recalculate motor parameters and stores set values (Data saved to EEPROM).

*1   When using the Light Load mode, always edit the inverter parameters from CX-Drive.
The CompoNet Communications Unit cannot be used in the High Frequency mode and the PM Motor mode.

*2   When the data was uploaded from an inverter, the value of the parameter Write to EEPROM is read as 0.
When downloading the parameter data next time, be sure to set the parameter value again.

Precautions for Correct Use

- To write the parameter data downloaded from the [Parameter Dialog] (in CX-Integrator) to the inverter's EEPROM, set the parameter Write to EEPROM to 1 or 2.
- When uploading parameters from an inverter in the [Parameter Dialog] (in CX-Integrator), the value of the parameter Write to EEPROM is read as 0. When downloading the parameter data next time, be sure to set Write to EEPROM again.
- When downloading inverter parameters from the [Parameter Dialog], check that the Remote I/O setting parameter P046 (Assembly Instance No.) is set correctly. If a different parameter setting is transferred, the number of words occupied by the CompoNet Communications Unit will be changed, which affects the network configuration.
- When using the inverter in the Light Load mode, always edit the inverter parameters from CX-Drive.
- In the High Frequency mode and the PM Motor mode, the CompoNet Communications Unit cannot be used.

Restrictions between Parameters		
Multi-function Input Selection 1 to 8 (C001 to C008)	=	Multi-function Input Selection 1 to 8 (C001 to C008)[1]
1st Frequency Upper Limit (A061)	>	1st Maximum Frequency (A004)
1st Frequency Lower Limit (A062)	>	1st Maximum Frequency (A004)
Output Frequency Setting (F001), 1st Multi-step Speed Reference 0 (A020)	>	1st Maximum Frequency (A004)
Output Frequency Setting (F001), 1st Multi-step Speed Reference 0 (A020)	>	1st Frequency Upper Limit (A061)
1st Frequency Lower Limit (A062)	>	Output Frequency Setting (F001), 1st Multi-step Speed Reference 0 (A020)
Starting Frequency (B082)	>	1st Frequency Upper Limit (A061)
Starting Frequency (B082)	>	1st Frequency Lower Limit (A062)
Starting Frequency (B082)	>	Output Frequency Setting (F001), 1st Multi-step Speed Reference 0 (A020)
Starting Frequency (B082)	>	Jogging Frequency (A038)
Output Frequency Setting (F001), 1st Multi-step Speed Reference 0 (A020)	=	Jump Frequency[1] (A063/A065/A067 ± A064/A066/A068)
Multi-step Speed Reference 1 to 15 (A021 to A035)	=	
Free V/f Frequency 7 (B112)	>	1st Frequency Upper Limit (A061)
Free V/f Frequency 7 (B112)	>	1st Frequency Lower Limit (A062)
Free V/f Frequency 7 (B112)	>	Output Frequency Setting (F001), 1st Multi-step Speed Reference 0 (A020)
2nd Frequency Upper Limit (A261)	>	2nd Maximum Frequency (A204)
2nd Frequency Lower Limit (A262)	>	2nd Maximum Frequency (A204)
Output Frequency Setting (F001), 2nd Multi-step Speed Reference 0 (A220)	>	2nd Maximum Frequency (A204)
Output Frequency Setting (F001), 2nd Multi-step Speed Reference 0 (A220)	>	2nd Frequency Upper Limit (A261)
2nd Frequency Lower Limit (A262)	>	Output Frequency Setting (F001), 2nd Multi-step Speed Reference 0 (A220)
Starting Frequency (B082)	>	2nd Frequency Upper Limit (A261)
Starting Frequency (B082)	>	2nd Frequency Lower Limit (A262)
Starting Frequency (B082)	>	Output Frequency Setting (F001), 2nd Multi-step Speed Reference 0 (A220)
Output Frequency Setting (F001), 2nd Multi-step Speed Reference 0 (A220)	=	Jump Frequency[2] (A063/a065/a067 ± A064/A066/a068)
Free V/f Frequency 7 (B112)	>	2nd Frequency Upper Limit (A261)
Free V/f Frequency 7 (B112)	>	2nd Frequency Lower Limit (A262)
Free V/f Frequency 7 (B112)	>	Output Frequency Setting (F001), 2nd Multi-step Speed Reference 0 (A220)

*1 The process will be terminated abnormally if the same set value exists in Multi-function input selection 1 to 8. The process will also be terminated abnormally if, when setting values in the order of Multi-function input selection 1 to 8, the value already set for a latter parameter is set for a preceding parameter.

*2 The process will be terminated if the frequency set for F001, A020, A220, or A021 to A035 is within the frequency range set for Jump frequency.

3-4   Editing Parameters with CX-Drive

The Inverter/Servo support tool CX-Drive is the support software to edit inverter parameters.
Installing the OMRON CX-One software simultaneously installs CX-Drive onto the PC.
CX-Drive enables you to connect your PC to the RJ45 or USB connector of an inverter to directly edit its parameters.
In addition, CX-Drive can be connected to the CS/CJ-series CPU Unit so that you can edit inverter parameters via CompoNet communications. (This feature is supported in Ver.2.6 or higher.)
This section describes how to connect CX-Drive via CompoNet to your inverter and provides a functional outline of CX-Drive.
For the functional details of CX-Drive, refer to the CX-Drive Operation Manual (Cat. No. W453).

3-4-1   Connecting CX-Drive (via CompoNet)

There are two ways to connect CX-Drive to your inverter via CompoNet.
In this section, the connection procedures for these methods are described in the following order.
• Connecting to the inverter by registering its connection type
• Automatically detecting the connected inverter

Connecting to the Inverter by registering its connection type

In this method, you connect CX-Drive to your inverter after creating a new inverter project and setting its connection type.
Follow the steps below.

1   **Start CX-Drive and select [File] - [New] to create a new project.**
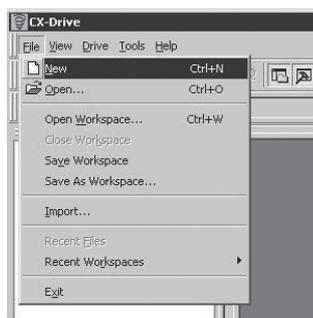
2 **In the New Drive window, select the Drive Type of the inverter and the Option Board Type.**

In the [Drive Type] section, select the inverter series and click the [Settings] button to the right.
In the Drive Type Settings window, select the Installation type/Option, Voltage Class, and Maximum Motor Capacity and, in the Option Board Type section, select CRT (CompoNet Communications Unit).
After selecting, click the OK button to close the Drive Type Settings window.
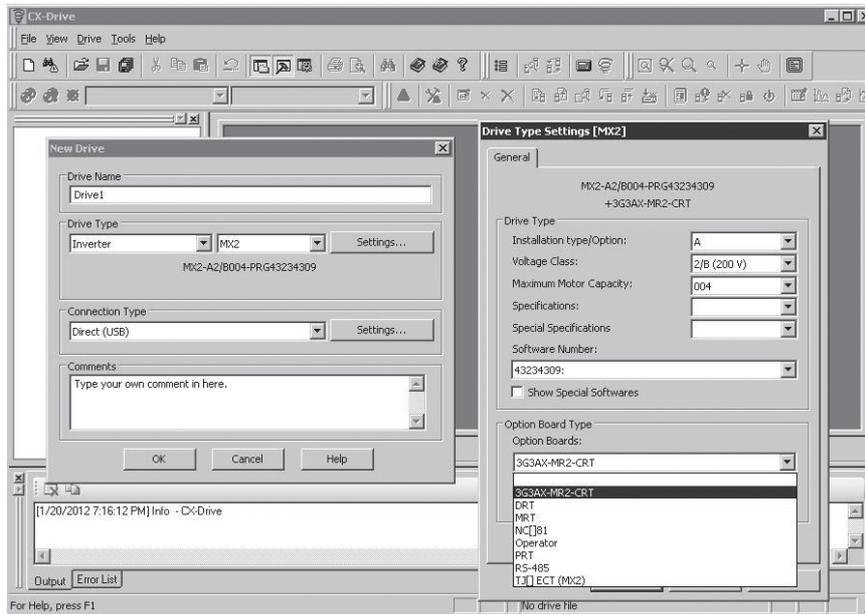
3 **Next, in the New Drive window, select the type of connection to the inverter.**

In the [Connection Type] section, select "Via PLC (CompoNet)" and click the [Settings] button to the right.
On the [Network] tab, select the Slave Unit Address. You do not need to set the Master Unit Address.
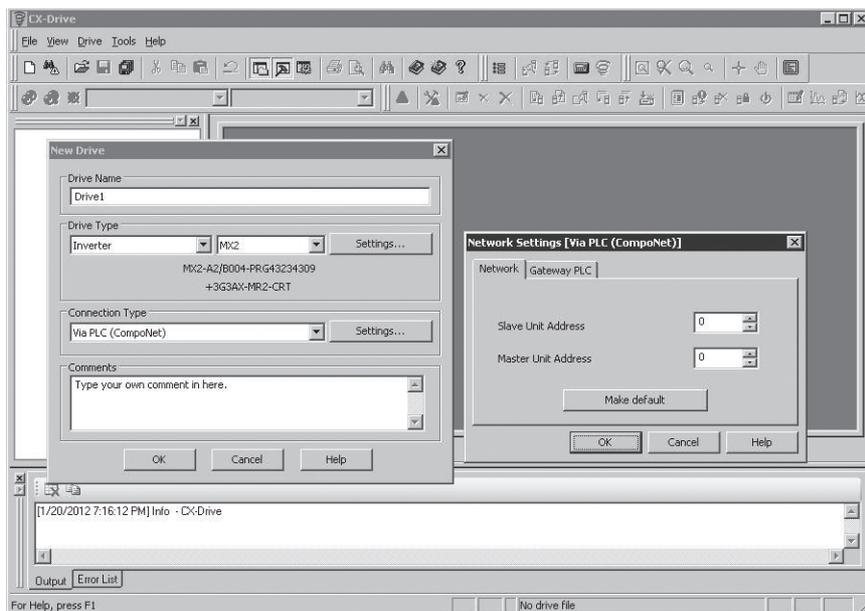
4 **Click the [Gateway PLC] tab and select the type of connection between CX-Drive and the CS/CJ-series CPU Unit.**

Click the [Properties] button and configure the following settings.
- Device Type: Select the model of the CPU Unit to which CX-Drive is connected.
- Network Type: Select the network via which CX-Drive is connected to the CPU Unit.
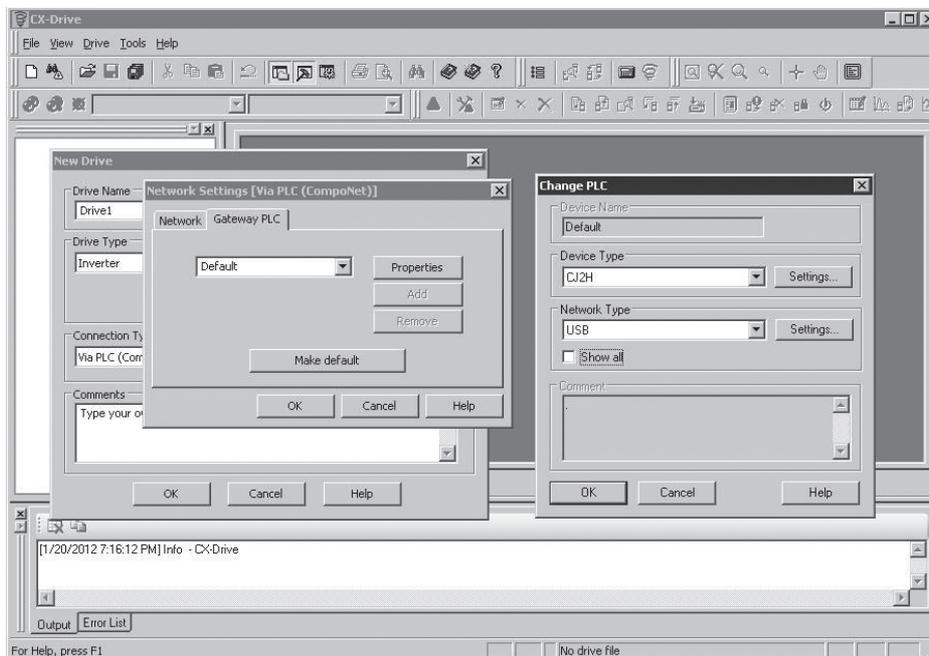
5 **When the above settings are done, use the [OK] button to close all the windows. A new project is registered in the workspace.**

You can click the Work Online button [⚠] to connect the inverter.
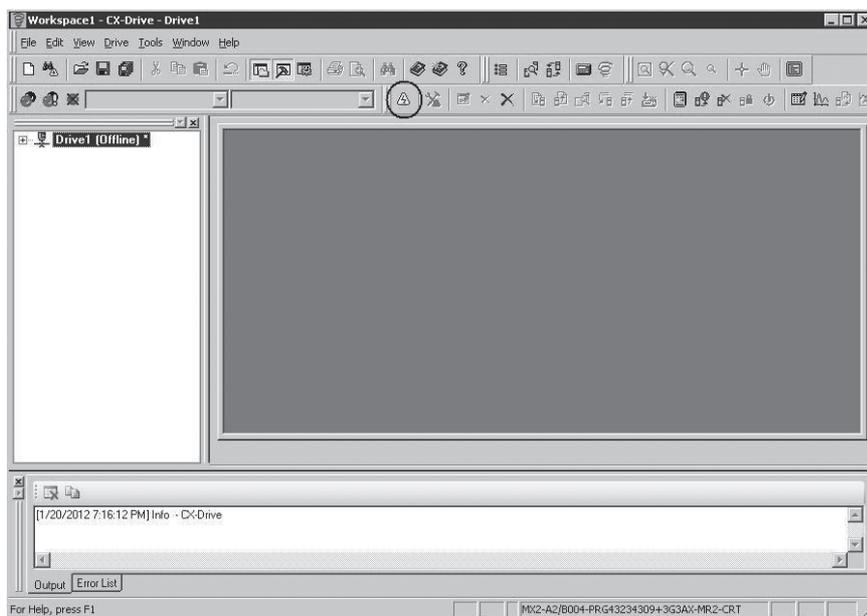
Automatically detecting the connected Inverter

In this method, you connect CX-Drive to your inverter using the Autodetect function after configuring the [Autodetect Options] in CX-Drive.
Follow the steps below.

1 **Start CX-Drive and select [Drive] - [Autodetect Options] to open the Options window.**
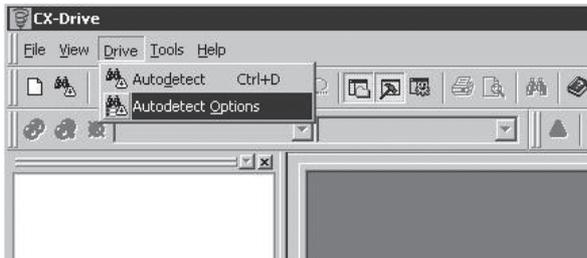
2 **On the [Autodetect] tab, in the [Drive Type Selection] section, select [Inverter] by clicking the [Inverter] check box. Then, in the [Connection Type Selection] section, select [Via PLC (CompoNet)] by clicking the [Via PLC (CompoNet)] check box. Next, click the [Advanced Options: Via PLC (CompoNet)] to the right.**
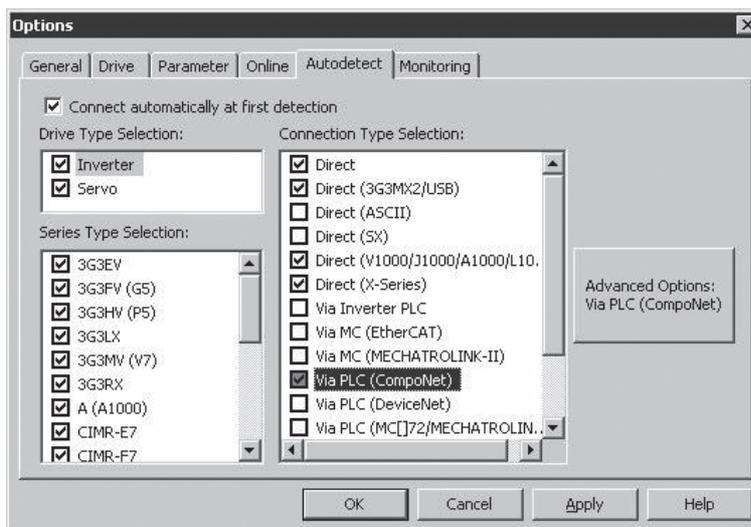
Additional Information

For quicker Autodetect operation, narrow down the scope of Auto detection by deselecting unnecessary check boxes.

3   **In the Advanced Options: [Via PLC (CompoNet)] window, configure the following two settings.**

• CompoNet node addresses: Select each node address of the CompoNet Master Unit and the inverter (CompoNet Communications Unit).

• [Gateway PLC]: Click the [Settings] button in the [Gateway PLC] section and select the Device Type and the Network Type.
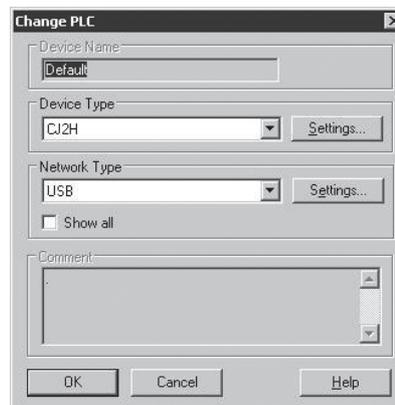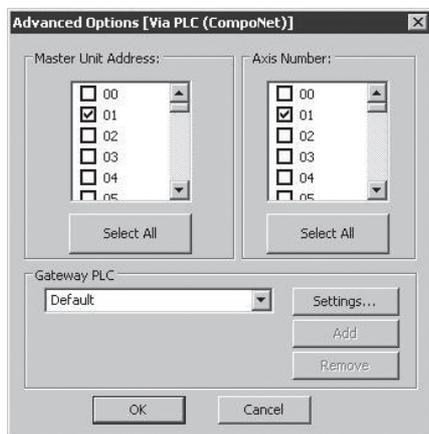
4   **When the above settings are done, use the [OK] button to close all the windows and click the [Autodetect] button.**

The Autodetect function starts to automatically create a new drive project.
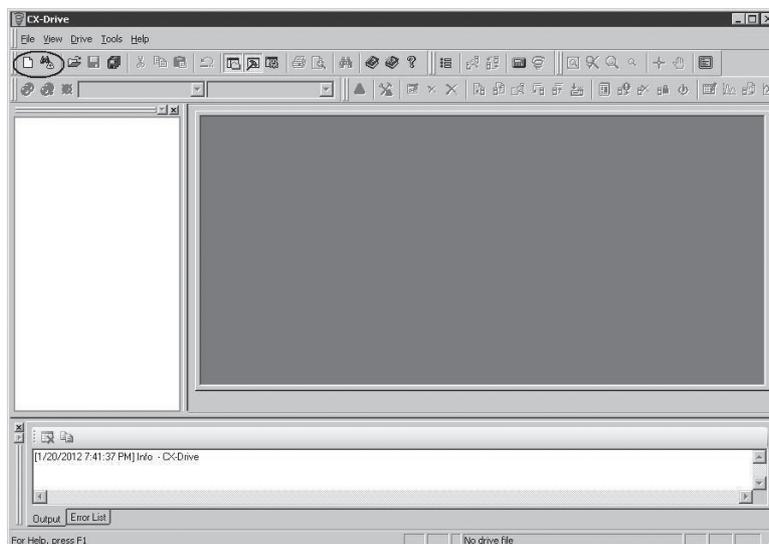
3-4-2   Outline of CX-Drive

The Inverter/Servo support tool CX-Drive enables you to edit inverter parameters and monitor the inverter status.
This section provides a functional outline of CX-Drive.

Screen Structure of CX-Drive

The screen structure of CX-Drive is shown below.
Registered drive projects are displayed in the workspace. Double-clicking a project displays the functions associated with it.
Double-clicking a function opens the window associated with the function.

Screen structure

Workspace

Window

Toolbar

Output window

Status bar
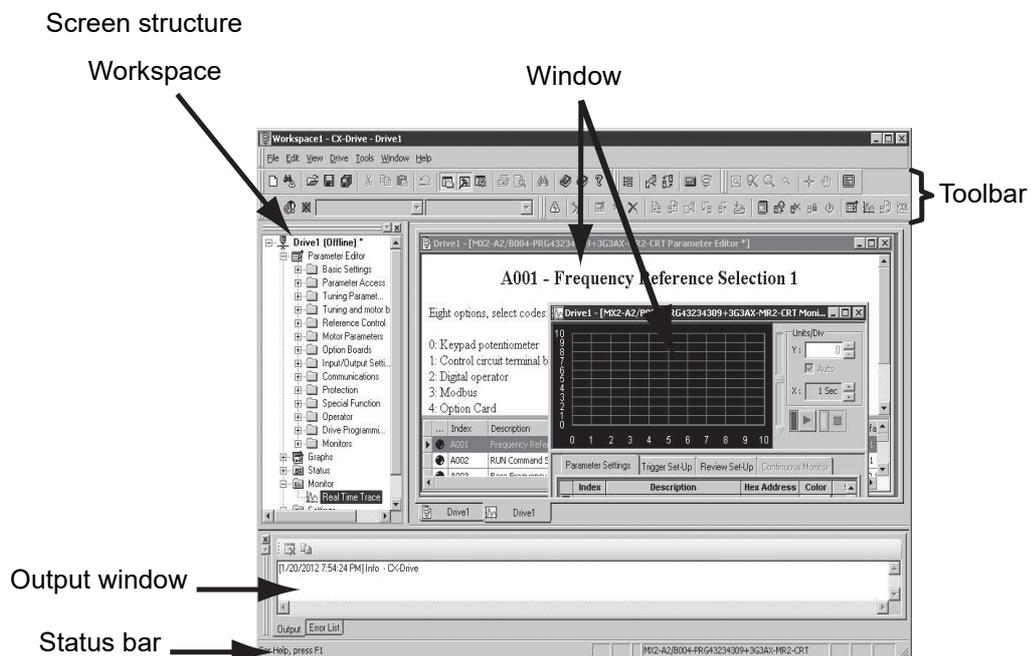
Precautions for Correct Use

CX-Drive, by default, does not allow connection to the inverter unless the software versions match.
• Software number of the inverter set in the CX-Drive project
• Software number of the inverter actually connected
If you cannot connect to the inverter due to a software number mismatch, select [Tools] - [Options] in the menu bar and, on the [Online] tab, deselect the [Check Drive Software Compatibility] check box.
This allows CX-Drive to connect to the inverter operate normally, although a warning will appear.

To match the software numbers, left-click the project, select [Properties], and click the [Settings] button in the [Drive Type] section. In the Drive Type Settings window, set the Software Number that matches that of the inverter.
If you cannot find the applicable software number in the CX-Drive's Software Number list, please upgrade the CX-Drive version.

Editing Device Parameters Using CX-Drive

Double-clicking Parameter Editor in the project opens a window in which all inverter parameters are listed (in ascending order).

You can edit inverter parameters in this window.

To upload/download inverter parameters, use the Transfer buttons in the toolbar.

- Double-click each folder under Parameter Editor in the Workspace to display only those parameters associated with it.
- Edit the value set for each parameter in the Value field of the parameter list.
- When a parameter is selected, the functional description of that parameter is displayed in the upper area.
- At the left end of the parameter list, the state of each parameter value is displayed. You can display only the parameters in the same state. A parameter is in one of the three states: Not default, Different from the inverter, or Invalid.
- You can selectively transfer only the required parameter(s) to the inverter.
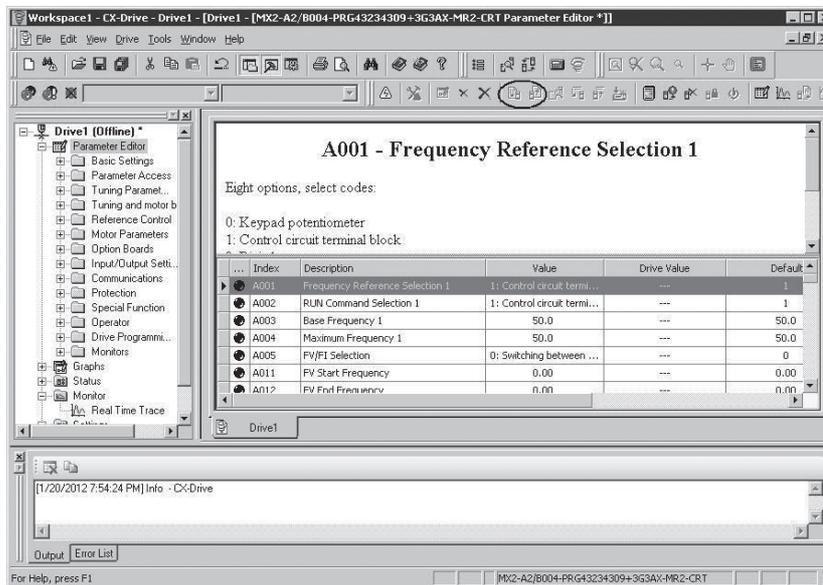
Status Function of CX-Drive

Open the Status folder in the project and double-click the status information.

The window corresponding to the selected status information opens.

- Digital Inputs: Displays the current ON/OFF status of digital inputs, including the input settings of the connected inverter.
- Digital Outputs: Displays the current ON/OFF status of digital outputs, including the output settings of the connected inverter.
- Inverter Status (Drive Status 1 and Drive Status 12): Displays the status values of dxxx in the inverter.
- Alarms: Displays the log of the current and past alarms.
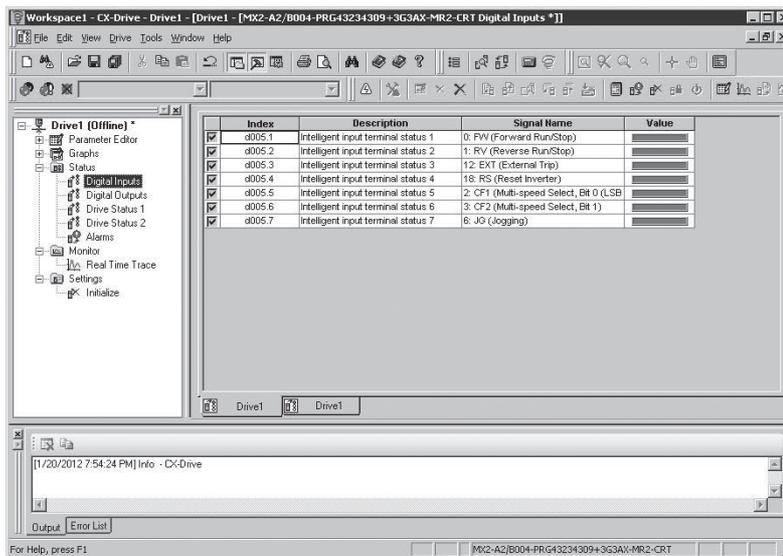
Monitor Function of CX-Drive

Open the Monitor folder in the project and double-click Real Time Trace.

The Real Time Trance window opens, in which you can monitor the operation status of the inverter.

- A maximum of seven signals can be traced.
- The ON/OFF timing of the inverter Status or a value can be set as a trigger.
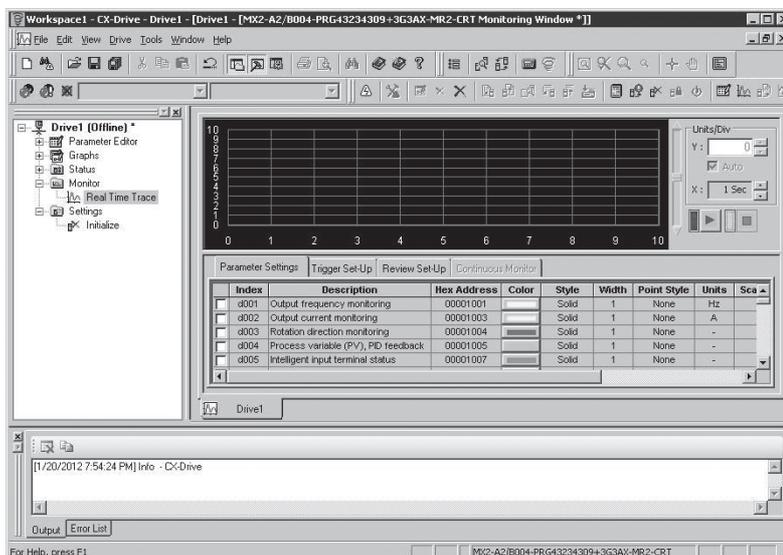
4

Remote I/O

This section describes the configuration method and function of Remote I/O (Compo-Net assembly I/O).

4-1　Remote I/O Configuration

4-1-1　Remote I/O Types

There are eight types of Remote I/O as described below. You can use the appropriate Remote I/O type for your application.

Type	Description
Basic Speed I/O	Remote I/O included as standard for CompoNet communications. This Remote I/O offers limited functions.
Extended Speed I/O	Remote I/O included as standard for CompoNet communications. This Remote I/O offers general inverter control functions.
Extended Speed and Acceleration Control	OMRON's unique Remote I/O not defined in the CompoNet specifications. This is the Extended Speed I/O with an additional Acceleration/Deceleration Time setting function.
Extended Speed and Torque Control	OMRON's unique Remote I/O not defined in the CompoNet specifications. This is the Extended Speed I/O with an additional Torque Reference function.
Extended Control I/O	OMRON's unique Remote I/O not defined in the CompoNet specifications. This Remote I/O is optimized for the input/output function of inverters. You can select the desired input/output function by setting a multi-function input/output parameter.
Extended Control I/O and Multi-function I/O Monitor	OMRON's unique Remote I/O not defined in the CompoNet specifications. This is the Extended Control I/O function with an additional Multi-function Input Monitor function. You can use this Remote I/O as general-purpose host inputs by configuring the multi-function inputs (C001 to C009).
Special I/O	OMRON's unique Remote I/O not defined in the CompoNet specifications. This Remote I/O enables access to Inverter's internal parameter areas via Modbus communication.
Flexible Format	OMRON's unique Remote I/O not defined in the CompoNet specifications. This Remote I/O enables more than one data including those in Inverter's internal parameter areas to be allocated via Modbus communication. You can select the data to be allocated using parameters P160 to P179.

4-1-2   Remote I/O Selection

Select and set the appropriate type of Remote I/O for your application in parameter P046.

Parameter	Description	Setting	Assembly No. (hex)		No. of occupied bytes (No. of words)	
			Output	Input	Output	Input
P046	Assembly Instance No.	00: Basic Speed I/O	20	70	4 (2)	4 (2)
		01: Extended Speed I/O (Default)	21	71	4 (2)	4 (2)
		02: Extended Speed and Torque Control	123	173	6 (3)	6 (3)
		03: Special I/O[*1]	100	150	8 (4)	8 (4)
		04: Extended Control I/O	101	151	8 (4)	8 (4)
		05: Extended Control I/O and Multi function I/O Monitor	101	153	8 (4)	9 (4.5)
		06: Flexible Format	139	159	16 (8)[*2]	16 (8)[*2]
		07: Extended Speed and Acceleration Control	110	111	8 (4)	8 (4)

*1   Special I/O differs from the conventional Special I/O in the data format.
*2   In Flexible Format, the number of occupied bytes changes depending on the number of allocated Modbus registers.

Additional Information

The CompoNet Communications Unit supports read/write of double-word data. Refer to *4-4-2 Special I/O (100/150)* on page 4-17.

Precautions for Correct Use

- During network connection, the Remote I/O is not updated even if parameter P046 is changed. To update the Remote I/O setting, cycle the inverter's input power supply.
- Using the CompoNet Communications Unit disables the inverter's Modbus communication function. Do not connect the communications cable to Modbus interface.

4-2 Basic and Extended Speed I/O

4-2-1 Basic Speed I/O (20/70)

Basic Speed I/O is a type of Remote I/O included as standard for CompoNet communications.
This Remote I/O offers more limited functions than Extended Speed I/O.

Basic Remote Output Assembly ID: 20 Dec (14 hex)

● **Output Format (CS/CJ-series → Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	–	–	–	–	–	RS	–	FW
	1	–	–	–	–	–	–	–	–
n + 1	2	Rotation Speed Reference (Low byte)							
	3	Rotation Speed Reference (High byte)							

● **Output Bit/Data Details**

Name		Description
FW	Forward/Stop	0: Stop 1: Forward
RS	Reset	0: – 1: Fault reset
Rotation Speed Reference		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency unit is [0.01 Hz].

Precautions for Safe Use

For safety reasons, the FW, RV, and RS command must be output after the cause of fault/trip is removed.

Basic Remote Input Assembly ID: 70 Dec (46 hex)

● **Input Format (CS/CJ-series ← Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	–	–	–	–	–	FWR	–	AL
	1	–	–	–	–	–	–	–	–
n + 1	2	Rotation Speed Monitor (Low byte)							
	3	Rotation Speed Monitor (High byte)							

● **Input Bit/Data Details**

Name		Description
AL	Alarm output	0: Normal 1: Fault/Trip
FWR	During forward operation	0: During reverse run/Stopping 1: During forward run
Rotation Speed Monitor		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].

4-2-2   Extended Speed I/O (21/71)

Standard I/O is a type of Remote I/O included as standard for CompoNet communications.
This Remote I/O offers general inverter control functions.

Standard Remote Output Assembly ID: 21 Dec (15 hex)

● **Output Format (CS/CJ-series → Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	–	REF	CTR	–	–	RS	RV	FW
	1	–	–	–	–	–	–	–	–
n + 1	2	Rotation Speed Reference (Low byte)							
	3	Rotation Speed Reference (High byte)							

● **Output Bit/Data Details**

Name		Description
FW	Forward/Stop	0: Stop 1: Forward
RV	Reverse/Stop	0: Stop 1: Reverse
RS	Reset	0: – 1: Fault reset
CTR	Net Ctrl.	0: Follow the setting of parameter A002. 1: Follow the reference from network control.
REF	Net Ref.	0: Follow the setting of parameter A001. 1: Follow the reference from network control.
Rotation Speed Reference		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency unit is [0.01 Hz].

Precautions for Safe Use

For safety reasons, the FW, RV, and RS command must be output after the cause of fault/trip is removed.

Standard Remote Input Assembly ID: 71 Dec (47 hex)

● Input Format (CS/CJ-series ← Inverter)

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	FA1	RFN	CFN	IRDY	RVR	FWR	WR	AL
	1	Drive Status							
n + 1	2	Rotation Speed Monitor (Low byte)							
	3	Rotation Speed Monitor (High byte)							

● Input Bit/Data Details

Name		Description
AL	Alarm output	0: Normal 1: Fault/Trip
WR	Warning	0: Normal 1: Warning
FWR	During forward operation	0: During reverse run/Stopping 1: During forward run
RVR	During reverse operation	0: During forward run/Stopping 1: During reverse run
IRDY	Operation ready	0: Not ready 1: Ready
CFN	Ctrl. from Net	0: Follow the setting of parameter A002. 1: CompoNet reference
RFN	Ref. from Net	0: Follow the setting of parameter A001. 1: CompoNet reference
FA1	Constant speed reached	0: Accelerating or decelerating/Stopping 1: Frequency agree
Drive State Detail		1: Startup 2: Not ready 3: Ready 4: Operation in progress 5: Stopping 6: Fault/Trip stop 7: Fault/Trip
Rotation Speed Monitor		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].

4-2-3   Extended Speed and Acceleration Control (110/111)

Extended Speed and Acceleration Control is OMRON's unique Remote I/O not defined in the Compo-Net specifications.

This is the Extended Speed I/O with an additional Acceleration/Deceleration Time setting function.

Extended Speed and Acceleration Control
Assembly ID: 110 Dec (6E hex)

● **Output Format (CS/CJ-series → Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	–	REF	CTR	–	FRS	RS	RV	FW
	1	–	–	–	–	–	–	–	–
n + 1	2	Rotation Speed Reference (Low byte)							
	3	Rotation Speed Reference (High byte)							
n + 2	4	Acceleration Time (Low byte)							
	5	Acceleration Time (High byte)							
n + 3	6	Deceleration Time (Low byte)							
	7	Deceleration Time (High byte)							

● **Output Bit/Data Details**

Name		Description
FW	Forward/Stop	0: Stop 1: Forward
RV	Reverse/Stop	0: Stop 1: Reverse
RS	Reset	0: – 1: Fault reset
FRS	Free-run Stop	0: Ignore 1: Free-run stop
CTR	Net Ctrl.	0: Follow the setting of parameter A002. 1: Follow the reference from network control.
REF	Net Ref.	0: Rotation Speed Reference follows the setting of parameter A001; Acceleration/Deceleration Time follows the setting of parameter F002/F003. 1: Follow the reference from network control.
Rotation Speed Reference		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency unit is [0.01 Hz].
Acceleration Time		Reference acceleration time. Unit: [0.1 s], Setting range: [0.1 to 3600.0] The set value must be within this setting range. If REF (Net.Ref.) is set to 0, the setting of parameter F002 is enabled.
Deceleration Time		Reference deceleration time. Unit: [0.1 s], Setting range: [0.1 to 3600.0] The set value must be within this setting range. If REF (Net.Ref.) is set to 0, the setting of parameter F003 is enabled.

⬤ **Precautions for Safe Use**

For safety reasons, the FW, RV, and RS command must be output after the cause of fault/trip is removed.

Extended Speed and Acceleration Control
Assembly ID: 111 Dec (6F hex)

● **Input Format (CS/CJ-series ← Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	MI3	MI2	MI1	FA1	–	AL	RVR	FWR
	1	Drive Status Detail							
n + 1	2	Rotation Speed Monitor (Low byte)							
	3	Rotation Speed Monitor (High byte)							
n + 2	4	Output Current Monitor (Low byte)							
	5	Output Current Monitor (High byte)							
n + 3	6	Trip Cause							
	7	RFN	CFN	FWT	MI8	MI7	MI6	MI5	MI4

● **Input Bit/Data Details**

	Name	Description
FWR	During forward operation	0: During reverse run/Stopping 1: During forward run
RVR	During reverse operation	0: During forward run/Stopping 1: During reverse run
AL	Alarm output	0: Normal 1: Fault/Trip
FA1	Constant speed reached	0: Accelerating or decelerating 1: Frequency agree
MI1 to MI7	Multi-function Input Monitor	Monitors multi function inputs S1 to S7 0: OFF 1: ON
MI8 ⟩RX⟩	Multi-function Input Monitor	Monitors multi function inputs S8 0: OFF 1: ON
CFN	Ctrl. from Net	0: Rotation Speed Reference follows the setting of parameter A001; Acceleration/Deceleration Time follows the setting of parameter F002/F003. 1: CompoNet reference
RFN	Ref. from Net	0: Follow the setting of parameter A001. 1: CompoNet reference
FWT ⟩RX⟩	Forward Rotation Terminal Input Monitor	Monitors the forward rotation command terminal state. 0: OFF 1: ON

Name	Description
Drive Status Detail	0: Stopping 1: Running 2: Jogging 3: Free running 4: Direct current DC braking 5: Restart (Retry)/Error detection (Deceleration stop) 7: Restart (Retry) in process 8: Waiting for restart (retry) 10: Fault/Trip 11: Undervoltage condition
Rotation Speed Monitor	If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is $[\text{min}^{-1}]$. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].
Output Current Monitor	Unit: [0.1 A]
Trip Cause	Displays direct trip cause. Decimal values 1 to 99 correspond to trips E01 to E99.

4-3   Remote I/O with Torque Reference Support

4-3-1   Torque Control Configuration

The type of Remote I/O described in this section provides the torque reference for torque control function, in addition to normal inverter speed control.

The Remote I/O functions described here can be used without the use of torque control. In this case, the input/output function related to torque control is disabled.

> **Precautions for Correct Use**
>
> If the inverter is set to the Light Load mode, torque reference input is prohibited and therefore you cannot use Remote I/O with the torque reference enabled. Use another type of Remote I/O.

Torque Control Configuration Steps

To use torque control, the inverter must operate under vector control. Follow the steps below to enable torque control.

1   **Select the vector control.**
Enable Vector Control by setting parameter A044 (1st Control Method) according to the MX2/RX-series Inverter User's Manual.

2   **Execute auto-tuning of the motor.**
Perform auto-tuning of the motor parameters on the connected motor according to the MX2/RX-series Inverter User's Manual. After auto-tuning, save the motor parameters into inverter.

3   **Configure the torque control.**
Configure the torque control function according to the MX2/RX-series Inverter User's Manual.

4   **Configure CompoNet.**
Configure the CompoNet parameters according to *3-1-2 Remote I/O Settings Using Torque Reference* on page 3-6.

5   **Configure the multi-function input to enable torque control.**
To enable torque control, you must set the Multi-function Input (C001 to C008) to 52 (Torque reference input permission) and turn it ON.
Turn ON the multi-function input configured via an external terminal or CompoNet Remote I/O.

> **Additional Information**
>
> For details about torque control, refer to Section 5-11 Torque Control of the MX2 User's Manual (Cat. No. I570) and Section 6-9 Torque Control of the RX User's Manual (Cat. No. I578).

Disabling Torque Control

Torque control is disabled unless the Multi-function Input is set to 52 (Torque reference input permission). Configuration of parameters related to torque control is unnecessary if toque control is disabled.

4-3-2   Extended Speed and Torque Control (123/173)

Extended Speed and Torque Control is OMRON's unique Remote I/O not defined in the CompoNet specifications.
This is the Extended Speed I/O with an additional Torque Reference function.

Extended Speed and Torque Control Output
Assembly ID: 123 Dec (7B hex)

● **Output Format (CS1/CJ1-series → Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	–	REF	CTR	–	–	RS	RV	FW
	1	–	–	–	–	–	–	–	–
n + 1	2	Rotation Speed Reference (Low byte)							
	3	Rotation Speed Reference (High byte)							
n + 2	4	Torque Reference (Low byte)							
	5	Torque Reference (High byte)							

● **Output Bit/Data Details**

Name		Description
FW	Forward/Stop	0: Stop 1: Forward
RV	Reverse/Stop	0: Stop 1: Reverse
RS	Reset	0: – 1: Fault reset
CTR	Net Ctrl.	0: Follow the setting of parameter A002. 1: Follow the reference from network control.
REF	Net Ref.	0: Follow the setting of parameter A001. 1: Follow the reference from network control.
Rotation Speed Reference		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].
Torque Reference		Reference torque. Unit: [%]

Precautions for Safe Use

For safety reasons, the FW, RV, and RS command must be output after the cause of fault/trip is removed.

Extended Speed and Torque Control Input
Assembly ID: 173 Dec (AD hex)

● **Input Format (CS1/CJ1-series ← Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	FA1	RFN	CFN	IRDY	RVR	FWR	WR	AL
	1	Drive Status							
n + 1	2	Rotation Speed Monitor (Low byte)							
	3	Rotation Speed Monitor (High byte)							
n + 2	4	Torque Actual (Low byte)							
	5	Torque Actual (High byte)							

● **Input Bit/Data Details**

Name		Description
AL	Alarm output	0: Normal 1: Fault/Trip
WR	Warning	0: Normal 1: Warning
FWR	During forward operation	0: During reverse run/Stopping 1: During forward run
RVR	During reverse operation	0: During forward run/Stopping 1: During reverse run
IRDY	Operation ready	0: Not ready 1: Ready
CFN	Ctrl. from Net	0: Follow the setting of parameter A002. 1: CompoNet reference
RFN	Ref. from Net	0: Follow the setting of parameter A001. 1: CompoNet reference
FA1	Constant speed reached	0: Accelerating or decelerating/Stopping 1: Frequency agree
Drive State Detail		1: Startup 2: Not ready 3: Ready 4: Operation in progress 5: Stopping 6: Fault/Trip stop 7: Fault/Trip
Rotation Speed Monitor		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].
Torque Actual		Actual torque monitor. Unit: [%]

4-3-3　Extended Control I/O (101/151/153)

Extended Control I/O is OMRON's unique Remote I/O not defined in the CompoNet specifications. This type of Remote I/O is optimized for the input/output function of inverters, allowing you to select each input/output function by setting a multi-function input/output parameter.

Extended Control I/O Output
Assembly ID: 101 Dec (65 hex)

● Output Format (CS1/CJ1-series → Inverter)

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	CI8	CI7	CI6	CI5	CI4	CI3	RV	FW
	1	CO2	CO1	CR	CO5	CO4	CO3	RS	EXT
n + 1	2	Rotation Speed Reference (Low byte)							
	3	Rotation Speed Reference (High byte)							
n + 2	4	Torque Reference (Low byte)							
	5	Torque Reference (High byte)							
n + 3	6	Torque Compensation Bias (Low byte)							
	7	Torque Compensation Bias (High byte)							

● Output Bit/Data Details

Name		Description
FW	Forward/Stop	0: Stop 1: Forward
RV	Reverse/Stop	0: Stop 1: Reverse
CI3 to CI7	Multi-function Input	Follow the setting of each multi-function input (C003 to C008). 0: OFF 1: ON
CI8 **RX**	Multi-function input [8]	Follows the setting of each multi-function input (C003 to C008). 0: OFF 1: ON
EXT	External trip	0: – 1: External fault
RS	Reset	0: – 1: Fault reset
CR	Multi-function Contact Output	If a multi-function output (C021 to C026) is set to 63 (OPO: Option), you can control the corresponding inverter multi-function output. 0: OFF 1: ON
CO1, CO2	Multi-function Output	
CO3 to CO5 **RX**	Multi-function Output	If a multi-function output (C021 to C026) is set to 63 (OPO: Option Board), you can control the corresponding inverter multi-function output. 0: OFF 1: ON

Name	Description
Rotation Speed Reference	If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].
Torque Reference	Reference torque: Unit: [%]
Torque Compensation Bias	Torque compensation bias torque. Unit: [%]

Precautions for Safe Use

For safety reasons, the FW, RV, and RS command must be output after the cause of fault/trip is removed.

Extended Control I/O Input Assembly ID: 151 Dec (97 hex)

● Input Format (CS1/CJ1-series ← Inverter)

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	AL	WR	IRDY	FA1	–	RVR	ZS	FWR
	1	MO4	MO3	MO2	MO1	MR	CFN	–	–
n + 1	2	Rotation Speed Monitor (Low byte)							
	3	Rotation Speed Monitor (High byte)							
n + 2	4	Torque Actual (Low byte)							
	5	Torque Actual (High byte)							
n + 3	6	Output Current Monitor (Low byte)							
	7	Output Current Monitor (High byte)							

● Input Bit/Data Details

Name		Description
FWR	During forward operation	0: During reverse run/Stopping 1: During forward run
ZS	0 Hz	0: At non-zero speed 1: At zero speed
RVR	During reverse operation	0: During forward run/Stopping 1: During reverse run
FA1	Constant speed reached	0: Accelerating or decelerating/Stopping 1: Frequency agree
IRDY	Operation ready	0: Not ready 1: Ready
WR	Warning	0: Normal 1: Warning
AL	Alarm output	0: Normal 1: Fault/Trip
CFN	Ctrl. from Net	0: Follow the setting of parameter A002. 1: CompoNet reference
MO1, MO2, MR	Multi-function (Contact) Output	Follows the setting of each multi-function input (C021 to C026). 0: OFF 1: ON

Name		Description
MO3, MO4 **RX**	Multi-function Output	Follows the setting of each multi-function input (C021 to C026). 0: OFF 1: ON
Rotation Speed Monitor		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is [min^{-1}]. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].
Torque Actual		Actual torque monitor. Unit: [%]
Output Current Monitor		Unit: [0.1 A]

4-3-4   Extended Control I/O and Multi function I/O Monitor (101/153)

This is the Extended Control I/O function with an additional Multi-function Input Monitor function.
The output format (CS/CJ series → Inverter) is the same as that of Extended Control I/O. The input format (CS/CJ series ← Inverter) is as shown below.

Extended Control I/O Input + Multi-function Input Monitor Assembly ID: 153 Dec (99 hex)

● **Input Format (CS1/CJ1-series ← Inverter)**

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	AL	WR	IRDY	FA1	–	RVR	ZS	FWR
	1	MO4	MO3	MO2	MO1	MR	CFN	–	–
n + 1	2	Rotation Speed Monitor (Low byte)							
	3	Rotation Speed Monitor (High byte)							
n + 2	4	Torque Actual (Low byte)							
	5	Torque Actual (High byte)							
n + 3	6	Output Current Monitor (Low byte)							
	7	Output Current Monitor (High byte)							
n + 4	8	MI8	MI7	MI6	MI5	MI4	MI3	MI2	MI1

● **Input Bit/Data Details**

Name		Description
FWR	During forward operation	0: During reverse run/Stopping 1: During forward run
ZS	0 Hz	0: At non-zero speed 1: At zero speed
RVR	During reverse operation	0: During forward run/Stopping 1: During reverse run
FA1	Constant speed reached	0: Accelerating or decelerating/Stopping 1: Frequency agree
IRDY	Operation ready	0: Not ready 1: Ready
WR	Warning	0: Normal 1: Warning

Name		Description
AL	Alarm output	0: Normal 1: Fault/Trip
CFN	Ctrl. from Net	0: Follows the setting of parameter A002. 1: CompoNet reference
MO1, MO2, MR	Multi-function (Contact) Output	Follows the setting of each multi-function input (C021 to C026). 0: OFF 1: ON
MO3, MO4 **RX**▷	Multi-function Output	Follows the setting of each multi-function input (C021 to C026). 0: OFF 1: ON
Rotation Speed Monitor		If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is $[\text{min}^{-1}]$. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency is monitored in units of [0.01 Hz].
Torque Actual		Actual torque monitor. Unit: [%]
Output Current Monitor		Unit: [0.1 A]
MI1 to MI7	Multi-function Input	Follows the setting of each multi-function input (C001 to C008). By setting these parameters to 255 (No allocation), you can use the Inverter's multi-function inputs as general-purpose host inputs. 0: OFF 1: ON
MI8 **RX**▷	Multi-function Input	Follows the setting of each multi-function input (C001 to C008). By setting these parameters to 255 (No allocation), you can use the inverter's multi-function inputs as general-purpose host inputs. 0: OFF 1: ON

4-4   Special I/O and Flexible Format

4-4-1   Frequency Reference/RUN Command Selection

Special I/O and Flexible Format are types of Remote I/O that utilize Modbus communication.
This means that, only when using Special I/O or Flexible Format, you specify Modbus communication as an input method for the frequency reference and RUN command.

● Destination Selection Parameter Settings

Parameter	Description	Setting
A001	1st Frequency Reference Selection	03: Modbus communication (Modbus-RTU)
A002	1st RUN Command Selection	

4-4-2   Special I/O (100/150)

Special I/O is OMRON's unique Remote I/O not defined in the CompoNet specifications.
This Remote I/O enables access to Inverter's internal parameter areas via Modbus communication.
Special I/O enables you to read/write data for two consecutive register numbers by setting the Function Code.
In addition, you can also read/write data to/from more than one register by switching the Function Code/Register No. at fixed intervals using a host program. In this case, on the host, check that the register numbers match before handing the communications. Once the register number set for output matches the register number displayed for input, proceed to the next Register No. setting step.

Special Remote Output Assembly ID: 100 Dec (64 hex)

● Output Format (CS1/CJ1-series → Inverter)

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	Function Code							
	1	(Set 0.)							
n + 1	2	First Register No. (Low byte)							
	3	First Register No. (High byte)							
n + 2	4	Data 0 (Low byte)							
	5	Data 0 (High byte)							
n + 3	6	Data 1 (Low byte)							
	7	Data 1 (High byte)							

● Output Bit/Data Details

Name	Description
Function Code[1]	10: Write data (1 word) 03: Read data (1 word) 50: Write data (Consecutive 2 words) 43: Read data (Consecutive 2 words)
Register No.	Write the Register No. corresponding to the inverter parameter.
Data 0, 1	Set the data to write to the specified register. Set Data 1 to "0" to write one word of data.

[1] Note that these codes are not the same as the Explicit Message service code/Modbus communication function code.

> **Precautions for Correct Use**
>
> The Register No. and read/write data are the same as those for Modbus communication. For these settings, refer to Section 6-8 Modbus Communication (Modbus-RTU) Data List of the MX2 User's Manual (Cat. No. I570) and 8-5 Modbus Communication Register Number List of the RX User's Manual (Cat. No. I578).

Special Remote Input Assembly ID: 150 Dec (96 hex)

● Input Format (CS1/CJ1-series ← Inverter)

Word No.	Byte No.	Bit Allocation							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
n	0	Function Code							
	1	–							
n + 1	2	First Register No. (Low byte)							
	3	First Register No. (High byte)							
n + 2	4	Data 0 (Low byte)							
	5	Data 0 (High byte)							
n + 3	6	Data 1 (Low byte)							
	7	Data 1 (High byte)							

● Input Bit/Data Details

Word No.	Byte No.	Write Success	Read Success	Failure
n	0	0x10 / 0x50	0x03 / 0x43	Function Code OR'ed with 0x80 for Each bit
	1	–	–	–
n + 1	2	First Register No. (Low byte)		
	3	First Register No. (High byte)		
n + 2	4	–	Data 0 (Low byte)	Error Code
	5	–	Data 0 (High byte)	–
n + 3	6	–	Data 1 (Low byte)	–
	7	–	Data 1 (High byte)	–

![Precautions icon] **Precautions for Correct Use**

The Register No. and read/write data are the same as those for Modbus communication. For these settings, refer to Section 6-8 Modbus Communication (Modbus-RTU) Data List of the MX2 User's Manual (Cat. No. I570) and 8-5 Modbus Communication Register Number List of the RX User's Manual (Cat. No. I578).

The error codes for the Special IO operation are listed below.

● **Special Remote Input Error Codes**

Error Code	Name	Description
01 hex	Function Code Error	A code other than 03/10/43 or 50 hex is set as function code.
02 hex	Register No. Error	The specified Register No. does not exist.
04 hex	Slave Device Error	The Option Board failed to communicate with the inverter.
21 hex	Data Setting Error	An upper or lower limit for the write data setting range is exceeded.
22 hex	Write Mode Error	Writing to a register that is write-prohibited or in a read-only state (for example, during operation).
23 hex	Register Size Error	Reading/Writing 2-byte data from/to a 4-byte register or 4-byte data from/to a 2-byte register.

![Precautions icon] **Precautions for Correct Use**

If a Special I/O read/write error occurs, the most significant bit (word address n, bit 7) of the Function Code turns ON. Prepare a program that starts error processing from this bit on the host.

Reading/Writing Input/Output Bit Data (Modbus Coil Information)

In Modbus communication, the MX2/RX-series inverters set control input, status monitor, or other bit information as coil information. This means that you cannot set/check data by reading/writing from/to communications registers.
Use the following registers provided to enable reading/writing of input and output bit information.

● **Register No. 1F01 hex for CompoNet output (Inverter control input)**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	–	In8	In7	In6	In5	In4	In3	In2	In1	–	–	RS	EXT	Dir	Opr	–
Value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Opr	RUN command (0: Stop/1: Run)	In3	General-purpose output terminal [3]
Dir	Rotation direction command (0: Forward/1: Reverse)	In4	General-purpose output terminal [4]
EXT	External trip	In5	General-purpose output terminal [5]
RS	Reset	In6	General-purpose output terminal [6]
In1	General-purpose output terminal [1]	In7	General-purpose output terminal [7]
In2	General-purpose output terminal [2]	RX▷ In8	General-purpose output terminal [8]

● Register No. 1E01 hex for CompoNet input (Inverter status monitor)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	ONT	RNT	TRQ	UV	–	OTQ	FA3	AL	OD	OL	FA2	FA1	RUN	–	IRDY	Dir
Value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Dir	Rotation direction (0: Forward/1: Reverse)	AL	Alarm output
IRDY	Operation ready	FA3	Setting frequency only
RUN	During RUN	OTQ	Overtorque/Undertorque
FA1	Constant speed reached	UV	During undervoltage
FA2	Setting frequency exceeded	TRQ	During torque limit
OL	Overload warning	RNT	RUN time over
OD	Excessive PID deviation	ONT	Power ON time over

4-4-3   Flexible Format (139/159)

Flexible Format is OMRON's unique Remote I/O not defined in the CompoNet specifications.
This Remote I/O enables you to allocate more than one data value including those in Inverter's internal parameter areas via Modbus communication. You can select the data to allocate using parameters P160 to P179.

- Any data can be selected from all Modbus registers.
- This Remote I/O helps minimize the communications traffic because it sets only the I/O data required for communications.

Flexible Format I/O Allocation

The relationship between Flexible I/O and inverter parameters is as follows.

● Flexible Format I/O Allocation

Word Offset	Description	
	Output Area	Input Area
+0	Modbus register set by P160	Modbus register set by P170
+1	Modbus register set by P161	Modbus register set by P171
+2	Modbus register set by P162	Modbus register set by P172
+3	Modbus register set by P163	Modbus register set by P173
+4	Modbus register set by P164	Modbus register set by P174
+5	Modbus register set by P165	Modbus register set by P175
+6	Modbus register set by P166	Modbus register set by P176
+7	Modbus register set by P167	Modbus register set by P177
+8	Not available for CompoNet Communications Unit Be sure to set 0.	Not available for CompoNet Communications Unit Be sure to set 0.
+9		

Flexible Format Configuration

Configure the Modbus registers for the functions you want to allocate to the Remote I/O outputs using parameters P160 to P167.

Configure the Modbus registers for the functions you want to allocate to the Remote I/O inputs using parameters P170 to P177.

A maximum of 8 words can be allocated for both input and output.

After completing the following configuration steps, cycle the power supply of the inverter (CompoNet Communications Unit).

- Start configuring the parameters from P160 or P170 in order and, when finished configuring the last Modbus register, be sure to set the remaining parameters to 0000. Setting a parameter to 0000 causes the register setting to be ignored and not allocated to Remote I/O.

  The number of words occupied by Remote I/O will be
    the number of allocated input registers (for input) and
    the number of allocated output registers (for output).

- Be sure to allocate non-zero registers at least once in the outputs/inputs area of Remote I/O.
- It is not allowed to allocate the same register more than once in the output area of Remote I/O.
- Be sure to configure registers that can always be written to for the output area of Remote I/O.
- Double-word registers must be allocated with two consecutive Modbus registers, firstly the high word and secondly the low word.

> **Precautions for Correct Use**
>
> - Communications data will be written constantly to register numbers which are allocated to the output area of Remote I/O. If you set any of the following write-prohibited parameters, an error will be detected in the CompoNet Communications Unit.
>
> | Write-prohibited Parameters |
> | --- |
> | Registers which are write-prohibited during operation |
> | Parameters which are write-prohibited in the Light Load mode. (When using the Light Load mode.) |
> | Parameters which are protected by parameter b031 (Soft Lock Selection) (Set b031 = 10 to cancel.) |
>
> - In the output area of Remote I/O, double-word registers allow only the low word to be set for the output area of Remote I/O.
>   In this case, the high-word data is always set to 0000. However, for the input area of Remote I/O, it is not possible to set only the low word.
> - For reading/writing input or output bit data (Modbus coil information), use Register No. 1F01 hex (inverter control input) or Register No. 1E01 hex (inverter status monitor) as described in *4-4-2 Special I/O (100/150)* on page 4-17, respectively.
> - If there is any incorrect setting in parameters P160 to 179, an error will be detected (the MS LED will blink red), causing the inverter to be in a trip state (error code E64). In such a case, correct the incorrect parameter value and cycle the power supply of the inverter.
> - When using the Flexible Format function, the number of words occupied by the CompoNet Communications Unit changes.
>   After cycling the power supply of the inverter, change the number of occupied words on the Master Unit.

> **Additional Information**
>
> Refer to the following information for a Modbus register list:
> **MX2** ▷ Holding Register List in 6-8 Modbus Communication (Modbus-RTU) Data List (ii) of the MX2 User's Manual (Cat. No. I570)
> **RX** ▷ 8-5 Modbus Communication Register Number List of the RX-series Manual (Cat. No. I578).

4-5   When to Input the RUN Command after Establishment of Communications

For safety reasons, this CompoNet Communications Unit is designed to ignore the input of the RUN command (Forward/Stop or Reverse/Stop) executed (turned ON) before communications are established. This section describes when to input the RUN command via CompoNet after establishment of communications.

Communication Connection Process and Establishment of Communications

The CompoNet Communications Unit executes the process of communication connection with the Master Unit in any of the following situations to establish communications.
You can check whether or not communications are established with the Participation/Communications Error Flags on the Master Unit.
• When the inverter (CompoNet Communications Unit) is powered on.
• When the inverter (CompoNet Communications Unit) is reset.
• When communications are re-established from the Master Unit.
• When the inverter (CompoNet Communications Unit) is newly connected to the network

When to Input the RUN Command

The RUN command (Forward/Stop or Reverse/Stop) must be input to the CompoNet Communications Unit in the following timing after communications are established.
• Upon establishment of communications, the CompoNet Communications Unit sends the inverter ready signal.
• After confirming the inverter ready signal, the RUN command is input.
• If the CompoNet Communications Unit recognizes the RUN command successfully and the inverter moves to a RUN state, it outputs the inverter running (During forward run or During reverse run) signal.
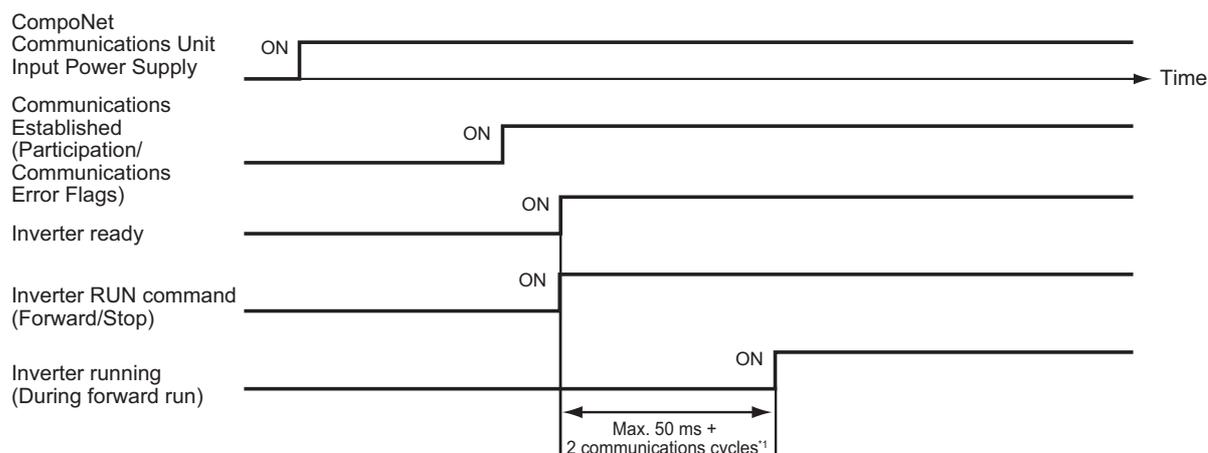
*1   You can check the communication cycle time of CompoNet communications from the following table. Because the Communication Cycle Time of CompoNet communications varies depending on the network configuration, after network configuration changes, be sure to check the Communication Cycle Time and, when necessary, review the input timing of the RUN command.

Slave Type/ Max. No. of Nodes	Baud Rate Communica- tions Mode No.	Communication Cycle Time (with message communications enabled)			
		4 Mbits/s	3 Mbits/s	1.5 Mbits/s	93.75 kbits/s
Word slave/IN 8 nodes and OUT 8 nodes max.	0	0.9 ms	0.9 ms	1.5 ms	19.8 ms
Word slave/IN 16 nodes and OUT 16 nodes max.	1	1.0 ms	1.2 ms	2.3 ms	30.2 ms
Word slave/IN 32 nodes and OUT 32 nodes max.	2	1.3 ms	1.7 ms	4.0 ms	51.3 ms
Word slave/IN 16 nodes and OUT 16 nodes max., Bit slave/IN 64 nodes and OUT 64 nodes max.	3	2.0 ms	2.5 ms	5.9 ms	72.1 ms
Word slave/IN 64 nodes and OUT 64 nodes max., Bit slave/IN 128 nodes and OUT 128 nodes max.	8	0.79 ms + Time elapsed for slave type/No. of nodes	0.85 ms + Time elapsed for slave type/No. of nodes	1.94 ms + Time elapsed for slave type/No. of nodes	24.81 ms + Time elapsed for slave type/No. of nodes

Precautions for Correct Use

- In any of the following situations, for safety reasons, turn OFF the inverter RUN command from the host program.
  When the system power supply is OFF, an error occurs, or the Reset command is input to the inverter.
- If the inverter fails to move to the RUN state, once turn OFF the RUN command and input the command again.
- With a third-party Master, the IDLE (communication not ready) message may persist after establishment of communications. In such a case, wait until the IDLE message disappears and, after communications are started normally, secure a sufficient wait time so that the CompoNet Communications Unit can recognize the RUN command OFF state.
- CompoNet Communications Unit may not recognize the RUN command OFF state if normal communications are blocked due to noise or other problems since establishment of communications. In this case, take measures against noise for the entire network.

5

Message Communications

This section describes how to read/write inverter parameters by the Message communications function (CompoNet Explicit Message).

5

5-1   Outline of Explicit Message

Explicit Message is a Message communications function defined in the CompoNet specifications. It uses the Node Address, Service Code, Class, Instance, Attribute, and other data to achieve Message communications. Because the communications frame of an Explicit Message is standardized in the CompoNet specifications, the CompoNet Communications Unit can perform Message communications even with third-party Masters.

Explicit Messages are sent/received as follows:
In Explicit Message communication, data is sent/received basically in units of 1 byte (8 bits).

Explicit Message Communications Frame

Header	Node Address	Service Codes	Class	Instance	Attribute	Data	Footer

Item	Description	
Header	The start of the Explicit Message. It shows that this frame is for an Explicit Message request or a response to an Explicit Message. This segment is set by CompoNet transparently to the user.	
Node Address	Request: Set the node address of the Slave/Master to send a request. Response: The node address of the Slave/Master that returns a response is set.	
Service Codes	Request: Set the service code for a request (read/write etc.). Response: The service code of the requested service is returned, with the value of the most significant bit (MSB) changed to 1.	
Class	Functional category (Major category)	These show categories of each function which are defined in the CompoNet specifications. Use these three codes to specify a function.
Instance	Item category (Minor item)	
Attribute	Attribute (The set value of each function is allocated.)	
Data	Request: Set the data to write, etc. Response: The requested data to be read or error message is attached.	
Footer	The end of the Explicit Message. It is used for the CRC check etc. This segment is set by CompoNet transparently to the user.	

5-2   Sending Messages from CS/CJ-series

This section describes how to send/receive messages using the Master Unit (Model: CS1W-CRM21/CJ1W-CRM21).

5-2-1   How to Issue Explicit Messages by CMND Instruction

The Master Unit (Model: CS1W-CRM21/CJ1W-CRM21) uses the CMND instruction to issue Explicit Messages.
To issue an Explicit Message, be sure to attach the FINS command (2802) at the beginning and issue it to the Master Unit. Upon receipt of this command, the Master Unit transforms the command data to an Explicit Message and transfer the message to the destination node. You cannot directly specify the destination node using the CMND instruction when issuing an explicit message.

(↑) CMND (490)
S
D
C
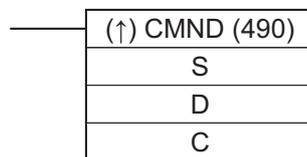
● S: First Word Address of Command Storage Area

Set the first word address of the command data to transfer to the CompoNet Master Unit.
Previously set the data to transfer to consecutive word addresses as shown below.

Word Address	Bit No.	
	15 to 8	7 to 0
S	Command code (Set the FINS Explicit Message command (2802).)	
S + 1	Node address of the Slave/Master to which the Explicit Message is sent: 0 to 3F hex (0 to 63)	
S + 2	Explicit Message service codes Write: 10, Read: 0E	
S + 3	Class ID code (Set the CompoNet Class code of the target function.)[1]	
S + 4	Instance ID code (Set the CompoNet Instance ID code of the target function.)	
S + 5	Attribute ID code (Set the CompoNet Attribute ID code of the target function.)	Attachment data (in case of a write request etc.)
…	Attachment data (in case of a write request etc.)	

*1   For the CompoNet Communications Unit on an inverter, set 0001 to 002A, 0064, 0065, 0094, or 00F7 hex.

● **D: First Word Address of Response Storage Area**

Set the first word address of the area to store the response to the Explicit Message.

📝 **Precautions for Correct Use**

• When the CMND instruction issues an Explicit Message, due to the following reason, the attachment data to the Explicit Message is sent in reverse order of high and low bytes.
Data on communications lines: Sent in order of low byte (L) to high byte (H).
Data processed in PLC: Sent in order of high byte (H) to low byte (L).
The attachment data in a response will also be sent in this order.
Note this when sending or receiving a single-word (16-bit) or double-word (32-bit) data.
Most inverter parameters take single-word data, except for the frequency reference, output frequency, and other parameters that take single-word data.

Example)   In an Explicit Message communications, single-word data 1234 hex will be sent in order of 34 hex to 12 hex on a communications line.

On the other hand, double-word data 12345678 hex will be sent in order of 78 hex, 56 hex, 34 hex, and 12 hex.

Command Format
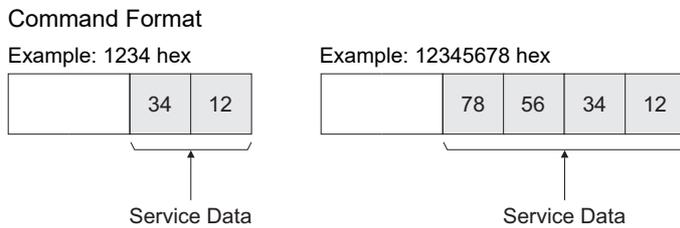
Therefore, in the CMND instruction, set the data in operand S+4 and onwards as follows.
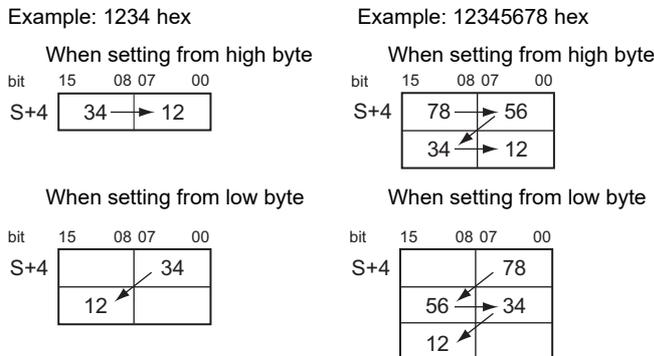
● **C: First Word Address of Control Data**

Set the first word address to configure the required control data for Message communications.

The CompoNet Master Unit requires to be previously set the following control data to consecutive word addresses.

Word Address	Bit No.		
	15	**14 to 8**	**7 to 0**
C	Number of bytes of command data: 0000 to 021E hex (0 to 542 bytes)[*1]		
C + 1	Number of bytes of response data: 0000 to 021E hex (0 to 542 bytes)[*2]		
C + 2	Network address: 0000 hex (0)		
C + 3	Command destination node address : 00 hex (0)		Command destination unit address : 20 to 7F hex (Unit No. 0 to 95(00 to 5F hex) + 20 hex)
C + 4	Response[*3]	Communications port number: 0 to 7[*4]	Number of resends: 00 to 0F hex (0 to 15)[*5]
C + 5	Response monitor time: 0000 hex → 2 s 0001 to FFFF hex → 0.1 to 6553.5 s [in units of 0.1 s][*6]		

*1   Set how many bytes the command data storage area occupies from the first word address S.

*2   Set how many bytes the response data storage area occupies from the first word address D.

*3   In word address C + 4, bit 15, set whether the response is required (0) or not required (1).
    For Explicit Messages, this must be set to 0 (Response required).

*4   Set the port used for CompoNet.

*5   Set the how many times the message is to be resent in case of an error response.

*6   For Explicit Messages, this must be set to 2 seconds or more.

5-2-2   When to Issue/Read an Explicit Message

An example of input conditions for issuing the CMND instruction is shown below. Note that the CMND instruction can be executed only once per communications port. Do not execute the CMND instruction when the Network Communications Command Execution Enabled Flag corresponding to each port is set to 0 (OFF).

When to Issue an Explicit Message

The CMND instruction must be issued with a condition which the CS/CJ-series unit's Network Communications Command Execution Enabled Flag is set.

```
     Command Execution      Network Communications
          Condition         Command Execution Enabled Flag
          ─┤ ├─                 ─┤ ├──────────── (↑) CMND (490)
                                                ┌──────────────┐
                                                │      S       │
                                                ├──────────────┤
                                                │      D       │
                                                ├──────────────┤
                                                │      C       │
                                                └──────────────┘
```
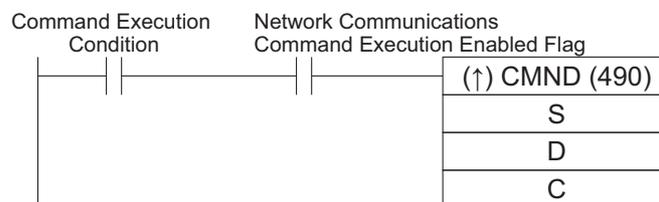
When to Read Response to an Explicit Message

The response to an Explicit Message must be read at the rising edge of the Network Communications Command Execution Enabled Fag for each communications port.

Network Communications Command
Execution Enabled Flag

Response Read Process
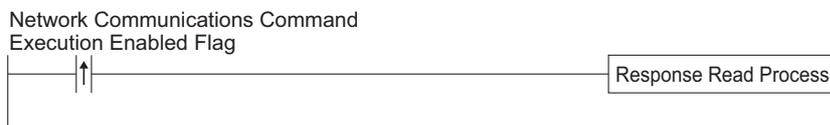
Flags Related to CompoNet Communications

Type	Flag Name	Address		Description
		Word	Bit	
CS/CJ-series Unit's Flag	Network Communications Command Execution Enabled Flag	A202	7 6 5 4 3 2 1 0 — Port 7 Port 6 Port 5 Port 4 Port 3 Port 2 Port 1 Port 0	0: Execution disabled (Executing) 1: Execution enabled (Not Executing)
	Network Communications Command Execution Error Flag	A219	7 6 5 4 3 2 1 0 — Port 7 Port 6 Port 5 Port 4 Port 3 Port 2 Port 1 Port 0	0: Terminated normally 1: Terminated abnormally

Precautions for Correct Use

For information on the CompoNet Master Unit status, refer to Section 5-2-5 Status Area Allocation of the CS/CJ-series CompoNet Master Units Operation Manual (W456).

5-3   Outline of Message Function and Response

When using the Message function, the CompoNet Communications Unit on the inverter returns the response in the following method.

In CompoNet communications, data is sent/received basically in units of 1 byte (8 bits).

For single-word (16-bit) data, the order of high and low bytes will be reversed due to the following reason.

- Data on communications lines: Sent/received in order of low byte to high byte.
- Data processed in programmable controller when issuing a command etc.: Sent/received in order of high byte to low byte.

Therefore, for attributes indicated as "word" in the Size column of the tables provided in *A-1 General Object Specifications* on page A-2 and *A-2 AC Drive Object Specifications* on page A-11, create attachment data or read response data in reverse order of high and low bytes.

Precautions for Correct Use

For Remote I/O, this need not be considered because high and low bytes will be reversed automatically.

● Command Format

28	02					Max. 32 bytes
Command Code	Destination node address	Service Code	Class ID	Instance ID		Service Data (Attribute No. or Attribute No. + Write Data)
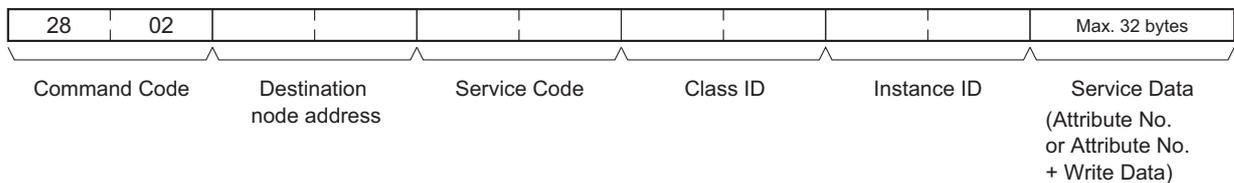
● Response Format

Normal response

28	02	00	00				Max. 32 bytes
Command Code	End Code	No. of received bytes		Source node address	Service Code		Service Data (Read Data)

Error response
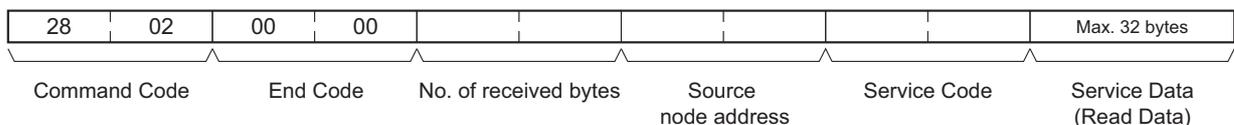
28	02	00	00			00	94	
Command Code	End Code	No. of received bytes		Source node address	Service Code (0094 hex fixed)			Error Code

Send failure or timeout

28	02	
Command Code	End Code	
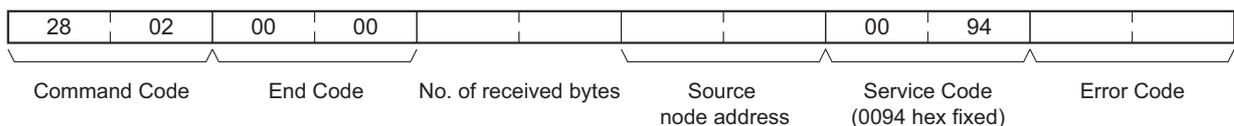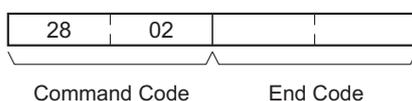
The CompoNet Communications Unit supports the following service codes.

● **Service Codes**

Service Description	Read	Write	Reset
Command	0E hex	10 hex	05 hex
Normal response	8E hex	90 hex	85 hex

Parameter Details

● **Destination Node Address (Command)**

This parameter specifies the destination slave node address for the Explicit Message. For Word Mixed Units such as the 3G3AX-MX2-CRT-E/3G3AX-RX-CRT-E, the value is defined as 10xx hex. The Slave Unit's node address (range 0 to 3F hex) is set for xx.

● **Service Code (Command, Response)**

For a command, specify the service code defined in the CompoNet network.
For details, refer to the following list of service codes.
For a normal response, a value will be returned with the most significant bit of the service code in the command set to 1 (ON). For an error response, 0094 hex, which indicates an error, will be returned.

Service Codes

Service Description	Read	Write	Reset
Command	0E hex	10 hex	05 hex
Normal response	8E hex	90 hex	85 hex

● **Class ID (Command)**

Specify the destination Class ID for the Explicit Message.

● **Instance ID (Command)**

Specify the destination Instance ID for the Explicit Message.

● **Service Data (Command, Response)**

For a command, specify the data defined by the service code.
For a response, the reception data defined by the service code will be returned.

● **Number of Received Bytes (Response)**

The number of bytes of data received from the destination (remote node) node address onwards will be returned.

● **Source (Remote Node) Node Address (Response)**

The remote node address of the response issuing source will be returned.

● **Error Code (Response)**

The error code defined in the CompoNet specifications will be returned.

Description

- The Explicit Message Send Command sends the Explicit Message defined in the CompoNet specifications to a Slave Unit and receives a response.
- For the Explicit Message Send Command, unlike other FINS commands, specify the CompoNet Master Unit as the destination of the control code in the CMND instruction and the actual destination node as the destination node address in the Explicit Message Send Command, respectively.
  Be sure to specify the Master Unit in the control code of the CMND instruction.

5-4   Parameter Read/Write (Class 64 hex)

Explicit messages can be used to read and write inverter parameters.
The CompoNet Communications Unit provides the Instance and Attribute registers corresponding to each parameter of the inverter in Class64 hex (100 dec). According to the following instructions, set parameters in the corresponding Class, Instance, and Attribute registers to issue an Explicit Message.

5-4-1   Supported Service Codes

The service codes that support the Parameter Read/Write object (Class 64 hex) are shown below.

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

5-4-2   Parameter Data Size

Inverter parameter can take data in two sizes, single-word (16-bit) data and double-word (32-bit) data. Fit the size appropriately to each Attribute data size (each Modbus Register No.) to send/receive data to/from Class 64 hex using Explicit Message.
If the data size is inappropriate, you will receive an error response to the Explicit Message. Check the error code attached to the error response to correct the data size.

● Single-word Parameters

Most inverter parameters take single-word data, although some parameters take double-word data. Be sure to handle data as single-word data even if it is a small value such as 0 or 1.

● Double-word Parameters

For double-word (32-bit) parameters such as the frequency reference and multi-step position command, two Attributes (each Modbus Register No.) are allocated. Use these Attributes (each Modbus Register No.) as appropriate as follows.
  • The high-level Attribute (each Modbus Register No.) indicated as HIGH takes double-word data. Data must be always all sent/received at the double-word (32-bit) size to/from this Attribute, regardless of the value to be sent.
  • The low-level Attribute (each Modbus Register No.) indicated as LOW takes single-word data. If the setting range "0 to 65535" is sufficient, this Attribute can be used for a single-word data. When writing data, set the high-level Attribute to "0000".
    When reading data, an error will be detected if the value is larger than "65535". In this case, use the high-level Attribute indicated as HIGH to handle it as double-word (32-bit) data.

Precautions for Correct Use

If single-word (16-bit) or double-word (32-bit) data is sent/received in an Explicit Message, the order of high and low bytes will be reversed due to the following reason. Therefore, in the Parameter Read/Write data, the Attribute value is located in high byte and the low byte of data is located in low byte. The high byte of data is located in high byte of the next word.
- Data on communications lines: Sent/received in order of low byte to high byte.
- Data processed in PLC when issuing a command etc.: Sent/received in order of high byte to low byte.

5-4-3   Parameter Read/Write Data

The Parameter Read/Write data is calculated according to the rules below and sent/received as a hexa-decimal value.

- The set value is divided by the data resolution and converted into a hexadecimal value.

Precautions for Correct Use

The data resolution indicates the minimum setting unit for each Modbus register.

Example: If the output frequency setting is 60 Hz and the data resolution is 0.01 Hz
60 / 0.01 = 6000 → 1770 hex
- Any negative value is represented as a 2's complement number.
Example: If the Torque Bias Value (P037) is set to -100% and the data resolution is 0.01 Hz (for 3G3MX2)
100 / 1 = 100 dec → 0064 hex, -100% → FF9C hex

0064 hex = | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |

↓ bit reversed

| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | = FF9B hex

↓ + 1

| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | = FF9C hex
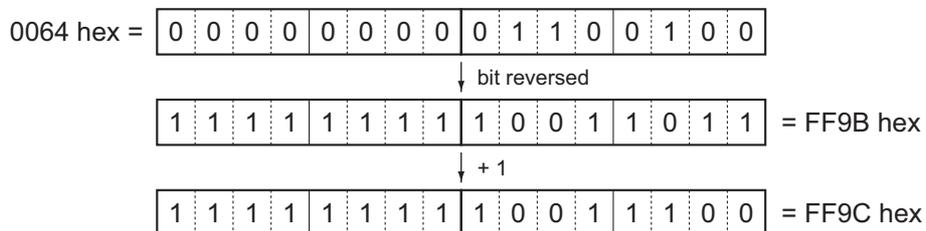
- If the set data is already represented in a hexadecimal form, the data will be sent without converting.
- Each unused bits must be set to 0.
- Do not set data in any unused register.

5-4-4   Saving Changes to Holding Registers (ENTER Command)

Using an Explicit Message to set data in each Attribute causes the new data to overwrite the existing data. However, this new data is not stored in EEPROM and will be lost when the inverter is powered off.
To save changes to the holding registers into EEPROM, you need to issue the ENTER command using the method shown below. In addition, if you have changed a control parameter, you must recalculate the motor parameters. In this case also, use the ENTER command to execute recalculation.

How to Issue ENTER Command (Common to the MX2/RX-series)

To issue the ENTER command (Write to EEPROM), send an Explicit Message to the following Attribute. At this time, select the value to be written using the following table.

   Class: 64 hex, Instance: 09 hex, Attribute: 00 hex (Register: 0900 hex)

Set Value	Description
0000	Recalculates the motor parameters.
0001	Stores the set values.
0002 to FFFF	Recalculates the motor parameters and stores the set values.

Precautions for Correct Use

- If you change any of the following parameters, you must recalculate the motor parameters by writing a value of 0000 or 0002 hex to the holding register for the ENTER command.
  Parameters that require recalculation of motor parameters

Function Code	Item	Function Code	Item
A003/A203	Base Frequency	H003/H203	Motor Capacity
A004/A204	Maximum Frequency	H004/H204	Motor Pole Number
A044/A244	Control Method	H005/H205	Speed Response
A082/A282	Motor Incoming Voltage Selection	H020/H220 to H024/H224	Various Motor Parameter
b112	Free V/f Frequency 7	H030/H230 to H034/H234	Various Motor Parameter (Auto-tuning Data)
H002/H202	Motor Parameter		

- Because the inverter EEPROM has a limitation in the number of overwrites (approximately 100,000 times), frequent use of the ENTER command may reduce the life expectancy of the inverter.

5-4-5   Parameter Class/Instance/Attribute

To specify each parameter of the register object in Class 64 hex, use the Modbus Register No..
Set high byte of the Modbus register to Instance and low byte to Attribute.
For a complete list of Modbus Register numbers for each inverter function and parameter, refer to Section 6-8 Modbus Communication (Modbus-RTU) Data List of the MX2 User's Manual (Cat. No. I570) and 8-5 Modbus Communication Register Number List of the RX User's Manual (Cat. No. I578).

5-4-6   Ladder Programming Example

Ladder Programming Example

The following is an example of a program that writes a value of 7.00 s (2BC hex in unit of 0.01 s) into parameter F002 1st Acceleration Time Setting (Modbus Register No. 1103 hex).
Parameter F002 1st Acceleration Time Setting takes double-word data.

Rung	Instruction	Description
000000	A20011 P_First_Cycle (1 Cycle ON at Operation Start flag)	
	(071) BSET #0000 D00000 D02999	Sets D00000 to D02999 to #0000.
	(021) MOV #000D D00000	Sets D00000 to #000D. (Number of bytes of sent data: 13)
	(021) MOV #000A D00001	Sets D00001 to #000A. (Number of bytes of received data: 10)
	(021) MOV #0001 D00002	Sets D00002 to #0001. (Destination network address 01)
	(021) MOV #05FE D00003	Sets D00003 to #05FE. (Destination node address 05, Destination unit address FE)
	(021) MOV #0000 D00004	Sets D00004 to #0000. (Response required, Communications port No. 0, No. of resends 0)
	(021) MOV #000A D00005	Sets D00005 to #000A. (Response monitor time 1.0 s)
	(021) MOV #2802 D10000	Sets D01000 to #2802. (Explicit command)
	(021) MOV #0B10 D10001	Sets D10001 to #0B01.
	(021) MOV #0064 D10002	Sets D10002 to #0064.
	(021) MOV #0011 D10003	Sets D10003 to #0011.
	(021) MOV #03BC D10004	Sets D10004 to #03BC.
	(021) MOV #0200 D10005	Sets D10005 to #0200.
	(021) MOV #0000 D10006	Sets D10006 to #00--.
	(021) MOV #0001 0000	Sets 0000CH to #0001.

(Command data) applies to D10000 – D10006.

Rung 000014:
Command Execution Condition 000000 ┤├ A20200 (Network Communications Command Execution Enabled) ┤├

(490) CMND D01000 D02000 D00000 — Issues 9 bytes of command data from D01000 to destination node address 05 and stores 10 bytes of response data to D02000 on local node (D00000: Control data)

(025) ASL 0000 — Shifts contents of word address 0000 one bit to left (to turn 000001 ON).

Wait for Command Execution Completion

Rung 000019:
000001 ┤├ A20200 (Network Communications Command Execution Enabled) ┤├ A21900 (Network Communications Command Execution Error) ┤├

(021) MOV A203 D00006 — Stores A203 (Network communications response code) in D00006.

(026) ASR 0000 — Shifts contents of word address 0000 one bit to right and retry in next cycle (to turn 000000 ON).

A21900 ┤/├

(025) ASL 0000

Rung 000025:
(001) END — Ends if successful.

END

5-5   Parameter Read/Write (Class 65 hex)

5-5-1   Supported Service Codes

● **Function Code Object (Class 65 hex) - Supported Service Codes**

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

5-5-2   Supported Instance and Attribute Codes

Use each inverter parameter number as a Function Code in the Instance and Attribute objects.
A Function Code is calculated using a sequence number of the parameter function group (A = 0, B = 1, etc) x 1000 + the 3-digit parameter number. This Function Code is used to allocate the Instance (2 high bytes) and Attribute (2 low bytes).

● **Function Code Object (Class0x65) - Supported Instance and Attribute Codes**

| Function Code	Decimal Base	Decimal Range	hexadecimal Range
A001 to A999	0	1 - 999	0001 to 03E7
b001 to b999	1000	1000 - 1999	03E9 to 07CF
C001 to C999	2000	2001 - 2999	07D1 to 0BB7
d001 to d999	3000	3001 - 3999	0BB9 to 0F9F
F001 to F999	5000	5001 - 5999	1389 to 176F
H001 to H999	7000	7001 - 7999	1B59 to 1F3F
P001 to P999	15000	15001 - 15999	3A99 to 3E7F
U001 to U999	20000	20001 - 20999	4E21 to 5207

> **Precautions for Correct Use**
>
> • For details about Modbus registers and data sizes, refer to
>   Section 6-8 Modbus Communication (Modbus-RTU) Data List of the MX2 User's Manual
>   (Cat. No. I570) and 8-5 Modbus Communication Register Number List of the RX User's Manual (Cat. No. I578).
> • All data written by the Function Code object are saved temporary in the inverter memory. Be sure to execute the ENTER command at the end of the writing sequence to store the values in EEPROM.
> • Function Code F001 cannot be written using the Function Code object.
> • Parameter b127 takes double-word data, which is different from the data size of Modbus registers (single word).
> • The ENTER command is executed by the following object and written to EEPROM. Refer to *5-4-4 Saving Changes to Holding Registers (ENTER Command)* on page 5-12.
>   Write to EEPROM: Class 65 hex, Instance 09 hex, Attribute 00 (0900 hex)

Example 1: Reading a Single-word Function Code

Parameter d005: Multi-function Input Monitor
Command:

| | | 00 | 0E | 00 | 65 | 00 | 0B | BD |

— Attribute ID

Destination   Service   Class ID   Instance
node address   Code   ID

Response:

| 00 | 06 | | | 00 | 8E | 01 | 00 |

No. of   Source   Service   Data
received   node   Code
bytes   address
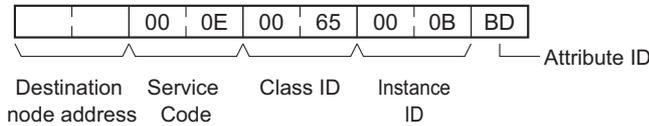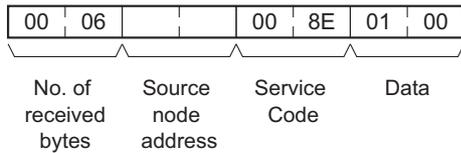
Instance and Attribute are determined as Value 3 (d) x 1000 + 005 = 3005, which is converted to 0BBD hex. The response shows that the value 0001 is read. In CompoNet, data is sent from low to high bytes.

Example 2: Writing a Double-word Function Code

Parameter P060: Multi-step Position Command 0 (Value: 128000 or 01F400 hex)
Command:

| | | 00 | 10 | 00 | 65 | 00 | 3A | D4 | 00 | F4 | 01 | 00 |

Destination   Service   Class ID   Instance   Data
node address   Code   ID

— Attribute ID

Response:

| 00 | 04 | | | 00 | 90 |

No. of   Source   Service
received   node   Code
bytes   address
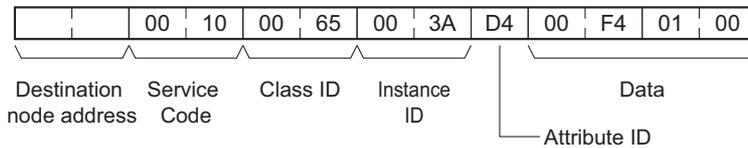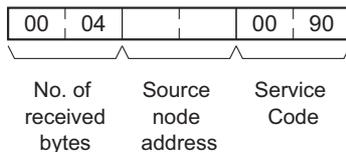
Instance and Attribute are determined as Value 15 (P) x 1000 + 060 = 15060, which is converted to 3AD4 hex. Please note the swapping of the byte order when setting the decimal value 128000. In CompoNet, data is sent from low to high bytes.

6

Troubleshooting

This section describes the troubleshooting for various problems which may occur in CompoNet, the inverter, and the CompoNet Communications Unit.

6-1   Outline of Error Indication

If an error occurs during CompoNet communications, or if the CompoNet Communications Unit fails, you can check the content of the error with the LED indicator on the inverter Digital Operator and the MS/NS LED indicators on the CompoNet Communications Unit.

After eliminating the cause of the error according to the instructions provided in this section, reset the inverter.

● **Example of LED indicators on MX2-series**

○ MS	Not lit
● MS	Lit red
● MS	Lit green
Ｖ MS	Flashing
○ MS	Unknown state
E60.1	Inverter error code
0.00	Unknown state
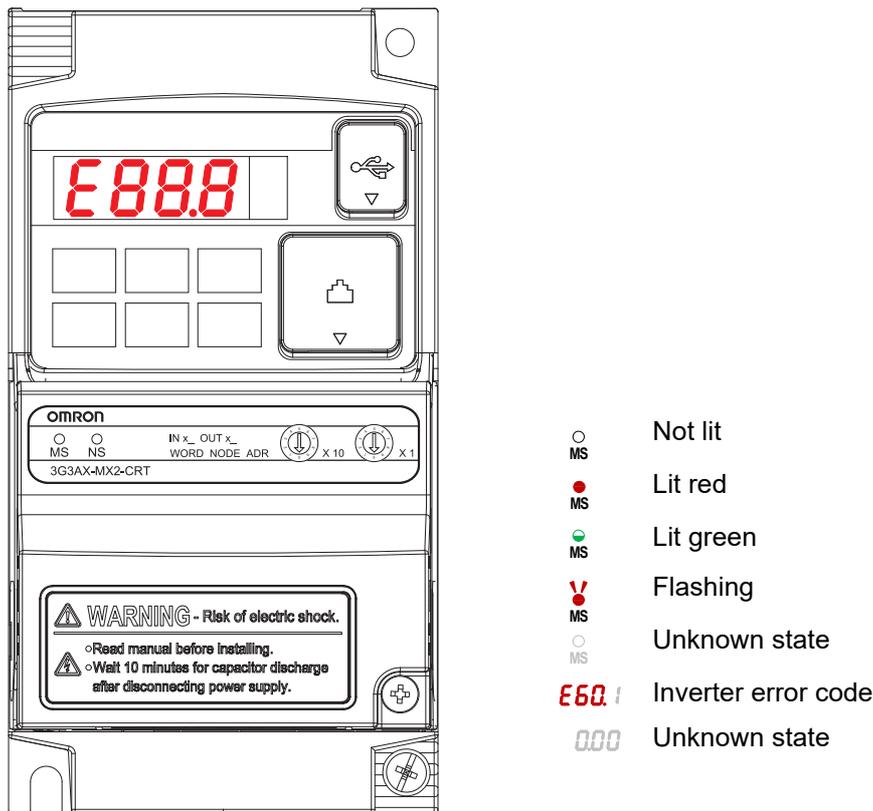
Precautions for Correct Use

Do not clear the trip state before you finish troubleshooting the error. If you clear the trip, the error code will be cleared from the 4-digit display. As a result, you may lose the error information before start troubleshooting. Checking data in the error log is still an option in this case.

6-2   Errors on a Communications Line

If the CompoNet Communications Unit cannot continue CompoNet communications due to interruption, short circuit, reverse connection, node address duplication, superimposed noise, or other cause, a transmission fault will be detected.
If a transmission fault occurs, the inverter turns ON the fault contact to stop the motor (free run stop). In this case, check the LED indicator on the CompoNet Communications Unit and take corrective action.

MS/NS LED Indicators in CompoNet Communications

The CompoNet Communications Unit has the MS and NS LED indicators that indicate the states of the power supply and communications.

⬜: Lit, ◪: Flashing, ⬛ : Not lit

Indicator Name	Indication		Operation State	Description	Corrective Action
	Color	State			
MS (Module Status)	Green	Lit ⬜	Power ON	CompoNet Communications Unit is operating normally.	–
	Red	Lit ⬜	Fatal fault	• Hardware error occurred in CompoNet Communications Unit. • Unsupported inverter version is used.	• Cycle inverter's input power supply. • Replace CompoNet Communications Unit. • Replace the inverter with another MX2-series, Ver. 1.1 or later; or RX-series, Ver. 2.0 or later.
		Flashing ◪	Minor fault	Recoverable fault • Node address is changed. • Illegal Flexible Format configuration • CompoNet Communications Unit parameter is out of range or write-prohibited. • CompoNet Communications Unit detected consecutive communication errors.	Take the following actions and cycle the power supply. • Correct node address configuration. • Review Flexible Format configuration. • Check and correct Remote I/O settings and register numbers. • Take environmental measures such as noise isolation.
	–	Not lit ⬛	Power OFF/Reset	• Power is not supplied to inverter. • Power is not supplied to CompoNet Communications Unit because it is not properly connected with inverter. • Unit is reset.	• Cycle inverter's input power supply. • Check CompoNet Communications Unit connector and turn on inverter's input power supply. • Replace CompoNet Communications Unit. • Check and correct inverter's reset input state or its setting (C102).

Indicator Name	Indication		Operation State	Description	Corrective Action
	Color	State			
NS (Network Status)	Green	Lit ⬜	Online/ Communication connection established	Network is in normal communication state. (Communications established)	–
		Flashing ◪	Online/ Communication connection not established	Network operates normally, but communications with Master Unit are not established.	• Check the number of words occupied by input/output assembly in registration table, correct it to match Remote I/O setting, and restart CompoNet Communications Unit.[1] • Power on Master Unit.
	Red	Lit ⬜	Fatal communications error	CompoNet Communications Unit detected a communications error that disabled Communications. • Node address duplication • Network error	Take the following actions and cycle the power supply. • Correct node address duplication. • Connect a terminating resistor to each end of communications line. • Correct improper connections on communications line. • Correct Master Unit error. • Take environmental measures such as noise isolation.
		Flashing ◪	Minor communications error	CompoNet Communications Unit detected a communications timeout error.	Take the following actions and cycle the power supply. • Connect a terminating resistor to each end of communications line. • Correct improper connections on communications line. • Take environmental measures such as noise isolation.
	-	Not lit ⬛	Power OFF	• Power is not supplied to CompoNet Communications Unit. (Check Module Status LED.) • Checking for node address duplication (intermediate state)	• Cycle inverter's input power supply. • Check CompoNet Communications Unit connector and turn on inverter's input power. Replace CompoNet Communications Unit if error persists.

[1] This is important if inverter parameter P046 (Assembly Instance No.) is used to change the CompoNet Communications Unit's default Remote I/O setting.
The CompoNet Registration Table function is enabled only when a type of Remote I/O that occupies IN 2/OUT 2 words is selected.
If you configure the function with a Remote I/O setting that occupies other than IN 2/OUT 2 words, the NS indicator will remain flashing and therefore CompoNet communications cannot be established.

📝 **Additional Information**

If an error occurs on a communications line, a detailed error code is displayed on the LED display of the Master Unit.
Check this error code and take corrective action according to Section 8 Troubleshooting of the CS/CJ-series CompoNet Master Units Operation Manual (W456).

6-3　Errors on Inverter or CompoNet Communications Unit

If an error occurs in the inverter or CompoNet Communications Unit, an error code is displayed on the Digital Operator's LED indicator.

This section provides information on the error code, assumed cause, and corrective action mainly related to errors on the CompoNet Communications Unit.

For errors related to the inverter, refer to Section 7 Maintenance Operations of the MX2 User's Manual (Cat. No. I570) and 10-1 Alarm Codes and Remedies of the RX User's Manual (Cat. No. I578).

6-3-1　Error Codes Related to CompoNet Communications Error

If an error occurs during CompoNet communications, it is indicated with the MS/NS LED indicators on the CompoNet Communications Unit, as well as the inverter error code. Check the content of the error according to the MS/NS LED indicators and the error code. The table below shows the error and the corrective action.

MX2 Error Codes & Indicators	RX Error Codes & Indicators	Assumed Cause	Corrective Action
0.00 MS NS		Waiting for connection	If you use Registration Table function, check if the number of words occupied by input/output assembly in registration table matches Remote I/O setting. *1
0.00 MS NS		Device Node Address (P190) does not match Unit's current online address.	This error may occur if Device Node Address (P190) is changed when communication connection is established. Cycle the power supply of the inverter.
E61.1 MS NS	E71.1 MS NS	CompoNet Master Unit cannot communicate with CompoNet Communications Unit because node address is already used.	Check (and correct) the following items: • Does Master Unit or any other slave device on CompoNet network also use the same node address?
E63.1 MS NS	E73.1 MS NS	Communication idle was detected during RUN mode.	Check (and correct) the following items: • Is CompoNet Master Unit sending IDLE messages? Check P048 and select an operation from Operation at Idle Mode Detection Setting.*2

MX2 Error Codes & Indicators	RX Error Codes & Indicators	Assumed Cause	Corrective Action
$E63.1$ MS NS	$E73.1$ MS NS	Connection timeout was detected.	Check (and correct) the following items: • Are wires connected to proper pins of CompoNet connector? • Are there any short circuits or line interruptions? • Is ground cable of CompoNet Communications Unit connected with chassis ground of inverter? Is chassis ground of inverter connected securely to ground? • Are you using proper cable type? • If you have branches from CompoNet cable trunk line: Are any of these branches too long? • Are terminating resistors mounted only on both trunk ends? • If noise interference is excessive, take the following corrective action. Noise reduction by means of isolation from noise source, shielding, or noise filtering.

*1 This is important if inverter parameter P046 (Assembly Instance No.) is used to change the CompoNet Communications Unit's default Remote I/O setting.
The CompoNet Registration Table function is enabled only when a type of Remote I/O that occupies IN 2/OUT 2 words is selected.
If you configure the function with a Remote I/O setting that occupies other than IN 2/OUT 2 words, the NS indicator will remain flashing and therefore CompoNet communications cannot be established.

*2 P048 configuration is unnecessary because OMRON's Master Unit does not send IDLE messages.

6-3-2   Error Codes Related to CompoNet Communications Unit

If an error occurs inside the CompoNet Communications Unit, the inverter stops with the error code displayed.
The table below shows the errors and the corrective action.

MX2 Error Codes & Indicators	RX Error Codes & Indicators	Assumed Cause	Corrective Action
0.00 ○ ○ MS NS		Inverter does not power on.	**MX2** Perform troubleshooting according to Section 7-2 Troubleshooting of the MX2 User's Manual (Cat. No. I570). **RX** Perform troubleshooting according to 10-4 Troubleshooting of the RX User's Manual (Cat. No. I578).
		CompoNet Communications Unit's inverter connector is damaged.	Replace CompoNet Communications Unit.
		Inverter RS input is ON.	Switch inverter RS input OFF.
E60.1 ● ○ MS NS	*E70.1* ● ○ MS NS	CompoNet Communications Unit encountered a major error during power-on.	Check if CompoNet Communications Unit is mounted properly and connector is sufficiently inserted, and then restart CompoNet Communications Unit. If problem persists, replace CompoNet Communications Unit.
		Inverter does not support CompoNet Communications Unit.	Replace the inverter with another MX2-series, Ver. 1.1 or later; or RX-series, Ver. 2.0 or later.
		CompoNet Communications Unit's inverter connector is damaged.	Replace CompoNet Communications Unit.
E60.1 ▼ ○ MS NS	*E70.1* ▼ ○ MS NS	CompoNet Communications Unit encountered a major error during operation.	Check if CompoNet Communications Unit is mounted properly and connector is sufficiently inserted, and then restart CompoNet Communications Unit. If problem persists, replace CompoNet Communications Unit.
E62.1 ○ ○ MS NS	*E73.1* ○ ● MS NS	The inverter is tripped with Force external fault/Trip through Fieldbus.	Clear External trip (EXT) from CompoNet communications and reset trip state.
E69.1 ○ ○ MS NS	*E79.1* ○ ○ MS NS	A fatal error was detected while CompoNet Communications Unit operates.	Check if CompoNet Communications Unit is mounted properly and connector is sufficiently inserted, and then restart CompoNet Communications Unit. If problem persists, replace CompoNet Communications Unit.

6-3-3   Parameter Setting Error in CompoNet Communications Unit

If the configuration of a parameter disables the CompoNet Communications Unit to operate normally, an error code will be displayed.
The table below shows the errors and the corrective action.

MX2 Error Codes & Indicators	RX Error Codes & Indicators	Assumed Cause	Corrective Action
E64. 1 MS ● NS ○	**E74.** 1 MS ● NS ○	One of configuration parameters P160 to P167 or P170 to P177 is rejected by inverter.	Check (and correct) the following items: • Does one of parameters P168, P169, P178, and P179 contain a value which is not zero? • Is one of parameters P160 to P167 and P170 to P177 specifying a Modbus register that does not exist? • Is one of parameters P160 to P167 specifying a double-word Modbus register? If so, are low and high words specified in sequence by two consecutive parameters? • Is one of parameters P170 to P177 specifying a double-word Modbus register? If so, are high and low words specified in sequence by two consecutive parameters? • Is a specific Modbus register specified twice in output parameters P160 to P167? • Is one of parameters P160 to P167 specifying a Modbus register that is read-only? **MX2** ▷ A register is read-only if it has an "R" in the R/W column of the register table in Section 6-8 Modbus Communication (Modbus-RTU) Data List of the MX2 User's Manual (Cat. No. I570). **RX** ▷ A register is read-only if it has an "R" in the R/W column of the register table in 8-5 Modbus Communication Register Number List of the RX User's Manual (Cat. No. I578). • Is one of parameters P160 to P167 specifying a Modbus register that is write-prohibited during operation? **MX2** ▷ A parameter is write-prohibited during operation if "no" is put in the "Data can be changed during RUN" column of the table in Section 4 of the MX2 Inverter manual (Cat. No. I570). **RX** ▷ A parameter is write-prohibited during operation if "No" is put in the "Changes during operation" column of the table in Section 4 Parameter List of the RX Inverter manual (Cat. No. I578). After correcting configuration, cycle the power supply.

MX2 Error Codes & Indicators	RX Error Codes & Indicators	Assumed Cause	Corrective Action
E65.1 MS NS	E75.1 MS NS	Inverter settings are not compatible with this version of Compo-Net Communications Unit.	• Check P046 value is in range [0 to 7] and restart CompoNet Communications Unit. • Initialize inverter parameters.

6-4   Errors Related to Message Communications

To send a CompoNet Explicit Message from a CS/CJ-series unit, use a FINS message.
If any Explicit Message/FINS message is not completed normally, check the contents of the FINS message response.

6-4-1   FINS Message Errors (CS/CJ-series)

The table below shows the assumed cause and corrective action for each FINS response.

FINS Response	Description	Assumed Cause	Corrective Action
0000	Normal completion	–	–
0101	Local node not in network	Local node is not in network.	Check Master Unit settings and network configuration.
0201	Destination node not in network	Destination node is not in network. (MS and NS LED indicators not indicating normal state)	Add destination node correctly to the network.
0204	Destination node is busy.	Destination node receives too much data.	Increase number of resends or review system so that the destination node does not receive so many messages.
0205	Response timeout	Response monitor time is too short.	Increase length of response monitor time.
		Message frame was destroyed by noise.	Check noise conditions and take corrective action. Increase number of resends.
1001	Command too long	Command is too long.	Check command format and correct command data.
1002	Command too short	Command is too short.	Check command format and correct command data.
1004	Command format error	Incorrect format is used.	Check command format and correct command data.
1005	Header error	Destination address setting (routing table) is incorrect.	Check FINS command (2802) in CMND instruction. Set routing table correctly.
110B	Response too long	Response is longer than maximum frame length.	Check command format and set correct number of elements.
2609	Necessary items not set	Required elements are not set in command data.	Check command format and set required elements in command data.

📝 **Additional Information**

For details about FINS commands not described above, refer to CS/CJ-series Communications Commands Reference Manual (Cat. No. W342).

6-4-2 Explicit Message Errors

If there is an Explicit message that is issued but not completed normally, the response will be returned with one of the following error codes attached to service code 94. If this occurs, check the error message and correct the request message or otherwise resend the message in a timely fashion.

Error Code	Description	Corrective Action
0000	Normal completion response	–
02FF	Internal communication error	Check if CompoNet Communications Unit connector is sufficiently inserted and resend. If problem persists, replace CompoNet Communications Unit.
08FF	Requested service does not exist.	Correct service code and resend.
09FF	Invalid Attribute was detected.	Correct Attribute value and resend.
0CFF	Requested service cannot be executed in object mode/state.	Stop inverter and resend.
0EFF	Request for changing unchangeable Attribute was received.	Correct service code/Attribute value and resend.
10FF	Service execution disabled mode	Requested service cannot be executed in current inverter mode. Correct mode or service and resend.
13FF	Data is insufficient for this service.	Provide data in correct size and resend.
14FF	There is no Attribute for this service.	Correct service code/Attribute value and resend.
15FF	There is too much data for this service.	Provide data in correct size and resend.
16FF	Specified object does not exist.	Correct Class/Instance value and resend.
20FF	Parameter for this request is invalid, or data is out of range.	Check data setting range, correct data, and resend.
1FFF	Vendor-specific error	Stop inverter and resend. Or check data setting range, correct data, and resend.

6-5 Special I/O Errors

If a problem is found in the output data of Special I/O, the inverter returns an error code to the input data without executing the request.

Determine whether or not an error occurred by the most significant bit (word address n, bit 7) of the Function Code in the input data.

In case of an error, the Function Code in the input data has a value of the output data added with 80 hex.

The table below shows the error code and corrective action for each Special I/O error.

Error Code	Name	Description	Corrective Action
01 hex	Function Code Error	A code other than 03/10/43 or 50 hex is set as Function Code.	Check and correct Function Code.
02 hex	Register No. Error	Specified Register No. does not exist.	Check and correct Register No.
04 hex	Slave Device Error	Option inverter communications error. (Internal communications error occurred between CompoNet Communications Unit and inverter)	Check if CompoNet Communications Unit is mounted properly (if connector is sufficiently inserted). If problem persists, replace CompoNet Communications Unit.
21 hex	Data Setting Error	Upper or lower limit of write data setting range is exceeded.	Check and correct data size so data is within data setting range.
22 hex	Write Mode Error	Inverter mode is incorrect. • Changing unchangeable register during operation. • ENTER command was issued during operation (UV[1]). • Writing to register in trip (UV[1]) state. • Writing to register in soft lock mode. • Changing an unchangeable input/output terminal. • Changing contact type of terminal to which RS (Reset) is allocated. • Writing to a register when auto-tuning is enabled. • Writing to a lock-enabled register during password setting.	• Write after stopping inverter operation. • Write after clearing UV error. • Write after releasing soft lock. • Correct after checking if terminal is changeable. • Write after completing auto-tuning. • Write after canceling password setting.
23 hex	Register Size Error	Reading/Writing 2-byte data from/to a 4-byte register or 4-byte data from/to a 2-byte register.	Check and correct data size properly.

*1 UV: During undervoltage

6-6 Removing CompoNet Communications Unit

⚠ DANGER

Do not attempt to remove the terminal block cover or disconnect and reconnect the CompoNet Communications Unit during power on or within 10 minutes after power off.
Doing so may result in severe injury due to electric shock.

⚠ Caution

Inverters contain high voltage parts and short-circuits may sometimes cause product damage or property damage. Measures must be taken to prevent chips, lead-wire pieces, or other metal waste from entering the product, for example, by installing a cover.

Do not attempt to disassemble, repair, or modify the CompoNet Communications Unit.
Doing so may result in injury.

Operation and Adjustment

- Be sure to confirm the permissible range of motors and machines before operation because the speed can be set from low to high.
- Before starting the CPU Unit and inverter programs, check the program contents as well as the interactions between these programs.

Maintenance and Inspection

- Be sure to confirm safety before conducting maintenance, inspection or parts replacement.
- Invalid parameter configuration may result in a communications error, interrupting the communications function of other units. Before participating in the network, make sure that the communications configuration parameters are set properly.
- Using a support tool to write all inverter parameters causes the CompoNet configuration parameters to be overwritten. Before reconnecting to CompoNet, make sure that the address and I/O allocations are correct.

6-6-1 How to Remove CompoNet Communications Unit - MX2-series

When you remove the CompoNet Communications Unit for replacement or inspection, follow the steps below. For the mounting steps, refer to *2-2 Installation* on page 2-6.

1 **Loosen the CompoNet Communications Unit mounting screw.**
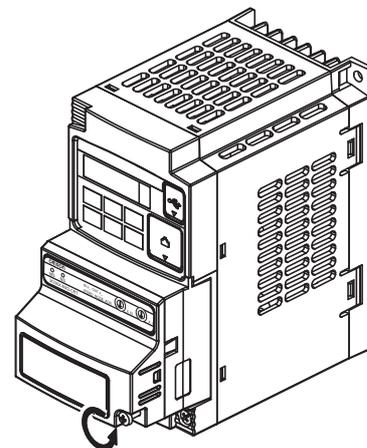
2 **Pull the CompoNet Communications Unit straight out of the inverter while pushing down on the indicated sides to release the snap-fits.**
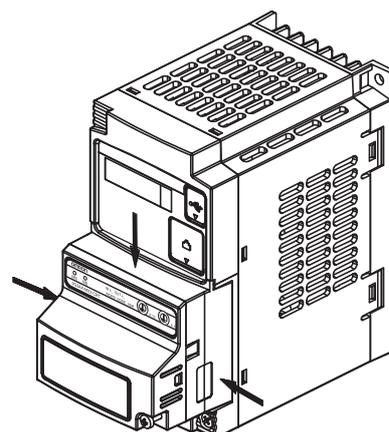
3 **For inverters up to 4.0 kW, loosen the screws of the terminal block cover to remove the cover.**
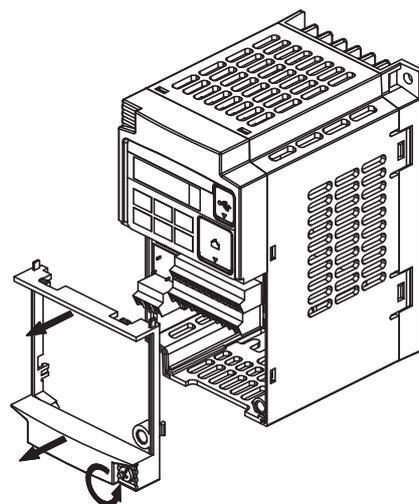
4 **Unscrew and remove the CompoNet Communications Unit grounding cable.**

1-phase 200 V 0.1 to 2.2 kW	3-phase 200 V 5.5 to 15 kW
3-phase 200 V 0.1 to 3.7 kW	3-phase 400 V 5.5 to 15 kW
3-phase 400 V 0.4 to 4.0 kW	
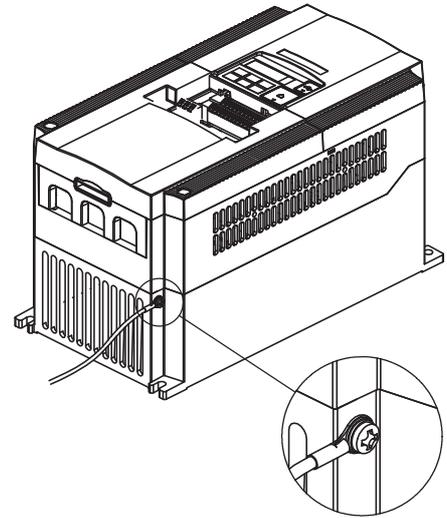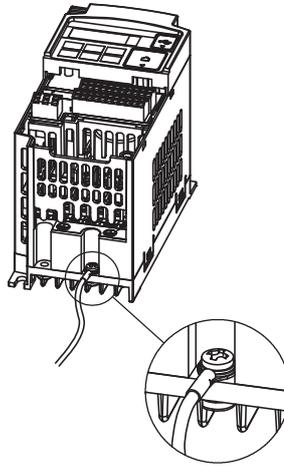
6-6-2   How to Remove CompoNet Communications Unit - RX-series

When you remove the CompoNet Communications Unit for replacement or inspection, follow the steps below. For the mounting steps, refer to *2-2 Installation* on page 2-6.

1 **Remove the Digital Operator by pushing the lip on the top.**
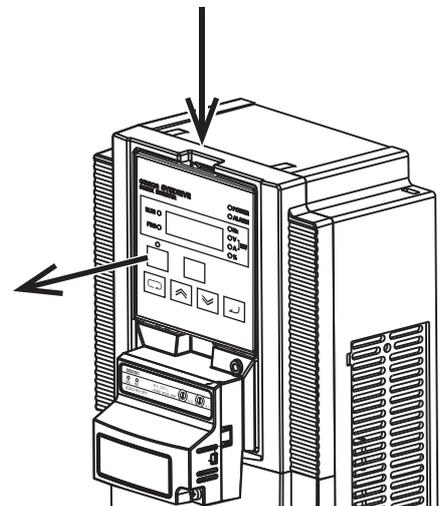
2 **Remove the terminal cover from the inverter.**
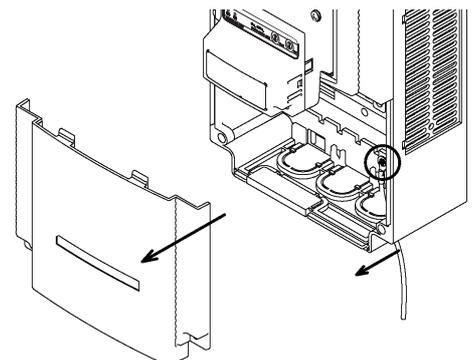
3 **Remove the grounding cable of inverter.**
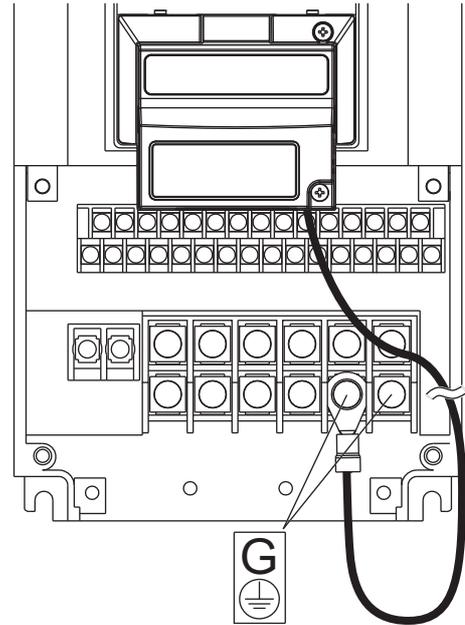
4 **Remove the CompoNet Communications Unit by the indicated step.**
Be careful not to stress the flat cable.
(a)   Push up the CompoNet Communications Unit to have a space under the bottom.
(b)   While pushing it up, draw out the CompoNet Communications Unit to the near side.

(b) Draw out the bottom

(a) Push up
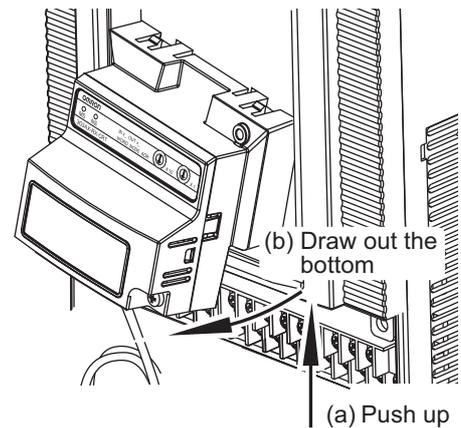
5 **Remove the inverter connection PCB by holding at the indicated locations.**
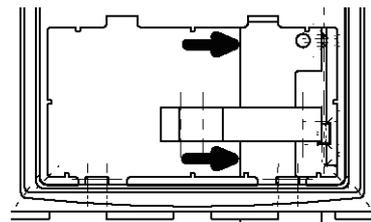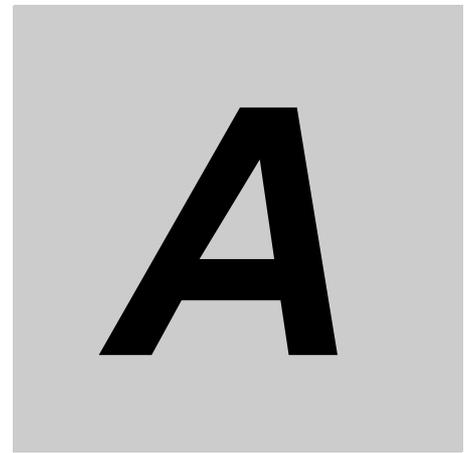
A

Appendices

This section contains the general object specifications and AC drive object specifications.

A-1 General Object Specifications

A-1-1 Identity Object (Class 01 hex)

Supported Service Codes

Table A-1 Identity Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
05	Resets data (to initial status).

Object Details

Table A-2 Identity Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	01	Vendor	Indicates the manufacturer's ID.	----	47 (OMRON Configuration)	Yes	No	UINT
	02	Device Type	Indicates the CompoNet profile classification	----	2 (AC Drive)	Yes	No	UINT
	03	Product Code	Depends on the inverter model.	----	Refer to Table A-3 or A-4.	Yes	No	UINT
	04	Revision	Indicates overall software revisions for the CompoNet Communications Unit and the inverter. Note that this Attribute depends on both the CompoNet Communications Unit and the inverter. Be sure to apply the correct EDS file to this revision during configuration.	----	Depends on Unit.	Yes	No	word
	05	Status	Indicates the communications status for the CompoNet Communications Unit. Bit allocation: 0 : Always ON 8 : Minor recoverable fault 9 : Minor unrecoverable fault 10 : Major recoverable fault 11 : Major unrecoverable fault	----	0 hex	Yes	No	UINT
	06	Serial Number	Indicates the serial number of the CompoNet Communications Unit.	----	Unique to each Unit	Yes	No	LONG
	07	Product Name	Depends on the inverter model.	----	Refer to Table A-3 or A-4.	Yes	No	UINT

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	09	Configuration Consistency Value	Indicates the consistency value which is incremented if an inverter parameter is changed and stored to EEPROM through the CompoNet Communications Unit interface. Please note that changes using the other inverter interfaces (Serial, Digital Operator) do not influence this Attribute. Writing to EEPROM Save (Modbus address 0900 hex, Class 64 hex, Instance 09 hex, Attribute 0 hex) also increments this value.	----	0 hex	Yes	No	UINT
	65	Firmware Revision Option Board	Indicates the software version of the CompoNet Communications Unit.	----	Depends on Unit.	Yes	No	word

📝 **Additional Information**

The product code and the product name depend on the model of inverter being used, as shown in the following tables.

Table A-3 MX2-series Model List

Inverter Model	Product Name	ID Code	Name of EDS File
3G3MX2-AB001 3G3MX2-A2001	3G3AX-MX2-CRT-AB001_A2001	1840	3G3AX-MX2-CRT-AB001_A2001.eds
3G3MX2-AB002 3G3MX2-A2002	3G3AX-MX2-CRT-AB002_A2002	1841	3G3AX-MX2-CRT-AB002_A2002.eds
3G3MX2-AB004 3G3MX2-A2004	3G3AX-MX2-CRT-AB004_A2004	1842	3G3AX-MX2-CRT-AB004_A2004.eds
3G3MX2-AB007 3G3MX2-A2007	3G3AX-MX2-CRT-AB007_A2007	1844	3G3AX-MX2-CRT-AB007_A2007.eds
3G3MX2-AB015 3G3MX2-A2015	3G3AX-MX2-CRT-AB015_A2015	1846	3G3AX-MX2-CRT-AB015_A2015.eds
3G3MX2-AB022 3G3MX2-A2022	3G3AX-MX2-CRT-AB022_A2022	1847	3G3AX-MX2-CRT-AB022_A2022.eds
3G3MX2-A2037	3G3AX-MX2-CRT-A2037	1849	3G3AX-MX2-CRT-A2037.eds
3G3MX2-A2055	3G3AX-MX2-CRT-A2055	1851	3G3AX-MX2-CRT-A2055.eds
3G3MX2-A2075	3G3AX-MX2-CRT-A2075	1852	3G3AX-MX2-CRT-A2075.eds
3G3MX2-A2110	3G3AX-MX2-CRT-A2110	1853	3G3AX-MX2-CRT-A2110.eds
3G3MX2-A2150	3G3AX-MX2-CRT-A2150	1854	3G3AX-MX2-CRT-A2150.eds
3G3MX2-A4004	3G3AX-MX2-CRT-A4004	1862	3G3AX-MX2-CRT-A4004.eds
3G3MX2-A4007	3G3AX-MX2-CRT-A4007	1864	3G3AX-MX2-CRT-A4007.eds
3G3MX2-A4015	3G3AX-MX2-CRT-A4015	1866	3G3AX-MX2-CRT-A4015.eds
3G3MX2-A4022	3G3AX-MX2-CRT-A4022	1867	3G3AX-MX2-CRT-A4022.eds
3G3MX2-A4030	3G3AX-MX2-CRT-A4030	1868	3G3AX-MX2-CRT-A4030.eds

Inverter Model	Product Name	ID Code	Name of EDS File
3G3MX2-A4040	3G3AX-MX2-CRT-A4040	1870	3G3AX-MX2-CRT-A4040.eds
3G3MX2-A4055	3G3AX-MX2-CRT-A4055	1871	3G3AX-MX2-CRT-A4055.eds
3G3MX2-A4075	3G3AX-MX2-CRT-A4075	1872	3G3AX-MX2-CRT-A4075.eds
3G3MX2-A4110	3G3AX-MX2-CRT-A4110	1873	3G3AX-MX2-CRT-A4110.eds
3G3MX2-A4150	3G3AX-MX2-CRT-A4150	1874	3G3AX-MX2-CRT-A4150.eds

Table A-4 RX-series Model List

Inverter Model	Product Name	ID Code	Name of EDS File
3G3RX-A2004	3G3AX-RX-CRT-A2004	2095	3G3AX-RX-CRT-A2004.eds
3G3RX-A2007	3G3AX-RX-CRT-A2007	2096	3G3AX-RX-CRT-A2007.eds
3G3RX-A2015	3G3AX-RX-CRT-A2015	2097	3G3AX-RX-CRT-A2015.eds
3G3RX-A2022	3G3AX-RX-CRT-A2022	2098	3G3AX-RX-CRT-A2022.eds
3G3RX-A2037	3G3AX-RX-CRT-A2037	2099	3G3AX-RX-CRT-A2037.eds
3G3RX-A2055	3G3AX-RX-CRT-A2055	2100	3G3AX-RX-CRT-A2055.eds
3G3RX-A2075	3G3AX-RX-CRT-A2075	2101	3G3AX-RX-CRT-A2075.eds
3G3RX-A2110	3G3AX-RX-CRT-A2110	2102	3G3AX-RX-CRT-A2110.eds
3G3RX-A2150	3G3AX-RX-CRT-A2150	2103	3G3AX-RX-CRT-A2150.eds
3G3RX-A2185	3G3AX-RX-CRT-A2185	2104	3G3AX-RX-CRT-A2185.eds
3G3RX-A2220	3G3AX-RX-CRT-A2220	2105	3G3AX-RX-CRT-A2220.eds
3G3RX-A2300	3G3AX-RX-CRT-A2300	2106	3G3AX-RX-CRT-A2300.eds
3G3RX-A2370	3G3AX-RX-CRT-A2370	2107	3G3AX-RX-CRT-A2370.eds
3G3RX-A2450	3G3AX-RX-CRT-A2450	2108	3G3AX-RX-CRT-A2450.eds
3G3RX-A2550	3G3AX-RX-CRT-A2550	2109	3G3AX-RX-CRT-A2550.eds
3G3RX-A4004	3G3AX-RX-CRT-A4004	2122	3G3AX-RX-CRT-A4004.eds
3G3RX-A4007	3G3AX-RX-CRT-A4007	2123	3G3AX-RX-CRT-A4007.eds
3G3RX-A4015	3G3AX-RX-CRT-A4015	2124	3G3AX-RX-CRT-A4015.eds
3G3RX-A4022	3G3AX-RX-CRT-A4022	2125	3G3AX-RX-CRT-A4022.eds
3G3RX-A4037	3G3AX-RX-CRT-A4037	2126	3G3AX-RX-CRT-A4037.eds
3G3RX-A4055	3G3AX-RX-CRT-A4055	2127	3G3AX-RX-CRT-A4055.eds
3G3RX-A4075	3G3AX-RX-CRT-A4075	2128	3G3AX-RX-CRT-A4075.eds
3G3RX-A4110	3G3AX-RX-CRT-A4110	2129	3G3AX-RX-CRT-A4110.eds
3G3RX-A4150	3G3AX-RX-CRT-A4150	2130	3G3AX-RX-CRT-A4150.eds
3G3RX-A4185	3G3AX-RX-CRT-A4185	2131	3G3AX-RX-CRT-A4185.eds
3G3RX-A4220	3G3AX-RX-CRT-A4220	2132	3G3AX-RX-CRT-A4220.eds
3G3RX-A4300	3G3AX-RX-CRT-A4300	2133	3G3AX-RX-CRT-A4300.eds
3G3RX-A4370	3G3AX-RX-CRT-A4370	2134	3G3AX-RX-CRT-A4370.eds
3G3RX-A4450	3G3AX-RX-CRT-A4450	2135	3G3AX-RX-CRT-A4450.eds
3G3RX-A4550	3G3AX-RX-CRT-A4550	2136	3G3AX-RX-CRT-A4550.eds
3G3RX-B4750	3G3AX-RX-CRT-B4750	2137	3G3AX-RX-CRT-B4750.eds
3G3RX-B4900	3G3AX-RX-CRT-B4900	2138	3G3AX-RX-CRT-B4900.eds
3G3RX-B411K	3G3AX-RX-CRT-B411K	2139	3G3AX-RX-CRT-B411K.eds
3G3RX-B413K	3G3AX-RX-CRT-B413K	2140	3G3AX-RX-CRT-B413K.eds

A-1-2   Message Router Object (Class 02 hex)

Object Details

No vendor-specific attributes are supported.

A-1-3 Assembly Object (Class 04 hex)

Supported Service Codes

Table A-5 Assembly Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-6 Assembly Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
14	03	Remote I/O Data	Same function as Basic Speed I/O (Output)	----	00 00 00 00	Yes	Yes	byte x 4
15	03	Remote I/O Data	Same function as Extended Speed I/O (Output)	----	00 00 00 00	Yes	Yes	byte x 4
46	03	Remote I/O Data	Same function as Basic Speed I/O (Input)	----	00 00 00 00	Yes	No	byte x 4
47	03	Remote I/O Data	Same function as Extended Speed I/O (Input)	----	00 00 00 00	Yes	No	byte x 4
64	03	Remote I/O Data	Same function as Special I/O (Output)	----	00 00 00 00 00 00 00 00	Yes	Yes	byte x 8
65	03	Remote I/O Data	Same function as Extended Control I/O (Output)	----	00 00 00 00 00 00 00 00	Yes	Yes	byte x 8
6E	03	Remote I/O Data	Same function as Extended Speed and Acceleration Control (Output)	----	00 00 00 00 00 00 00 00	Yes	Yes	byte x 8
6F	03	Remote I/O Data	Same function as Extended Speed and Acceleration Control (Input)	----	00 00 00 00 00 00 00 00	Yes	No	byte x 8
7B	03	Remote I/O Data	Same function as Extended Speed and Torque Control (Output)	----	00 00 00 00 00 00	Yes	Yes	byte x 6
8B	03	Remote I/O Data	Same function as Flexible Format (Output)	----	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Yes	Yes	byte x 16 max.*
96	03	Remote I/O Data	Same function as Special I/O (Input)	----	00 00 00 00 00 00 00 00	Yes	No	byte x 8
97	03	Remote I/O Data	Same function as Extended Control I/O (Input)	----	00 00 00 00 00 00 00 00	Yes	No	byte x 8
99	03	Remote I/O Data	Same function as Extended Control I/O and Multi function I/O Monitor (Input)	----	00 00 00 00 00 00 00 00 00	Yes	No	byte x 9
9F	03	Remote I/O Data	Same function as Flexible Format (Input)	----	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Yes	No	byte x 16 max.*

* The size of the Flexible Format assembly is dependent on the actual configuration.

📓 **Additional Information**

• The data to be allocated to each assembly in this object is the same as that defined in *Section 4 Remote I/O* on page 4-1.

A-1-4   Connection Object (Class 05 hex)

Supported Service Codes

Table A-7 Connection Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-8 Connection Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01 Multicast Poll I/O	01	State	Status of the instance	----	1	Yes	No	USINT
	02	Instance Type	Type of the instance	----	1	Yes	No	USINT
	03	Transport Class Trigger	Defines the communications type by code.	----	83 hex	Yes	No	byte
	07	Produced Connection Size	Indicates the maximum number of bytes for transmission.	----	16	Yes	No	UINT
	08	Consumed Connection Size	Indicates the maximum number of bytes for reception.	----	16	Yes	No	UINT
	09	Expected Packet Rate	Indicates the length of the internal processing timeout when a communications request is received (in units of 10 ms).	0-65535	0	Yes	Yes	UINT
	0C	Watchdog Time-out Action	Indicates the action for the internal processing timeout related to communications. 00: Retain timeout status (until reset or cleared) 01: Update connection automatically 02: Operate with the same connection	----	0	Yes	Yes	USINT

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01 Multicast Poll I/O	0D	Produced Connection Path Length	Number of bytes for the produced connection path.	----	3	Yes	No	UINT
	0E	Produced Connection Path	Specifies the application object for the produced connection path.	----	Depends on Default Connection Path.	Yes	Yes	ARRAY
	0F	Consumed Connection Path Length	Number of bytes for the consumed connection path.	----	3	Yes	No	UINT
	10	Consumed Connection Path	Specifies the allocation for the consumed connection path.	----	Depends on Default Connection Path.	Yes	Yes	ARRAY

A-1-5　Discrete Input Point Object (Class 08 hex)

Supported Service Codes

Table A-9 Discrete Input Point Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-10 Discrete Input Point Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01 to 09	03	Value	Terminal state 0: OFF 1: ON	----	----	Yes	No	BOOL
	69	Override	Terminal state (Override) 0: OFF 1: ON	----	----	Yes	Yes	BOOL

Precautions for Correct Use

MX2　Instances 1 to 7 correspond to the inverter's multi-function input terminals S1 to S7.

RX　Instances 1 to 8 correspond to the inverter's multi-function input terminals S1 to S8.
Instance 9 corresponds to the FW input terminal.

A-1-6 Discrete Output Point Object (Class 09 hex)

Supported Service Codes

Table A-11 Discrete Output Point Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-12 Discrete Output Point Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01 to 06	03	Value	Terminal state 0: OFF 1: ON	----	----	Yes	Yes	BOOL

Precautions for Correct Use

MX2 Instances 1 to 3 correspond to the inverter's multi-function output terminals P1/P2 and the relay output terminal.

RX Instances 1 to 6 correspond to the inverter's multi-function output terminals P1 to P5 and the relay output terminal.

A-1-7　Unit Parameter Object (Class 94 hex)

Supported Service Codes

Table A-13 Unit Parameter Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-14 Unit Parameter Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	64	Default Connection Path	0: Basic Speed I/O 1: Extended Speed I/O 2: Extended Speed and Torque Control 3: Special I/O 4: Extended Control I/O 5: Extended Control I/O and Multi function I/O Monitor 6: Flexible Format 7: Extended Speed and Acceleration Control	0 - 7	1	Yes	Yes	USINT

Precautions for Correct Use

The value written to this Instance is reflected on Assembly Instance No. (P046).

A-1-8　CompoNet Link Object (Class F7 hex)

Supported Service Codes

Table A-15　CompoNet Link Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-16　CompoNet Link Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	01	MAC ID	Node address N of CompoNet Communications Unit	0-63	0	Yes	No	USINT
	02	Baud Rate	Baud rate of CompoNet Communications Unit 0: 93.75 kbits/s 1: Reserved 2: 1.5 Mbits/s 3: 3 Mbits/s 4: 4 Mbits/s	0-4	0	Yes	No	UINT
	05	Allocation Choice	CompoNet communication connection information	----	2	Yes	No	word
	06	MAC ID Switch Changed	Node address changed after power-on or reset	----	0	Yes	No	BOOL
	08	MAC ID Switch Value	Node address setting feedback value	----	0	Yes	No	UINT
	0A	Explicit message timer	Waiting timer setting for getting token from Master to Slave	----	0	Yes	Yes	UINT

A-2 AC Drive Object Specifications

A-2-1 Motor Data Object (Class 28 hex)

Supported Service Codes

Table A-17 Motor Data Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-18 Motor Data Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	03	Motor Type	3: PM synchronous motor (d060 = 3) 7: Squirrel cage induction motor (d060 ≠ 3)	----	7	Yes	Yes	USINT
	06	Motor Rated Current	Motor rated current Unit: [0.1 A]	----	Depends on the inverter type.	Yes	Yes	UINT
	07	Motor Rated Voltage	Motor rated voltage Unit: [V] Reflected on inverter parameter A082 (Motor Incoming Voltage Selection).	----	Depends on the inverter type.	Yes	Yes	UINT
	08	Motor Rated Power	Reflected on inverter parameter H003 (Motor Capacity).	----	Depends on the inverter type.	Yes	Yes	UINT
	09	Motor Rated Frequency	Motor rated frequency Unit: [Hz]	300 to Max. Speed	50	Yes	Yes	UINT
	0B	Max. Speed	Maximum allowable motor speed Unit: [min^{-1}]	Depends on the inverter mode (d060).	50	Yes	Yes	UINT
	0C	Pole Count	Number of motor poles (Speed conversion only) Only even numbers are valid.	0 - 38	0	Yes	Yes	UINT

A-2-2   Control Supervisor Object (Class 29 hex)

Supported Service Codes

Table A-19 Control Supervisor Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-20 Control Supervisor Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	03	Forward/ Stop	0: Stop 1: Forward	----	0	Yes	Yes	BOOL
	04	Reverse/ Stop	0: Stop 1: Reverse	----	0	Yes	Yes	BOOL
	05	Net Control	0: Follow the setting of parameter A002. 1: CompoNet reference	----	0	Yes	Yes	BOOL
	06	State	Drive status	----	----	Yes	No	UINT
	07	During Forward Run	0: Stop 1: During forward run	----	----	Yes	No	BOOL
	08	During Reverse Run	0: Stop 1: During reverse run	----	----	Yes	No	BOOL
	09	Inverter Ready	0: Not ready 1: Ready	----	----	Yes	No	UINT
	0A	Fault	0: Normal 1: Fault	----	----	Yes	No	BOOL
	0B	Alarm	0: Normal 1: Alarm	----	----	Yes	No	BOOL
	0C	Fault Reset	Resets the Fault/Trip state of the inverter when 1 is written.	----	0	Yes	Yes	BOOL
	0D	Fault Code	Fault/Trip state code	----	----	Yes	No	UINT

📝 **Additional Information**

The comparison between the inverter Error/Trip codes and the CIP Fault/Warning codes is shown in Table A-20.

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	0F	Control From Net Run Signal Input Status	0: Follow the setting of parameter A002 1: CompoNet	----	----	Yes	No	BOOL
	10	CompoNet Fault Mode	Indicates the inverter operation on network error. 0: Inverter Fault/Trip and stop (P045 = 1) 1: Ignore (P045 = 2) 2: Vendor-specific	----	2	Yes	Yes	UINT
	11	Force Fault/Trip Communications External trip Input	Inverter's External trip (EXT) input	----	0	Yes	Yes	BOOL
	12	Force Status Communications External trip Input Status	External trip (EXT) input status 0: Communicating 1: Fault detected	----	0	Yes	No	BOOL
	14	Net Idle Mode	Indicates the inverter operation on network idle mode. 0: Stop (P048 = 4) 1: Ignore (P048 = 2) 2: Vendor-specific	----	2	Yes	Yes	USINT

	64	Drive State Detail	Inverter Drive State Detail value:
			 0 :Stopping
			 1 :Running
			 2 :Jogging
			 3 :Free running
			 4 :Direct current DC braking
			 5 :Restart (Retry)
			    Error detected (Decelerated stop)
			 7 :Restart (Retry)
			    in process
			 8 :Waiting for restart (retry)
			10 :Fault/Trip
			11 :Undervoltage condition
				----	----	Yes	No	USINT

	65	Trip Cause	Returns a direct Trip cause (E01 to E99).	----	----	Yes	No	USINT
	66	Free Run	Enables/disables free run. 0: Ignore 1: Free run enabled	----	0	Yes	Yes	BOOL

A-2 AC Drive Object Specifications

A-2-2 Control Supervisor Object (Class 29 hex)

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Table A-21 Error Code Conversion

Error/Trip Code		CIP Fault/Warning Code	
Code	Name	Code	Name
E01	Overcurrent protection at constant speed	2200	Current inside device
E02	Overcurrent protection during deceleration	2214	Overcurrent during slowdown
E03	Overcurrent protection during acceleration	2213	Overcurrent during startup
E04	Other overcurrent protection	2200	Current inside device
E05	Overload protection	2220	Continuous overcurrent
E06	Braking resistor overload protection	7112	Brake chopper overcurrent
E07	Overvoltage protection	3210	Overvoltage inside device
E08	EEPROM error	6320	Parameter error
E09	Undervoltage	3220	Undervoltage inside device
E10	Current detector error	5210	Measurement circuit
E11	CPU error	6100	Internal software
E12	External trip	9000	External malfunction
E13	USP error	9000	External malfunction
E14	Ground fault	2120	Short to ground
E15	Input overvoltage protection	3110	Trunk line overvoltage
E16	Momentary power interruption protection	3120	Trunk line undervoltage
E20	Temperature error due to cooling fan frequency lowering	4000	Temperature
E21	Temperature error	4200	Device temperature
E22	CPU error	5000	Device hardware
E24	Phase failure	3130	Phase failure
E25	Main circuit error	5410	Output stages
E30	Driver error	5400	Power section
E35	Thermistor error	7300	Sensor
E36	Braking error	9000	External malfunction
E37	Emergency disconnect	9000	External malfunction
E38	Low-speed overload protection	2221	Continuous overcurrent 1
E40	Operator connection error	5300	Operator control circuit
E41	Modbus communication error	7500	Communications
E60	Option error (Inverter communications error)	7510	Serial interface 1
E61	Option error (Duplicated MAC ID)	7510	Serial interface 1
E62	Option error (External trip)	7510	Serial interface 1
E63	DRT/CRT Communication lost / idle	7510	Serial interface 1
E64	Illegal flexible mapping	6320	Parameter error
E65	Option error (Reserved)	7510	Serial interface 1
E66	Option error (Reserved)	7510	Serial interface 1
E67	Option error (Reserved)	7510	Serial interface 1
E68	Option error (Reserved)	7510	Serial interface 1
E69	Option error (Inverter communications lost error)	7510	Serial interface 1
E70	Option error (Inverter communications error)	7510	Serial interface 2
E71	Option error (Duplicated MAC ID)	7510	Serial interface 2
E72	Option error (External trip)	7510	Serial interface 2
E73	DRT/CRT communications lost/idle	7510	Serial interface 2
E74	Illegal flexible mapping	6320	Parameter error
E75	Option error (Reserved)	7510	Serial interface 2
E76	Option error (Reserved)	7510	Serial interface 2
E77	Option error (Reserved)	7510	Serial interface 2
E78	Option error (Reserved)	7510	Serial interface 2
E79	Option error (Inverter communications lost error)	7510	Serial interface 2
E80	Encoder disconnection	7305	Incremental encoder 1 defective

MX2 (bracket spanning E60–E79)

RX (bracket spanning E70–E79)

Error/Trip Code		CIP Fault/Warning Code	
Code	Name	Code	Name
E81	Excessive speed	8401	Velocity following error
E82	Positioning error	8500	Positioning error
E83	Position control range trip	8501	Position following error

A-2-3　AC/DC Drive Object (Class 2A hex)

Supported Service Codes

Table A-22 AC/DC Drive Object - Supported Service Codes

Service Code No. (hex)	Service Description
0E	Reads Attribute data.
10	Writes Attribute data.

Object Details

Table A-23 AC/DC Drive Object - Object Details

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	03	At Reference	0: Stopping/Accelerating or decelerating 1: At reference	----	----	Yes	No	BOOL
	04	Net Reference	Speed reference selection 0: Follow the setting of parameter A002. 1: Network control	0 - 1	0	Yes	Yes	BOOL
	06	Drive Mode	0: Vendor-specific mode	0	0	Yes	No	USINT
	07	Rotation Speed Monitor	If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is $[min^{-1}]$. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency unit is [0.01 Hz].	----	----	Yes	No	INT
	08	Rotation Speed Reference	If parameter P049 (Number of Poles for Rotation Speed Setting) is set appropriately, the rotational speed unit is $[min^{-1}]$. If parameter P049 (Number of Poles for Rotation Speed Setting) is set to 0, the frequency unit is [0.01 Hz].	0 - Max. Speed	0	Yes	Yes	INT
	09	Current Actual	Output current monitor Unit: [0.1 A]	----	----	Yes	No	INT
	0F	Power Actual	Output power monitor Unit: [W]	----	----	Yes	No	INT

Instance (hex)	Attribute (hex)	Name	Description	Setting Range	Default	Read	Write	Size
01	11	Output Voltage	Output voltage monitor Unit: [V]	----	----	Yes	No	INT
	12	Accel Time	Unit: [ms]	10 - 3600000	10000	Yes	Yes	UINT
	13	Decel Time	Unit: [ms]	10 - 3600000	10000	Yes	Yes	UINT
	1D	Reference From the Net	Speed reference input selection monitor: 0: Follow the setting of parameter A002. 1: CompoNet	0 - 1	0	Yes	Yes	BOOL
	77	Torque Actual Rel	Actual torque monitor Unit: [%]	----	----	Yes	Yes	INT
	78	Torque Ref Rel	Reference torque: Unit: [%]	0 - 200	0	Yes	Yes	INT
	79	Torque Compensation Bias Rel	Compensation bias torque Unit: [%]	-200 - 200	0	Yes	Yes	INT
	7A	At Zero Speed	0: Non-zero speed 1: At zero speed	----	----	Yes	No	BOOL

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