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Cat. No. W452-E1-06

SYSMAC One NSJ Series

NSJ5-TQ□□(B)-G5D, NSJ5-SQ□□(B)-G5D, NSJ8-TV□□(B)-G5D, NSJ10-TV□□(B)-G5D, NSJ12-TS□□(B)-G5D, NSJ5-TQ□□(B)-M3D, NSJ5-SQ□□(B)-M3D, NSJ8-TV□□(B)-M3D, NSJW-ETN21, NSJW-CLK21-V1, NSJW-IC101

NSJ Controllers

OPERATION MANUAL

OMRON

SYSMAC One NSJ Series

NSJ5-TQ□□(B)-G5D, NSJ5-SQ□□(B)-G5D, NSJ8-TV□□(B)-G5D, NSJ10-TV□□(B)-G5D, NSJ12-TS□□(B)-G5D, NSJ5-TQ□□(B)-M3D, NSJ5-SQ□□(B)-M3D, NSJ8-TV□□(B)-M3D, NSJW-ETN21, NSJW-CLK21-V1, NSJW-IC101

NSJ Controllers

Operation Manual

Revised November 2010

Notice:

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

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

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.

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

⚠ Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

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

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

The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

Visual Aids

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

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

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

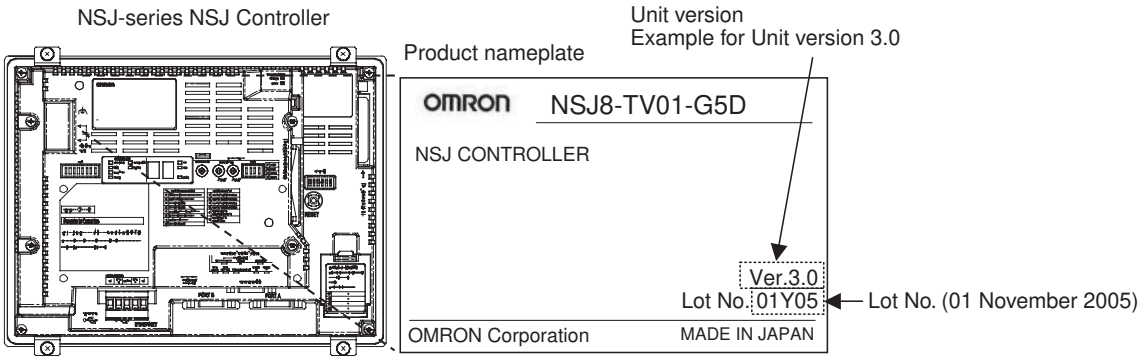
Unit Versions of NSJ-series NSJ Controllers

Unit Versions

A “unit version” has been introduced to manage NSJ Controllers in the NSJ Series according to differences in functionality accompanying product upgrades.

Notation of Unit Versions on Products

The unit version is given to above the lot number on the nameplate of the products for which unit versions are being managed, as shown below. The Controller Section of the NSJ Controllers has the same architecture as a CJ-series CJ1-H CPU Unit with unit version 3.0. The unit version of NSJ Controllers thus starts from unit version 3.0.



Confirming Unit Versions with Support Software

The CX-Programmer can be used to confirm the unit version using one of the following methods.

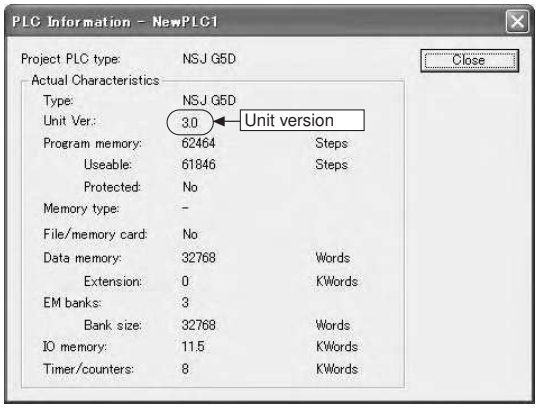
- Using the ***PLC Information***
- Using the ***Unit Manufacturing Information*** (This method can be used for Special I/O Units and CPU Bus Units as well.)

Note CX-Programmer version 6.1 or higher is required to go online with NSJ□-□□□□(B)-G5D Controllers. CX-Programmer version 7.0 or higher is required to go online with NSJ□-□□□□(B)-M3D Controllers.

PLC Information

- If you know the device type and CPU type, select them in the *Change PLC* Dialog Box, go online, and select ***PLC - Edit - Information*** from the menus.
- If you don't know the device type and CPU type, but are connected directly to the Unit on a serial line, select ***PLC - Auto Online*** to go online, and then select ***PLC - Edit - Information*** from the menus.

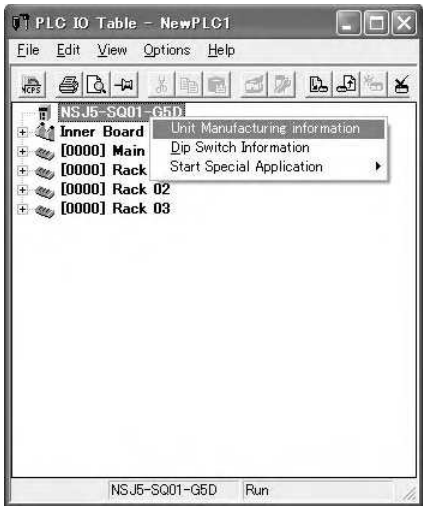
In either case, the following *PLC Information* Dialog Box will be displayed.



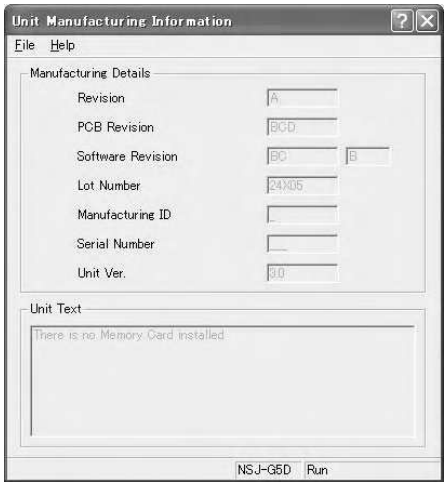
Use the above display to confirm the unit version of the NSJ Controller.

Unit Manufacturing Information

In the IO Table Window, right-click and select ***Unit Manufacturing information - CPU Unit.***



The following *Unit Manufacturing information* Dialog Box will be displayed.



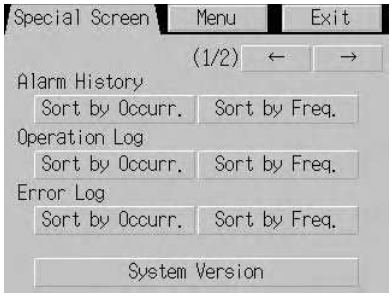
Use the above display to confirm the unit version of the NSJ Controller connected online.

System Menu on the Display Section

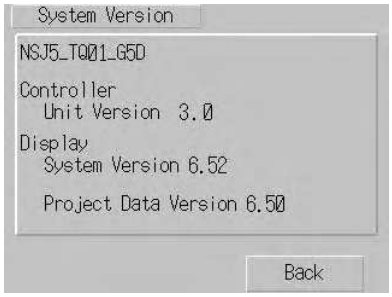
The unit version can be confirmed using the System Menu on the Display Section.

1,2,3... 1. Simultaneously press two of the touch panel's four corners. The System Menu will be displayed.

2. Press the **Special Screen** Button. The following screen will be displayed.



3. Press the **System Version** Button. The unit version of the Controller Section and the system version of the Display Section will be displayed.



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About this Manual:

This manual describes the installation and operation of the NSJ-series NSJ Controllers and includes the sections described on the following page. The following NSJ Controllers are available:
NSJ5-TQ□□(B)-G5D
NSJ5-SQ□□(B)-G5D
NSJ8-TV□□(B)-G5D
NSJ10-TV□□(B)-G5D
NSJ12-TS□□(B)-G5D
NSJ5-TQ□□(B)-M3D
NSJ5-SQ□□(B)-M3D
NSJ8-TV□□(B)-M3D

Refer to *1-1-1 The NSJ Series* for basic information on the configuration of an NSJ Controller and Programming Software used for an NSJ Controller.

Please read this manual and all related manuals listed in the following tables and be sure you understand information provided before attempting to install or use an NSJ Controller.

Controller Section

Manual		Cat. No.
CJ Series PLC Operation Manual		W393
CS/CJ Series PLC Programming Manual		W394
CS/CJ Series PLC Instructions Reference Manual		W474
CS/CJ Series PLC Communications Commands Reference Manual		W342
Built-in DeviceNet Section	CS/CJ Series DeviceNet Unit Operation Manual	W380
	DeviceNet Operation Manual	W267

Display Section

Manual	Cat. No.
NS-Series Setup Manual	V083
NS-Series Programming Manual	V073

Support Software

Manual	Cat. No.
CX-One Setup Manual	W463
CX-Programmer Operation Manual	W446
CX-Integrator Ver. 2.□ Operation Manual	W464
CX-Programmer Operation Manual: Function Blocks/Structured Text	W447
CX-Designer Operation Manual	V099
DeviceNet Configurator (Ver. 2.□) Operation Manual	W382

Expansion Units

Manual	Cat. No.
Controller Link Unit Operation Manual	W309
CS/CJ Series Ethernet Unit Operation Manual: Ethernet Units Construction of Networks Operation Manual	W420
CS/CJ Series Ethernet Unit Operation Manual: Ethernet Units Construction of Applications Operation Manual	W421

Related Manuals

Name	Cat. No.	Contents
SYSMAC One NSJ Series NSJ5-TQ□□(B)-G5D, NSJ5-SQ□□(B)-G5D, NSJ8-TV□□(B)-G5D, NSJ10-TV□□(B)-G5D, NSJ12-TS□□(B)-G5D, NSJ5-TQ□□(B)-M3D, NSJ5-SQ□□(B)-M3D, NSJ8-TV□□(B)-M3D, NSJW-ETN21, NSJW-CLK21-V1, NSJW-IC101 NSJ Controllers Operation Manual	W452 (this manual)	Provides an outline of, and describes the design, installation, maintenance, and other basic operations for the NSJ-series NSJ Controllers. Information is also included on features, system configuration, wiring, I/O memory allocations, and troubleshooting. Use together with the CJ-series *Programmable Controllers Operation Manual* (W393), CS/CJ-series *Programmable Controllers Programming Manual* (W394), and *NS-Series Programmable Terminals Setup Manual* (V083).
SYSMAC CJ Series CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, CJ1H-CPU□□H-R Programmable Controllers Operation Manual	W393	Provides an outline of, and describes the design, installation, maintenance, and other basic operations for the CJ-series PLCs. Information is also included on features, system configuration, wiring, I/O memory allocations, and troubleshooting. Use together with the CS/CJ-series *Programmable Controllers Programming Manual* (W394).
SYSMAC CS/CJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, CJ1H-CPU□□H-R, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Programmable Controllers Programming Manual	W394	Describes programming, tasks, file memory, and other functions for the CS-series, CJ-series, and NSJ-series PLCs. Use together with the *Programmable Controllers Operation Manual* (W339 for CS-series PLCs and W393 for CJ-series PLCs).
SYSMAC CS/CJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, CJ1H-CPU□□H-R, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Programmable Controllers Instructions Reference Manual	W340	Describes the ladder diagram programming instructions supported by CS-series, CJ-series, and NSJ-series PLCs. Use together with the *Programmable Controllers Operation Manual* (W339 for CS-series PLCs and W393 for CJ-series PLCs), and *Programmable Controllers Programming Manual* (W394).
SYSMAC CS/CJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, CJ1H-CPU□□H-R, CP1H-X□□□□-□, CP1H-XA□□□□-□, CP1H-Y□□□□-□, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D, CS1W-SCB21-V1/41-V1, CS1W-SCU21-V1, CJ1W-SCU21-V1/41-V1 Communications Commands Reference Manual	W342	Describes the C-series (Host Link) and FINS communications commands used with CS-series, CJ-series, CP-series, and NSJ-series PLCs. This manual describes only communications commands addressed to the CPU Unit without regard to the communications path. (Communications are possible via the serial ports on the CPU Unit, ports on Serial Communications Boards/Units, Communications Units, etc.) Refer to the operation manual for the relevant Unit for commands addressed to Special I/O Units and CPU Bus Units.
NS Series NS5-SQ□□(B)-V1/V2, NS5-TQ□□(B)-V2, NS5-MQ□□(B)-V2, NS8-TV□□(B)-V1/V2, NS10-TV□□(B)-V1/V2, NS12-TS□□(B)-V1/V2 Programmable Terminals Setup Manual	V083	Provides an outline of, and describes the design, installation, maintenance, and other basic operations for the NS-series PTs. Information is also included on connecting to hosts and Programming Devices, and settings required for communications and PT operation.
NS Series NS5-SQ□□(B)-V1/V2, NS5-TQ□□(B)-V2, NS5-MQ□□(B)-V2, NS8-TV□□(B)-V1/V2, NS10-TV□□(B)-V1/V2, NS12-TS□□(B)-V1/V2 Programmable Terminals Programming Manual	V073	Describes the functions of NS-series PTs, including screen configurations, object functions, and host communications for the PT.

Name	Cat. No.	Contents
CS/CJ-series CS1W-DRM21(-V1) and CJ1W-DRM21 DeviceNet Units Operation Manual	W380	Provides information on the DeviceNet Section of an NSJ Controller, including descriptions of functions, settings required for operation, and maintenance.
DeviceNet Operation Manual	W267	Provides DeviceNet communications specifications and wiring methods.
DeviceNet DRT2 Series Slaves Operation Manual	W404	Describes DeviceNet DRT2-series Smart Slaves.
DeviceNet DRT1 Series Slaves Operation Manual	W347	Describes DeviceNet DRT1-series Smart Slaves.
DeviceNet MULTIPLE I/O TERMINAL Operation Manual	W348	Describes MULTIPLE I/O TERMINALs, which are one type of DeviceNet Slave.
CS/CJ Series CS1W-CLK23/CLK21-V1, CJ1W-CLK23/CLK21-V1, C200HW-CLK21, CVM1-CLK21, CQM1H-CLK21 (CS1W-RPT01/02/03 Repeater Units) Controller Link Units Operation Manual	W309	Describes the functions, settings required for operation, and maintenance of Controller Link Units. Controller Link Units are used to connect to a Controller Link Network.
CS1W-ETN21, CJ1W-ETN21 Ethernet Units Operation Manual Construction of Networks	W420	Provides information on operating and installing 100Base-TX Ethernet Units, including details on basic settings and FINS communications. Refer to the *Communications Commands Reference Manual* (W342) for details on FINS commands that can be sent to CS-series and CJ-series CPU Units when using the FINS communications service.
CS1W-ETN21, CJ1W-ETN21 Ethernet Units Operation Manual Construction of Applications	W421	Provides information on constructing host applications for 100Base-TX Ethernet Units, including functions for sending/receiving mail, socket service, automatic clock adjustment, FTP server functions, and FINS communications.
SYSMAC WS02-CXPC□-V□ CX-Programmer Operation Manual	W446	Provides information on how to use the CX-Programmer, a Windows-based programming device. Use together with the *Programmable Controllers Operation Manual* (W339 for CS-series PLCs and W393 for CJ-series PLCs), CS/CJ-series *Programmable Controllers Programming Manual* (W394) and the CS/CJ-series *Programmable Controllers Instructions Reference Manual* (W474) to perform programming.
CX-Integrator CS/CJ/CP/NSJ-series Network Configurator Operation Manual	W464	Describes CX-Integrator operating methods, e.g., for setting up and monitoring networks including data link settings, routing table settings, and Communications Unit settings.
CXONE-AL□□C-V4/AL□□D-V4 CX-One Setup Manual	W463	Describes the installation and overview of CX-One FA Integrated Tool Package.
SYSMAC WS02-CXPC□-V□ CX-Programmer Operation Manual: Function Blocks/Structured Text	W447	Describes specifications and operation methods related to function blocks. This information is required only when using function blocks.
SYSMAC CX-Designer NS-CXDC1-V□ Operation Manual	V099	Describes how to install and use the CX-Designer, including screen data creation methods, screen data transfer methods, and system settings.
DeviceNet Configurator Ver. 2.□ Operation Manual	W382	Describes the operating procedures of the DeviceNet Configurator.

This manual contains the following sections.

Section 1 introduces the NSJ-series NSJ Controllers and describes differences between the NSJ Controllers and previous OMRON product. Application precautions are also provided.

Section 2 provides the basic operating procedures required to use the NSJ-series NSJ Controller.

Section 3 provides the specifications of the NSJ-series NSJ Controller and describes the system configurations in which it is used.

Section 4 gives the names of the parts of the NSJ Controller, describes the function of each part, and provides NSJ Controller Dimensions.

Section 5 describes how to install and wire the NSJ-series NSJ Controller.

Section 6 section provides information on functionality added to the PLC Setup, I/O Allocations, and I/O Memory of the NSJ Controllers in comparison to the functionality of CJ-series PLCs. Refer to the *CJ Series PLC Operation Manual* (W393) for all information not given here.

Section 7 describes the operation of the Controller Section.

Section 8 describes the methods for operating the System Menu.

Section 9 describes error processing and troubleshooting procedures needed to keep the NSJ Controller operating properly.

Section 10 provides inspection and maintenance information.

The ***Appendices*** provide list of system memory in the Display Section and system program replacement procedures for the Display Section.

Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

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 NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

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

In no event shall 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 HANDLED, 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.

PRECAUTIONS

This section provides general precautions for using the NSJ-series NSJ Controllers and related devices.

The information contained in this section is important for the safe and reliable application of NSJ Controllers. You must read this section and understand the information contained before attempting to set up or operate an NSJ Controller.

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2 General Precautions xx
3 Safety Precautions xx
4 Operating Environment Precautions xxiii
5 Application Precautions xxiii
6 Conformance to EC Directives xxx
6-1 Applicable Directives xxx
6-2 Concepts xxx
6-3 Conformance to EC Directives xxxi
6-4 Relay Output Noise Reduction Methods xxxi

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

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating the NSJ Controller. Be sure to read this manual before attempting to use the NSJ Controller and keep this manual close at hand for reference during operation.

⚠WARNING It is extremely important that the NSJ Controller be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying an NSJ Controller to the above-mentioned applications.

3 Safety Precautions

⚠WARNING Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.

⚠WARNING Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.

⚠WARNING Do not use the touch switch input functions of the Display Section for applications where danger to human life or serious property damage is possible, or for emergency switch applications.

⚠WARNING Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the NSJ Controller or another external factor affecting the NSJ Controller operation. Not doing so may result in serious accidents.

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

- The NSJ Controller will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. Unexpected operation, however, may still occur for errors in the I/O control section, errors in I/O memory, and other errors that cannot be detected by the self-diagnosis function. As a countermeasure for all such errors, external safety measures must be provided to ensure safety in the system.
- The NSJ Controller outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

⚠WARNING Do not attempt to disassemble, repair, or modify the NSJ Controller. Doing so may impair the safety functions.

⚠WARNING Confirm safety before transferring data files stored in the file memory (Memory Card or EM file memory) to the I/O area (CIO) of the Controller Section using a Programming Device. Otherwise, the devices connected to Output Units may malfunction regardless of the operation mode of the Controller Section.

⚠WARNING Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes. Serious accidents may result from abnormal operation if proper measures are not provided.

⚠WARNING The NSJ Controller refreshes I/O even when the program is stopped (i.e., even in PROGRAM mode). Confirm safety thoroughly in advance before changing the status of any part of memory allocated to Output Units, Special I/O Units, or CPU Bus Units. Any changes to the data allocated to any Unit may result in unexpected operation of the loads connected to the Unit. Any of the following operations may result in changes to memory status.

- Transferring I/O memory data to the Controller Section from a Programming Device.
- Changing present values in memory from a Programming Device.
- Force-setting/-resetting bits from a Programming Device.
- Transferring I/O memory files from a Memory Card or EM file memory to the Controller Section.
- Transferring I/O memory from a host computer or from another node on a network.

⚠WARNING Always ensure that the personnel in charge confirm that installation, inspection, and maintenance were properly performed for the NSJ Controller. “Personnel in charge” refers to individuals qualified and responsible for ensuring safety during machine design, installation, operation, maintenance, and disposal.

⚠WARNING Ensure that installation and post-installation checks are performed by personnel in charge who possess a thorough understanding of the machinery to be installed.

⚠**Caution** Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

⚠**Caution** Confirm safety at the destination node before transferring a program to another node or changing contents of the I/O memory area. Doing either of these without confirming safety may result in injury.

⚠**Caution** When setting Units using the IORD or IOWR instructions, check the operation of the ladder program and data completely before using them in actual operation. Incorrect settings may cause the Unit to stop operating or may result in unexpected operation of connected devices.

⚠**Caution** The NSJ Controller automatically backs up the user program and parameter data to flash memory when these are written to the Controller Section. I/O memory (including the DM, EM, and HR Areas), however, is not written to flash memory. The DM, EM, and HR Areas can be held during power interruptions with a battery. If there is a battery error, the contents of these areas may not be accurate after a power interruption. If the contents of the DM, EM, and HR Areas are used to control external outputs, prevent inappropriate outputs from being made whenever the Battery Error Flag (A40204) is ON. Areas such as the DM, EM, and HR Areas, the contents of which can be held during power interrupts, is backed up by a battery. If a battery error occurs, the contents of the areas that are set to be held may not be accurate even though a memory error will not occur to stop operation. If necessary for the safety of the system, take appropriate measures in the ladder program whenever the Battery Error Flag (A40204) turns ON, such as resetting the data in these areas.

⚠**Caution** When installing the NSJ Controller on the door of a control panel or any other moving object, be sure that all cables are long enough so that excessive force is not applied to cables and connectors.

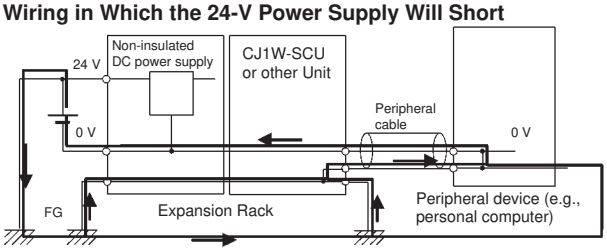
⚠**Caution** Tighten the power supply terminal block screws to the torque specified in this manual. Loose screws may result in fire or malfunction.

⚠**Caution** Wire the polarity of the power supply correctly when using a DC power supply. Reversing the polarity may cause abnormal operation.

⚠**Caution** Do not touch a Power Supply Unit while power is being supplied or immediately after turning OFF the power supply. The Unit may be hot and may cause burns.

⚠**Caution** When connecting a Programming Device or other personal computer to a NSJ Controller to which a non-insulated Power Supply Unit (e.g., CJ1W-PD022) is mounted, either ground the 0 V side of the external power supply or do not ground the external power supply at all ground. A short-circuit will occur in the external power supply if incorrect grounding methods are used. Never ground the 24 V side, as shown below.

Wiring in Which the 24-V Power Supply Will Short



4 Operating Environment Precautions

⚠Caution Do not operate the control system in the following locations:

- Locations subject to drastic temperature changes or condensation.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to high humidity and the possibility of condensation.
- Locations subject to exposure to chemicals.
- Locations subject to exposure to oil.
- Locations subject to corrosive or flammable gases.
- Locations subject to shock or vibration.
- Locations outdoors subject to direct rain or wind.
- Locations subject to strong ultraviolet light.
- Locations subject to excessive dust and dirt.
- Locations subject to direct sunlight.

⚠Caution Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations close to power lines.
- Locations subject to possible exposure to radioactivity.

⚠Caution The operating environment of the NSJ Controller can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the NSJ Controller. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

⚠WARNING Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always connect to a ground of 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.

- Always turn OFF the power supply to the NSJ Controller before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
  - Mounting or dismounting Power Supply Units, I/O Units, or any other Units.
  - Assembling the Units or Racks.
  - Setting DIP switches or rotary switches.
  - Connecting cables or wiring the system.
  - Connecting or disconnecting the connectors.

⚠ **Caution** Failure to abide by the following precautions could lead to faulty operation of the NSJ Controller or the system, or could damage the NSJ Controller. Always heed these precautions.

- When opening the package, check the external appearance of the NSJ Controller to be sure that it has not been damaged. Also, shake the NSJ Controller gently to check for abnormal sounds.
- Do not drop the product or subject it to excessive vibration or shock.
- Install external breakers and take other safety measures against short-circuiting in external wiring.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable.
- Do not apply a force greater than 100 N on the terminal block when tightening the terminals.
- Do not perform withstand voltage tests on the NSJ Controller.
- The allowable thickness of the panel for mounting is between 1.6 and 4.8 mm. Secure the mounting bracket with a uniform tightening torque of between 0.5 and 0.6 N to keep the NSJ Controller waterproof and dustproof. The front sheet may become distorted if the tightening torque is more than the specified limit or not uniform. Always use a panel that is clean, undistorted, and strong enough to adequately withstand mounting the NSJ Controller.
- Do not allow metal particles to enter the NSJ Controller while work is being performed on the panel.
- Do not connect an AC power supply to the power terminals on the NSJ Controller.
- Use a DC power supply with minimal voltage fluctuation that provides a stable output even if the power supply input is interrupted for 10 ms. The DC power supply must also have reinforced or double insulation.
  Rated power supply voltage: 24 VDC (Allowable range: 20.4 to 27.6 VDC)
  Capacity for NSJ12, NSJ10, or NSJ8: 30 W min
  Capacity for NSJ5-TQ: 22 W min.
  Capacity for NSJ5-SQ: 21 W min.
- Connect power to the power terminal block using twisted-pair power lines with a cross-sectional area of at least 2 mm^2 and always using M3.5 crimp terminals. The correct tightening torque for the terminal block is 0.8 N·m.
- To conform to the Low Voltage Directive in the EC Directives, use a power supply with reinforced insulation for Expansion Racks.

- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables or other wiring lines. Doing so may break the cables.
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up. Not doing so may result in malfunction or damage.
- When transporting or storing circuit boards, cover them in antistatic material to protect LSIs, ICs, and other components from static electricity and maintain the proper storage temperature.
- Do not touch circuit boards or the components mounted to them with your bare hands. There are sharp leads and other parts on the boards that may cause injury if handled improperly.
- Mount Units only after checking terminal blocks and connectors completely.
- Be sure that the terminal blocks, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Be sure that all the terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Wire all connections correctly.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning. Do not connect more than two crimp terminals to the same terminal.
- Check switch settings, the contents of the DM Area, and other preparations before starting operation. Starting operation without the proper settings or data may result in an unexpected operation.
- Always use the power supply voltages specified in this operation manuals. An incorrect voltage may result in malfunction or burning.
- Double-check all wiring and switch settings before turning ON the power supply.
- When assembling and wiring connectors, check all pin numbers carefully and wire them correctly.
- Properly ground the NSJ Controller to prevent malfunction due to noise.
- Perform all wiring according to the methods given in this and other relative manuals.
- Always use the special cables listed in this manual or make cables according to manual specifications. Using commercially available cables may damage the external devices or the NSJ Controller.
- Confirm the safety of the system before turning ON or OFF the power supply or before pressing the reset button.
- Always reset the power supply after changing switch settings.
- Leave the label attached to an I/O Unit when wiring it. Removing the label may result in malfunction if foreign matter enters the Unit.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.