Cat. No. V072-E1-02

NS-Series
NS12-TS00□, NS12-TS01□
NS10-TV00□, NS10-TV01□
NS7-SV00□, NS7-SV01□

Programmable Terminals

SETUP MANUAL

OMRON

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.

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.

⚠ **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **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.

The abbreviation “host” means a controller, such as an IBM PC/AT or compatible computer, that controls a PT (Programmable Terminal).

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.
Reference	Indicates supplementary information on related topics that may be of interest to the user.
1, 2, 3...	1. Indicates lists of one sort or another, such as procedures, checklists, etc.
CS1G-CPU□□-VI	Boxes in model numbers indicate variable characters. For example, "CS1G-CPU□□-EV1" indicates the following models: CS1G-CPU42-EV1, CS1G-CPU43-EV1, CS1G-CPU44-EV1, and CS1G-CPU45-EV1.

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Section 6 System Menu Operations

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Section 1 Overview

This section provides an overview of the NS-series PTs, including functions, features, connection types, and communications methods.

Section 2 Before Connecting

This section provides information on methods for connecting NS-series PTs that must be understood before connecting the host and peripheral devices.

Section 3 Installing the PT and Connecting Peripheral Devices

This section describes the methods used to install the PT and connect peripheral devices.

Section 4 Connecting Host to Serial Port

This section describes the methods for connecting the host to the serial port of the PT.

Section 5 Connecting to Host via Ethernet or Controller Link

This section describes the methods for connecting the PT to the host using the PT's Ethernet interface or Controller Link.

Section 6 System Menu Operations

This section describes the methods for operating the System Menu. It also provides details on functions that are useful for NS-series PT applications and for system maintenance.

Section 7 Maintenance and Troubleshooting

This section describes the maintenance and inspection methods for preventing errors occurring, and troubleshooting measures when errors occur in the PT.

Appendices

Describe hardware specifications and methods for preparing connections cables, and provide lists of standard products.

⚠WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

Related Manuals

The following manuals are used for NS-series PTs. (The boxes at the end of the catalog numbers indicate the revision code.)

This manual

NS Series Setup Manual .....V072-E1-□

Describes how to connect the PT to the host and peripheral devices, methods to setup communications and operation, and procedures for maintenance.

Refer to the *NS Series Programming Manual* (V073-E1-□) for information on PT functions and specific operating procedures.

NS Series Programming Manual .....V073-E1-□

Describes the screen configurations, object functions, and host communications for the PT.

NS-Designer Operation Manual.....V074-E1-□

Describes operating procedures for the NS-Designer, which is used to create the screens displayed on the PT and transfer them to the PT. It includes screen creation and transfer procedures.

Terminology

The following terminology is used in this manual.

PT	In this manual, indicates an NS-series Programmable Terminal.
NS Series	Indicates products in the OMRON NS□□ Series of Programmable Terminals.
PLC	Indicates a Programmable Controller in the OMRON SYSMAC CS/CJ, C, or CVM1/CV Series of Programmable Controllers.
CS/CJ Series	Indicates Programmable Controllers in the OMRON SYSMAC CS/CJ Series of Programmable Controllers: CS1G, CS1H, CS1G-H, CS1H-H, CJ1G.
C Series	Indicates products in the OMRON SYSMAC C Series of Programmable Controllers: C200HS, C200HX(-Z), C200HG(-Z), C200HE(-Z), CQM1, CQM1H, CPM1A, CPM2A, CPM2C.
CVM1/CV Series	Indicates products in the OMRON SYSMAC CVM1/ CV Series of Programmable Controllers: CV500, CV1000, CV2000, CVM1
Serial Communications Unit	Indicates a Serial Communications Unit for an OMRON CS/CJ-series PLC.
Serial Communications Board	Indicates a Serial Communications Board for an OMRON CS-series or CQM1H PLC.
Communications Board	Indicates a Communications Board for an OMRON C200HX/HG/HE(-Z) PLC.
CPU Unit	Indicates a CPU Unit in the OMRON SYSMAC CS/CJ, C, or CVM1/CV Series of Programmable Controllers.
NS-Designer	Indicates the OMRON NS-Designer (NS-NSDC1-V□).
Host	Indicates the PLC, IBM PC/AT or compatible computer, or personal computer functioning as the control device and interfaced with the NS-series PT.
Programming Manual	Indicates the *NS Series Programming Manual* (V073-E1-□).

Introduction

• 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 FA systems into production facilities.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and connecting FA systems.
- Personnel in charge of managing FA systems and facilities.

• General Precautions

- The user must operate the product according to the performance specifications described in the operation manuals.
- Do not use the PT touch switch input functions for applications where danger to human life or serious property damage is possible, or for emergency switch applications.
- 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 connecting and setting up an NS-series PT. Be sure to read this manual before attempting to use the PT and keep this manual close at hand for reference during installation and operation.

• Safety Precautions

⚠ WARNING

Do not attempt to take the Unit apart and do not touch any internal parts while the power is being supplied. Doing either of these may result in electrical shock.

Section 1

Overview

This section provides an overview of the NS-series PTs, including functions, features, connection types, and communications methods.

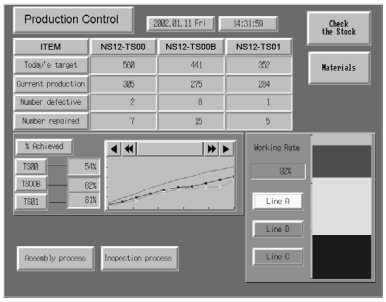
1-1 NS-series PT Functions and Operation

The NS Series offers advanced operator interfaces called Programmable Terminals that can be used to display required information and provide operating capabilities for FA manufacturing sites. This section describes the role and functions of the NS-series PTs for first-time users of Programmable Terminals.

1-1-1 PT Functions for FA Manufacturing Sites

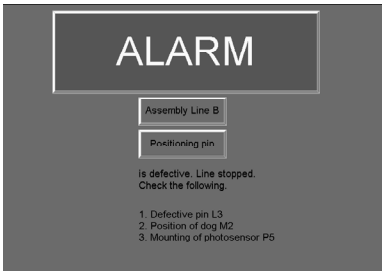
● Line Operating Status Monitor Display

NS-series PTs can be used to display information such as the operating status of the system and the devices. Graphs and other indicators can be used to better represent the information and make it easy to understand.



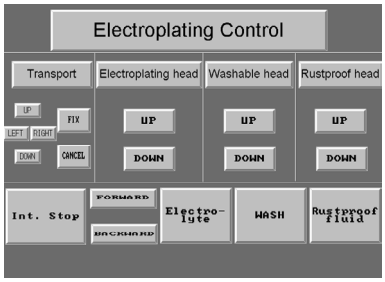
● Directions for FA Site Operators

The PTs can be used to inform the operators of system and device errors and assist them in taking appropriate measures.



● Control Panel Switches

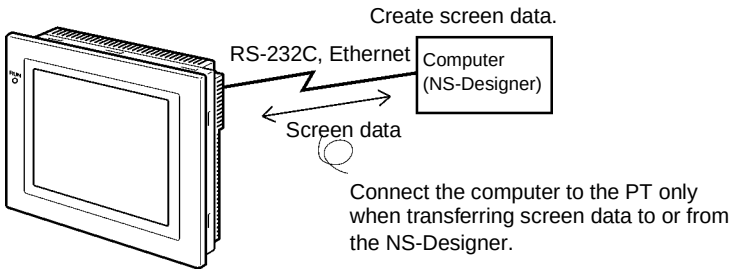
The NS-series PTs allow the user to create various on-screen switches. By using touch switch inputs, operating results can be sent to the host.



1-1-2 NS-series PT Operating System

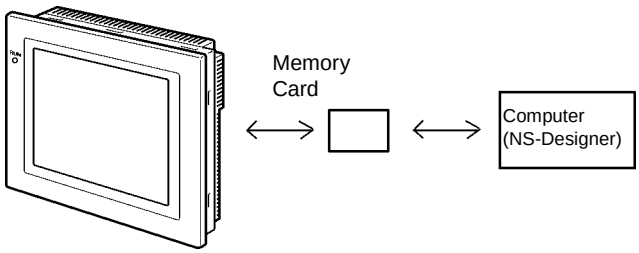
● Transferring Screen Data

The screen data displayed on NS-series PTs is created using the NS-Designer on a computer and transferred to the PT through RS-232C or Ethernet communications.



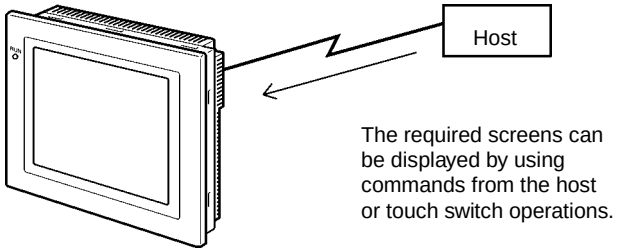
Note: Some models do not support Ethernet.

Screen data can also be transferred at high speed using a Memory Card.



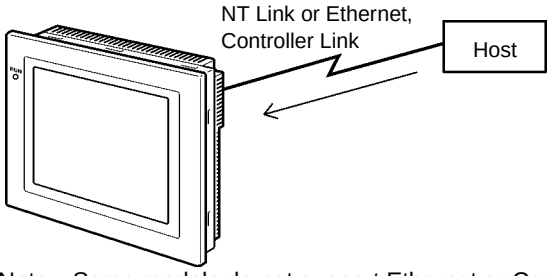
● Displaying Screens

The information displayed on the screens is created using the NS-Designer on a computer and transferred to the PT. The required screens can be displayed by using commands from the host or touch switch operations.



● Reading Data from the Host

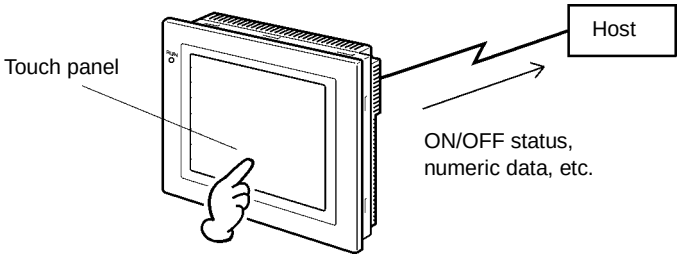
A communications method such as NT Link Ethernet or Controller Link is used to connect the host, and the required data is automatically read from the host.



Note: Some models do not support Ethernet or Controller Link.

● Sending Data to the Host

Data input using touch switches (button ON/OFF status, numerals, and character strings) is sent to the host.

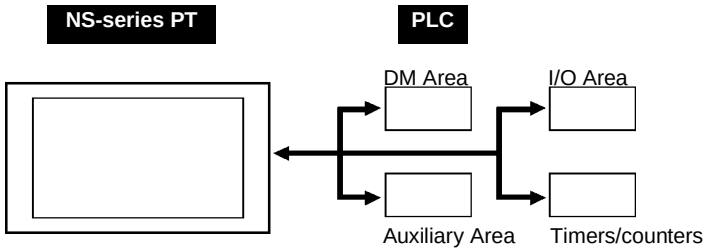


1-2 Communications with the Host

NS-series PTs allow the user to allocate words and bits in any PLC area for use in accessing the required display contents and storing input data.

Operations that can be performed include reading and writing allocated word contents and bit status directly, changing the display status of functional objects on the PT screen, and controlling and notifying PT status.

The NS-series PTs also enable communications with more than one PLC. A host name is registered for each PLC connected, allowing access to any PLC areas by specifying the host name and address.



When using NS-series PTs, the host can be connected using any of the following methods.

- 1:1 NT Link
- 1:N NT Link (normal or high-speed)
- Ethernet
- Controller Link

1-2-1 What is an NT Link?

An NT Link is a method for high-speed communications with OMRON PLCs using a special protocol. The following PLCs can be connected using NT Link communications.

CPM1A, CPM2A, CPM2C, CQM1, CQM1H, C200HS, C200HX/HG/HE (-Z),

CS1G/CS1H-E (V1), CS1G/CS1H-H, CJ1G, CJ1G/CJ1H-H, and CVM1/CV-series (V1 and higher) PLCs

In addition to 1:1 NT Links, where a single PT is connected to a single PLC, NS-series PTs also support 1:N NT Links, allowing up to eight PTs to be connected to a single PLC port. The following PLCs can be connected using 1:N NT Link communications.

CQM1H, C200HX/HG/HE(-Z), CS1G/CS1H-E(V1), CS1G/CS1H-H, and CJ-series PLCs

The NS-series PTs also support high-speed 1:N NT Links for even faster communications. The following PLCs can be connected using high-speed 1:N NT Link communications.

CS1G/CS1H-E (V1 and higher), CS1G/CS1H-H, and CJ-series PLCs

In the rest of this manual, "NT Link" refers to NT Link communications in general, "1:1 NT Link" refers to an NT Link in a 1:1 configuration only, and "1:N NT Link" refers to NT Links in a 1:N configuration only. Where necessary, normal 1:N NT Link and high-speed 1:N NT Link are used. When "1:N NT Link" is used alone, it refers to both normal and high-speed communications.

1-2-2 Ethernet

The NS-series PTs can communicate with hosts that are connected to the Ethernet and support FINS message communications, one of OMRON’s standard communications services. Ethernet Units for PLCs that are supported by the NS-series PTs can be used to read and write data, word, and bit information quickly and simply without requiring protocol recognition. The following PLCs can be connected to the Ethernet.

CS1G/CS1H (V1), CS1G/CS1H-H, CVM1/CV, and CJ-series PLCs

1-2-3 Controller Link

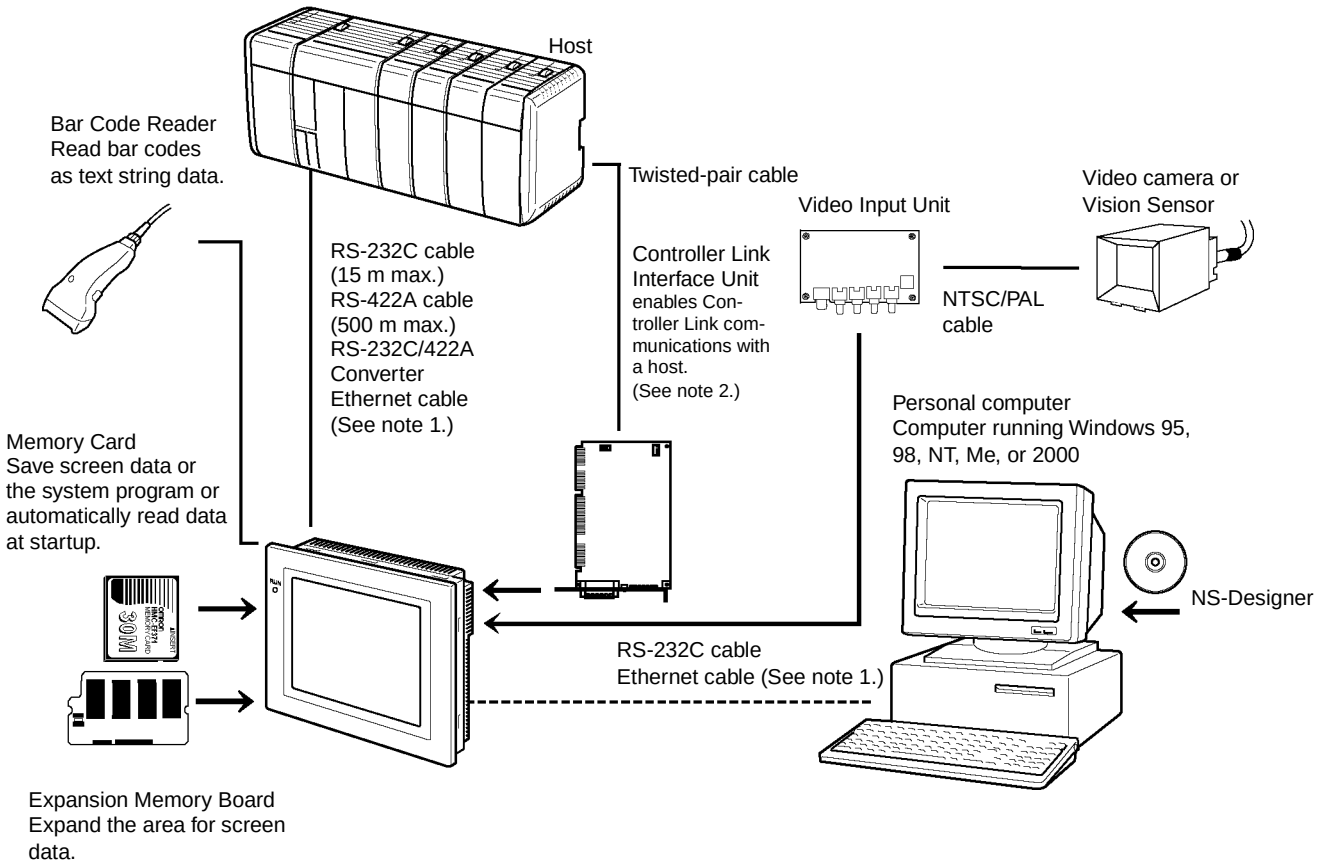
The Controller Link is an FA network that can send and receive large data packets flexibly and easily among OMRON PLCs and IBM PC/AT or compatible computers. The Controller Link supports data links that enable data sharing and a message service that enables sending and receiving data when required.

The following PLCs can be connected using Controller Link: CS1G/CS1H-E(V1), CS1G/CS1G-H, C200HX/HG/HE(-Z), CV500/CV1000/CV2000(V1), CVM1(V2), CQM1H, CJ1G, and CJ1G/CJ1H-H.

1-3 System Configuration

The following information describes the system configuration using NS-series PTs. Refer to *Appendix 8 Standard Models* for details on available models.

1-3-1 Supported Peripheral Devices



Note 1: Only the following models support Ethernet: NS12-TS01(B), NS10-TV01(B), and NS7-SV01(B)

Note 2: Only the following models support the Controller Link Interface Unit and Video Input Unit: NS12-TS0□, NS10-TV0□**.**

- **PT (Refer to *Appendix 8 Standard Models*.)**
- **Recommended Bar Code Reader (Refer to page 3-12.)**
  OMRON V520-RH21-6
- **Expansion Memory Board (Refer to page 3-15.)**
  OMRON NS-MF081 (8-MB flash memory)
  OMRON NS-MF161 (16-MB flash memory)
- **RS-232C/422A Converter**
  OMRON NS-AL002 (non-insulated) (Refer to page A-13.)
  OMRON NT-AL001 (insulated)

- **Recommended Memory Cards (Refer to page 3-18.)**
  OMRON HMC-EF172 (15-MB flash memory)
  OMRON HMC-EF372 (30-MB flash memory)
  OMRON HMC-EF672 (64-MB flash memory)

- **NS-Designer (Refer to *NS-Designer Operation Manual* (V074-E1-□)**
  NS-NSDC1-V□ (CD-ROM version)

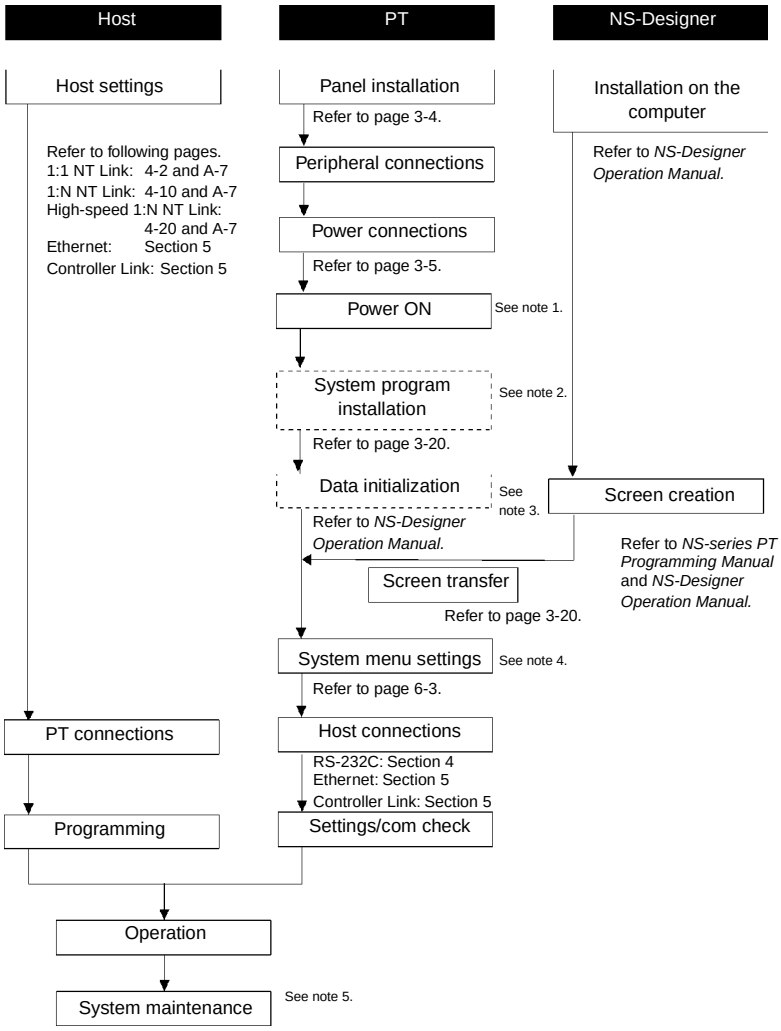
Reference The following optional products are available. (Refer to page A-34.)

Anti-reflection Sheets (5 sheets)	NS12-KBA04	(For NS12 and NS10)
	NS7-KBA04	(For NS7)
Protective Covers (5 covers)	NS12-KBA05	(For NS12 and NS10)
	NS7-KBA05	(For NS7)
Replacement Battery	C500-BAT08	(For NS12 and NS10)
	CPM2A-BAT01	(For NS7)

- **Video Input Unit (Refer to page 3-27.)**
  NS-CA001
- **Controller Link Interface Unit (Refer to page 3-39.)**
  NS-CLK21

1-4 Procedure for Running NS-series PTs

Use the following procedure to start up the NS-series system.



Note 1. RUN mode is entered automatically if screen data already exists.
An error message is displayed if screen data does not exist. Transfer screen data from either the NS-Designer or a Memory Card.
2. The system program is installed in special situations only, such as when the system program is being changed or recovered.
3. The system menu can be operated as required to initialize data saved in the PT.
4. The system menu can be displayed by pressing two of the four corners of the touch panel.
5. When errors occur during operation, check I/O and setting statuses as required.

The following table lists the device and software manuals used for reference.

Device/Software	Manual name	Catalog No.
NS-series PTs	Programming Manual	V073
	Macro Reference	Provided with NS-Designer
	Tutorial	Provided with NS-Designer
NS-Designer	NS-Designer Operation Manual	V074
NS-series Ladder Monitor	NS-series Ladder Monitor Operation Manual	Provided with NS-series Ladder Monitor
PLC	SYSMAC C200HS Installation Guide	W236
	SYSMAC C200HS Operation Manual	W235
	SYSMAC C200HX/HG/HE(-Z) Installation Guide	W302
	SYSMAC C200HX/HG/HE Operation Manual	W303
	SYSMAC C200HX/HG/HE(-ZE) Operation Manual	W322
	SYSMAC CQM1 Operation Manual	W226
	SYSMAC CQM1H Operation Manual	W363
	SYSMAC CV Series CV500/CV1000/CV2000/CVM1 Programming Manual: Ladder Diagrams	W202
	SYSMAC CPM1A Operation Manual	W317
	SYSMAC CPM2A Operation Manual	W352
	SYSMAC CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual	W353
	SYSMAC CPM2C Operation Manual	W356
	SYSMAC CJ Series Operation Manual	W393
	SYSMAC CS/CJ Series Serial Communications Unit and Board Operation Manual	W336
	SYSMAC CS Series Operation Manual	W339
	SYSMAC CS/CJ Series Programming Manual	W394
	SYSMAC CS/CJ Series Instruction Reference Manual	W340
	SYSMAC CS/CJ Series Programming Console Operation Manual	W341
	SYSMAC CS/CJ Series Communications Command Reference Manual	W342
Programming Devices/Software	SYSMAC Support Software Operation Manual: C-series PLCs	W248
	SYSMAC Support Software Operation Manual: CVM1 PLCs	W249
	SYSMAC CPT Operation Manual	W333
	CX-Programmer User Manual	W361
Ethernet Unit	SYSMAC CS/CJ Series Ethernet Unit Operation Manual	W343
	SYSMAC CVM1/CV Series Ethernet Unit System Manual	W242
	FINS Command Reference Manual	W227
Controller Link Support Board	Controller Link Support Board Operation Manual	W307
	Controller Link Support Board for PCI Bus Operation Manual	W383
Controller Link Unit	Controller Link Unit Operation Manual	W309

Section 2

Before Connecting

This section provides information on methods for connecting NS-series PTs that must be understood before connecting the host and peripheral devices.

2-1 Connecting the Host

This section provides details on the networks for hosts that can be used with NS-series PTs.

2-1-1 Communications Types and Connection Methods

• Communications Ports and Methods

The PT has two serial ports. The NS12-TS01(B), NS10-TV01(B), and NS7-SV01(B) each have one Ethernet interface. A Controller Link Interface Unit can also be mounted to enable Controller Link communications. These communications ports and interfaces can be used for the communications methods shown in the following table.

Communications ports	Supported communications methods
Serial port A	1:1 NT Link 1:N NT Links (See note.) For connecting the NS-Designer and for Bar Code Reader input.
Serial port B	1:1 NT Link 1:N NT Links (See note.) For connecting the NS-Designer and for Bar Code Reader input.
Ethernet interface	FINS communications For connecting the NS-Designer.
Controller Link Interface Unit	FINS communications Data links

Note: NT Links can be set for either normal or high-speed communications.

The following table shows the possible combinations of communications methods when serial ports A and B are connected to the host at the same time.

Using serial ports A and B at the same time	Supported/not supported.
1:1 NT Link + 1:1 NT Link	Supported.
1:1 NT Link + 1:N NT Links	Supported.
1:N NT Links + 1:N NT Links	Not supported.

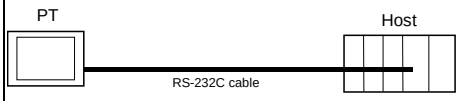
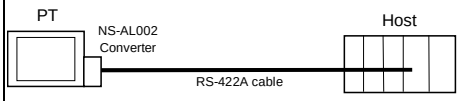
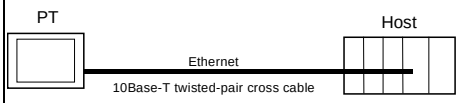
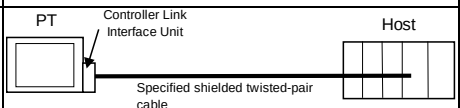
• Converting Communications Type Using RS-232C/RS-422A Converter

OMRON's NS-AL002 RS-232C/RS-422A Converter can be used to convert the communications type between RS-232C and RS-422A.

• Communications Type and Connection Method Combinations

The following table shows the possible connection methods for each communications type.

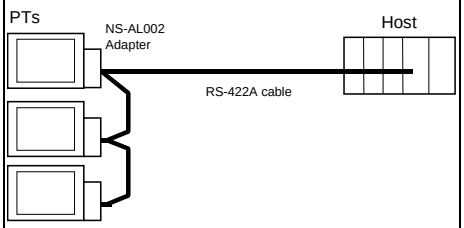
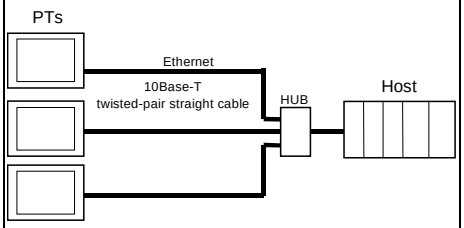
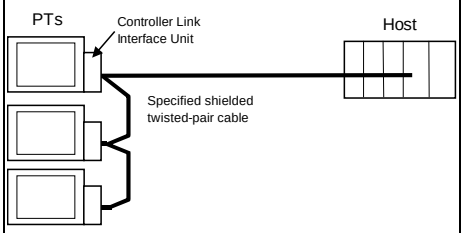
1:1 Connection

PT communications type	Host communications type	Supported connection methods	Supported communications methods				Reference page
			1:1 NT Link	1:N NT Links	FINS	Data Links	
RS-232C	RS-232C		Yes	Yes	No	No	P.4-2 P.4-10
	RS-422A		Yes	Yes	No	No	P.4-2 P.4-10
Ethernet	Ethernet		No	No	Yes	No	P.5-2
Controller Link (See note.)	Controller Link		No	No	Yes	Yes	P. 5-15

Yes: Connection is possible. No: Connection is not possible.

Note: Only when a Controller Link Interface Unit (NS-CLK21) is mounted.

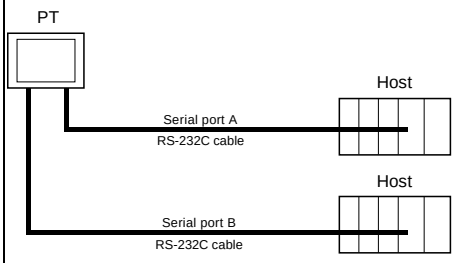
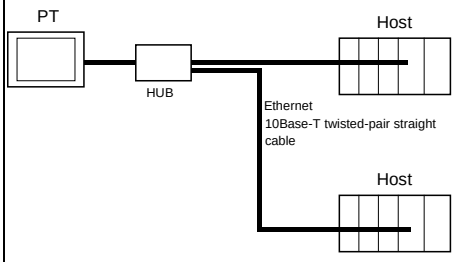
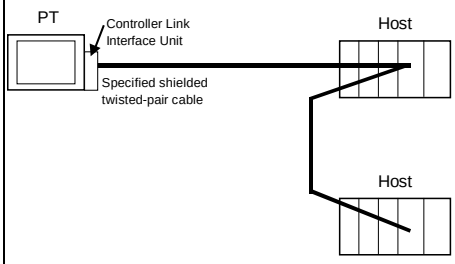
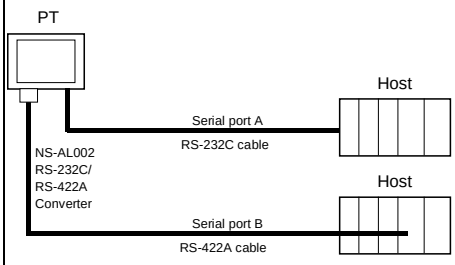
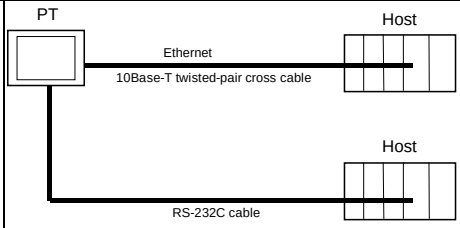
1:N Connection (Connecting Multiple PTs to a Single Host)

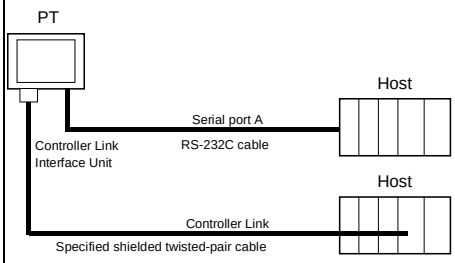
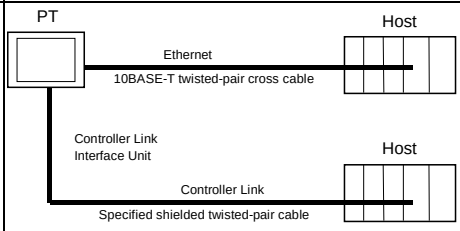
PT communications type	Host communications type	Supported connection methods	Supported communications methods				Reference page
			1:1 NT Link	1:N NT Links	FINS	Data Links	
RS-232C	RS-422A		No	Yes	No	No	P.4-10
Ethernet	Ethernet		No	No	Yes	No	P.5-2
Controller Link (See note.)	Controller Link		No	No	Yes	Yes	P. 5-15

Yes: Connection is possible. No: Connection is not possible.

Note: Only when a Controller Link Interface Unit (NS-CLK21) is mounted.

N:1 Connection (Connecting Multiple Hosts to a Single PT)

PT communications type	Host communications type	Supported connection methods	Supported communications methods				Reference page
			1:1 NT Link	1:N NT Links	FINS	Data Links	
RS-232C	RS-232C		Yes	Yes	No	No	P.4-2 P.4-10
Ethernet	Ethernet		No	No	Yes	No	P.5-2
Controller Link (See note.)	Controller Link		No	No	Yes	Yes	P. 5-15
RS-232C	RS-232C, RS-422A	 An RS-422A line can be connected to serial port A at the same time that an RS-232C line is connected to serial port B.	Yes	Yes	No	---	P.4-2 P.4-10
Ethernet, RS-232C	Ethernet, RS-232C		Yes	Yes	Yes	---	P.4-2 P.4-10 P.5-2

PT communications type	Host communications type	Supported connection methods	Supported communications methods				Reference page
			1:1 NT Link	1:N NT Links	FINS	Data Links	
RS-232C, Controller Link	RS-232C, Controller Link		Yes	Yes	Yes	Yes	P.4-2 P.4-10 P.5-15
Ethernet, Controller Link	Ethernet, Controller Link		No	No	Yes	Yes	P.5-2 P.5-15

Yes: Connection is possible. No: Connection is not possible.

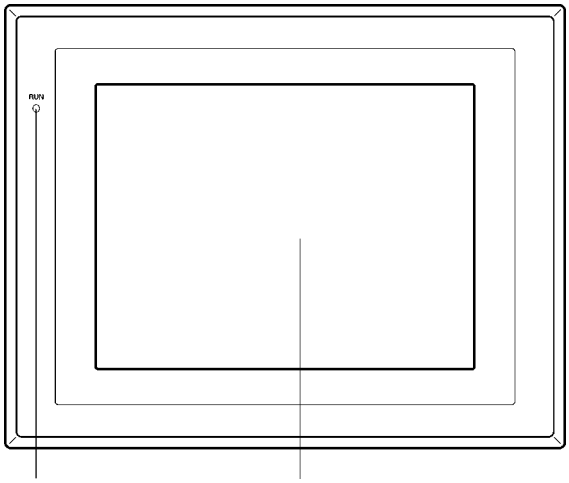
Note: Only when a Controller Link Interface Unit (NS-CLK21) is mounted.

- The NS-AL002 is connected directly to the serial port of the PT and power is supplied from pin 6 of the port.
- When there are multiple serial ports and Ethernet Units for a single host, each port can be used to communicate with separate PTs. This type of communications method, however, will reduce the communications performance at the host.

2-2 Part Names and Functions

The part names and functions of the PT are described here.

NS12/NS10 Front Panel



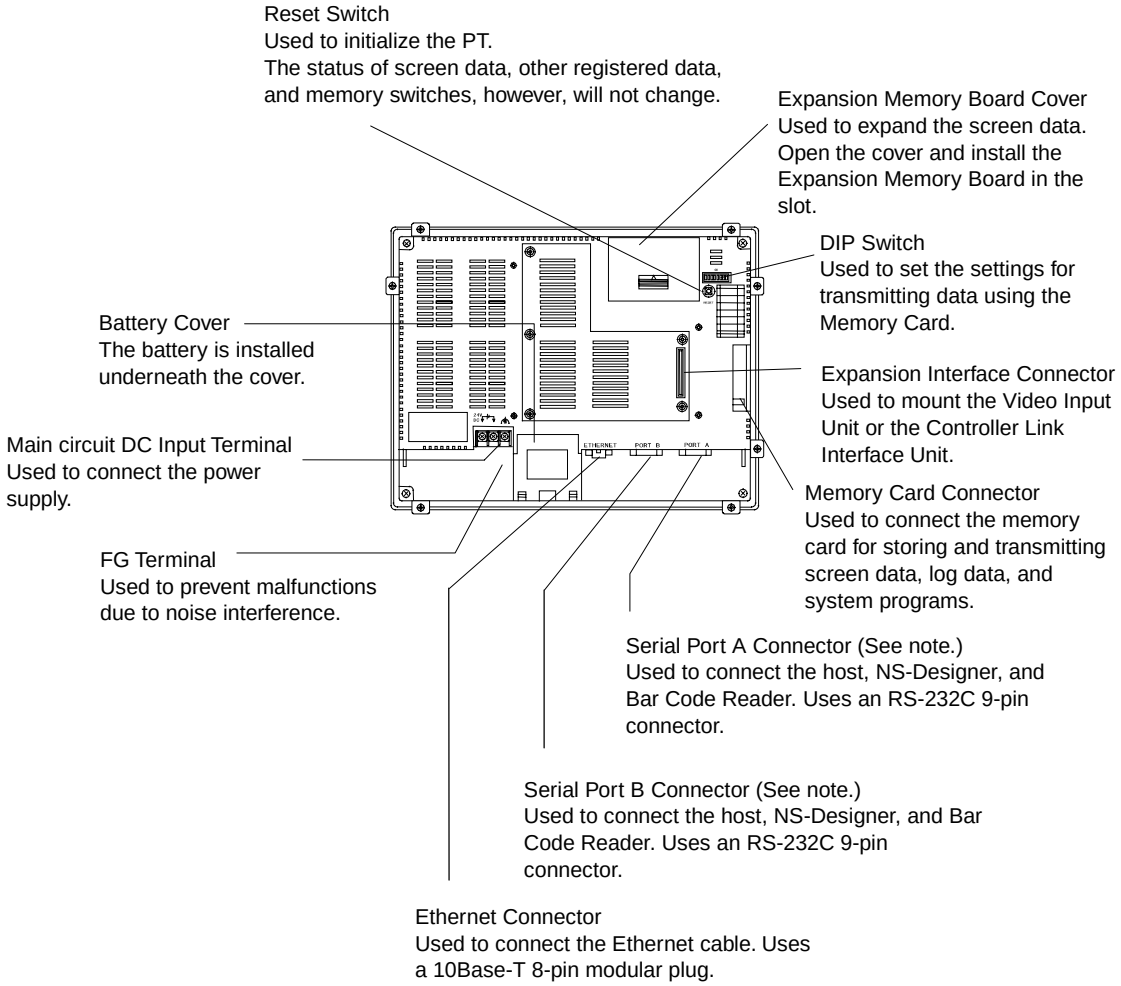
RUN indicator
Lights or flashes to indicate the status of the PT.

Display
NS12: 12.1-inch TFT high-luminance LCD
NS10: 10.4-inch TFT high-luminance LCD
The entire display is a touch panel that serves as an input device.

RUN Indicator Status

Indicator	Green	Orange	Red
Lit	PT is operating normally.	• The file system check that is performed immediately after the power is turned ON is in progress. • The battery power is low, or the battery is not connected and the PT is operating normally.	Not used.
Flashing	Memory Card transfer ended normally. A backlight error occurred immediately after power was turned ON.	Memory Card transfer in progress.	Memory Card transfer ended abnormally.
Not lit	• Power is not being supplied to the PT. • The fuse is broken. • The system program is damaged and the system cannot be booted.		

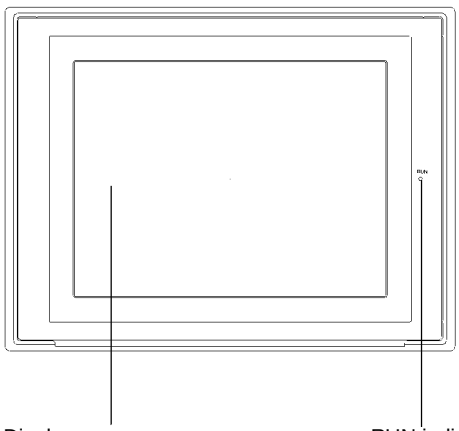
NS12/NS10 Rear Panel Switches



Note: The 5-V output of serial ports A and B cannot be used at the same time.

Note Confirm system safety before turning the power ON/OFF or restarting. Otherwise the system may operate unpredictably.

NS7 Front Panel



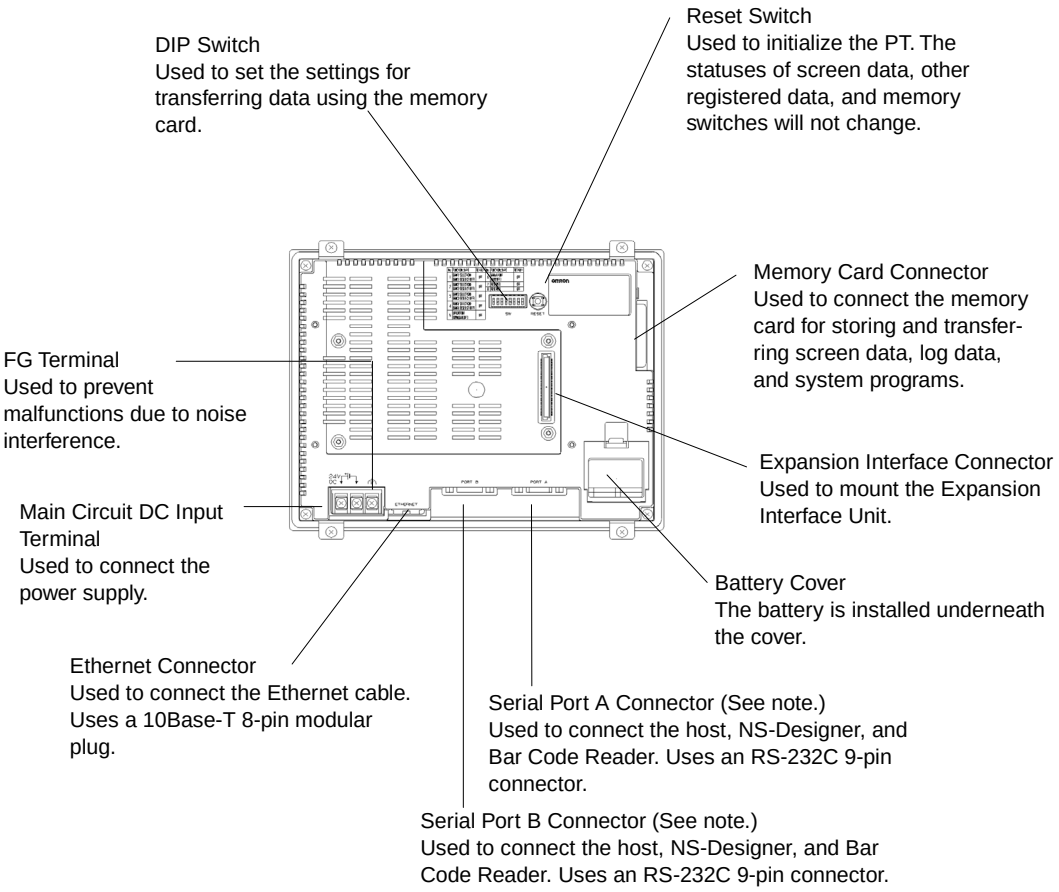
Display
7.7-inch color STN LCD
The entire display is a touch panel that serves as an input device.

RUN indicator
Lights or flashes to indicate the status of the PT.

RUN Indicator Status

Indicator	Green	Orange	Red
Lit	PT is operating normally.	• The file system check that is performed immediately after the power is turned ON is in progress. • The battery power is low, or the battery is not connected and the PT is operating normally.	Not used.
Flashing	Memory Card transfer ended normally. A backlight error occurred immediately after power was turned ON.	Memory Card transfer in progress.	Memory Card transfer ended abnormally.
Not lit	• Power is not being supplied to the PT. • The fuse is broken. • The system program is damaged and the system cannot be booted.		

NS7 Rear Panel

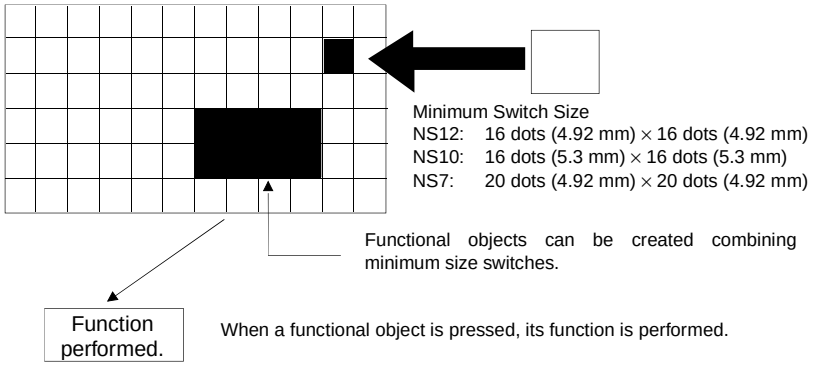


Note: The 5-V output of serial ports A and B cannot be used at the same time.

Note Confirm system safety before turning the power ON/OFF or restarting. Otherwise the system may operate unpredictably.

Touch Panel

The touch switches on the front panel of the PT are used to perform input operations. Press the touch switches to perform operations such as switching screens and sending bit status to the host.



To ensure correct input operations, create touch switches so that they consist of at least two switches horizontally and vertically.

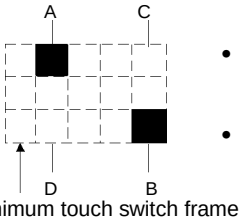
Note
- Press the touch switches with a pressure of 30 N max.
- Do not press the touch switches when the backlight is not lit or when there is no display.
- Check system safety before pressing the touch switches.
- Inputs may not be recognized if the touch switches are pressed in rapid succession. Check that one input operation has finished before performing the next one.

Reference

- Pressing Three Switches Simultaneously

When the positions of multiple touch switches are set as shown in the example and three switches are pressed simultaneously, the touch switches will malfunction due to structural characteristics.

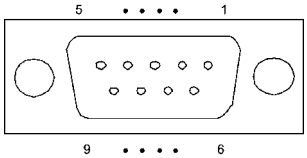
Position the touch switches carefully. In the example shown below, switches have been created in positions A and B, and at points C and D, where the vertical and horizontal lines through A and B intersect.



Minimum touch switch frame

- If touch switches A, B, and C are turned ON simultaneously, switch D may also turn ON due to the structure of the touch panel.
- In the same way, if touch switches A, B, and D are turned ON simultaneously, switch C may also turn ON.

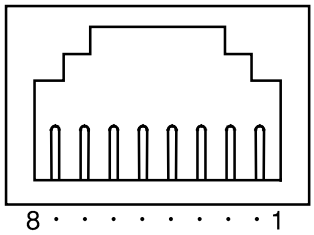
Connector Pin Arrangement of Serial Ports A and B



Pin number	Signal name	Name
1	NC	Not connected.
2	SD	Send data
3	RD	Receive data
4	RS	Request to send
5	CS	Clear to send
6	+5V	5-V output (250 mA max.)
7	NC	Not connected.
8	NC	Not connected.
9	SG	Signal ground

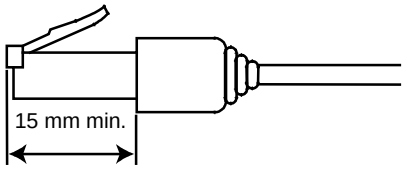
Note Make sure that the total current capacity of devices being supplied power is 250 mA max. before using the 5-V power supply from pin 6. The capacity of the PT's 5-V output is 250 mA max. at 5 V ±5%.
The 5-V output of serial ports A and B cannot be used at the same time.

Ethernet Connector Pin Arrangement



Pin number	Signal name	Name
1	TD+	Twisted-pair output (differential output)
2	TD–	Twisted-pair output (differential output)
3	RD+	Twisted-pair input (differential input)
4	NC	Not connected.
5	NC	Not connected.
6	RD–	Twisted-pair input (differential input)
7	NC	Not connected.
8	NC	Not connected.

When using a cable with a hood (or boot), make sure that the length for connection is at least 15 mm, as shown in the following diagram.



Section 3

Installing the PT and Connecting Peripheral Devices

This section describes the methods used to install the PT and connect peripheral devices.

For details on methods for connecting the host, refer to *Section 4 Connecting the Host to the Serial Port* or *Section 5 Connecting to Host via Ethernet or Controller Link*.

Note When unpacking the PT and peripheral devices, check for any external damage. Shake the product gently and check for any abnormal sounds.

3-1 Installing the PT

The methods used to mount the PT to the control panel and connect the power supply are described here.

3-1-1 Installation Environment

Always mount the PT to the control panel and perform other installation procedures according to the following precautions.

Note Do not install the PT in any of the following locations:
- Locations subject to extreme temperature changes.
- Locations subject to temperatures or humidity outside the ranges in the specifications.
- Locations subject to high humidity that may result in condensation.
- Locations that would subject the PT to chemicals.
- Locations that would subject the PT to oil.
- Locations subject to corrosive or flammable gases.
- Locations that would subject the PT to direct shock or vibration.
- Locations that would directly expose the PT to wind or rain.
- Locations subject to strong ultraviolet light.

Provide proper shielding measures when installing in the following locations:
- Locations subject to static electricity or other sources of noise.
- Locations subject to strong electromagnetic fields.
- Locations near to power supply lines.
- Locations subject to possible exposure to radiation.

3-1-2 Installing Expansion Memory Boards and RS-232C/RS-422A Converters

When using Expansion Memory Boards or Adapters, mount the PT to the control panel before installing these Units.

For details on installing and removing Expansion Memory Boards, refer to *3-5 Using Expansion Memory Boards*. For details on installing and removing RS-232C/RS-422A Converters, refer to *Appendix 4 Using NS-AL002 RS-232C/RS-422A Converters*.

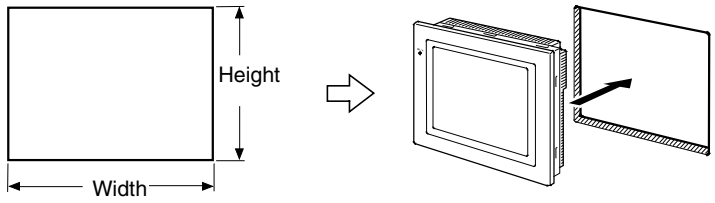
3-1-3 Mounting the PT to the Control Panel

The PT is flush-mounted to the control panel.

The PT is mounted using the panel mounting brackets provided with the PT, and tools, such as a Phillips screwdriver.

Use the following procedure to mount the PT to the control panel.

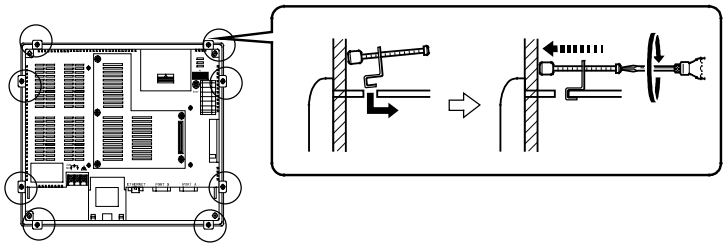
1. Make a hole in the panel for flush mounting according to the following dimensions and insert the PT from the front of the panel.



Recommended panel thickness:
1.6 to 4.8 mm

Model	Dimensions
NS12	Width 302 $^{+1}_{0}$ × Height 228 $^{+1}_{0}$ mm
NS10	Width 302 $^{+1}_{0}$ × Height 228 $^{+1}_{0}$ mm
NS7	Width 220.5 $^{+0.5}_{0}$ × Height 165.5 $^{+0.5}_{0}$ mm

2. Secure the panel mounting brackets from the back of the panel, as shown in the following diagram.
   Insert the catch on each bracket into the square hole on the PT, and secure the PT to the panel by tightening the screws with a Phillips screwdriver while gently pulling in the PT.

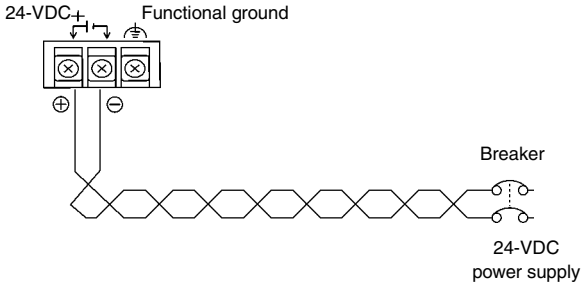


Note
- Do not allow metal particles to enter the PT while work is being performed on the panel.
- The allowable thickness of the panel for mounting is between 1.6 and 4.8 mm.
  Secure the mounting bracket with a uniform tightening torque of between 0.5 and 0.6 N·m to keep the PT waterproof and dustproof.
  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 PT.

3-1-4 Connecting the Power Supply

Connect a 24-VDC power supply to the power input terminals.

Note
- Do not connect an AC power supply to the power terminals.
- Use a DC power supply with low voltage fluctuation.
- Do not perform a dielectric strength test.
- To conform to the Low Voltage Directive in the EC Directives, use a power supply with reinforced insulation.



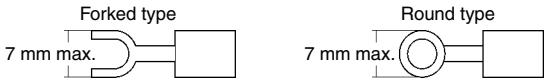
- **Power Supply**

The following table shows the specifications for the power supply that can be connected. Determine power supply specifications that meet the power supply capacity requirements.

Item	Value
Power supply voltage	24 VDC
Allowable voltage range	20.4 to 27.6 VDC (24 VDC ±15%)
Power supply capacity	20 W min

- **Parts Used to Connect the Power Supply**

Note 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. Tighten terminal block screws properly.



- **Recommended Products**

Manufacturer	Model number of forked terminals	Model number of round terminals	Applicable power lines (twisted-pair)
J.S.T. Mfg. Co., Ltd.	2-YS3A	2-3.5	2.0 to 2.63 mm^2
Fuji Terminal Industry Co., Ltd.	2-YAS3.5	V2-S3.5	
Nichifu Terminal Industries Co., Ltd.	2Y-3.5	2-3.5	

3-1-5 Wiring the Ground Wire

The PT is provided with a functional ground (FG: ⏚) terminal.

Wire the FG terminal according to the following conditions.

1. Ground according to *Figure (a)* if the distance between the PT and the host is short, and there is no difference in potential expected between the ground wires.
2. Ground according to *Figure (b)* when there is difference in potential between the PT and host. Do not ground the functional ground of the PT if it is far from the host and one-point grounding is difficult.
3. Do not ground the functional ground (FG: ⏚) of the PT if it is mounted to the same panel as devices that generate noise, such as motors and inverters.

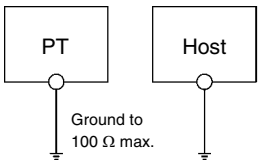


Figure (a)

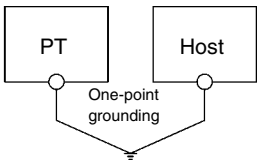


Figure (b)

Note Ground correctly to prevent malfunctions caused by noise.

3-2 Starting the PT

Check that the hardware is connected properly, turn ON the power to the PT, and then start the PT.

Use the following procedure to start the PT.

3-2-1 Operation at Startup

When the power is ON or the PT is reset, the PT will operate as follows:

Indicator lights orange.

Immediately after the power is turned ON, the indicator will light orange.
The file system will be checked and the system recovered if the power was turned OFF while a file was being written in previous operation, or if the battery capacity was low and drive safety information from the system program area screen data area could not be saved.

↓

Indicator lights green.

When the system starts properly, the indicator will light green.
If the indicator does not light green, the system programs may be damaged. Contact your nearest OMRON representative.

↓

Startup message is displayed.

A message about the startup status will be displayed.
If an error occurs, the PT will stop startup procedures and display a message. (Refer to *Section 5 Troubleshooting* in the *Programming Manual*.)
If an error occurs that allows startup to continue, a warning will be displayed. When a warning is displayed, the PT will enter standby state and wait for touch input. Check the message and then touch the screen. The PT will continue with startup procedures.

↓

PT starts operating

The PT goes into RUN mode and starts operating according to the screen data in the PT.

When the PT is connected using communications conditions other than the set conditions, a message “Connecting…” will be displayed at the bottom right of the screen, and the PT will be in standby status until normal connection is established.

To change the communications settings, display the System Menu and change the settings.

Note Confirm the safety of the system before turning the power ON and OFF or pressing the reset switch.

3-2-2 Starting the PT for the First Time

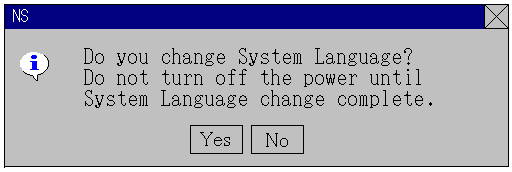
Always perform the following operations when turning ON the PT for the first time after purchase.

1. Language selection.
2. Format the screen data area.
3. Set the date and time.

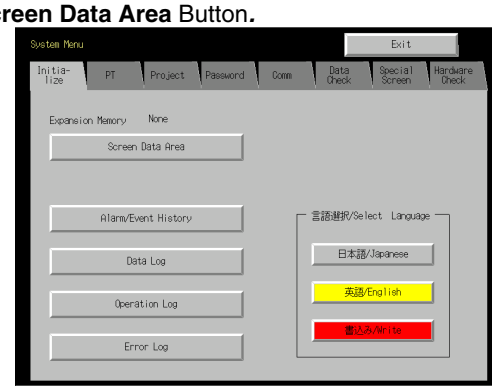
Operate according to the following conditions.

a) When the power is turned ON to the PT, the following error message will be displayed. Press the **OK** Button.

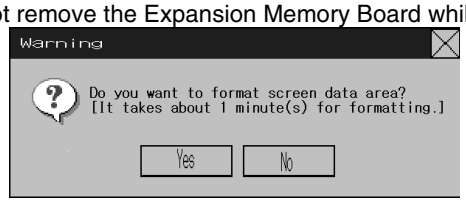
b) The System Menu will be displayed. Press the **Initialize** Tab. The dialog boxes and System Menu are set for English-language displays at the factory. The language can be changed to Japanese at this point if desired. To change to Japanese, select it and then press the **Write** Button. The following message will be displayed. Press the **Yes** Button. Do not turn OFF the power supply until the language change process has been completed.



c) Press the **Screen Data Area** Button.



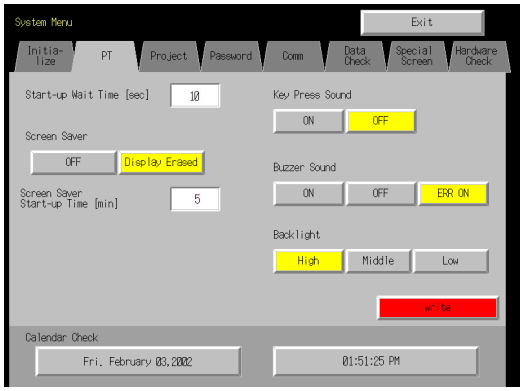
d) The following message will be displayed. Press the **Yes** Button to format the screen data. Do not turn OFF the power while formatting is in progress. If an Expansion Memory Board is installed in the PT, do not remove the Expansion Memory Board while formatting is in progress.



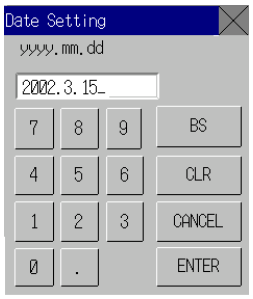
The time required for formatting depends on whether expansion memory is used and the size of the expansion memory. The NS7 finishes formatting instantly.

e) When formatting has been completed, a message saying that formatting has been completed will be displayed. Press the **OK** Button.

f) Next, select the **PT** Tab. Set the time and date.



g) Press the date display area under the heading *Date and Time*. A dialog box will be displayed. Input the date in yyyy/mm/dd format.



Example: Input March 15, 2002 as **2002.3.15**.

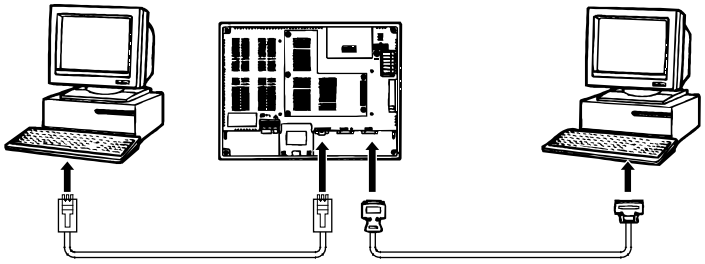
h) Press the time display area under the heading *Date and Time*. A dialog box will be displayed. Input the time using a 24-hour clock in hours/minutes/seconds format.
Example: Input 06:01:01 p.m. as **18.1.1**.
The **Write** Button will be displayed, but the time and date settings will be enabled immediately after they have been input in the dialog box.
This completes the procedure required to start the PT for the first time. Now transfer the project data. Refer to *3-6 Using Memory Cards* and *Section 10 Transferring Data to and from PTs* in the *NS-Designer Operation Manual*.

3-3 Connecting the NS-Designer

Use an RS-232C or Ethernet cable to connect the PT and computer so that screen data that has been created with the NS-Designer can be transferred to the PT.

Connect the RS-232C cable from the computer to serial port A or B. The cable can be connected to either serial port A or B.

Units that support Ethernet communications can also be connected to the computer via the Ethernet and screen data transferred.



- **Communications Conditions**

The communications conditions must be set from the PT and FinsGateway. (When using Ethernet, the settings must be set from the NS-Designer and the project data transferred to the PT.) For details, refer to *Section 10 Transferring Data to and from PTs* in the *NS-Designer Operation Manual*.

- **Recommended Connecting Cables**

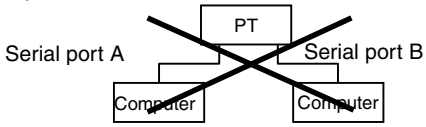
Use the following cables when connecting via RS-232C.

XW2Z-S002 (OMRON, cable length: 2 m)
(D-Sub male 9-pin and D-Sub female 9-pin, for IBM PC/AT or compatible computers and NX computers in the PC-9800 Series)

For details on preparing connecting cables, refer to *Appendix 4 Preparing Connecting Cables*.

Reference When connecting two computers in series to a single PT, data cannot be transferred using the serial cables.

Example: When a PT is connected in series to the computer's COM1 and COM2 ports.



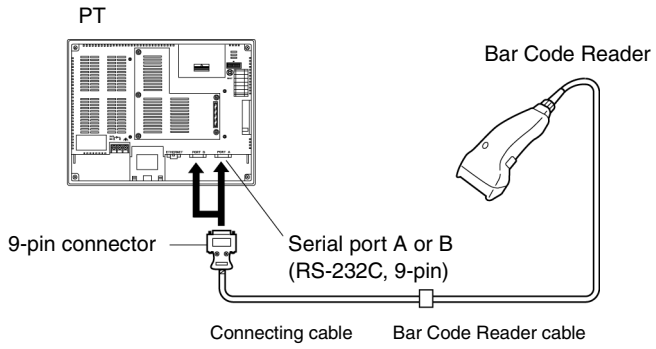
3-4 Connecting to Bar Code Readers

Connecting a Bar Code Reader to the PT allows bar code data to be read as character strings in the character string input areas.

For details on methods for inputting character strings from a Bar Code Reader, refer to *3-6 Inputting Numeral and Character Strings* in the *Programming Manual*.

3-4-1 Connection Methods

Connect the Bar Code Reader to either serial port A or B of the PT as shown in the following diagram.



Recommended Bar Code Reader:
V520-RH21-6, manufactured by OMRON.

Note Always turn OFF the power to the Bar Code Reader and the PT before connecting or disconnecting cables.

Prepare the connecting cables, referring to *Appendix 7 Preparing Connecting Cables for Bar Code Readers*.

Reference Bar Code Readers cannot be connected to both serial ports A and B at the same time.

3-4-2 Setting Bar Code Readers

The Bar Code Reader's communications conditions and other settings can be set from either the NS-Designer or the PT.

● Setting from the NS-Designer

Use the NS-Designer to set PT settings, such as the conditions for communications with the Bar Code Reader, according to the following table. Set the communications conditions supported by the Bar Code Reader to suit the application environment.

Item	Settings	Default
Data bits	7 or 8 bits	7 bits
Stop bits	1 or 2 bits	2 bits
Parity	None, odd, or even	Even
Communications Speed	4,800, 9,600, or 19,200 bps	9,600 bps
Input method	Manual or Auto	Auto

● Setting from the PT

Set the communications conditions from the System Menu.

For details on specific methods for operating the System Menu, refer to *6-6-6 Bar Code Reader Settings*.

● Bar Code Reader Settings

Set the settings for the Bar Code Reader according to the following table. Make sure, however, that the communications conditions settings for the communications speed, parity, stop bits, and data bits, match those set for the PT. For details on setting methods, refer to the operation manual of the Bar Code Reader being used.

Item	Settings
Communications Speed	4,800, 9,600, or 19,200 bps
Parity	Even, odd, or none.
Stop bits	1 or 2 bits
Data bits	7 or 8 bits
Preamble	STX
Postamble	ETX
RS/CS control	Invalid
Communications protocol	No protocol mode
Bar code label digit transfer	Transfer prohibited.
ID character transfer	Transfer prohibited.
Bar code types	Multi-read (reads everything)
Trigger switch setting	Automatic read mode

3-4-3 Data Format

Use the following data format for communications using the PT's bar code input function.

STX	Data	Data		Data	ETX
(02H)					(03H)

The supported data characters are 20_H to $7F_H$ hexadecimal and the maximum data length is 40 bytes.

All data that does not follow the specified data format will be discarded as invalid.

3-4-4 Bar Code Input

Use the following procedure to input bar codes using the PT.

1. Touch a Numeral Display & Input or String Display & Input object.
2. The Numeral Display & Input or String Display & Input object will become highlighted.
3. Read the bar code data from the Bar Code Reader.
4. Touch the command button set to either RET (Return) or ENT (Enter) to confirm the input.

For details on the methods for setting Numeral Display & Input, String Display & Input, and Command Button objects, refer to *2-9 Buttons* and *2-11 Display & Input* in the *Programming Manual*.

Reference To input bar codes for Numeral Display & Input and String Display & Input objects, select *Other Input Method (command buttons, etc.)* for the input method. When *Other Input Method (command button, etc.)* is selected, the input pad cannot be opened.

3-5 Using Expansion Memory Boards

This section provides details on Expansion Memory Boards that are used with NS-series PTs.

When using the NS10 or NS12, the volume of screen data can be increased by installing an Expansion Memory Board in the PT. (Expansion Memory Boards cannot be used with the NS7.)

Note
- Always turn OFF the power to the PT before installing or removing the Expansion Memory Board. Install the Expansion Memory Board securely according to the installation method.
- Do not touch the patterned surface or the mounted section of the Board with your bare hands.
- Always discharge any static electricity from your body before handling the Board.

The NS12 and NS10 are provided with a 4-Mbyte memory for screen data. Use an Expansion Memory Board if the total volume of screen data exceeds 4 Mbytes.

The NS7 is provided with an 6-Mbyte memory for screen data. The Expansion Memory Board cannot be used with the NS7, so make sure that the total volume of screen data does not exceed 6 Mbytes.

The data size can be checked from the NS-Designer by selecting *Resource Report* from the Tools Menu.

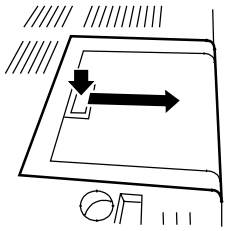
Reference There are two types of Expansion Memory Board, each of which has a different capacity, as follows:

Model	Memory capacity
NS-MF081	8 Mbytes
NS-MF161	16 Mbytes

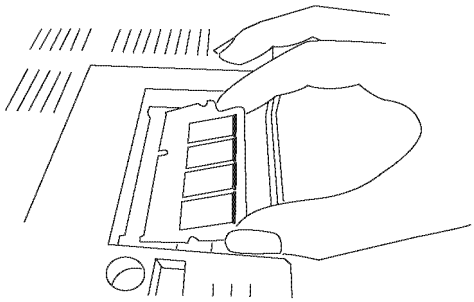
3-5-1 Installation Procedure

Use the following procedure to install the Expansion Memory Board.

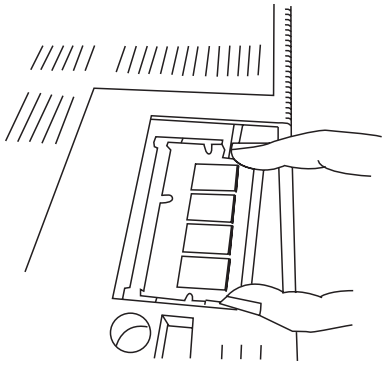
1. Turn OFF the power to the PT.
2. Remove the cover of the Expansion Memory Connector at the top of the PT rear panel by sliding it upwards.



3. Make sure that the recessed terminal section of the Expansion Memory Board is aligned with the protruding section of the slot for the Expansion Memory Board, and then insert the Board at an angle.
   Insert the end of the Board until it reaches the base of the slot and the terminal plating cannot be seen.



4. Make sure that the position of the Board is not skewed when pushing it in.
   Press down on the Expansion Memory Board until it is lying in the correct position and it clicks into place.



   To remove the Expansion Memory Board, simultaneously press out the levers on both ends of the slot, check that the Board is at an angle, and then pull it out.
5. Replace the cover by reversing the procedure to that used for removing it.

Note Do not hold the cover when carrying the PT, as the cover may slip off.

3-5-2 Using the Board

After installing the Expansion Memory Board in the PT, initialize (format) the Expansion Memory Board. The PT settings do not require changing. When transferring more than 4 Mbytes of data to the PT, the data is also transferred automatically to the Expansion Memory Board.

The expansion memory is formatted from the System Menu.

Format the expansion memory by selecting the **Initialize** Tab, and pressing the **Screen Data Area** Button. (Refer to *6-2 Initializing Data* for further details.)

The following table shows the estimated time that is required to format an Expansion Memory Board.

Model	Memory capacity	Time (See note.)
NS-MF081	8 Mbytes	Approx. 3 min.
NS-MF161	16 Mbytes	Approx. 5 min.

Note: Includes the time that is required (approx. 1 min.) to format the internal ROM.

3-6 Using Memory Cards

1. Memory Cards can be used with the PT. History files can be stored in Memory Cards as CSV files. There are four different types of history file, as follows:

Alarm/event history:	Stores alarm/event history data that has been registered by NS-Designer.
Data log:	Stores trend data.
Operation log:	Stores screen operation log data.
Error log:	Stores error history data for when macros are executed.

   The history data is normally saved in internal memory that is backed up in the PT, but can also be saved in CSV file format. When history data is saved as a CSV file, it is stored in the Memory Card.

   The CSV files are saved into the log folder created in the Memory Card.

2. The following data can be transferred to the Memory Card.
   - System programs (the programs required to operate the PT, such as for communications and fonts)
   - Screen data (data used in the PT display)

There are three methods for transferring data, as follows:

- Automatic download (Transfers data from the Memory Card to the PT.)
- Automatic upload (Transfers data from the PT to the Memory Card.)
- Manual transfer (Direction for data transfer is selected manually.)

Reference There are four types of recommended Memory Cards, each of which has a different capacity.

Model	Memory capacity	Memory type
HMC-EF172	15 Mbytes	Flash memory
HMC-EF372	30 Mbytes	
HMC-EF672	64 Mbytes	

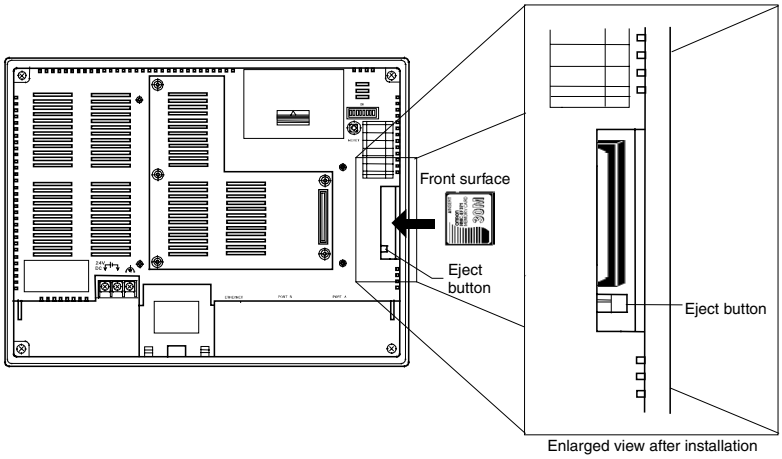
The Memory Card can be overwritten approximately 100,000 times.
When using the PC card socket in devices such as laptop computers, use the HMC-AP001 Memory Card Adapter.

For details on transferring data with the computer (NS-Designer), refer to *Section 10 Transferring Data to and from PTs* in the *NS-Designer Operation Manual*.

3. The data created in Data Block Tables can be saved as CSV files in DBLK folder on a Memory Card.

3-6-1 Installation

The Memory Card is installed in the memory card interface on the side of the PT.



Push the Memory Card firmly into the back of the slot. (The eject button will be pushed out when the Memory Card is installed properly.)

- **Removing the Memory Card**

Press the eject button.

To stop the Memory Card from springing out and falling, place your middle finger on the eject button, and hold the Memory Card with your index finger.

3-6-2 Replacing System Programs

When the system programs are loaded with the NS-Designer, they are stored under the NS-Designer's install folder (default location is C:\Program Files\Omron\NS-Designer-V2) in folders that are created for each type and version, as follows:

\SystemProgram\NS12\V3_0x\bank1: Ver. 3.0x for NS12
\NS10\V3_0x\bank1: Ver. 3.0x for NS10
\NS7\V3_0x\bank1: Ver. 3.0x for NS7

To replace a system program, use Windows Explorer or another method to copy each of the folders for the required system program under \bank1 to the route directory of the Memory Card.

For details on methods for transferring data from the Memory Card to the PT, refer to *3-6-3 Transferring Data with Memory Cards*.

3-6-3 Transferring Data with Memory Cards

Using a Memory Card with the PT allows system programs (programs that are required to operate the PT, such as those for communications and fonts) and screen data to be transferred to and from the PT.

Use the DIP switch on the rear panel of the PT to set the operating mode for data transfer to automatic download (transfers data from the Memory Card to the PT), automatic upload (transfers data from the PT to the Memory Card), or manual transfer (user selects whether to download or upload).

Data can be transferred with the Memory Card when the PT is started up.

Note
- Before transferring data, check that the system programs and screen data types match those in the PT.
- Always reset the PT or turn ON the power again after changing the DIP switch setting.
- Do not perform the following operations while accessing the Memory Card. The data may be damaged and the Memory Card may need to be formatted.
  - Turn OFF the power to the PT.
  - Press the PT reset switch.
  - Remove the Memory Card.
- Always use the following procedure to remove the Memory Card.

If the PT system is damaged due to the power being turned OFF while a file is being written, or other reason, using normal downloading to replace the system programs may not be possible. For details on troubleshooting, refer to page *3-25*.

● DIP Switch

The Memory Card can be divided into up to four areas, which are called banks.

The DIP switch on the rear panel of the PT has eight pins. The ON/OFF combination of these pins specifies which transfer method is used.

Pin No.	Function
1	Specifies bank 1 when transferring. (ON: Specifies bank 1.)
2	Specifies bank 2 when transferring. (ON: Specifies bank 2.)
3	Specifies bank 3 when transferring. (ON: Specifies bank 3.)
4	Specifies bank 4 when transferring. (ON: Specifies bank 4.)
5	Specifies upload or download. (ON: Upload, OFF: Download)
6	Specifies manual or automatic transfer. (ON: Manual, OFF: Automatic)
7	Reserved (Not used.)
8	Reserved (Not used.)

Banks are automatically created under the following conditions.

- When data is transferred to the Memory Card using the NS-Designer transfer program.
- When data is transferred (uploaded) from the PT.

Reference

- When transferring data, only one bank can be specified. Set only one of pins 1 to 4 to ON.
- The PT will operate normally when the DIP switch is set to a combination other than one specifying automatic upload, download, or manual transfer.
- When data has already been stored in the banks of the Memory Card and uploading is executed, the previous data in the specified bank will be deleted. Always check the data stored in the banks before uploading.
- If the \BANK□\DATA and \BANK□\SYSTEM are created manually in the Memory Card, and used for purposes other than transferring data, when uploading is performed, the data in the folders will be deleted, and the data in the PT will be copied to the folders. Therefore, do not use \BANK□\DATA or \BANK□\SYSTEM when creating folders in the Memory Card.
- Set all pins to OFF when using the PT for normal operations.

Automatic Download

An automatic download transfers system programs and screen data from the Memory Card to the PT.

Set the DIP switch for automatic download, as shown below.

The Memory Card cannot be used to transfer data when the DIP switch pins are set to combinations other than those specified here.

DIP switch pin and status								Operation
1	2	3	4	5	6	7	8	
ON								Automatically downloads bank 1 system programs and screen data.
	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	ON							Automatically downloads bank 2 system programs and screen data.
OFF		OFF	OFF	OFF	OFF	OFF	OFF	
		ON						Automatically downloads bank 3 system programs and screen data.
OFF	OFF		OFF	OFF	OFF	OFF	OFF	
			ON					Automatically downloads bank 4 system programs and screen data.
OFF	OFF	OFF		OFF	OFF	OFF	OFF	

Use the following procedure to automatically download data.

1. Turn OFF the power to the PT.
2. Set the DIP switch.
3. Insert the Memory Card with the specified banks stored in it into the PT.
4. Turn ON the power to the PT.
   The system programs and screen data will be written to the PT.
5. The status of the PT indicators during data transfer is as shown below.
   Do not remove the Memory Card during data transfer.
   Transferring data: Indicator flashes orange.
   Transferring completed: Indicator flashes green.
   Error occurred: Indicator flashes red.
   Refer to page *3-25* if an error occurs.
6. Turn OFF the power.
7. Remove the Memory Card.
8. Turn OFF all the DIP switch pins.
9. Turn ON the power.

For an automatic download, 1 Mbyte of screen data is transferred in approximately 25 s.

A warning message will not be displayed when automatic download is executed even if the PT model, version, and language for the system programs and screen data that are stored in the PT are different from those that are stored in the Memory Card.

Always check carefully that the PT model and Memory Card details match before transferring data automatically.

● Automatic Upload

An automatic upload transfers system programs and screen data from the PT to the Memory Card.

Set the DIP switch for automatic upload, as shown below.

The Memory Card cannot be used to transfer data when the DIP switch pins are set to combinations other than those specified here.

DIP switch pin and status								Operation
1	2	3	4	5	6	7	8	
ON				ON				Automatically uploads system programs and screen data to bank 1.
	OFF	OFF	OFF		OFF	OFF	OFF	
	ON			ON				Automatically uploads system programs and screen data to bank 2.
OFF		OFF	OFF		OFF	OFF	OFF	
		ON		ON				Automatically uploads system programs and screen data to bank 3.
OFF	OFF		OFF		OFF	OFF	OFF	
			ON	ON				Automatically uploads system programs and screen data to bank 4.
OFF	OFF	OFF			OFF	OFF	OFF	

Use the following procedure to automatically upload data.

1. Turn OFF the power to the PT.
2. Set the DIP switch.
3. Insert the Memory Card into the PT.
4. Turn ON the power to the PT.
   The system programs and screen data will be written to the Memory Card.
5. The status of the PT indicator during data transfer is as shown below.
   Do not remove the Memory Card during data transfer.
   Transferring data: Indicator flashes orange.
   Transferring completed: Indicator flashes green.
   Error occurred: Indicator flashes red.
   Refer to page *3-25* if an error occurs.
6. Turn OFF the power.
7. Remove the Memory Card.
8. Turn OFF all the DIP switch pins.
9. Turn ON the power.

For an automatic upload, 1 Mbyte of screen data is transferred in about 25 s.

A warning message will not be displayed when automatic upload is executed even if the PT model, version, and language for the system programs and screen data that are stored in the PT are different from those that are stored in the Memory Card

Always check carefully that the PT model and Memory Card details match before transferring data automatically.

● Manual Transfer

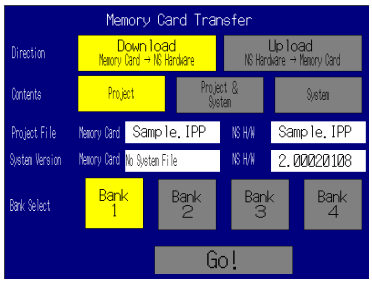
Use screen operations to select the direction (download, upload), contents (project, project and system, or system), and banks.

Set pin 6 of the DIP switch to ON for manual transfer.

DIP switch pin and status								Operation
1	2	3	4	5	6	7	8	
					ON			Manually downloads or uploads system programs and screen data.
OFF	OFF	OFF	OFF	OFF		OFF	OFF	

Use the following procedure to manually transfer data.

1. Turn OFF the power to the PT.
2. Turn ON pin 6 of the DIP switch.
3. Insert the Memory Card into the PT.
4. Turn ON the power.
5. The following screen will be displayed on the PT.



6. Specify the direction, contents (project, project and system, or system), and bank.
7. The IPP file name and system version that are stored in both the specified bank of the Memory Card and the PT will be displayed in the Project File and System Version fields. After confirming the details, press the **Go** Button.
8. A message confirming the transfer will be displayed. Press the **OK** Button to execute the specified data transfer operation. When downloading, the screen data previously stored in the PT will be deleted.
9. A warning message will be displayed if the PT model, system program/screen data versions, and language for the data stored in the PT are different from that for the data stored in the Memory Card. Press the **Yes** Button to continue transferring the data.
10. The uploading/downloading screen will be displayed while data is being transferred. A screen indicating that the transfer has completed will be displayed when the transfer has finished. (If an error occurs, a transfer error screen will be displayed. Refer to page *3-25* if an error occurs.)
11. The indicator will flash green when transferring has finished.
12. Turn OFF pin 6 of the DIP switch and reset the PT.

A warning message is not displayed at the PT when the PT model, version, and language are different if the system programs used are version 1.0□.

Therefore, if the wrong data is downloaded, execute the transfer operation again using automatic download.

The system settings cannot be changed for the upload operation.

● Errors

- During Automatic Transfer
  The indicator on the front panel will flash red if an error occurs during data transfer. Check the following items if an error occurs.
  - Is the Memory Card inserted into the PT?
  - Do the banks set with the DIP switch exist in the Memory Card? (During Download)
  - Is the size of the transfer data greater than the free space in the PT or Memory Card?

Check these items before transferring data again.

Reference An error message will not be displayed if an error occurs.

- During Manual Transfer

If an error occurs during data transfer, a transfer error screen will be displayed.

Check the following items for each message displayed.

Error Messages Requiring Checking

Error message	Check item
Memory Card Error Could not recognize a Memory Card. Check the Memory Card and reset the NS Hardware.	• Is the Memory Card inserted into the PT? • Is the Memory Card damaged?
Project Transmission Error Transmission Failed. Check the Memory Card and reset the NS Hardware.	• Was the Memory Card removed during data transfer? • Is the free space on the Memory Card insufficient? • Is the Memory Card damaged? • Does the screen data volume exceed the memory capacity of the PT?
System Transmission Error Transmission Failed. Check the Memory Card and reset the NS Hardware.	
Cannot find source data. Are you sure to continue Downloading/Uploading?	• Does the transfer source directory or file exist? (Note: If the **Yes** Button is pressed and data is transferred, the previous data at the transfer destination will be deleted.)

After checking the message, reset the PT, and transfer the data again.

- If the system programs cannot be replaced by using automatic download or the PT system is damaged due to a reason such as the power being turned OFF while a file is being written, using normal downloading to replace the system program may not be possible.

The following message will be displayed when the PT is started up.

> ****ERROR**: Fail in Loading System file. Since this file itself is needed to download the System Programs, System downloading in usual way will not be possible.
> Please follow the instruction below to reinstall all your System Programs safely.
> Insert the Memory Card with System Programs inside.
> Touch the Screen if it is ready**

Use the following procedure to operate the PT if this message is displayed or the System Program is damaged and the PT does not start.

1. Copy *Update_to_Ver.3.X.* to a Memory Card. This program can be installed with NS-Designer Ver. 3.0 by specifying it in the set up wizard.
2. Place the Memory Card into the PT and turn ON the power. The recovery program will start automatically.
   Refer to the *How to update or recover the system program (PDF)* for details on recovery operations. This can be started from ***Windows Start – Programs – Omron – NS-Designer Ver. 3.0***.
3. The system will start automatically downloading data from bank 1 of the Memory Card to the PT.

The indicator will flash green when the download has finished.

3-7 Installing the Video Input Unit

A Video Input Unit (NS-CA001) can be mounted to an NS-series PT. Mounting a Video Input Unit allows images from a video camera or vision sensor to be displayed on the PT screen. This section explains how to connect a Video Input Unit to the PT with a cable. The Video Input Unit can be mounted to NS12 and NS10 PTs only. It cannot be mounted to an NS7 PT.

3-7-1 Video Input Unit Components

The following table shows the Video Input Unit's product configuration.

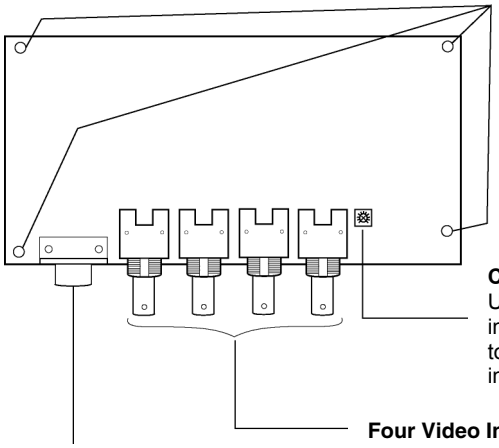
Model	Components	
	Name	Contents
NS-CA001 Video Input Unit	Video Board (1)	Allows video input.
	Cover (1)	Protects Video Board.
	Cable (1)	Connects the PT's functional ground terminal and the cover to prevent noise.
	Screw (M3) (9)	These screws are used for the following: -Securing the Video Board to the back of the PT. -Securing the cover to the back of the PT. -Attaching the cable to the cover.
	Instruction sheet	Instruction sheet for NS-CA001.

Note To comply with EC Directives (Low Voltage Directive) when mounting the Video Input Unit on the PT, attach the PT to a control panel that has been cut to fit the size. (Refer to *3-1-3 Mounting the PT to the Control Panel* for panel cutout dimensions.)

3-7-2 Nomenclature and Functions

Familiarize yourself with the nomenclature and functions of the Video Board before using the Video Input Unit.

Video Board: Front View



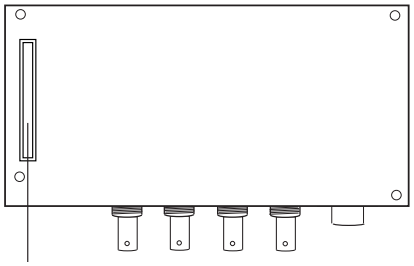
Positions of screws for attaching Video Board to PT

Contrast Adjuster
Used to adjust the contrast for video input. All 4 channels are adjusted together. They cannot be adjusted individually.

Four Video Input Connectors
BNC connectors for inputting NTSC/PAL signals.

Console Port Connector
Connects to the console connector of OMRON Vision Sensors and allows Vision Sensor settings to be performed from the PT.

Video Board: Rear View



Expansion Interface Connector
Connects to the PT's expansion interface connector when mounting the Video Board.

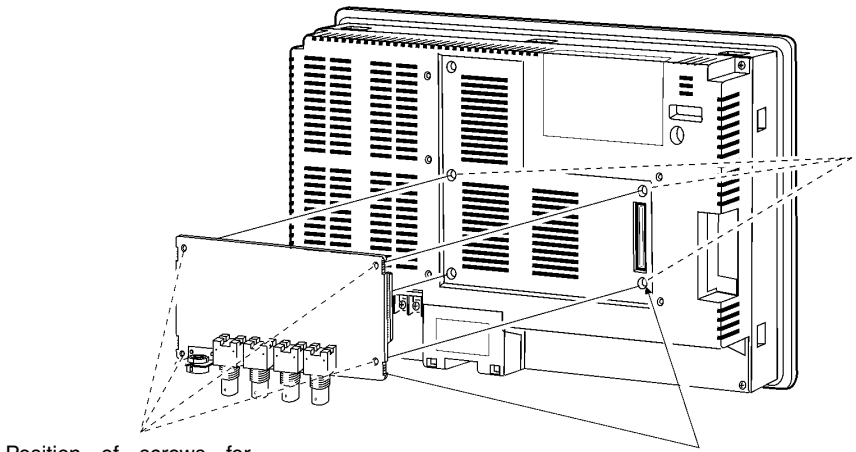
3-7-3 Installation Method for Video Input Unit

This section describes the method for mounting the Video Input Unit to the PT. The Video Input Unit can be mounted to NS12 and NS10 PTs only. It cannot be mounted to an NS7 PT.

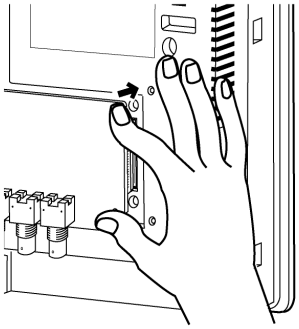
Note
- Do not touch the surface of the substrate or mounted devices with your bare hands. Also, discharge static electricity from your body in advance.
- After mounting the Video Input Unit to the PT, all fittings must be tightened with the provided screws. Tighten the screws to a torque of 0.6 N·m.
- Always turn OFF the power to PT before mounting or removing the Unit. Follow the procedures and install the Unit correctly.
- When the Video Input Unit is installed, the depth of the PT will increase by 24 mm. To install the Video Input Unit, secure sufficient space inside the control panel beforehand.

● Installing the Video Input Unit

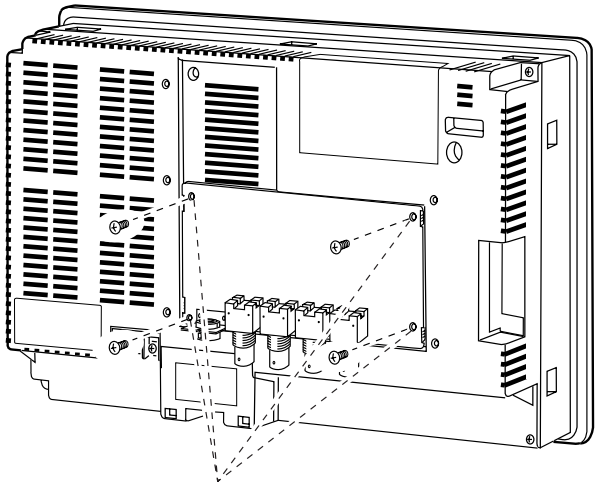
1. Mount the Video Board onto the back of the PT so that its expansion interface connector is inserted into the expansion interface connector on the back of the PT and the respective screw holes are aligned. Hold the Video Board by the corners keeping it parallel to back of the PT.



Push firmly on the connector end of the board to ensure that it is inserted sufficiently.

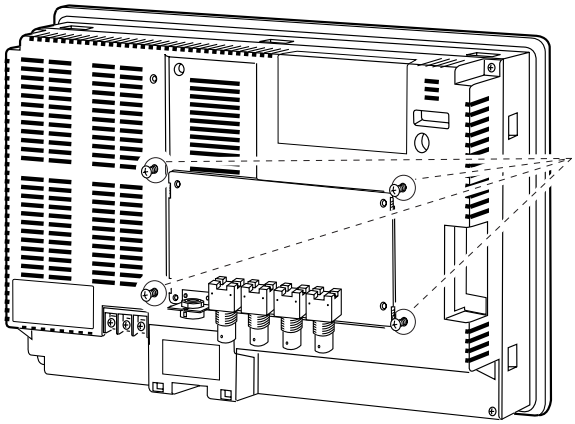


2. Secure the four corners of the Video Board with screws.



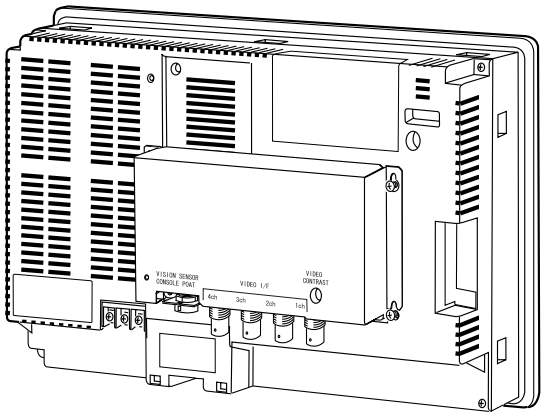
Secure these four places with screws.

3. Insert screws in the screw holes for attaching the cover and tighten them slightly.



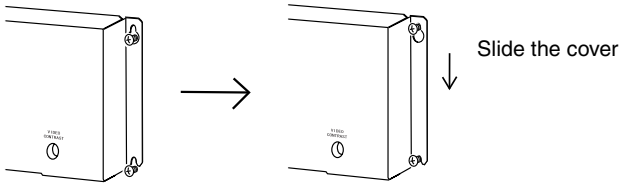
Insert the screws first.

Align the cover's screw holes with the screws and mount the cover.



Mount the cover.

Slide the cover downward and tighten the screws.

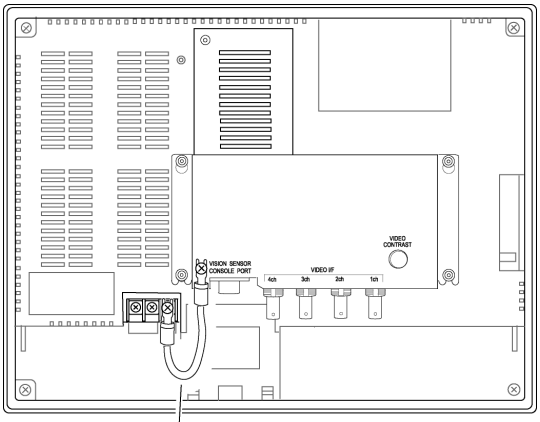


Mount the cover.

Tighten the screws.

● Connecting the Cable

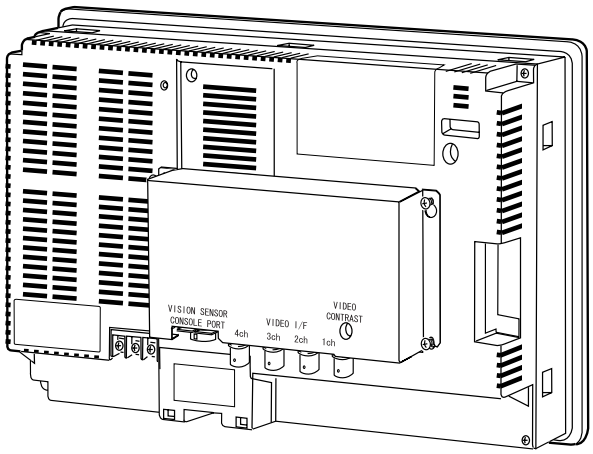
Connect the functional ground terminal of the PT and the cover with the cable to prevent malfunction due to noise.



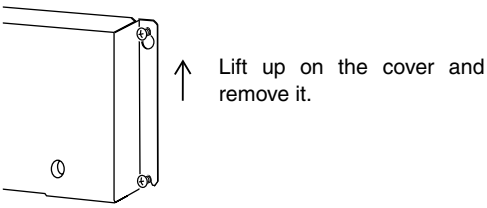
Connect the functional ground terminal and the cover with the cable.

● Removing the Video Input Unit

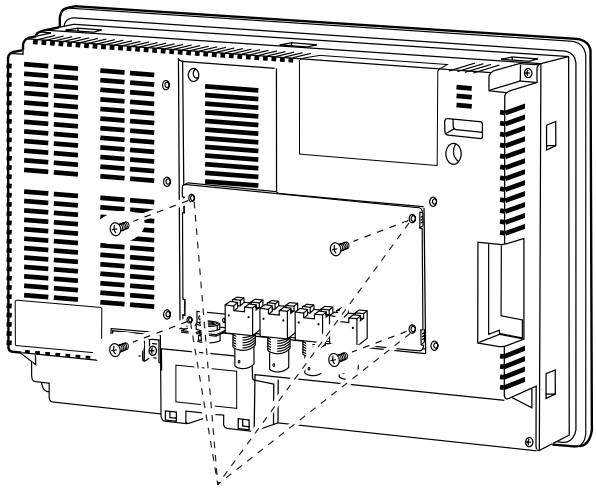
1. Remove the cover from the PT as follows:
   Loosen the screws.



Lift up on the cover and remove it.

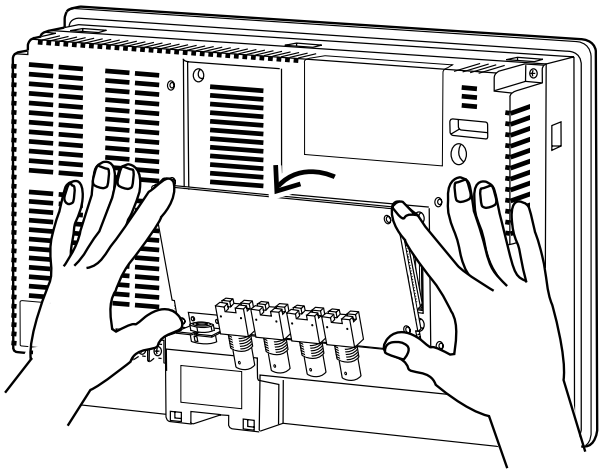


2. Remove the screws from the four corners.

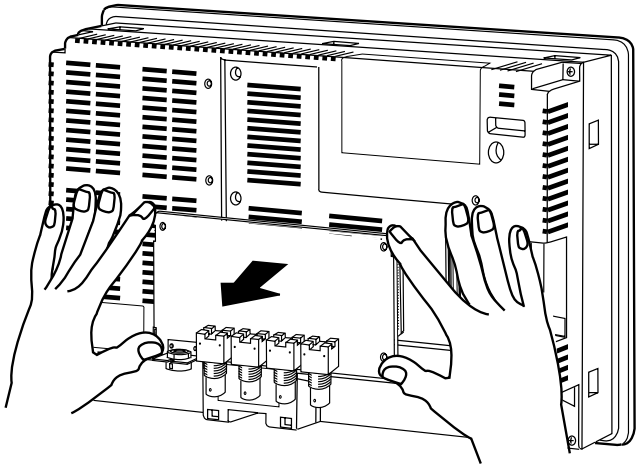


Remove the screws.

3. Remove the Video Board from the expansion interface connector of PT. Follow the procedure shown below.



Remove the upper side of the Video Board first, holding the four corners.



Then, pull out the entire Video Board.

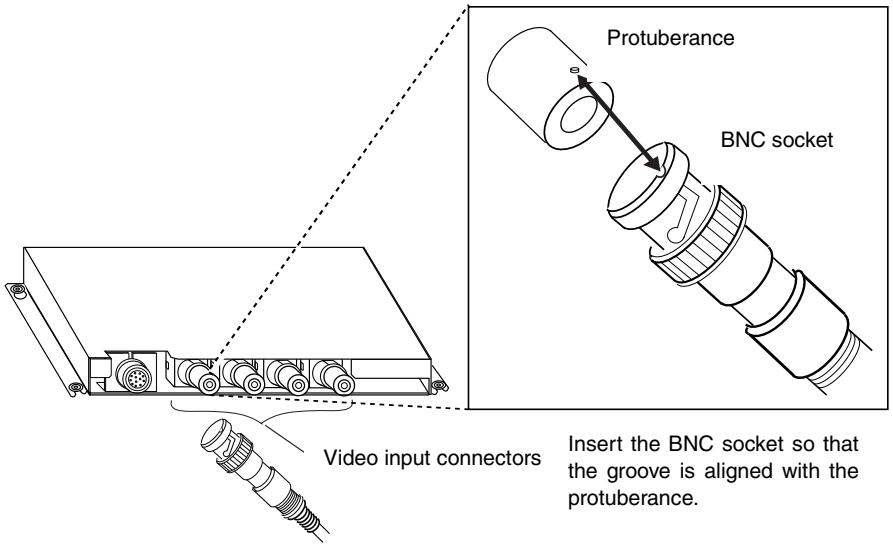
3-7-4 Connecting to Video Input Connectors

Use the following method to connect cameras to the Video Input Unit mounted to the PT.

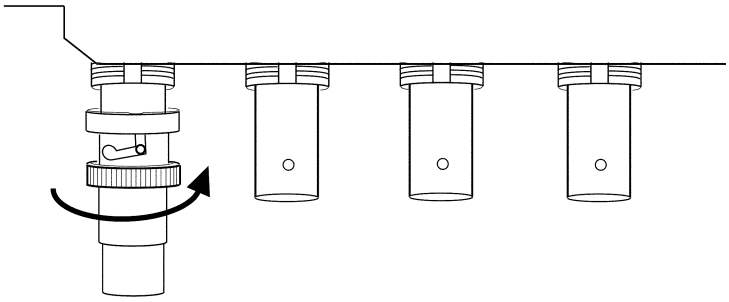
Note The tensile load of the cable is 30 N maximum. Do not exceed maximum load.

● Connecting to Video Input Connectors

1. Insert the BNC socket on the camera's video output cable into a video input connector.



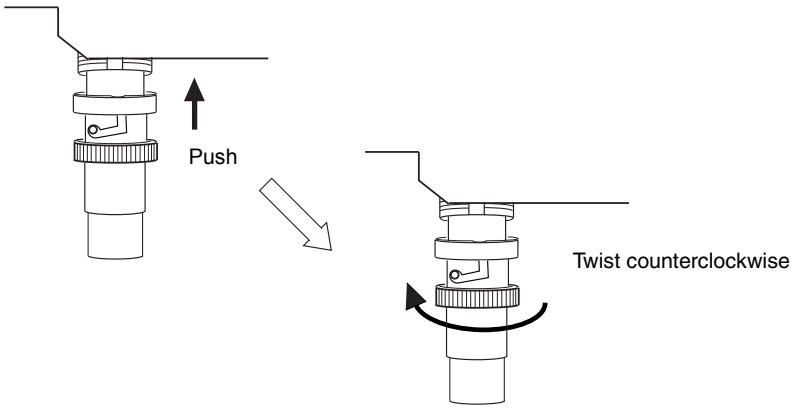
2. After inserting the BNC socket, twist it clockwise until it locks into place



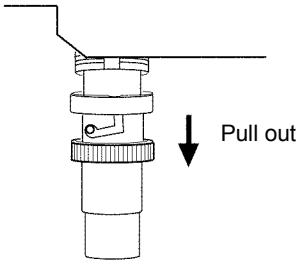
Twist clockwise.

● Removing the Video Input Connector

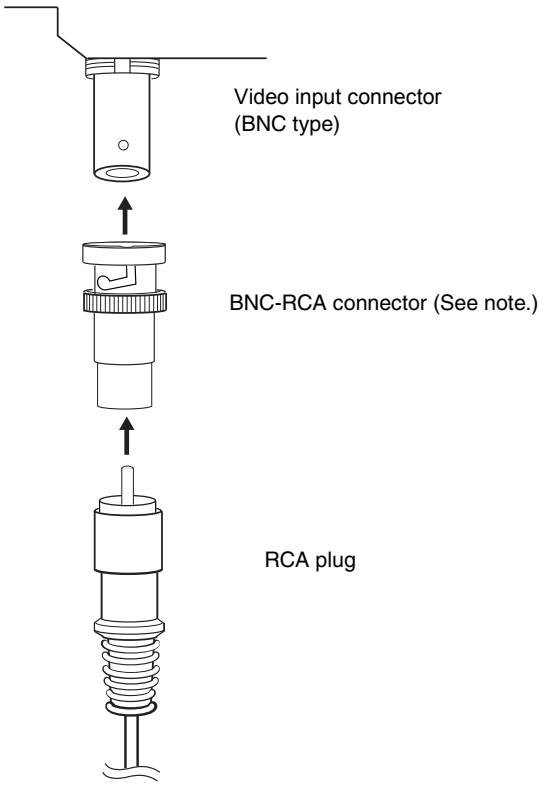
1. Unlock the BNC socket on the camera's video output cable by twisting it counterclockwise while pushing it.



2. After unlocking the BNC socket, pull it out.



If the camera's video output cable uses an RCA plug, connect it to the video input connector using a BNC-RCA connector in the way shown below.

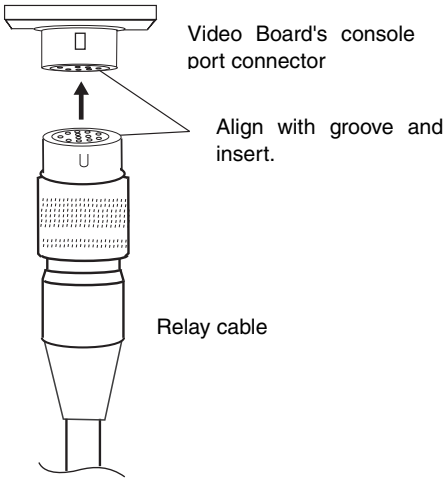


Note A BNC-RCA connector is provided with the Monitor Cable (F150-VM) for OMRON Vision Sensors. It is not provided with the Video Input Unit (NS-CA001).

●Connecting to the Console Port Connector

Use the following method to connect the Video Board's console port connector to the console connector of an OMRON Vision Sensor (F150-C10V3, F160-C10, F180-C10, F400-C10V2, F250-C10, V530-R150V2).

1. Insert the socket of the Relay Cable (F150-VKP; see note) into the Video Board's console port connector.

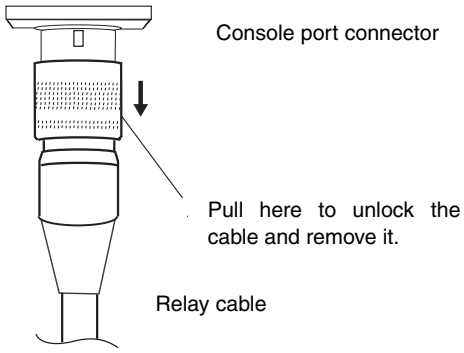


Note The Relay Cable (F150-VKP) is the cable used to connect the Video Board's console connector to the console connector of an OMRON Vision Sensor.

● Removing the Console Port Connector

Use the following method to remove the Relay Cable from the Video Board's console port connector.

1. Remove the Relay Cable by pulling on the connector as shown below.



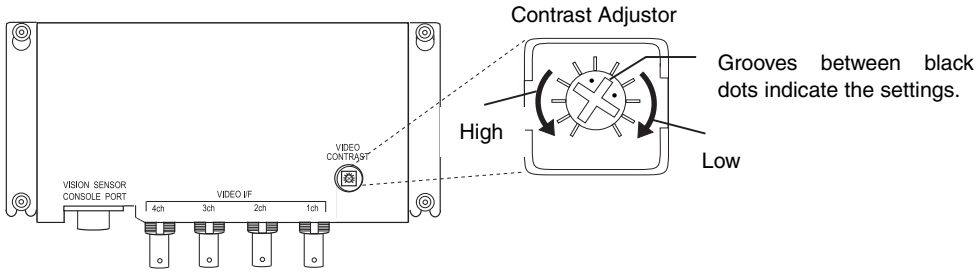
● Setting the Contrast

If the picture displayed on the PT screen is too bright or dark, contrast adjustment is required. Contrast adjustment is usually performed using one of the following procedures.

- Select *Video Configuration* from the Special Screen Tab Page in the System Menu. (Refer to *Video Configuration* under *2-18 Special Functions* in the NS-series Programmable Terminals Programming Manual.)
- Select the *Contrast Adjustment* function for Command Buttons. (Refer to *Command Buttons* under *2-9 Buttons* in the NS-series Programmable Terminals Programming Manual).

If the contrast is not improved using the above methods, change the contrast with the Video Board's contrast adjustor using the following method.

Turn the contrast adjustor gradually using a small screwdriver while checking the picture displayed on the PT screen.



If turning the contrast adjustor too much, the image may be distorted. Turn the contrast adjustor in the opposite direction to remove the noise.

3-8 Installing the Controller Link Interface Unit

This section describes the method for installing and wiring the Controller Link Interface Unit. It can be mounted to NS12 and NS10 PTs only. It cannot be mounted to an NS7 PT.

3-8-1 Controller Link Interface Unit Components

The following table shows the Controller Link Interface Unit's product configuration.

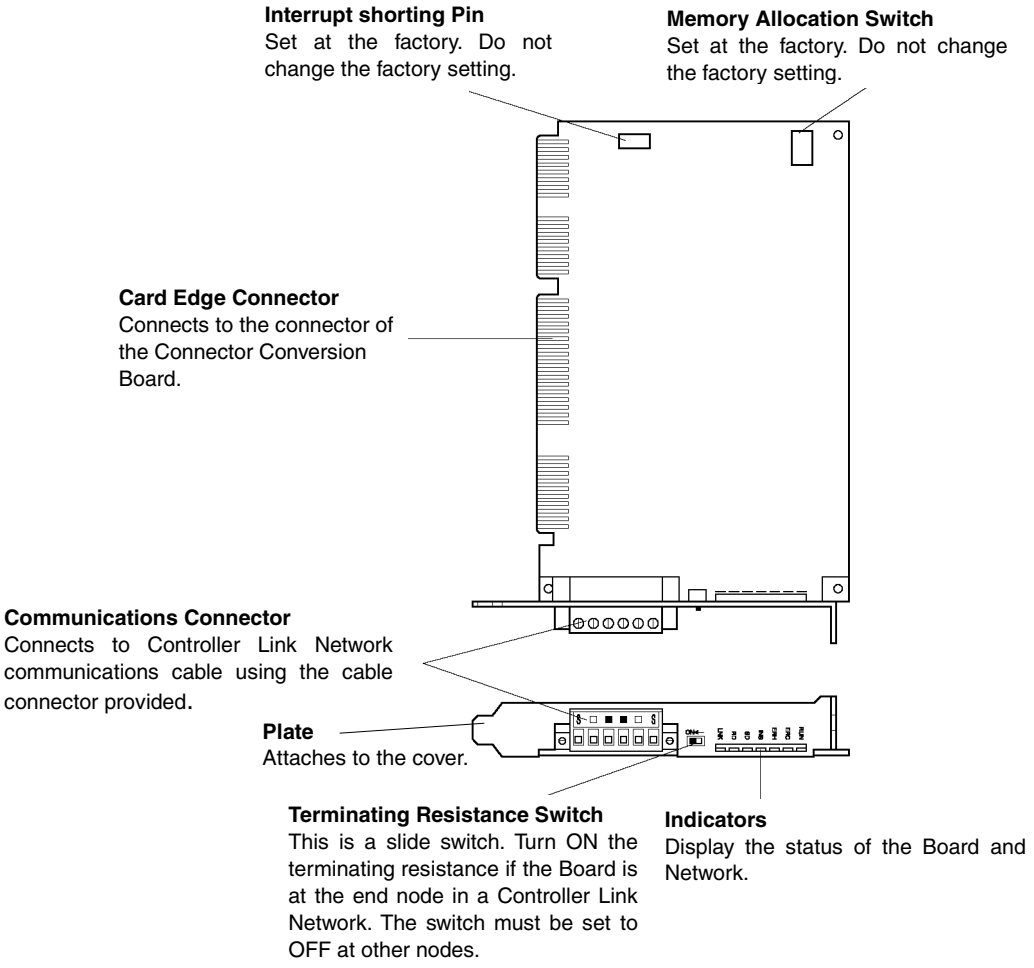
Model	Components	
	Name	Contents
NS-CLK21 Controller Link Interface Unit	NS-CLK001 Connector Conversion Board (1)	Used for mounting the Controller Link Support Board to the PT.
	NS-CLK01 Controller Link Support Board (1)	Connects the PT to the Controller Link Network.
	Connector (1)	Connects the communications cable and Controller Link Support Board.
	Cover (1)	Protects the connector and the Controller Link Support Board.
	Cable (1)	Connects the cover and the PT's functional ground terminal to prevent noise.
	Screw (M3) (10)	These screws are used for: • Securing the Connector Conversion Board to the back of the PT. • Securing the cover to the back of the PT. • Attaching the cable to the cover.
	Instruction sheet	Instruction sheet for NS-CLK21

Reference NS-CLK21 Units with lot number 12Y2 or later (manufactured on November 12, 2002 or later) comply with EC Directives.

Note To comply with EC Directives (Low Voltage Directive) when mounting the Controller Link Interface Unit on the PT, attach the PT to a control panel that has been cut to fit to size. (Refer to *3-1-3 Mounting the PT to the Control Panel* for cutout dimensions.)

3-8-2 Nomenclature and Functions

Familiarize yourself with the nomenclature and functions of the Controller Link Support Board before operation.



Reference To identify nonconforming Controller Link Boards, check the Model printed on the Plate. This will tell you whether it conforms with EC Directives.
Model 3G8F5-CLK21: Does not conform with EC Directives
Model NS-CLK01: Conforms with EC Directives

● Indicators

Indicator	Name	Color	status	Meaning
RUN	Operating	Green	Lit	Normal operation.
			Not lit	A Board operating error (watchdog timer error) occurred.
ERC	Communications error	Red	Lit	One of the following errors occurred. • Communications error • Same node address used twice (i.e., address duplication error) • Hardware error
			Not lit	Normal operation
ERH	EEPROM error	Red	Lit	One of the following errors occurred. • EEPROM error • EEPROM data link table error • EEPROM routing table error • EEPROM network parameter error
			Not lit	No EEPROM error.
INS	Network participation	Yellow	Lit	The Board is participating in the network.
			Not lit	The Board is not participating in the network.
SD	Send	Yellow	Lit	Sending data.
			Not lit	Not sending data.
RD	Receive	Yellow	Lit	Receiving data.
			Not lit	Not receiving data.
LNK	Data link	Yellow	Lit	Participating in data link.
			Flashing	Error in data link table setting.
			Not lit	Not participating in data link or data link inactive.

●Switch Settings

The following settings are made at the factory. Do not change these settings.

Item	Switch	Setting
Memory address	Memory allocation switch	SW1: ON SW2: ON SW3: OFF SW4: ON
Interrupt level	Interrupt shorting pin	Set to IRQ10.

●Setting Terminating Resistance

Turn the built-in terminating resistance ON or OFF using the terminating resistance switch (slide switch). Terminating resistance is required at the both ends of a wired network to absorb unnecessary signals and reduce the noise. The Controller Link Support Board has built-in terminating resistance, which can be connected simply by setting the slide switch to ON.

Set the switch to ON to connect the terminating resistance at both end nodes in wired networks and set the switch to OFF at all other nodes.

Setting	Terminating resistance
OFF (factory setting)	Not connected
ON	Connected

Note This switch can be set after the Controller Link Interface Unit is installed on the PT. Turn OFF the power of the PT before changing the setting.

Reference This switch is set to OFF by default (terminating resistance disconnected).

3-8-3 Installation Method for Controller Link Interface Unit

This section explains the method for mounting a Controller Link Interface Unit to the PT.

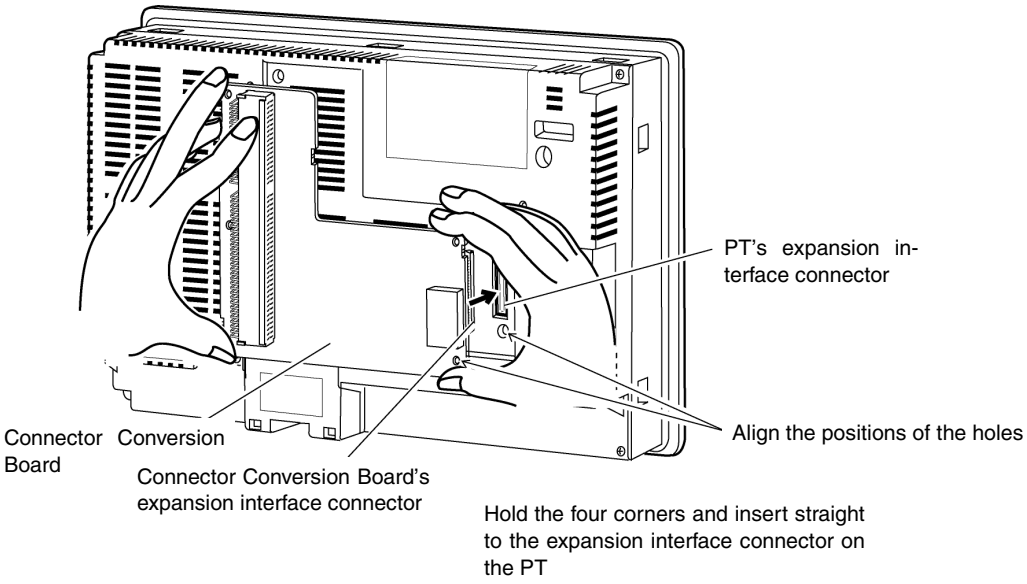
The Controller Link Interface Unit can be mounted to NS12 and NS10 PTs only. It cannot be mounted to an NS7 PT.

Note

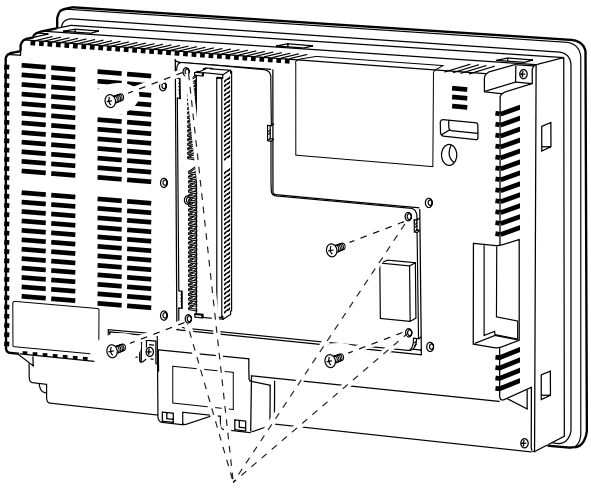
- Do not touch the surface of the substrate or mounted devices with your bare hands. Also, discharge static electricity from your body in advance.
- After mounting the Controller Link Interface Unit to the PT, all fittings must be tightened with the provided screws. Tighten the screws to a torque of 0.6 N·m.
- Always turn OFF the power to PT before mounting or removing the Unit. Follow the procedures and install the Unit correctly.
- When the Controller Link Interface Unit is installed, the depth of the PT will increase by 35 mm.
- To install the Controller Link Interface Unit, secure sufficient space inside the control panel beforehand.

● Connecting and Disconnecting

1. Mount the Connector Conversion Board onto the back of the PT so that its expansion interface connector is inserted into the expansion interface connector on the back of the PT and the respective screw holes are aligned. Hold the Board by the corners keeping it parallel to back of the PT.

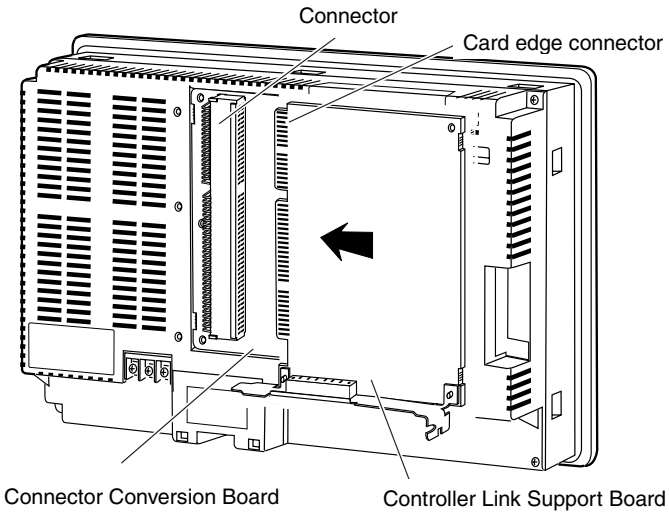


2. Secure the four corners of the Connector Conversion Board with screws.



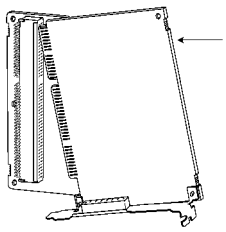
Secure these four places with screws.

3. Insert the Controller Link Support Board's card edge connector into the Connector Conversion Board's connector.

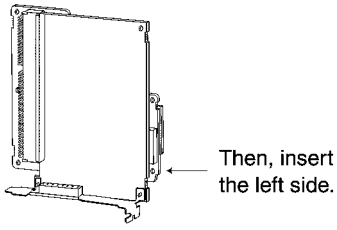


Reference Follow the steps given below if it is hard to insert the card edge connector to the connector on the connector conversion board.

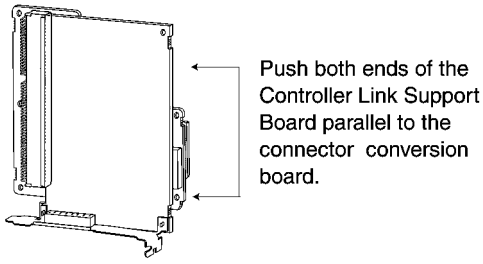
(1)



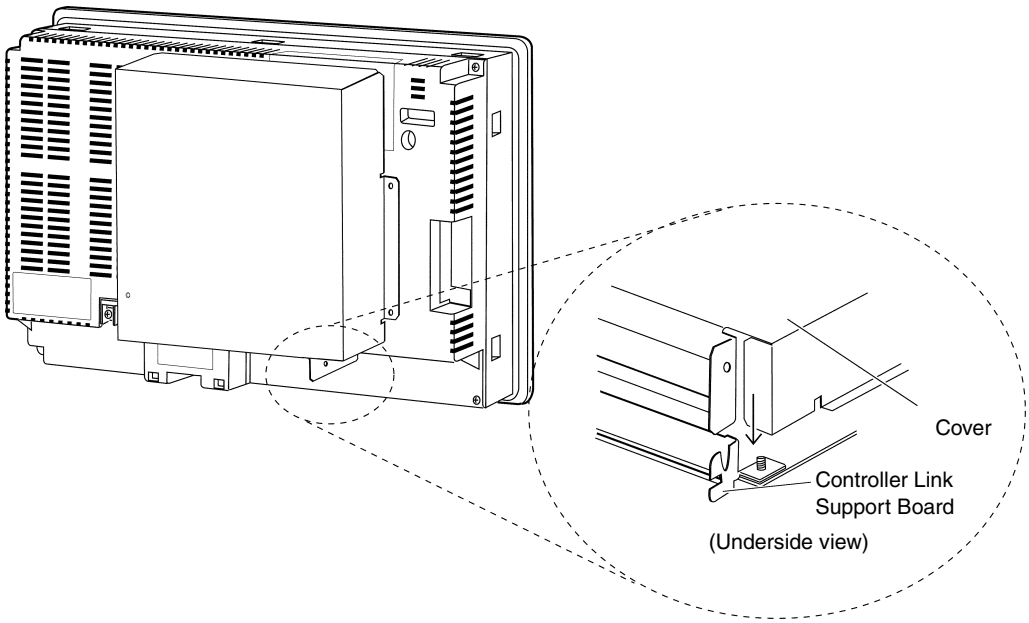
(2)



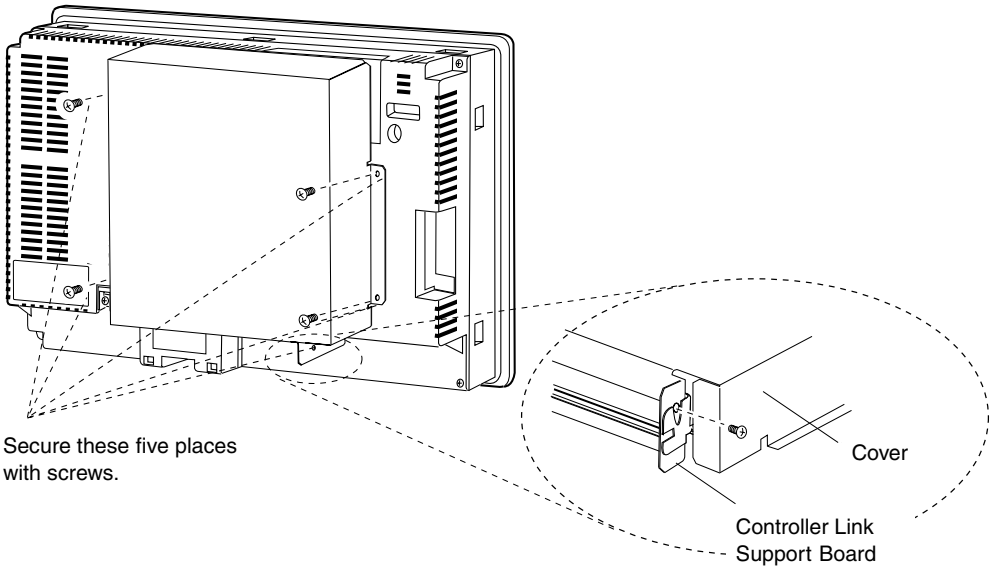
(3)



4. Mount the cover to the PT.

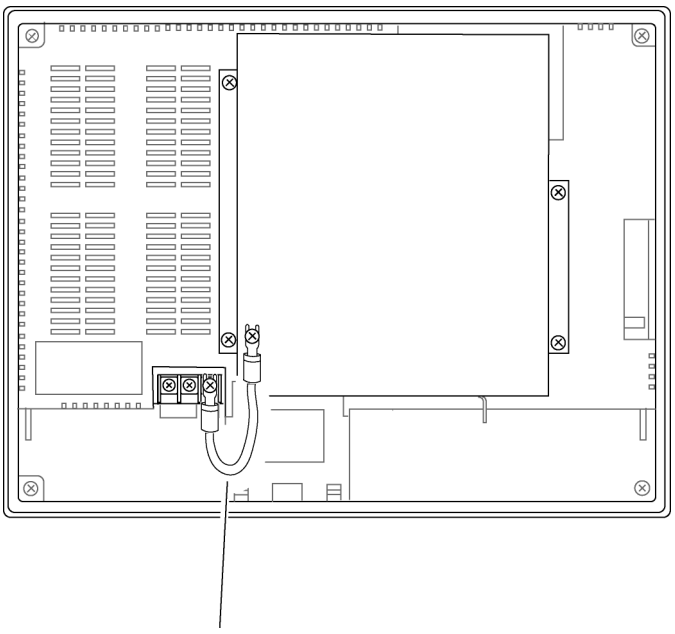


Secure the five places shown below with screws.



• Connecting the Cable

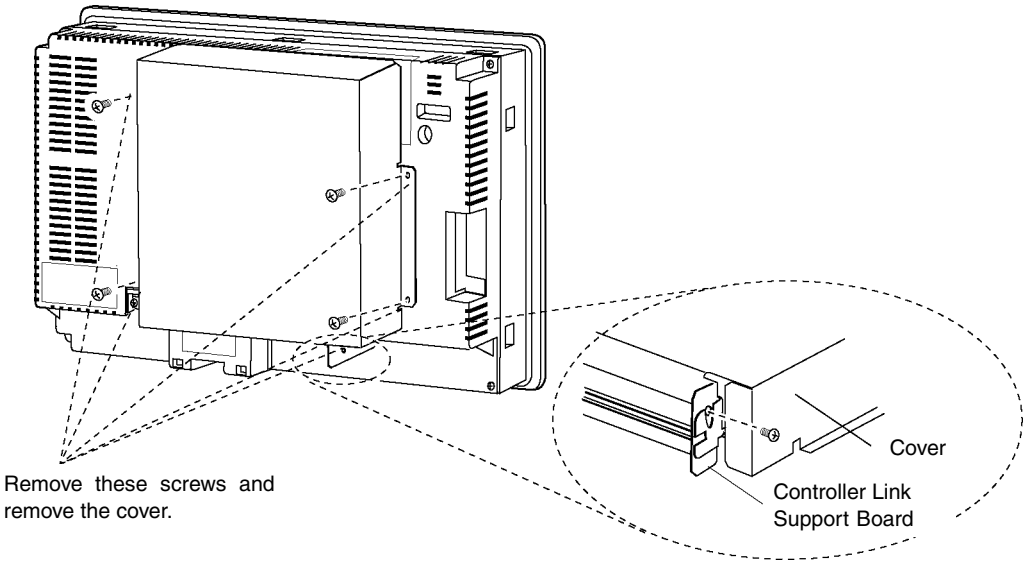
Connect the functional ground terminal of the PT and the cover with the cable to prevent malfunction due to noise.



Connect the functional ground terminal and the cover with the cable.

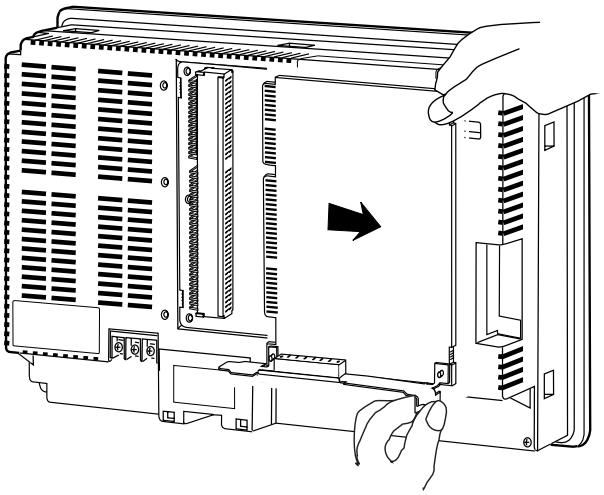
• Removing Controller Link Interface Unit

1. Remove the cover.



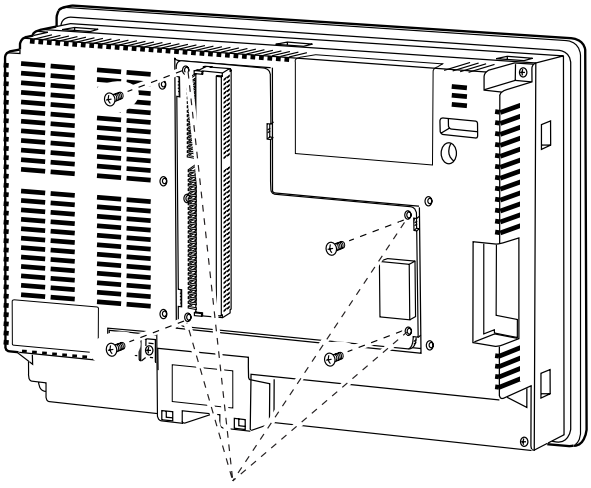
Remove these screws and remove the cover.

2. Disconnect the Controller Link Support Board from the connector conversion board. Hold both ends of the Controller Link Support Board and pull out straight.



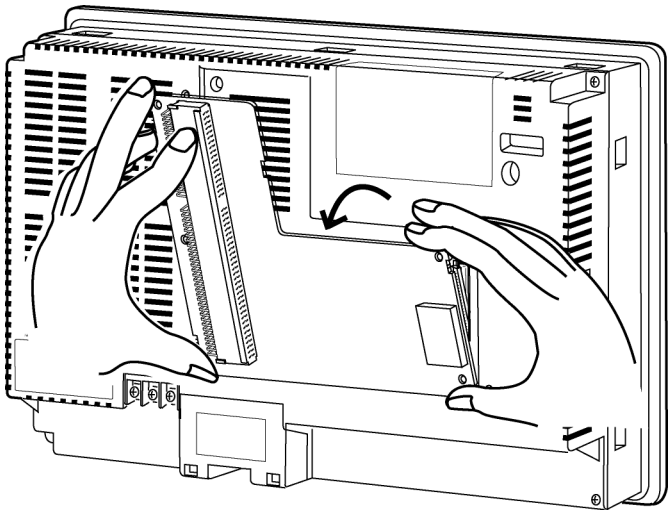
Hold both ends of the Controller Link Support Board and pull out straight.

3. Remove the screws from the Connector Conversion Board.

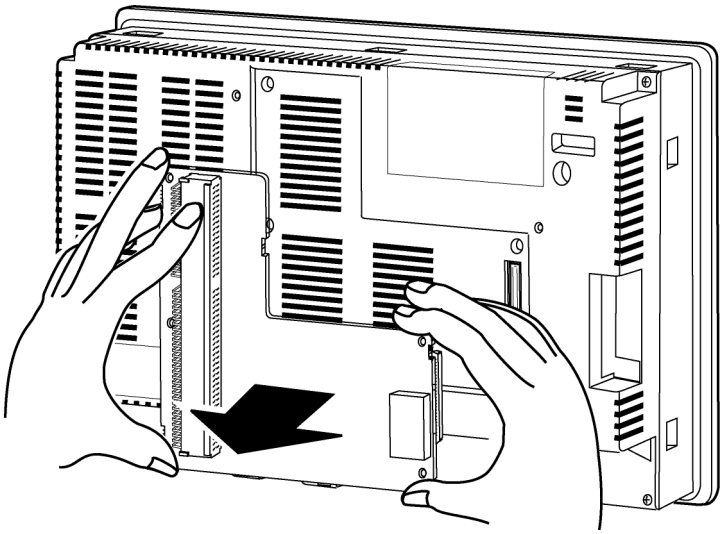


Remove the four screws.

4. Disconnect the Connector Conversion Board from the PT. To do this, follow the steps given below.



Hold the four corners of the Board and detach upper side first.



Then, pull out the Board completely.

3-8-4 Wiring

This section describes the method for wiring the network communications cable to the Controller Link Support Board.

●Wiring the Communications Cable

Wire the communications cable to connect identical signals.

Note
- Use the cable specified for the communications cable.
- Keep communications cables separated from power lines or high-tension lines to prevent influences from electronic noise.
- Ground the shield of the communications cable at one end of the network. Do not ground the shield at both ends.
- Do not connect the shield cable of the communications cable to a ground that is also being used for power-system devices, such as inverters.
- Do not run wiring outdoors. If outdoor wiring is necessary, take protective measures against lightening, such as underground wiring or wiring inside pipes.
- Always turn OFF the power to PT before connecting the communications cable or installing/removing the connector.
- Use the connector attached to the Controller Link Support Board.

Connecting the Communications Cable

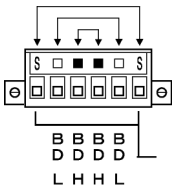
Connect the communications cable to the Controller Link Support Board after first connecting it to the cable connector provided.

Use one of the twisted-pair cables listed below as the communications cable.

Model	Manufacturer	Remarks
Li2Y-FCY2x0.56qmm	KROMBERG & SHUBERT, Department KOMTEC	German company
1x2xAWG-20PE+Tr. CUSN+PVC	DRAKA CABLES INDUSTRIAL	Spanish company
#9207	BELDEN	American company
ESVC0.5x2C	Bando Densen Co.	Japanese company

Note
- Use the cables listed above.
- Normal communications may not be possible if a communications cable other than those listed above is used.

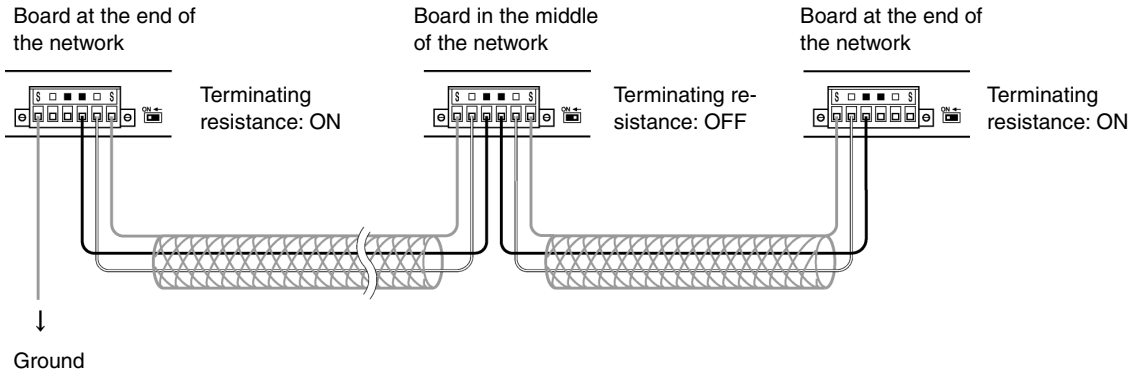
Reference
- Terminals for the same signal on the Controller Link Support Board's connector are connected internally.



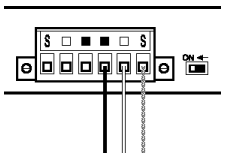
- The thickness of the ground wire connected to the Controller Link Support Board's connector must be less than 2.5 mm^2.
- Connect to the network using the special connector provided with the Controller Link Interface Unit.

Note
- The minimum length of the communications cable between nodes is 1 m. Prepare the communications cables at a length of 1 m or longer.
- Use the multidrop method for connecting nodes. Normal communications will not be possible with T branches.

Ground all of the shield lines (including the shield line for the node at only one end of the network) in the way shown below.



Reference
- Terminals of the same type are connected internally. They can thus be connected to either the right or left half of the end Boards.

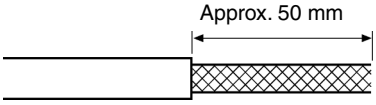


● Connecting Cables to Communications Connectors

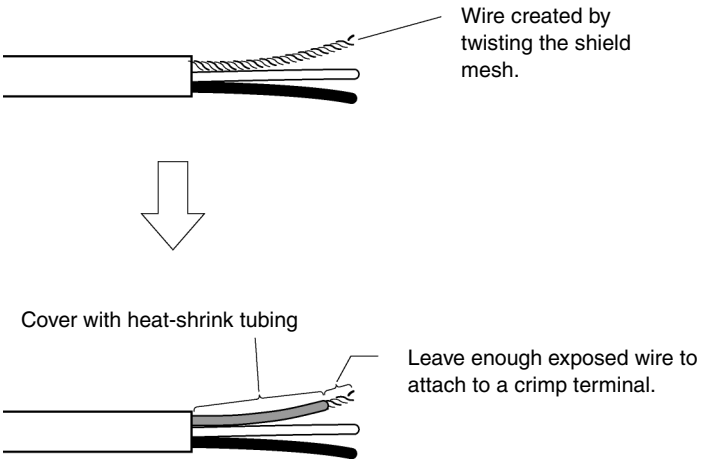
When connecting a communications cable to a Controller Link Support Board, connect the cable to the attached connector first and then attach to the connector to the Board.

Connect the communications cable to the connector using the following procedure.

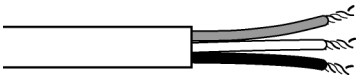
1. Taking care not to damage the mesh of the shield, strip about 50 mm off the end of the cable. Do not strip the cable too far because it may cause a short-circuit.



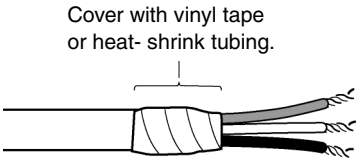
2. At the end connected to the node, twist the mesh of the shield into a single wire. Leave sufficient length at the tip of the twisted shield to be connected to a crimp terminal and cover the remaining section with heat-shrink tubing. Cut all the shield mesh off at the end not connected to the node.



3. Strip the ends of the signal wires far enough to attach to the crimp terminals. Twist the wire strands together.



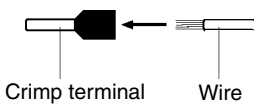
4. Cover the end of the cable at the point it was stripped to in step 1 with vinyl tape or heat-shrink tubing.



5. Attach crimp terminals to the shield wire and signal wires. Cover the connections with vinyl tape or heat-shrink tubing.

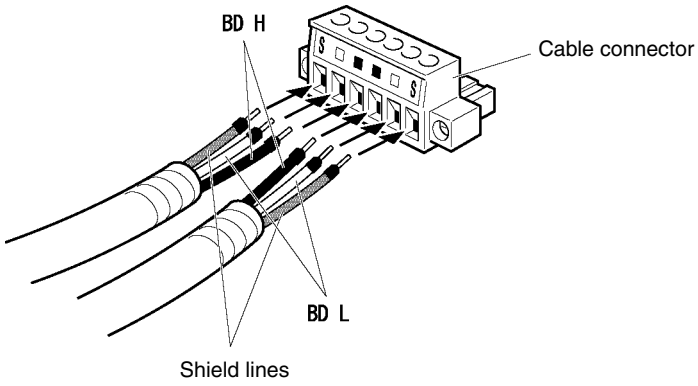
Reference

- We recommend the Phoenix AI-series crimp terminals shown in the following diagram. Phoenix's ZA3 crimping tool can be used to attach these terminals.



Insert the wire and crimp the terminal to the wire.

6. Carefully insert the signal and shield lines into the respective holes of the connector (identified with the markings). Ensure that the connector is oriented correctly. The following example is for connection to a Board in the middle of the network.



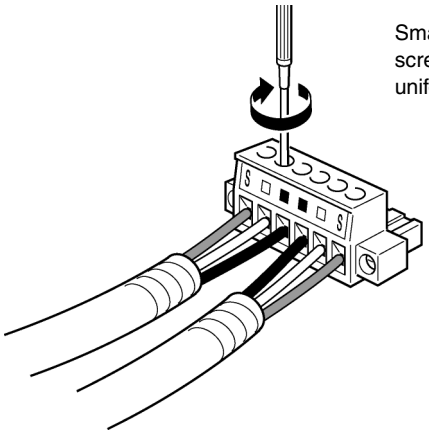
Note
- Loosen the screws in the connector enough to allow the terminal to pass before inserting the signal line. If the screw is not loosened, the signal line will go completely into the connector and you will not be able to secure the line.
- Attach crimp terminals to the wires. Never connect bare power supply wires directly to the connector.

Reference
- Marks are provided on the connector for the signal lines. Connect the signal lines according to the marks.

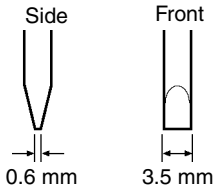
Marking	Signal name	Line color
■	BD H (communications data high)	Black
□	BD L (communication data low)	White
S	SHLD (shield)	–

- Marks indicate signals as listed above.
- The lines can be connected to either the right or left half of the connector at the node on either end of the network.
- If grounding by node, the connection method for the shield is different.
  Refer to *Wiring Communications Cable* and *Connecting the Shield Line to the Connector* under *3-8-4 Wiring,* for details on connecting the shield to the connector.

7. Firmly secure each signal line with the signal line screws in the connector. An ordinary flat-blade screwdriver with a tip that tapers at the end is not suitable because it cannot be inserted far enough. Use a small flat-blade screwdriver with a uniform width. The applicable tightening torque is 0.2 N·m.



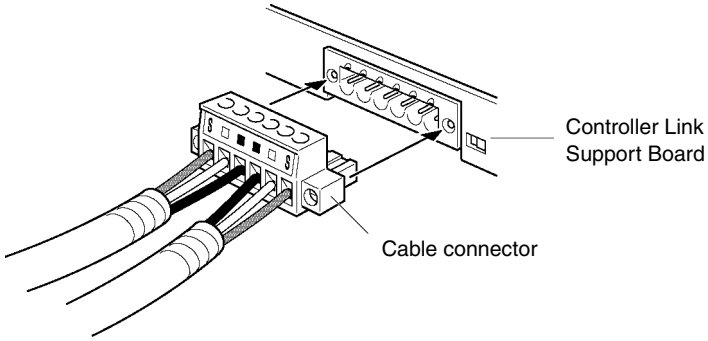
Reference The following screwdriver is available from OMRON.
Model XW4Z-00C



● Connecting the Connector to the Board

Connect the connector on the communications cable to the connector on the Board using the following procedure.

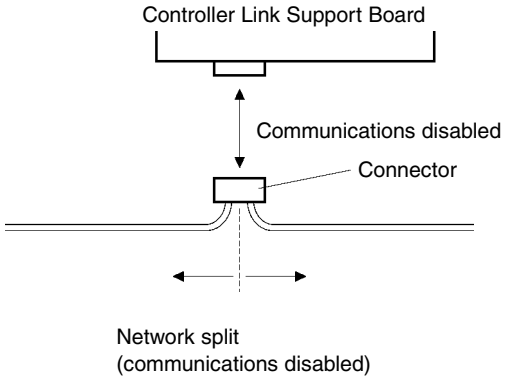
1. Insert the connector on the communications cable into the connector on the Board as shown below.



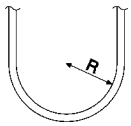
2. Secure the connector to the Board by tightening the screws on the connector. The applicable tightening torque is 0.2 N·m.

Note

- If the connector becomes disconnected, not only will the Board be unable to perform communications with other nodes in the network, the network will be split into two at the point of disconnection. Take the utmost care to ensure that the connector does not become disconnected during communications.



- Do not pull on the communications cable.
- When bending the communications cable, allow 60 mm or more for the bending radius (R).



- Do not place heavy objects on the communications cable.
- Supply power only after checking the wiring thoroughly.
- Always tighten the screws of connector after connecting the communications cable.

Section 4

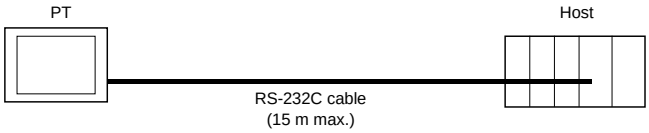
Connecting the Host to Serial Port

This section describes the methods for connecting the host to the serial port of the PT.

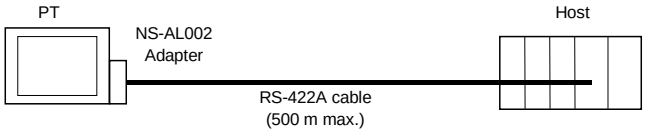
4-1 1:1 Host Connection

This section describes the methods for connecting the host to serial port A or B of the PT using RS-232C or RS-422A communications. The connection methods are as follows:

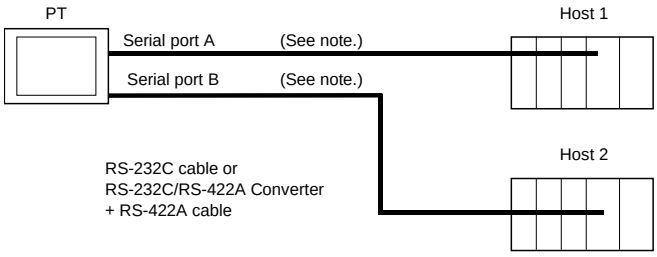
- Direct Connection using RS-232C (Refer to page *3* of this section.)
  This is the easiest connection method. OMRON cables with connectors can be used, depending on the host being connected.



- A 1:1 Connection using RS-422A and an NS-AL002 RS-232C/RS-422A Converter (Refer to page *3* of this section.)
  This connection method allows an extended communications distance of up to 500 m.



The NS-series PTs have two serial ports that can be used simultaneously. Therefore, two hosts can be connected at the same time. Any combination of devices can be connected to the PT.



Note: Each port allows 1:N connection. Both serial ports A and B cannot be connected at the same time, however, in a 1:N connection. Further, the NS-AL002 Converter can be connected to one serial port only.

Note
- Always tighten the connector screws after connecting communications cables.
- The connector's pull load is 30 N.
  Do not subject the connectors to a greater load than that specified.

4-1-1 Host Types and Settings

The types of hosts that can be connected to NS-series PTs and the host settings are as follows:

1:1 NT Link Connection

- **Supported RS-232C Host Units**

Units that have a built-in 1:1 NT Link function vary according to the type and series of OMRON PLC used. CQM1H PLCs can be connected in a 1:1 NT Link by adding a Serial Communications Board. C200HX/HG/HE(-Z) PLCs also have CPU Units that can be connected in a 1:1 NT Link by adding a Communications Board.

When connecting the PT to the host, check the series and type of the PLC and the model of the Board mounted to the PLC.

The following Units can be connected to the PT as hosts using RS-232C or RS-422A communications in a 1:1 NT Link.

PLC series	CPU Units with built-in 1:1 NT Link function	CPU Units that can be connected using Communications Boards
C Series	C200HS-CPU21 C200HS-CPU23 C200HS-CPU31 C200HS-CPU33	
	C200HE-CPU42(-Z)	C200HE-CPU32(-Z) (See note 1.) C200HE-CPU42(-Z) (See note 1.)
	C200HG-CPU43(-Z) C200HG-CPU63(-Z)	C200HG-CPU33(-Z) (See note 1.) C200HG-CPU43(-Z) (See note 1.) C200HG-CPU53(-Z) (See note 1.) C200HG-CPU63(-Z) (See note 1.)
	C200HX-CPU44(-Z) C200HX-CPU64(-Z) C200HX-CPU65-Z C200HX-CPU85-Z	C200HX-CPU34(-Z) (See note 1.) C200HX-CPU44(-Z) (See note 1.) C200HX-CPU54(-Z) (See note 1.) C200HX-CPU64(-Z) (See note 1.) C200HX-CPU65-Z (See note 1.) C200HX-CPU85-Z (See note 1.)
	CQM1-CPU41-V1 CQM1-CPU42-V1 CQM1-CPU43-V1 CQM1-CPU44-V1 CQM1-CPU45-EV1	
	CPM1A-10CD□-□ (-V1) CPM1A-20CD□-□ (-V1) CPM1A-30CD□-□ (-V1) CPM1A-40CD□-□ (-V1)	
	CPM2A-30CD□□□-□ CPM2A-40CD□□-□ CPM2A-60CD□□-□	
	CPM2C-10□□□□□□-□ (See note 4.) CPM2C-20□□□□□□-□ (See note 4.)	
	CQM1H-CPU21 CQM1H-CPU51 CQM1H-CPU61	CQM1H-CPU51 (See note 2.) CQM1H-CPU61 (See note 2.)
CV Series (See note 3.)	CV500-CPU01-V1	
	CV1000-CPU01-V1	
	CV2000-CPU01-V1	
CVM1 Series (See note 3.)	CVM1-CPU01-V2 CVM1-CPU11-V2 CVM1-CPU21-V2	

Note 1. A C200HW-COM02/COM04/COM05/COM06(-V1) Communications Board is required.
2. A CQM1H-SCB41 Serial Communications Board is required.
3. CVM1/CV-series CPU Units without a -V□ suffix cannot be connected.
4. Connect using CS1W-CN118 Converter Cable and XW2Z-200T-2 Cable with Connectors.

Reference CS-series CPU Units cannot be connected in a 1:1 NT Link. Use a 1:1 connection through a 1:N NT Link (normal or high speed). For details, refer to *1:N NT Links* or *High-speed 1:N NT Links* in *Section 4-2 1:1 Host Connection*.

• Supported RS-422A Host Units

Units for RS-422A communications with a built-in 1:1 NT Link function vary according to the type and series of OMRON PLC used.

- C200HX/HG/HE(-Z) PLCs can be connected in a 1:1 NT Link for RS-422A by adding a Communications Board.
- CQM1H PLCs can be connected in a 1:1 NT Link for RS-422A by adding a Serial Communications Board.

Check the series and type of the PLC and the model of the Board that is mounted to the PLC when connecting the PT to the host.

The following table lists the Units that can be connected to NS-series PTs as hosts and support a 1:1 NT Link using RS-422A.

PLC series	CPU Units that support 1:1 NT Link using RS-422A
C Series	C200HE-CPU32(-Z) (See note 1.) C200HE-CPU42(-Z) (See note 1.)
	C200HG-CPU33(-Z) (See note 1.) C200HG-CPU43(-Z) (See note 1.) C200HG-CPU53(-Z) (See note 1.) C200HG-CPU63(-Z) (See note 1.)
	C200HX-CPU34(-Z) (See note 1.) C200HX-CPU44(-Z) (See note 1.) C200HX-CPU54(-Z) (See note 1.) C200HX-CPU64(-Z) (See note 1.) C200HX-CPU65-Z (See note 1.) C200HX-CPU85-Z (See note 1.)
	CQM1H-CPU51/61 (See note 2.)
CV Series (See note 3.)	CV500-CPU01-V1
	CV1000-CPU01-V1
	CV2000-CPU01-V1
CVM1 Series (See note 3.)	CVM1-CPU01-V2 CVM1-CPU11-V2 CVM1-CPU21-V2

Note 1. A C200HW-COM03-V1 or C200HW-COM06-V1 Communications Board is required.
2. A CQM1H-SCB41 Serial Communications Board is required.
3. CVM1/CV-series CPU Units without a -V□ suffix cannot be connected.

Reference The 1:1 NT Link is not supported for RS-485 (two-wire) communications. Always use RS-422A (four-wire).

• Host Settings

The methods for setting each Unit are as follows:

Connecting C Series, C200HS, C200HX/HG/HE(-Z), CQM1, CPM2A, CPM2C, or CQM1H PLCs

PLC Setup Area

Write the settings directly from the Programming Device (CX-Programmer, etc.) to the PLC Setup Area (in DM Area) according to the host type and port used.

Using RS-232C

Host type	Address	Write value	Settings
Built-in RS-232C port of C200HS, C200HX/HG/HE(-Z), CPM1A, CPM2A, CPM2C, CQM1, or CQM1H	DM 6645	4000	Uses 1:1 NT Link
Port A of C200HX/HG/HE(-Z) (See note 1.) Port 1 of CQM1H (See note 2.)	DM 6555		
Port B of C200HX/HG/HE(-Z) (See note 1.)	DM 6550		

Note 1. RS-232C port of Communications Board.
2. RS-232C port of Serial Communications Board.

Using RS-422A

Host type	Address	Write value	Settings
Port A of C200HX/HG/HE(-Z) (See note 1.)	DM 6555	4000	Uses 1:1 NT Link
Port 2 of CQM1H (See note 2.)	DM 6550	4000	

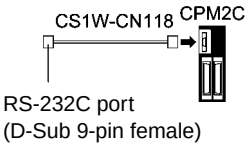
Note 1. RS-422A port of Communications Board.
2. RS-422A port of Serial Communications Board.

Refer to the manuals of the PLC being used for details on using the PLC Setup Area.

Connecting to CPM2C PLCs

The CPM2C has a single connector that is the same shape as a CS-series peripheral port. Internally, the connector has signal lines that are for use with the CPU's built-in RS-232C port and the peripheral port. Therefore, when using the CPM2C, use the settings for the CPU's built-in RS-232C port or for the peripheral port according to the converter cable and port used, as follows: Refer to the *CPM2C Operation Manual* (W356) for details.

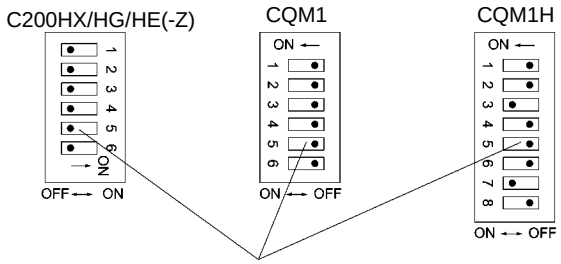
Port for connecting PT	PLC Setup
CS1W-CN118 port (D-Sub 9-pin)	Set for built-in RS-232C.



Setting the Front Panel DIP Switch

Using RS-232C

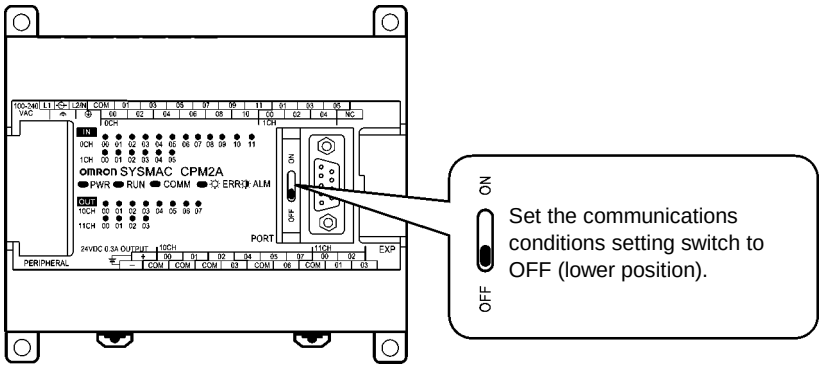
When using C200HX/HG/HE(-Z), CQM1, or CQM1H PLCs, set the DIP switch on the front panel to enable the PLC Setup Area (Data Memory) settings, as follows:



RS-232C Communications Conditions Setting
Set pin 5 of the DIP switch to OFF to enable the PLC Setup Area settings.

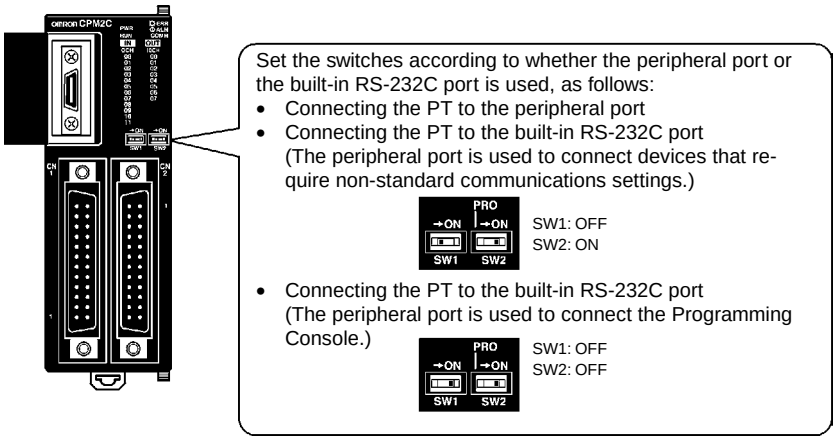
Setting the CPM2A Front Panel DIP Switch

When using a CPM2A, set the DIP switch on the front panel to enable the PLC Setup Area (Data Memory) settings, as follows:



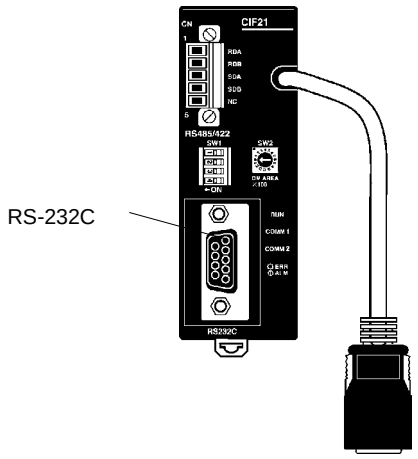
Setting the CPM2C Front Panel DIP Switches

When using a CPM2C, set the switches on the front panel to enable the PLC Setup Area (Data Memory) settings, as follows:



Connecting to Simplified Communications Units

When using a **CPM2C1**-CIF21 Simplified Communications Unit, connect it to the RS-232C port.



Setting the Communications **Board** Switches

Using RS-422A

Set the **switches** of the C200HX/HG/HE(-Z) Communications Board as follows:

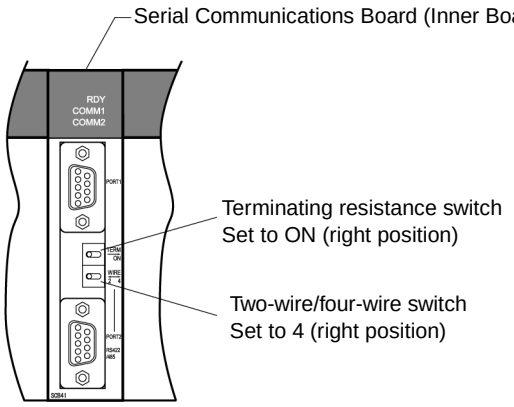
Switch 1: 4 (Four-wire method = RS-422A)

Switch 2: ON (terminator ON = terminating resistance used)

Set the **switches** of the CQM1H Serial Communications Board as follows:

Two-wire/four-wire switch (WIRE): 4 (Four-wire method = RS-422A)

Terminating resistance switch (TERM): ON (terminator ON = terminating resistance used)



• Connecting to CVM1/CV Series (-V□) PLCs

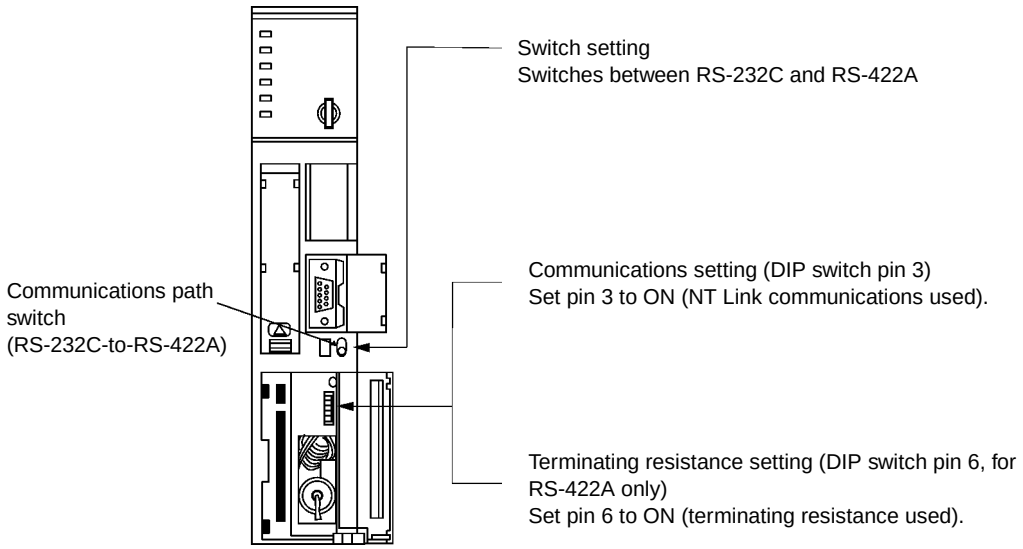
PLC Setup

Using RS-232C/RS-422A

When using CVM1/CV-series PLCs, always set the Execute Process (Execute Control 2) in the PLC Setup to **synchronous** execution.

Setting the Front Panel DIP Switch

Set the DIP switch on the front panel, as shown in the following diagram.



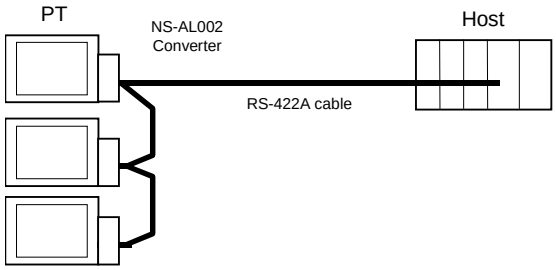
4-2 1:N Host Connection

1:N NT Links

This **section** describes the methods used to connect multiple PTs to a single host in a 1:N connection and provides information on the relationship between the connection methods and the communications methods.

- The Host and PTs are connected in a 1:N configuration using RS-422A with an RS-232C/RS-422A Converter. (Refer to page *4-9*.)

This **connection** method can be used for 1:N NT Link connections (normal, high-speed).



Both serial ports A and B cannot be used, however, to connect to PLCs in a 1:N configuration at the same time.

- **Supported Host Units**

OMRON PLCs that can be connected in 1:N NT Links are limited to CS/CJ-series CS1G/H, CS1G/H-H, CJ1G/H-H, and CJ1G, C-series C200HX/HG/HE (-Z), and CQM1H (when using CQM1H-SCB41 only). The CS-series can also be connected in 1:N NT Links by using a CS1W-SCU21 Serial Communications Unit. The CJ-series can also be connected in 1:N NT Links by using a CJ1W-SCU41 Serial Communications Unit.

Check the series and type of the PLC and the model of the Board or Unit that is mounted to the PLC when connecting the PTs to the host.

Host Units that Can be Connected between RS-232C Ports

PLC series	CPU Units with built-in 1:N NT Link function	CPU Units that can be connected with Communications Boards or Units
CS Series	CS1G-CPU42/43/44/45-E(V1) CS1H-CPU63/64/65/66/67-E(V1) CS1G-CPU42H/43H/44H/45H CS1H-CPU63H/64H/65H/66H/67H	CS1G-CPU42/43/44/45-E(V1) (See note 1.) CS1H-CPU63/64/65/66/67-E(V1) (See note 1.) CS1G-CPU42H/43H/44H/45H (See note 1.) CS1H-CPU63H/64H/65H/66H/67H (See note 1.)
CJ Series	CJ1G-CPU44 CJ1G-CPU45	CJ1G-CPU44 (See note 2.) CJ1G-CPU45 (See note 2.) CJ1G-CPU42H/43H/44H/45H (See note 2.) CJ1H-CPU65H/66H (See note 2.)
C Series	C200HE-CPU42(-Z)	C200HE-CPU32(-Z) (See note 3.) C200HE-CPU42(-Z) (See note 3.)
	C200HG-CPU43(-Z) C200HG-CPU63(-Z)	C200HG-CPU33(-Z) (See note 3.) C200HG-CPU43(-Z) (See note 3.) C200HG-CPU53(-Z) (See note 3.) C200HG-CPU63(-Z) (See note 3.)
	C200HX-CPU44(-Z) C200HX-CPU64(-Z) C200HX-CPU65-Z C200HX-CPU85-Z	C200HX-CPU34(-Z) (See note 3.) C200HX-CPU44(-Z) (See note 3.) C200HX-CPU54(-Z) (See note 3.) C200HX-CPU64(-Z) (See note 3.) C200HX-CPU65-Z (See note 3.) C200HX-CPU85-Z (See note 3.)
		CQM1H-CPU51 (See note 4.) CQM1H-CPU61 (See note 4.)

Note 1. A CS1W-SCB21/41 Serial Communications Board or CS1W-SCU21 Serial Communications Unit is required.
2. A CJ1W-SCU41 Serial Communications Unit is required.
3. A C200HW-COM02/COM04/COM05/COM06(-V1) Communications Board is required.
4. A CQM1H-SCB41 Serial Communications Board is required.

Reference RS-485 (two-wire) communications are not supported by the NS Series. Always use RS-422A (four-wire).

Host Units that Can be Connected to PT's RS-232C and RS-422A Ports

PLC series	CPU Units with built-in 1:N NT Link function	CPU Units that can be connected with Communications Boards or Units
CS Series		CS1G-CPU42/43/44/45-E(V1) (See note 1.) CS1G-CPU42H/43H/44H/45H (See note 1.) CS1H-CPU63/64/65/66/67(-V1) (See note 1.) CS1H-CPU63H/64H/65H/66H/67H (See note 1.)
CJ Series		CJ1G-CPU44 (See note 2.) CJ1G-CPU45 (See note 2.) CJ1G-CPU42H/43H/44H/45H (See note 2.) CJ1H-CPU65H/66H (See note 2.)
C Series		C200HE-CPU32(-Z) (See note 3.) C200HE-CPU42(-Z) (See note 3.)
		C200HG-CPU33(-Z) (See note 3.) C200HG-CPU43(-Z) (See note 3.) C200HG-CPU53(-Z) (See note 3.) C200HG-CPU63(-Z) (See note 3.)
		C200HX-CPU34(-Z) (See note 3.) C200HX-CPU44(-Z) (See note 3.) C200HX-CPU54(-Z) (See note 3.) C200HX-CPU64(-Z) (See note 3.) C200HX-CPU65-Z (See note 3.) C200HX-CPU85-Z (See note 3.)
		CQM1H-CPU51/61 (See note 4.)

Note 1. A CS1W-SCB41 Serial Communications Board is required.
2. A CJ1W-SCU41 Serial Communications Unit is required.
3. A C200HW-COM03-V1 or C200HW-COM06-V1 Communications Board is required.
4. A CQM1H-SCB41 Serial Communications Board is required.

Reference CS-series PLCs with -V1 suffix support high-speed 1:N NT Links as well as normal 1:N NT Links. CS-series PLCs without the -V1 suffix can also be connected to high-speed 1:N NT Links if the latest Serial Communications Board/Unit is used. Refer to *High-speed 1:N NT Link* for details. (page 4-20)

Host Settings

The methods for setting each Unit are as follows:

Connecting C-series C200HX/HG/HE(-Z), and CQM1H PLCs

PLC Setup Area

Write the settings directly from the Programming Device or Support Software (CX-Programmer, etc.) to the PLC Setup Area (Data Memory) according to the host type and port used.

• **Using RS-232C**

Host type	Address	Write value	Settings
Built-in RS-232C port of C200HX/HG/HE(-Z)	DM 6645	5□00	Uses 1:N NT Link □: Largest unit number (1 to 7) of connected PTs. (See note 3.)
Port A of C200HX/HG/HE(-Z) (See note 1.) Port 1 of CQM1H (See note 2.)	DM 6555		
Port B of C200HX/HG/HE(-Z) (See note 1.)	DM 6550		

Note 1. RS-232C port of Communications Board.
2. RS-232C port of Serial Communications Board.
3. The PT unit numbers for the C200HE (-Z) are 1 to 3.

• **Using RS-422A**

Host type	Address	Write value	Settings
Port A of C200HX/HG/HE(-Z) (See note 1.)	DM 6555	5□00	Uses 1:N NT Link □: Largest unit number (1 to 7) of the connected PTs. (See note 3.)
Port 2 of CQM1H (See note 2.)	DM 6550	5□00	

Note 1. RS-422A port of Communications Board.
2. RS-422A port of Serial Communications Board.
3. The PT unit numbers for the C200HE (-Z) are 1 to 3.

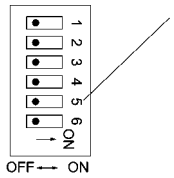
Refer to the manuals of the PLC being used for details on using the PLC Setup Area.

Reference
- There is no Communications Board for use with C200HX/HG/HE (-Z) where port B is an RS-422A port.
- There is no Communications Board for use with CQM1H where Port 1 is an RS-422A port.

Setting the Front Panel DIP Switch

• **Using RS-232C**

When using C200HX/HG/HE(-Z), set the DIP switch on the front panel to enable the PLC Setup Area (Data Memory) settings, as follows:



Sets the RS-232C port communications conditions. Set DIP switch pin 5 to OFF to enable the PLC Setup settings.

Setting the Communications Board Switches

• Using RS-422A

Set the switches of the C200HX/HG/HE(-Z) Communications Board, as follows:

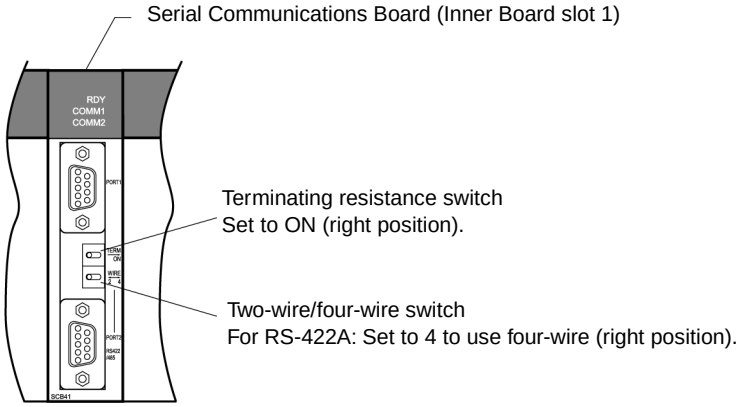
Switch 1: 4 (Four-wire method = RS-422A)

Switch 2: ON (terminator ON = terminating resistance used)

Set the switches of the CQM1H Serial Communications Board as follows:

Two-wire/four-wire switch (WIRE): 4 (Four-wire method = RS-422A)

Terminating resistance switch (TERM): ON (terminator ON = terminating resistance used)



Connecting to CS-series CPU Units

CS-series CPU Units:

CS1G/H-CPU□□-E(V1) and CS1G/H-CPU□□H

PLC Setup Area

• Using RS-232C

When connecting the PT to a CS-series CPU Unit, set the communications conditions in the PLC Setup according to the communications port used, as follows:

Using Built-in RS-232C Port of CS1G/H or CS1G/H-H

Address	Write value	Settings
160	8200	1:N NT Link Mode
161	0000 to 0009 (See note 1.)	Baud rate (normal)
166	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note 2.)

Note 1. Set the baud rate to a numeric value between 0000 to 0009 Hex. (The setting is the same for any value between 0000 and 0009 Hex.)

2. When using a 1:N connection, set the value for □ to 1 or higher.

Using Peripheral Port of CS1G/H or CS1G/H-H

Address	Write value	Settings
144	8200	1:N NT Link Mode
145	0000 to 0009 (See note 1.)	Baud rate (normal)
150	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note 2.)

Note 1. Set the baud rate to a numeric value between 0000 to 0009 Hex. (The setting is the same for any value between 0000 and 0009 Hex.)
2. When using a 1:N connection, set the value for □ to 1 or higher.

For example, to connect PTs with unit numbers 0, and 2 to 5 to the built-in RS-232C port in 1:N NT Links, set address 160 to 8200 Hex, and address 166 to 0005 Hex.

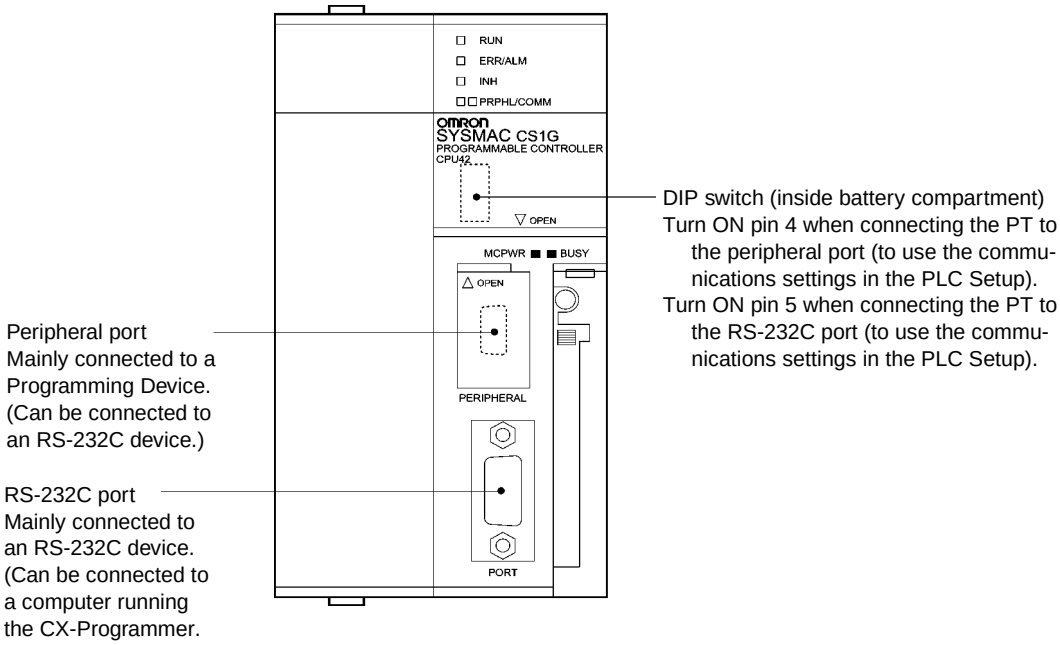
Set whether the PLC Setup is set directly from the Programming Device (Programming Console) or created using the Support Software (CX-Programmer) and transferred to the CPU Unit.

Refer to the *SYSMAC CS/CJ Series Operation Manual* (W341) for information on PLC Setup.

Setting the Front Panel Switches

- **Using RS-232C**

Set DIP switch pin 4 or 5 of the CPU Unit according to the port to which the PT is connected, as follows:



CJ-series CPU Units:

CJ1G-CPU□□

PLC Setup Area

- **Using RS-232C**

When connecting the PT to a CJ-series CPU Unit, set the communications conditions in the PLC Setup according to the communications port used, as follows:

Using the CJ1G Built-in RS-232C Port

Address	Write value	Settings
160	8200	1:N NT Link Mode
161	0000 to 0009 (See note 1.)	Baud rate (normal)
166	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note 2.)

Note 1. Set the baud rate to a numeric value between 0000 to 0009 Hex. (The setting is the same for any value between 0000 and 0009 Hex.)
2. When using a 1:N connection, set the value for □ to 1 or higher.

Using the CJ1G Peripheral Port

Address	Write value	Settings
144	8200	1:N NT Link Mode
145	0000 to 0009 (See note 1.)	Baud rate (normal)
150	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note 2.)

Note 1. Set the baud rate to a numeric value between 0000 to 0009 Hex. (The setting is the same for any value between 0000 and 0009 Hex.)
2. When using a 1:N connection, set the value for □ to 1 or higher.

For example, to connect PTs with unit numbers 0, and 2 to 5 to the built-in RS-232C port in 1:N NT Links, set address 160 to 8200 Hex, and address 166 to 0005 Hex.

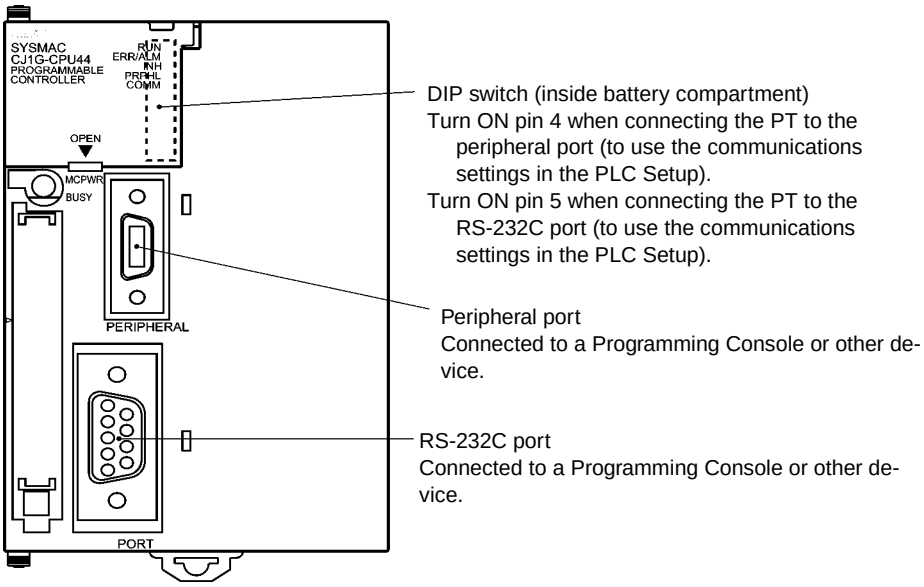
Set whether the PLC Setup is set directly from the Programming Device (Programming Console) or created by the Support Software (CX-Programmer) and transferred to the CPU Unit.

Refer to the SYSMAC *CJ Series Operation Manual* (W393) for information on the PLC Setup.

Setting the Front Panel Switches

- **Using RS-232C**

Set DIP switch pin 4 or 5 of the CPU Unit according to the port to which the PT is connected, as follows:



Connecting to CS-series Serial Communications Boards

Serial Communications Boards with RS-232C and RS-422A Ports for Use with CS-series CPU Units:

CS1W-SCB21 (Both ports 1 and 2 are RS-232C ports.)
CS1W-SCB41 (Port 1 is an RS-232C port and Port 2 is an RS-422A port.)

Setting DM Area Allocations in CPU Unit

Write the settings directly from the Programming Device or Support Software (Programming Console or CX-Programmer) to the DM Area (Parameter Area) in the CPU Unit. After writing the settings, enable the settings by turning ON the power again, restarting the Unit, restarting the communications port, or executing the CHANGE SERIAL PORT SETUP (STUP) instruction.

The following table shows the allocated DM Area words and settings.

The allocations and settings are the same for RS-232C and RS-422A (CS1W-SCB41 Port 2).

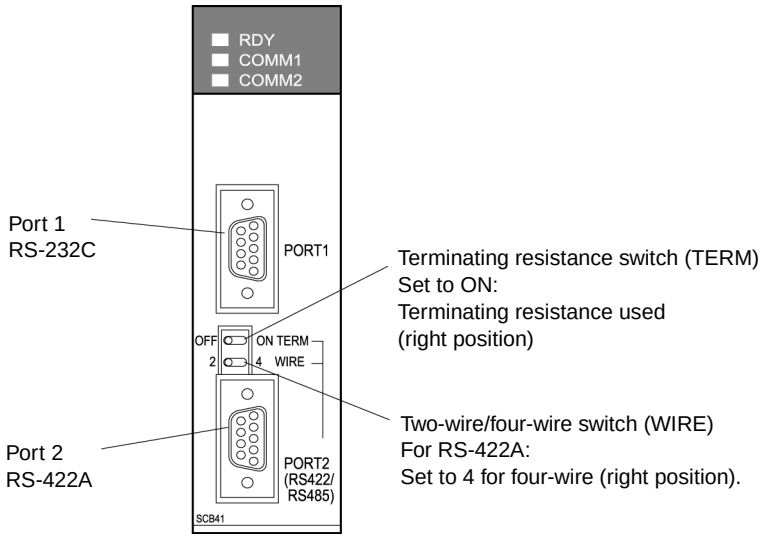
Allocated DM Area words		Write value	Settings
Port 1	Port 2		
DM32000	DM32010	8200	1:N NT Link Mode
DM32001	DM32011	0000 to 0009 (See note 1.)	Baud rate (normal)
DM32006	DM32016	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note 2.)

Note 1. Set the baud rate to a numeric value between 0000 to 0009 Hex. (The setting is the same for any value between 0000 and 0009 Hex.)
2. When using a 1:N connection, set the value for □ to 1 or higher.

For example, to connect PTs with unit numbers 3 to 6 to Port 1 in 1:N NT Links, set DM32000 to 8200 Hex, DM32001 to 0000 Hex, and DM32006 to 0006 Hex.

Setting the Front Panel Switches

- **Using RS-422A**



Connecting to CS-series Serial Communications Units

CS-series Rack-mounted Type:

CS1W-SCU21 (Both ports 1 and 2 are RS-232C ports.)

CPU Unit DM Area Settings

- **Using RS-232C**

Write the settings directly from the Programming Device or Support Software (Programming Console or CX-Programmer) to the DM Area (Parameter Area) in the CPU Unit. After writing the settings, enable the settings by turning ON the power again, restarting the Unit, restarting the communications port, or executing the CHANGE SERIAL PORT SETUP (STUP) instruction.

The following table shows the allocated DM Area words and settings.

m = 30000 + 100 × unit number

Allocated DM Area words		Write value	Settings
Port 1	Port 2		
DM m	DM m + 10	8200	1:N NT Link Mode
DM m + 1	DM m + 11	0000 to 0009 (See note 1.)	Baud rate (normal)
DM m + 6	DM m + 16	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note 2.)

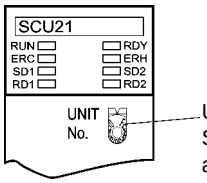
Note 1. Set the baud rate to a numeric value between 0000 to 0009 Hex. (The setting is the same for any value between 0000 and 0009 Hex.)

2. When using a 1:N connection, set the value for □ to 1 or higher.

Setting the Front Panel Switches

- **Using RS-232C**

Set the unit number of the Serial Communications Unit with the rotary switches on the front of the Unit. Use a flat-blade screwdriver to set the numerals and symbols in the switches setting display window, as follows:



Unit number setting
Set a value between 0 and F that is not the same as that of other Units in the system.

CJ-series Units:

CJ1W-SCU41 (Port 1 is an RS-422A port and Port 2 is an RS-232C port.)

CPU Unit DM Area Settings

Write the settings directly from the Programming Device or Support Software (Programming Console or CX-Programmer) to the DM Area (Parameter Area) in the CPU Unit. After writing the settings, enable the settings by turning ON the power again, restarting the Unit, restarting the communications port, or executing the CHANGE SERIAL PORT SETUP (STUP) instruction.

The following table shows the allocated DM Area words and settings.

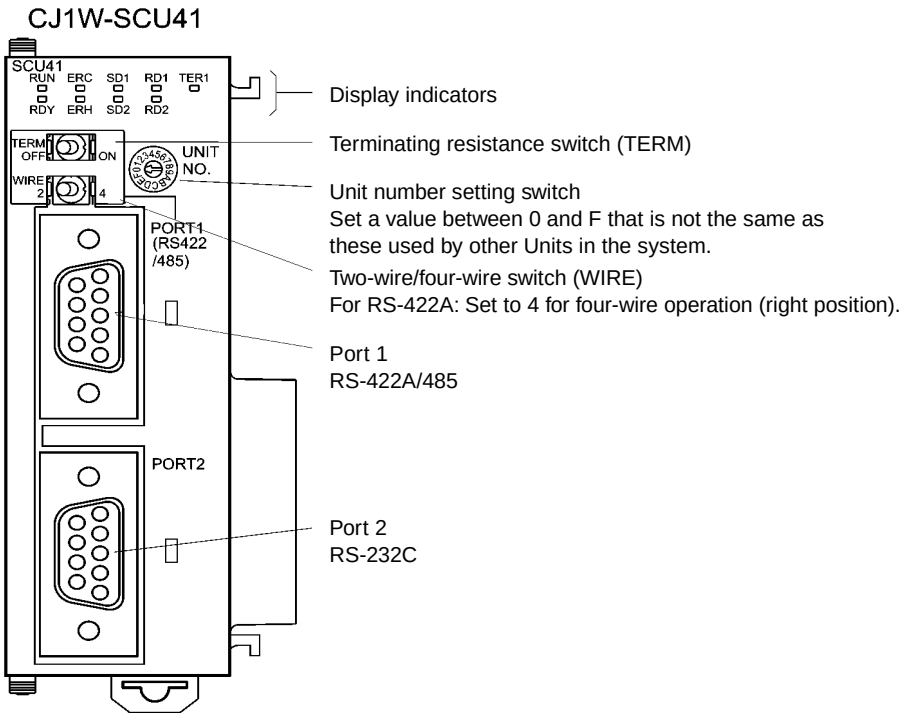
The allocations and settings are the same for RS-232C and RS-422A.

m = 30000 + 100 × unit number

Allocated DM Area words		Write value	Settings
Port 1	Port 2		
DM m	DM m + 10	8200	1:N NT Link Mode
DM m + 1	DM m + 11	0000 to 0009 (See note 1.)	Baud rate (normal)
DM m + 6	DM m + 16	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note 2.)

Note 1. Set the baud rate to a numeric value between 0000 to 0009 Hex. (The setting is the same for any value between 0000 and 0009 Hex.)
2. When using a 1:N connection, set the value for □ to 1 or higher.

Setting the Front Panel Switches



● High-speed 1:N NT Link

- **Supported Host Units**

OMRON PLCs that can be connected to high-speed 1:N NT Links using RS-232C are CS-series CS1G/H and CS1G/H-H with -V1 suffix and CJ-series CJ1G. The CS-series PLCs can also be connected in high-speed 1:N NT Links by using a CS1W-SCU21 Serial Communications Unit. (CS-series PLCs without a -V1 suffix can also be connected in high-speed 1:N NT Links if a Serial Communications Unit is used.) The CJ-series PLCs can also be connected in high-speed 1:N NT Links by using a CJ1W-SCU41 Serial Communications Unit.

OMRON PLCs that can be connected in high-speed 1:N NT Links using RS-422A are CS-series CS1G/H and CS1G/H-H and CJ-series CJ1G. The CS-series PLCs can also be connected in high-speed 1:N NT Links by using a CS1W-SCB41 Serial Communications Board. (CS-series PLCs without -V1 suffix can also be connected in high-speed 1:N NT Links if a Serial Communications Board is used.) The CJ-series PLCs can also be connected in high-speed 1:N NT Links by using a CJ1W-SCU41 Serial Communications Unit.

Check the series and type of the PLC and the model of the Board or Unit that are mounted to the PLC when connecting the PT to the host.

Host Units that Can be Connected to both PTs and RS-232C Ports

PLC series	CPU Units with built-in 1:N NT Link function	CPU Units that can be connected with Communications Boards/Units
CS Series	CS1G-CPU42/43/44/45-EV1 (See note 1.) CS1H-CPU63/64/65/66/67-EV1 (See note 1.) CS1G-CPU42H/43H/44H/45H (See note 1.) CS1H-CPU63H/64H/65H/66H/67H (See note 1.)	CS1G-CPU42/43/44/45-EV1 (See note 2.) CS1H-CPU63/64/65/66/67-EV1 (See note 2.) CS1G-CPU42H/43H/44H/45H (See note 2.) CS1H-CPU63H/64H/65H/66H/67H (See note 2.)
CJ Series	CJ1G-CPU44 CJ1G-CPU45	CJ1G-CPU44 (See note 3.) CJ1G-CPU45 (See note 3.)

Note 1. CS-series CPU Units without the -V suffix cannot be connected.
2. A CS1W-SCB21/41 Serial Communications Board or CS1W-SCU21 Serial Communications Unit is required.
3. A CJ1W-SCU41 Serial Communications Unit is required.

Host Units that Can be Connected to NS-series RS-232C and RS-422A Ports

PLC series	CPU Units with built-in high-speed 1:N NT Link function	CPU Units that can be connected with Communications Boards/Units
CS Series		CS1G-CPU42/43/44/45-EV1 (See note 1.) CS1H-CPU63/64/65/66/67-EV1 (See note 1.) CS1G-CPU42H/43H/44H/45H (See note 1.) CS1H-CPU63H/64H/65H/66H/67H (See note 1.)
CJ Series		CJ1G-CPU44 (See note 2.) CJ1G-CPU45 (See note 2.)

Note 1. A CS1W-SCB41 Serial Communications Board is required.
2. A CJ1W-SCU41 Serial Communications Unit is required.

• Host Settings

The methods for setting each Unit are as follows:

Connecting to CS-series CPU Units

CS-series CPU Units:

CS1G/H-CPU□□-EV1

PLC Setup Area

• Using RS-232C

When connecting the PT to a CS-series CPU Unit, set the communications conditions in the PLC Setup according to the communications port used, as follows:

Using Built-in RS-232C Port of CS1G/H or CS1G/H-H

Address	Write value	Settings
160	8200	1:N NT Link Mode
161	000A	Baud rate (high-speed)
166	000□	□: Largest unit number (1 to 7) of connected PTs. (See note.)

Note: To connect a single Unit in a 1:N connection, set the value for □ to 1 or higher.

Using Peripheral Port of CS1G/H or CS1G/H-H

Address	Write value	Settings
144	8200	1:N NT Link Mode
145	000A	Baud rate (high-speed)
150	000□	□: Largest unit number (1 to 7) of connected PTs. (See note.)

Note: To connect a single Unit in a 1:N connection, set the value for □ to 1 or higher.

For example, to connect PTs with unit numbers 0, and 2 to 5 to the built-in RS-232C port in high-speed 1:N NT Links, set address 160 to 8200 Hex, address 161 to 000A Hex, and address 166 to 0005 Hex.

Set whether the PLC Setup is set directly from the Programming Device (Programming Console) or created by the Support Software (CX-Programmer) and transferred to the CPU Unit.

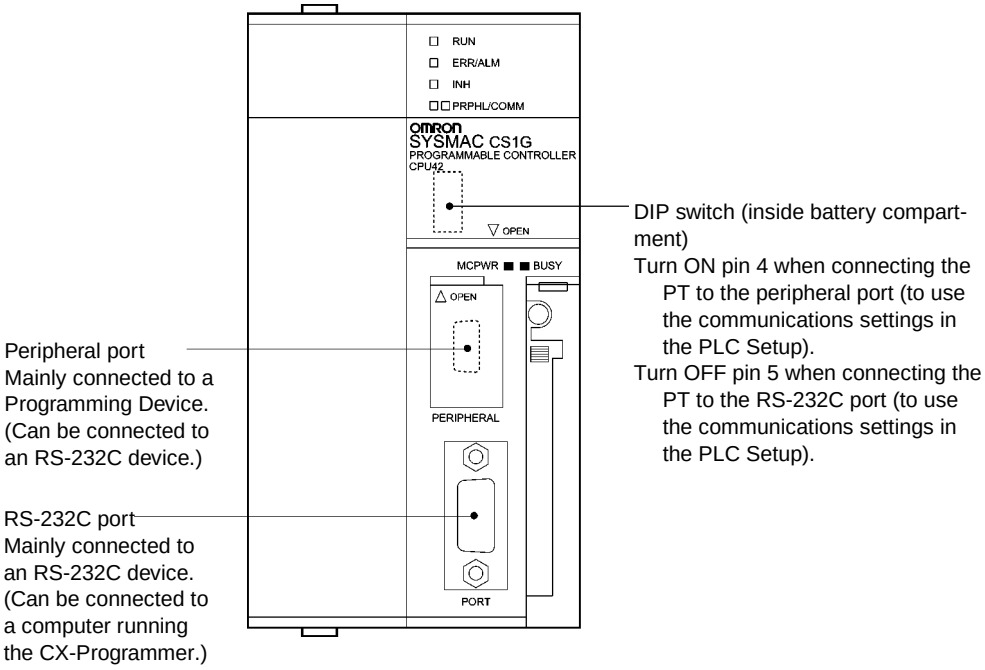
Refer to the *SYSMAC CS/CJ Series Operation Manual* (W339) for information on the PLC Setup.

Reference To set high-speed 1:N NT Link communications from the CX-Programmer, set the baud rate to 115,200 bps.

Setting the Front Panel Switches

Using RS-232C

Set DIP switch pin 4 or 5 of the CPU Unit according to the port to which the PT is connected, as follows:



Connecting to CJ-series CPU Units

CJ-series CPU Units:

CJ1G-CPU□□

PLC Setup Area

• Using RS-232C

When connecting the PT to a CJ-series CPU Unit, set the communications conditions in the PLC Setup according to the communications port used, as follows:

Using the CJ1G Built-in RS-232C Port

Address	Write value	Settings
160	8200	1:N NT Link Mode
161	000A	Baud rate (high-speed)
166	000□	□: Largest unit number (1 to 7) of connected PTs. (See note.)

Note: When connecting a single Unit in a 1:N connection, set the value of □ to 1 or higher.

Using the CJ1G Peripheral Port

Address	Write value	Settings
144	8200	1:N NT Link Mode
145	000A	Baud rate (high-speed)
150	000□	□: Largest unit number (1 to 7) of connected PTs. (See note.)

Note: When connecting a single Unit in a 1:N connection, set the value of □ to 1 or higher.

For example, to connect PTs with unit numbers 0, and 2 to 5 to the built-in RS-232C port in 1:N NT Links, set address 160 to 0200 Hex and address 166 to 0005 Hex.

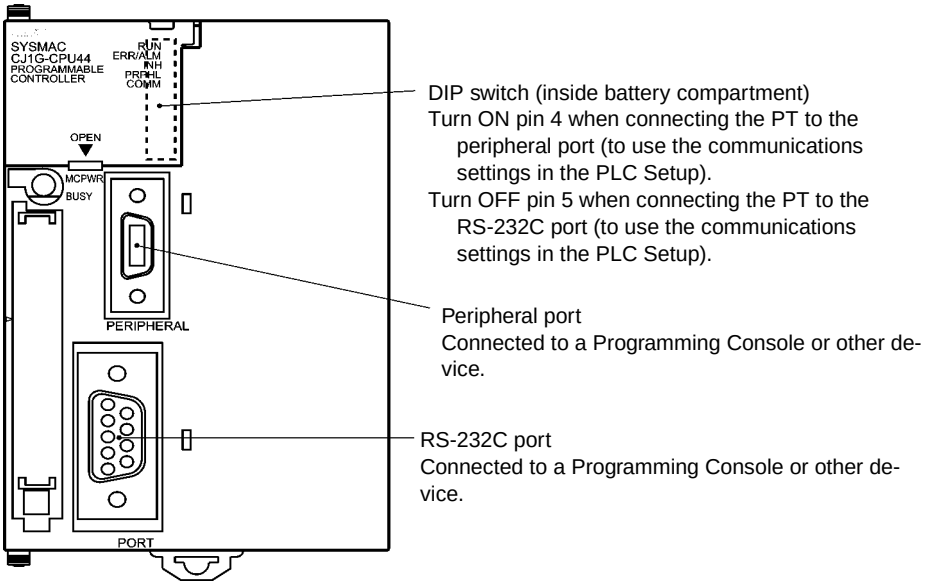
Set whether the PLC Setup is to be set directly from the Programming Device (Programming Console) or created by the Support Software (CX-Programmer) and transferred to the CPU Unit.

Refer to the *SYSMAC CJ Series Operation Guide* (W393) for information on the PLC Setup.

Setting the Front Panel Switches

• Using RS-232C

Set DIP switch pin 4 or 5 of the CPU Unit according to the port to which the PT is connected, as follows:



Connecting to CS-series Serial Communications Boards

Serial Communications Boards with RS-232C Port for Use with CS-series CPU Units:

CS1W-SCB21 (Both ports 1 and 2 are RS-232C ports.)
CS1W-SCB41 (Port 1 is an RS-232C port and Port 2 is an RS-422A port.)

Reference High-speed 1:N NT Links can be used with Serial Communications Boards and Serial Communications Units from lot numbers 991220 (December 20, 1999) or later. Boards and Units with earlier lot numbers cannot be used, so confirm that the lot number is supported.

CPU Unit DM Area Settings

Write the settings directly from the Programming Device (Programming Console) or Support Software (CX-Programmer) to the DM Area (Parameter Area) in the CPU Unit. After writing the settings, enable the settings by turning ON the power again, restarting the Unit, restarting the communications port, or executing the CHANGE SERIAL PORT SETUP (STUP) instruction.

The following table shows the allocated DM Area words and settings. The settings are the same for RS-232C and RS-422A (CS1W-SCB41 Port 2).

Allocated DM Area words		Write value	Settings
Port 1	Port 2		
DM32000	DM32010	8200	1:N NT Link Mode
DM32001	DM32011	000A	Baud rate (high-speed)
DM32006	DM32016	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note.)

Note: When connecting a single Unit in a 1:N connection, set the value of □ to 1 or higher.

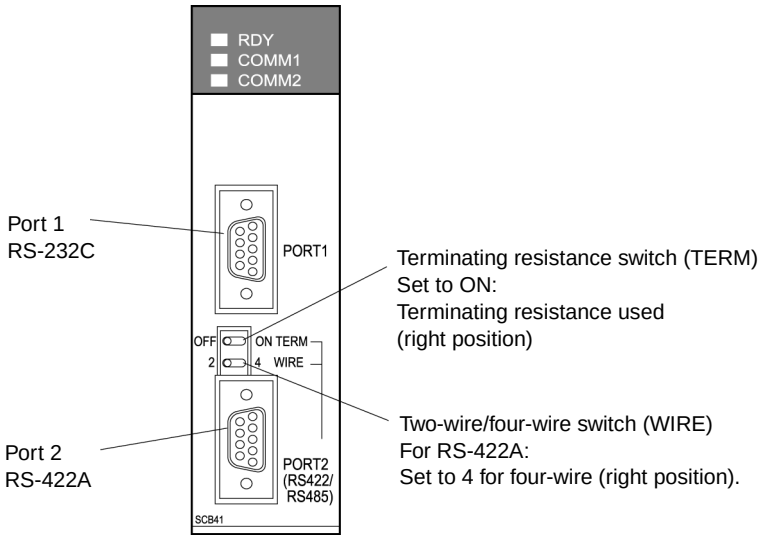
For example, to connect PTs with unit numbers 3 to 6 to Port 1 in 1:N NT Links, set DM32000 to 8200 Hex, DM32001 to 000A Hex, and DM32006 to 0006 Hex.

Serial Communications Boards with RS-422A Port for Use with CS-series CPU Units:

CS1W-SCB41 (Port 2 is an RS-422A port.)

Setting the Front Panel Switches

• Using RS-422A



Connecting to CS-series Serial Communications Units

CS-series Rack-mounted Type:

CS1W-SCU21

Reference High-speed 1:N NT Links can be used with Serial Communications Boards and Serial Communications Units from lot numbers 991220 (December 20, 1999) or later. Boards and Units with earlier lot numbers cannot be used, so confirm that the lot number is supported.

CPU Unit DM Area Settings

Write the settings directly from the Programming Device (Programming Console) or Support Software (CX-Programmer) to the DM Area (Parameter Area) in the CPU Unit. After writing the settings, enable the settings by turning ON the power again, restarting the Unit, restarting the communications port, or executing the CHANGE SERIAL PORT SETUP (STUP) instruction.

The following table shows the allocated DM Area words and settings.

Using RS-232C

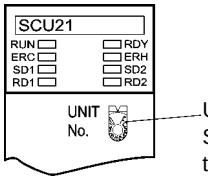
m = 30000 + 100 × unit number

Allocated DM Area words		Write value	Settings
Port 1	Port 2		
DM m	DM m + 10	8200	1:N NT Link Mode
DM m + 1	DM m + 11	000A	Baud rate (high-speed)
DM m + 6	DM m + 16	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note.)

Note: When connecting a single Unit in a 1:N connection, set the value of □ to 1 or higher.

Setting the Front Panel Switches

Set the unit number of the Serial Communications Unit with the rotary switches on the front of the Unit. Use a flat-blade screwdriver to set the numerals and symbols of the switch's setting display window, as follows:



Unit number setting
Set a value between 0 and F that is different from that of any other Units in the system.

Connecting to CJ-series Serial Communications Units

CJ-series Units:

CJ1W-SCU41 (Port 1 is an RS-422A port and Port 2 is an RS-232C port.)

CPU Unit DM Area Settings

Write the settings directly from the Programming Device (Programming Console or CX-Programmer) to the DM Area (Parameter Area) in the CPU Unit. After writing the settings, enable the settings by turning ON the power again, restarting the Unit, restarting the communications port, or executing the CHANGE SERIAL PORT SETUP (STUP) instruction.

The following table shows the allocated DM Area words and settings.

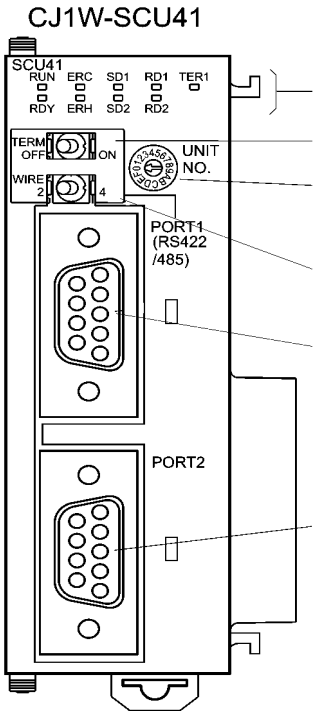
The allocations and settings are the same for RS-232C and RS-422A.

m = 30000 + 100 × unit number

Allocated DM Area words		Write value	Settings
Port 1	Port 2		
DM m	DM m + 10	8200	1:N NT Link Mode
DM m + 1	DM m + 11	000A	Baud rate (high-speed)
DM m + 6	DM m + 16	000□	□: Largest unit number (1 to 7) of the connected PTs. (See note.)

Note: When connecting a single Unit in a 1:N connection, set the value of □ to 1 or higher.

Setting the Front Panel Switches



Display indicators

Terminating resistance switch (TERM)

Unit number setting switch
Set a value between 0 and F that is not the same as these used by other Units in the system.

Two-wire/four-wire switch (WIRE)
For RS-422A: Set to 4 for four-wire operation (right position).

Port 1
RS-422A/485

Port 2
RS-232C

4-3 Recommended Connector Cables

Always use recommended connectors, connector hoods, and cables, where possible, when making connector cables. Depending on the Unit, a connector and connector hood may be included with the Unit.

Check the required components before preparing them.

Name	Model	Details	Units with the connectors and connector hoods included.
Connector	XM2A-0901	9-pin type made by OMRON.	CS/CJ Series C-series CQM1 and C200HS C200HX/HG/HE(-Z) CVM1/CV-series CPU Units CV500-LK201
	XM2A-2501	25-pin type made by OMRON.	CV500-LK201 C200H-LK201-V1
Connector Hood	XM2S-0911	9-pin type made by OMRON. (mm screws)	C-series CQM1 and C200HS C200HX/HG/HE(-Z) CVM1/CV-series CPU Units CV500-LK201
	XM2S-0911-E	9-pin type made by OMRON.	CS/CJ Series
	XM2S-0913	9-pin type made by OMRON. (inch screws)	
	XM2S-2511	25-pin type made by OMRON.	CV500-LK201 C200H-LK201-V1
Cable	AWG28 × 5P IFVV-SB	Multiconductor shielded cable made by Fujikura Densen, Ltd.	
	CO-MA-VV-SB 5P × 28AWG	Multiconductor shielded cable made by Hitachi Densen, Ltd.	

Note The connector's tensile load is 30 N max. Do not subject the connectors to a load greater than that specified.

• OMRON Cables with Connectors

The following OMRON Cables with Connectors can be used.

Model	Cable length	Connector specifications
XW2Z-200T	2 m	9-pin-to-9-pin
XW2Z-500T	5 m	
XW2Z-200T-2	2 m	9-pin-to-CPM2C peripheral port
XW2Z-200T-5	5 m	

• OMRON Cables for CS1-series PLC Peripheral Port

Model	Cable length	Connector specifications
CS1W-CN118	0.1 m	9-pin (female)-to-CS1-series peripheral port

• OMRON RS-232C/RS-422A Converter

Model	Connection method	Terminal block specifications
NS-AL002	Connects directly to RS-232C port.	8-pole terminal block (1:N NT Link)

The connectors for the connecting cables are not included with the PT and must be purchased separately.

Section 5

Connecting to Host via Ethernet or Controller Link

This section describes the methods for connecting the PT to the host using the PT's Ethernet interface and the Controller Link Interface Unit.

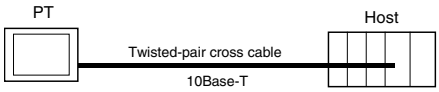
5-1 Connecting to Host Via Ethernet

To connect to the network using Ethernet, the network number, node number, and IP address must be set. Use the NS-Designer to set the settings. For details, refer to *Section 7 System Settings* of the *NS-Designer Operation Manual* and *Section 9 Ethernet Connection* of the *Tutorial* included in the NS-Designer CD-ROM.

The following connection methods are possible when connecting via the Ethernet only.

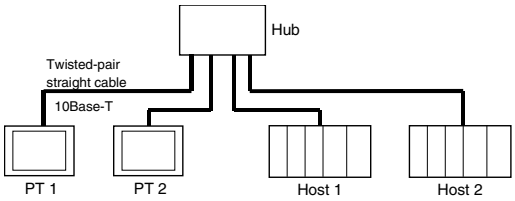
• Connecting PT Directly to the Host

Connect the PT to the host using twisted-pair cross cable.



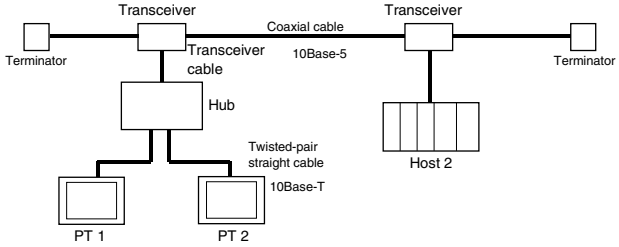
• Connecting PT to Host with a Hub

Multiple PTs and hosts can be connected using twisted-pair straight cable and a hub.



• Connecting PT and Host Using Transceivers

PTs can be connected in a 10Base-5 network configuration by using a hub and transceiver that support 10Base-5.



• Devices Required for Network Configuration

The following additional devices are required to configure the network using the Ethernet and must be purchased separately.

Always use products that conform to IEEE802.3 standards for all network configuration devices.

Network configuration device	Details
Ethernet Unit	A Communications Unit for connecting the PLC to the Ethernet network.
Hub	A network device that serves as a central wiring point for multiple terminals.
Twisted-pair cable	Cable consisting of four pairs of thin, copper wires twisted into a cross cable or a straight cable. Twisted-pair cables are used for 10Base-T networks.
Coaxial cable	Cable consisting of a central conductor surrounded (in concentric circles) by insulation and an external conductor of braided wire. This cable is used for 10Base-5 networks.
Transceiver	A device that serves as an interface between the coaxial cable and nodes.
Transceiver cable	Cable used to connect the transceiver to the nodes.
24-VDC power supply	A 24-VDC external power supply for supplying power to the transceiver through the transceiver cable.
Coaxial cable terminator (terminating resistance)	Connected to both ends of the coaxial cable.

5-1-1 Host Types and Settings

Units that are used for Ethernet communications vary according to the type and series of OMRON PLC used.

When connecting an Ethernet Unit, check the series and type of the PLC that it will be connected to and the model of the Unit that is mounted to the PLC.

The following table shows the host units that can be connected to NS-series PTs via the Ethernet.

PLC series	CPU Units that can be connected to Ethernet Units	Ethernet Unit
CS Series	CS1G-CPU42/43/44/45(-V1) CS1H-CPU63/64/65/66/67(-V1) CS1G-CPU42H/43H/44H/45H CS1H-CPU63H/64H/65H/66H/67H	CS1W-ETN01 CS1W-ETN11
CV Series	CV500-CPU01-V1	CV500-ETN01
	CV1000-CPU01-V1	
	CV2000-CPU01-V1	
CVM1 Series	CVM1-CPU01-V2 CVM1-CPU11-V2 CVM1-CPU21-V2	CV500-ETN01
CJ Series	CJ1G-CPU44 CJ1G-CPU45	CJ1W-ETN11

The types of hosts that can be connected to NS-series PTs with the Ethernet and the host settings are as follows:

- **Host Settings**

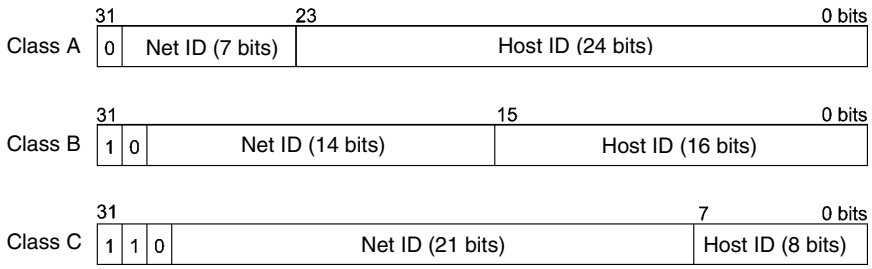
The following settings must be set at the host.

Item	Host Settings
Network number	1 to 127
Conversion table	Node number: 1 to 126 IP address: 0.0.0.0 to 255.255.255.255
UDP port number	1 to 65535, default is 9600.
IP address	0.0.0.0 to 255.255.255.255
Subnet mask	0.0.0.0 to 255.255.255.255
Default gateway	0.0.0.0 to 255.255.255.255
IP proxy address	“”(blank), 0.0.0.0 to 255.255.255.255
Node number	1 to 126
Routing tables	Define communications paths for FINS messages. Routing tables are set from the CX-Programmer.

IP Address Configuration

The IP address is comprised of 32 bits of binary data, consisting of the net ID and host ID. The net ID is the address that identifies the network, and the host ID is the ID that identifies the host (node).

The IP address is divided into class A, B, and C. Select the address system from among the classes according to the network configuration.



The number of networks and hosts that can be identified depends on the class used.

Class	Number of networks	Number of hosts
Class A	Small	$2^{24} - 2$ max. (16,777,214 max.)
Class B	Medium	$2^{16} - 2$ max. (65,534 max.)
Class C	Large	$2^{8} - 2$ max. (254 max.)

The IP address is a 32-bit value divided into four 8-bit fields. Each octet is expressed as a decimal and is separated by a period.

Example: 10000010 00111010 00010001 00100000 → 130.58.17.32

Reference

- Set the same net ID for all nodes in the same network.
- The net ID of the IP address is the value that identifies the Ethernet network (IP network segment). The net ID is not the same as the network address used for FINS communications.
- The IP network segment is the logical network unit that is configured by the nodes that have the same net ID.

IP Address Allocation

The IP addresses are allocated so that they are unique for each node in the network (or between two or more networks). If two or more nodes are allocated the same IP address, the remote nodes with the same IP address will also malfunction.

IP (Internet Protocol) is a communications protocol that conforms to international standards. Therefore, to connect to the Internet, always obtain IP addresses that have been allocated by a public organization (i.e., the NIC in the country of use, such as the JPNIC in Japan). Using IP addresses that are not recognized by the NIC (JPNIC) to connect to the Internet could have unforeseen social consequences, such as causing the networks of another organizations to malfunction unexpectedly.

Local IP Address

The local IP address indicates the IP address of the Ethernet Unit that is used to set the settings.

The following IP address settings are not possible.

Net ID with all bits set to 0 or 1.
Host ID with all bits set to 0 or 1.
Subnet ID with all bits set to 1.
IP addresses that begin with 127 (7F Hex) (e.g., 127.35.21.16).

Subnet Mask

When more than one node is connected to the network, network operation and management can be difficult. Therefore, for convenience, configure the system by dividing a single network into multiple sub-networks. The system operates internally as multiple networks, but externally appears as a single network.

To operate a system in this way, divide the host ID field of the IP address into a subnet ID field and a host ID field.

The subnet ID field is identified by the information in the subnet mask. The subnet mask is a bit mask in which the net ID and subnet ID fields are 1 and the host ID field is 0.

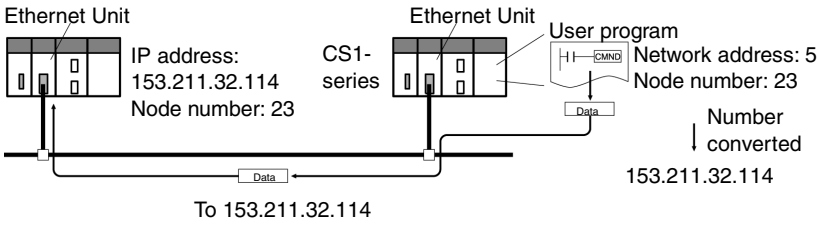
Example: 11111111 11111111 11111111 00000000 → FFFFFF00

The subnet mask must have a value that is common to all nodes on the same sub-network.

Setting the subnet mask is not required if sub-networks are not used. The system recognizes subnet masks without a subnet ID field (i.e., subnet masks with net ID and host ID fields only).

Address Conversion (when Using FINS Communications Service Only)

When using the FINS communications service, nodes must be specified following the FINS addressing system. Data that is transmitted on the Ethernet network using FINS communications, however, must follow the IP address format. Address conversion changes the FINS address to an IP address.



There are three methods for converting addresses, as follows:

- Automatic generation method (default address conversion)
- IP address table method
- IP table + automatic generation method

All of these address conversion methods are performed from the system settings using the Support Software (CX-Programmer, SYSMAC-CPT, SYSMAC Support Software, or CV Port Software Ver.2 or later). The details for each method are explained below. Refer to the *SYSMAC CS/CJ Series Ethernet Unit Operation Manual* (W343) and the *SYSMAC CVM1/CV Series Ethernet Unit Operation Manual* (W242) for details on setting methods.

Automatic Generation Method

The automatic generation method uses the FINS node number without modification as the host ID of the IP address. The net ID of the local IP address is used as the net ID.

Automatic generation uses the following type of remote IP address configured from the local IP address, subnet mask, and remote node number (FINS node number).

Remote IP address = (Local IP Address AND subnet mask)
OR remote node number

- Automatic Generation Characteristics

Automatic generation has the advantage of easily understandable handling of FINS addresses and IP addresses. This method, however, does have the following limitations.

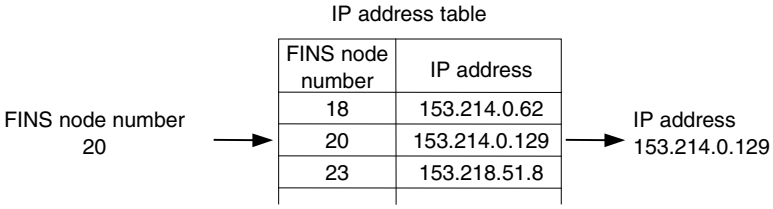
1. This method is applicable for addresses with the same net ID only.
2. The remote host ID is restricted to the range of FINS node numbers (1 to 126).
3. The Ethernet Unit's host ID and node number must be set to the same value. Automatic generation is set as the default address conversion method, so it does not need to be set from the CX-Programmer.

IP Address Table Method

Whereas the automatic generation method obtains the IP address from the FINS node number, the IP address table method converts the FINS node number to the IP address based on a preset conversion table (IP address table).

The IP address table is configured from the system settings using Support Software (CX-Programmer, SYSMAC-CPT, SYSMAC Support Software, or CV Support Software Ver.2 or later). Refer to the *SYSMAC CS/CJ Series Ethernet Unit Operation Manual* (W343) and *SYSMAC CVM1/CV Series Ethernet Unit Operation Manual* (W242) for details on setting methods.

Nodes that have different net IDs for different segments can also be registered.



- IP Address Table Method Characteristics

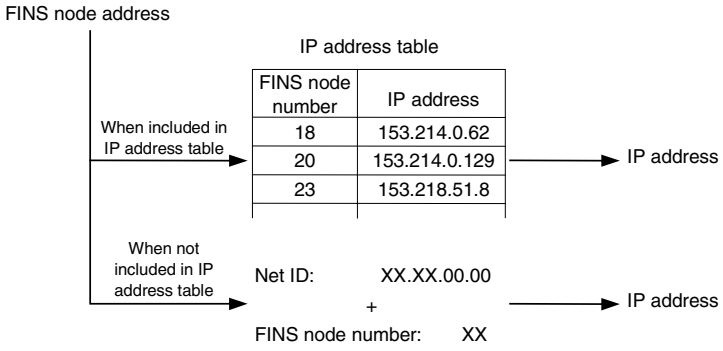
The IP address table method simply prepares a conversion table, offering the advantage of allowing the correspondence between FINS node numbers and IP addresses to be created freely.

This method is, however, subject to restrictions. The IP address table allows registration of up to 32 corresponding addresses only, so no more than 32 nodes, including the local node, can be registered. If there is no correspondence, the remote FINS node number is not recognized.

IP Table + Automatic Generation Method

This method combines automatic generation and the IP address table method.

First refer to the IP address table, and if the required FINS address is included in the table, read the corresponding IP address. If the required FINS address is not included, calculate the IP address using the automatic generation method.



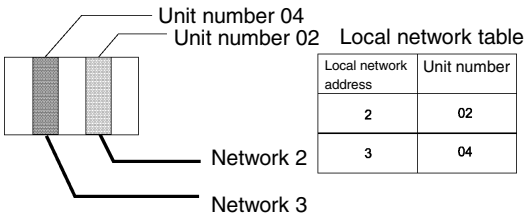
Setting Routing Tables

Routing tables define the communications path between the local node and the network containing the destination node. Routing tables are required to perform network communications. Routing tables consist of local network tables and remote network tables.

Local Network Tables

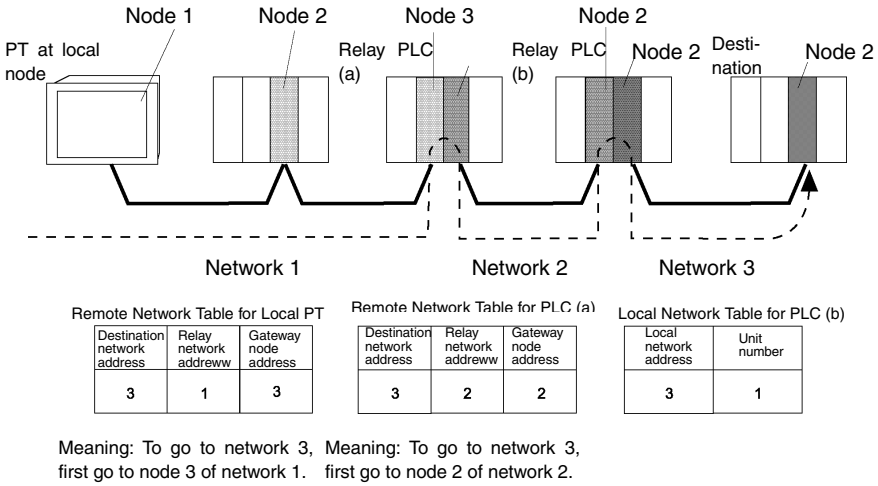
A local network tables contains the unit number and network address for every Communica-

tions Unit mounted at a node. If there is more than one Communications Unit at a node, each Unit will contain a local network table.



Remote Network Table

The remote network table provides the node and network address corresponding to the initial relay point (first point the data must pass) en route to a target network (end network) not directly connected to the local PLC. The table specifies the route from the relay point to the end network.



Routing tables are created using the CX-Programmer and then transferred to the host. Refer to the *CX-Programmer User Manual* for actual procedures.

The methods for setting each Unit are described next.

- **CS-series PLCs**

Note
- Always turn OFF the power to the PLC before setting the rotary switches.
- Create I/O tables for the CPU Unit when setting the unit number for the first time or changing settings.

CS1G/CS1H and CS1G/CS1H-H Ethernet Units:

CS1W-ETN01
CS1W-ETN11

Setting the Front Panel Switches

Setting Unit Numbers

Always set the unit numbers so that the unit numbers of other CPU Bus Units mounted to the

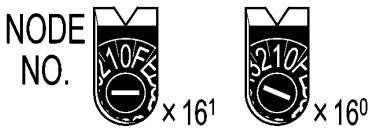
CPU Unit are all unique.

Use a small screwdriver to set the rotary switches, being careful not to damage them.

The factory setting is 0.

Setting range
0 to F

Setting Node Numbers



Setting range
01 to 7E (1 to 126 decimal)

Set the upper digit using the left rotary switch and the lower digit using the right rotary switch.

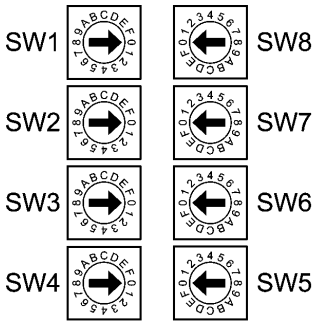
The factory setting is 01.

When converting addresses using the automatic generation method, set the node number to the same value as that set for SW7 and SW8 of the local IP address setting switches, which are described on the following pages. If the same values cannot be set, the IP address table method or IP table + automatic generation method must be used to convert the addresses.

Setting the Rear Panel Switches

Setting Local IP Addresses

Set the local IP address for the Ethernet Unit using the eight hexadecimal rotary switches (local IP address setting switches), expressing each 4-bit value as a single hexadecimal digit. Set the IP address as a hexadecimal using the eight switches combining SW1 and SW2, SW3 and SW4, SW5 and SW6, and SW7 and SW8, as shown in the following diagram.



Setting range for each switch
0 to F

SW No.

Local IP address 1 2 . 3 4 . 5 6 . 7 8

Example: Setting130.58.17.32 (Decimal)

This address will be 82.3A.11.20 in hexadecimal, so the switch would be set as shown in the following table.

Switch Setting	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
	8	2	3	A	1	1	2	0
Local IP address in hexadecimal	82		3A		11		20	
Local IP address in decimal	130		58		17		32	

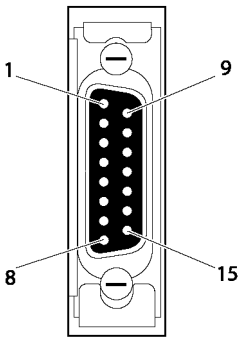
Reference
- When using automatic generation (default method) for converting addresses, set the same value for the node number as that set for SW7 and SW8, and set the other host ID fields to 0. The ERC indicator will flash if the value of the IP address host ID does not correspond to the node number value.
- Set the subnet mask in the CPU Bus Unit Setup Area using the CX-Programmer.

Ethernet Connectors:

CS1W-ETN01

This is the connector used to connect the transceiver cable to the Ethernet.

- Electrical characteristics: Conforms to IEEE802.3 standards.
- Lock structure: Conforms to IEEE802.3 standards for Slide latches.

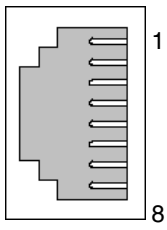


Connector Pin	Signal name	Abbreviation	Signal direction
1	Signal ground	GND	—
2	Collision detection signal +	COL+	Input
3	Send data +	TX+	Output
4	Signal ground	GND	–
5	Receive data +	RX+	Input
6	Voltage common Power ground (common with signal ground)	VC	–
7	Not used.	–	
8	Signal ground	GND	–
9	Collision detection signal –	COL–	Input
10	Send data –	TX–	Output
11	Signal ground	GND	–
12	Receive data –	RX–	Input
13	Transceiver power	VP	–
14	Signal ground	GND	–
15	Not used.	–	–
Hood	Frame ground	FG	–

CS1W-ETN11

This is the connector used to connect the twisted-pair cable to the Ethernet.

- Electrical characteristics: Conforms to IEEE802.3 standards.
- Connector structure: RJ45 8-pin modular connector (conforms to ISO8877).



Connector Pin	Signal name	Abbreviation	Signal direction
1	Send data +	TD+	Output
2	Send data –	TD–	Output
3	Receive data +	RD+	Input
4	Not used.	–	–
5	Not used.	–	–
6	Receive data –	RD-	Input
7	Not used.	–	–
8	Not used.	–	–

• CJ-series PLCs

Note
- Always turn OFF the power to the PLC before setting the rotary switches.
- Create I/O tables for the CPU Unit when setting the unit number for the first time or changing settings.

CJ-series Ethernet Units:

CJ1W-ETN11

Setting the Front Panel Switches

Setting Unit Numbers

Always set the unit numbers so that the unit numbers of other CPU Bus Units mounted to the same CPU Unit are all unique.

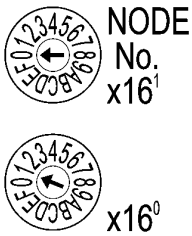
Use a small screwdriver to set the rotary switches, being careful not to damage them.

The factory setting is 0.

Setting range
0 to F

Setting Node Numbers

Set the node numbers as hexadecimal values with the node number setting switch. Always set the node numbers so that other Ethernet Units connected to the same Ethernet network all have unique addresses. As long as the addresses are unique, they can be set between 01 and 7E (1 to 126 decimal).



Setting range
01 to 7E (1 to 126 decimal)

Set the upper digit using the top rotary switch and the lower digit using the bottom rotary switch.

The factory setting is 01.

When using automatic generation to convert addresses, set the node number to the same value as that of the rightmost byte of the local IP address. If the same values cannot be set, the IP address table method or combination method must be used to convert the addresses.

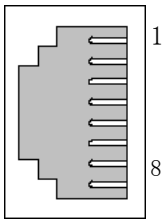
Setting Local IP Addresses

For CJ-series Ethernet Units, set the local IP address from the CX-Programmer or other Support Software for the CPU Unit. Refer to the *SYSMAC CS/CJ Series Ethernet Unit Operation Manual* (W343) for details on setting methods.

CJ1W-ETN11

This is the connector used to connect the twisted-pair cable to the Ethernet.

- Electrical Characteristics: Conforms to IEEE802.3 standards.
- Connector Layout: RJ45 8-pin modular connector (conforms to ISO8877).



Connector Pin	Signal name	Abbreviation	Signal direction
1	Send data	TD+	Output
2	Send data –	TD–	Output
3	Receive data +	RD+	Input
4	Not used.	–	–
5	Not used.	–	–
6	Receive data –	RD–	Input
7	Not used.	–	–
8	Not used.	–	–

• CV/CVM1-series (-V□) PLCs

Unit for CV500-CPU01-V1, CV1000-CPU01-V1, CV2000-CPU01-V1, CVM1-CPU01-V2, CVM1-CPU11-V2, and CVM1-CPU21-V2 CPU Units:

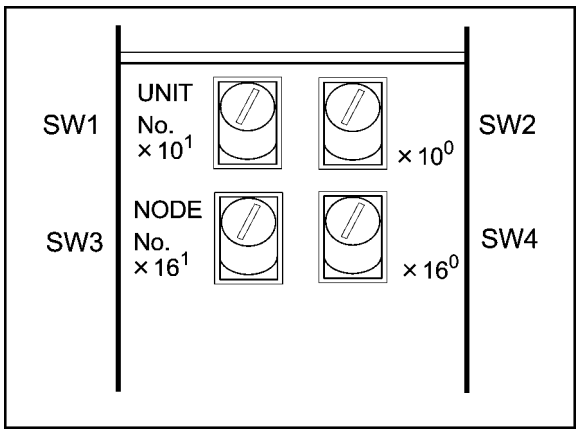
CV500-ETN01

Setting Rotary Switches

Set the unit number and node number with the two rotary switches on the front of the Unit.

Switch Layout

The layout of the two switches is shown in the following diagram.



- Set the unit number using SW1 and SW2. Set the unit number so that it is different from other CPU Bus Units in the system.
- Set the node number using SW3 and SW4.

Setting Range

Each switch can be set within the following range.

Settings	Setting range
Unit number (SW1, SW2)	00 to 15 (decimal)
Node number (SW3, SW4)	01 to 7E hexadecimal (1 to 126 decimal)

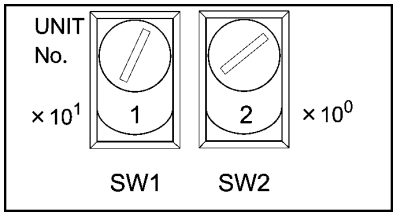
Setting Unit Numbers

The unit number is used to identify each Unit when multiple CPU Bus Units are mounted to the CPU Unit.

Use the left switch (SW1) to set the ten's digit, and the right switch (SW2) to set the one's digit. Set between 00 and 15 decimal.

Setting Example

This example is for unit number 12.



Reference

- The unit number cannot be set to a value more than 15. If the unit number is set to a value higher than 15, the ERH indicator in the display will light.
- When more than one CPU Bus Unit is mounted to a single PLC, set each Unit with a unique unit number.

Setting Node Numbers

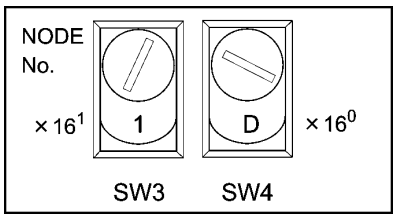
The node number is used to identify PLCs when more than one PLC is connected to the Ethernet. This setting is the node number used for FINS communications.

Use the left switch (SW3) to set the left digit as a hexadecimal, and the right switch (SW4) to set the right digit. The setting range is 01 to 7E hexadecimal (1 to 126 decimal).

Setting Example:

This example is for node number 29 (decimal).

29 = 1 × 16 + 13 = 1D（hexadecimal）



Reference

- The node number cannot be set to a value higher than 7E (126 decimal). If the node number is set to a higher value, an error will occur and the ERH indicator in the display will light.
- Set the node numbers so that all the nodes in the same network are unique.

Setting IP Addresses for Ethernet Units

The IP address must also be set for Ethernet Units. Ethernet communications are not possible if the IP address of the Ethernet Unit is not set.

Set the IP address for the Ethernet Unit from the CPU Bus Unit Setup Area using Programming Devices (SYSMAC-CPT, SYSMAC Support Software, CV Support Software Ver. 2 or later, FIT20-MF501-V2, FIT10-MF501-V2, FIT20-MC601, or FIT20-MC701). Refer to the *SYSMAC CVM1/CV Series Ethernet Unit Operation Manual* (W242) for details on setting methods.

Ethernet Unit System

Set the system settings for the Ethernet Unit to operate on the Ethernet network as a node. Set the system settings using a Programming Device (SYSMAC-CPT, SYSMAC Support Software, CV Support Software Ver.2 or later, FIT20-MF501-V2、FIT10-MF501-V2, FIT20-MC601, or FIT20-MC701).

Reference

- For details on operating the Support Software, refer to the CPU Bus Unit Setup Area in the *SYSMAC Support Software Operation Manual: Networks* (W201) and *SYSMAC Support Software Operation Manual: CV Series* (W249).
- Turn ON the power to the CPU Unit again after setting the system settings. The system settings are not enabled after setting them until the power has been turned ON again.

5-2 Connecting to the Host Using Controller Link

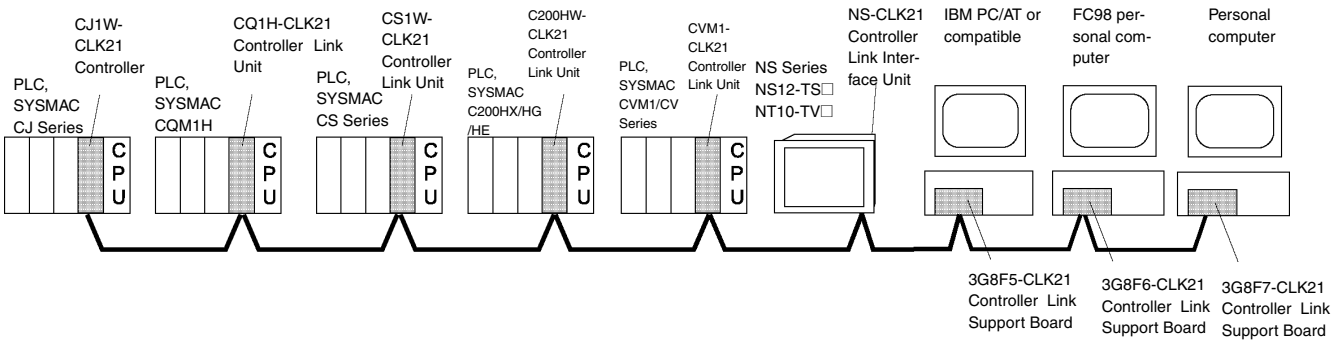
This section explains the method for connecting to the host using a Controller Link Interface Unit.

5-2-1 What Is a Controller Link Network?

A Controller Link Network is an FA Network that can send and receive large data packets flexibly and easily among the OMRON C200HX/HG/HE PLC Programmable Terminal (PTs), SYSMAC CS-series PLCs, CJ-series PLCs, CQM1H-series PLCs, C200HX/HG/HE PLCs, CVM1/CV-series PLCs, IBM PC/AT or compatible computers, and NS-series PTs. The Controller Link supports data links that enable data sharing and a message service that enables sending data and receiving data when required. Data link areas can be freely set to create a flexible data link system and effectively use data areas.

The network is connected using shielded twisted-pair cable or optical fiber cable. In addition, the Controller Link Network can transfer large quantities of data at high speed, so that it is possible to construct a wide-area network easily that supports from low-level systems to high. For details on data links and message service, refer to the *Controller Link Support Board Operation Manual* (W307), *Controller Link Support Board for PCI Bus Operation Manual* (W383), and the *Controller Link Unit Operation Manual* (W309).

Note: An optical fiber cable is not available for NS-series PTs.



To connect the PT to the Controller Link, it is necessary to install a Controller Link Expansion Board on the PT. Refer to *3-8 Installing the Controller Link Expansion Board* for the procedure for installing and wire the Controller Link Expansion Board.

When communicating by Controller Link, the network number, node number, routing tables, and data link tables must be set. For details, refer to *Section 7 System Settings* in the *NS Series Operation Manual*.

Required Devices

To construct a Controller Link Network, the devices described in the following table are required.

Device	Model	Remarks
Controller Link Unit	CVM1-CLK21 C200HW-CLK21 CS1W-CLK21 CQM1H-CLK21 CJ1W-CLK21	Required to connect PLC with Controller Link Network.
Controller Link Support Board (ISA Bus/PC98)	3G8F5-CLK21 3G8F6-CLK21	Required to connect IBM PC/AT or compatible computers with Controller Link Network.
Controller Link Support Board (PCI Bus)	3G8F7-CLK21	
Twisted-pair Cable	ESVC0.5×2C	Required to connect the PT, PLC, and IBM PC/AT or compatible computers. Use shielded twisted-pair cable.
Controller Link Wired Relay Terminal Block	CJ1W-TB101	Used as a relay terminal block for wires and can be used as required to facilitate replacement and maintenance of Controller Link Units and Boards after the communications system has been started.

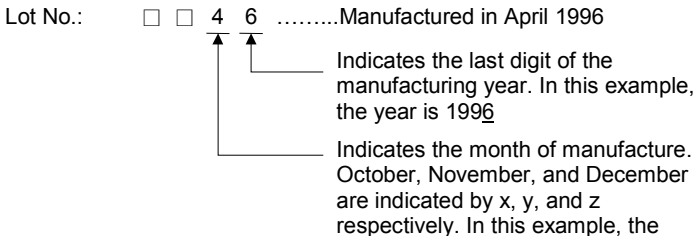
5-2-2 Host Type and Settings

The CPU Units that support the Controller Link are listed in the following table.

PLC	CPU Unit	Controller Link Unit
CS1 PLCs	All models	CS1W-CLK21
CJ1 PLCs	All models	CJ1W-CLK21
C200HX C200HG, C200HE PLCs (*1)	C200HX-CPU64/54/44/34-(Z)E /65-Z/85-ZE C200HG-CPU63/53/43/33-(Z)E C200HE-CPU42/32-(Z)E	C200HW-CLK21
CQM1 PLCs	CQM1H-CPU61/51	CQM1H-CLK21
CV500, CV1000, CV2000 PLCs (*2)	All models	CVM1-CLK21
CVM1 PLCs (*2)	All models	CVM1-CLK21

*1: One of the following is necessary to connect a Controller Link Unit.
C200HW-COM01/04 Board
C200HW-CE001/002/012 Bus-connecting Unit

*2: Routing tables are required if any of the CVM1/CV-series CPU Units in the network have been manufactured on or before April 1996. The manufacturing data can be determined from the lot number on the side of the CPU Unit.



For the method of setting the Controller Link for each PLC, refer to *Controller Link Unit Operation Manual* (W309).

5-2-3 Data Links

This section outlines data links and the method of setting data link tables when using data links. For details, refer to the *Controller Link Support Board Operation Manual* (W307)*, Controller Link Unit Operation Manual* (W309), and the *Controller Link Support Board for PCI Bus Operation Manual* (W383).

What Are Data Links?

Data links automatically exchange preset data between nodes (i.e., between PLCs, between a PLC and an IBM PC/AT or compatible computer, or between a PLC and an NS-series PT). Data links can be freely created for CS-series PLCs, C200HX/HG/HE PLCs, CVM1, CV-series PLCs, CJ-series PLCs, CQM1H-series PLCs, and NS-series PTs.

Two data link areas, area 1 and area 2, can be set for each node. Data links can be set in either of the following ways.

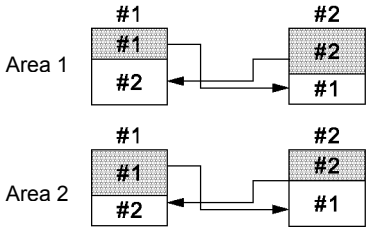
- Data link areas can be set by inputting data link tables through the Controller Link Support Software. Data link tables are created to define the data links. These tables enable free allocation of data link areas.
- Data links can be set automatically from a Programming Device. With automatically set data links, all link areas are the same size.

Automatic setting and manual setting cannot be used together in the same network.

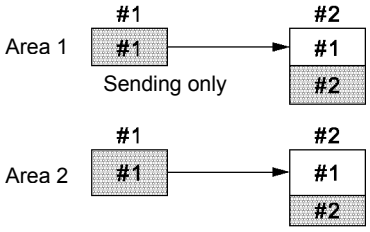
The following rules apply to these methods of setting data links.

1. Data links are enables concurrently for area 1 and area 2.
2. Separate settings (data link start words and send area size) are made in area 1 and area 2. The sequences of send and receive words are the same in area 1 and area 2.
3. Not all nodes must participate in the data links.

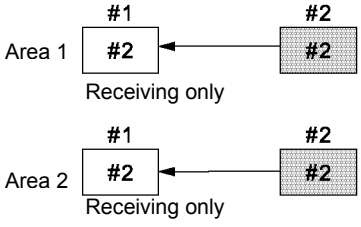
Example 1: The order of send and receive nodes is free.



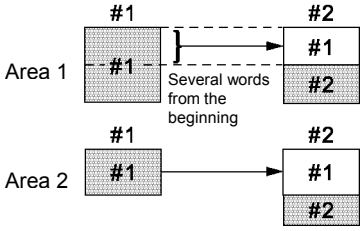
Example 2: Some nodes can send data without receiving data.



Example 3: Some nodes can receive data without sending data.



Example 4: A node can receive a specified number of words from the beginning of an area.



Setting Data Link Tables

To perform data links, data link tables are required. Set data link tables by following the steps below.

1. Set data link tables using the CX-Server (Network Setting Tool).
   Data link tables are created to define data links. These tables must be set for each node participating in data links. Refer to the manual for CX-Server (W362) for the method of setting.
   The following table shows the items and setting range for data link tables in the Controller Link Support Board mounted on the PT.

Setting item		Setting range
PT Model		Set as a "NSB."
Node		1 to 32 Set the address of the refresh nodes.
First data link status word		If a number is set, it will be invalid because the first word to store data link status is fixed. Set "-".
Area1	Data link start word (See note.)	$B0 to $B32767 $W0 to $W24575 Use CIO for $B and D for $W in the CX-Server. The same area cannot be set for both area 1 and area 2. Set different areas.
	Number of words	• Remote nodes: 0 to the number of source words Set the number of words to be received • Local nodes: 0 to 1000 Set the number of words to be transmitted The total number of words in area 1 and area 2 in each node must not exceed 1,000. The number of words in both area 1 and area 2 in each node must not be set to 0.
	Offset	• Remote nodes: 0 to one less than number of source words Set offset for data to be received • Local nodes: Cannot be set. This setting is not required if an offset is not used.
Area2	Data link start word (See note.)	$B0 to $B32767 $W0 to $W24575 Use CIO for $B and D for $W in the CX-Server. The same area cannot be set for both area 1 and area 2. Set different areas.
	Number of words	• Remote nodes: 0 to the number of source words Set the number of words to be received • Local nodes: 0 to 1000 Set the number of words to be transmitted The total number of words in area 1 and area 2 in each node must not exceed 1,000. The number of words in both area 1 and area 2 in each node must not be set to 0.
	Offset	• Remote nodes: 0 to one less than number of source words Set offset for data to be received • Local nodes: Cannot be set. This setting is not required if an offset is not used.

Note The following examples show how to change CIO and D addresses to $B and $W addresses.
1. Changing to $B addresses:
   $B address = Word in CIO address (0 to 2047) × 16 + Bit in CIO address (00 to 15)
   Example: If the CIO address is 00100.04, $B address = 100 × 16 + 4 = $B1604.
   Word Bit
2. Changing to $W addresses:
   $W address = D address (0 to 24575)
   Example: If the D address is D00100, $W address = $W100.

- The total number of words set in area 1 and area 2 must not exceed 32,000.
- Always delete the data link tables if the node does not participate in data links.

Save the data link tables after setting the above items.

2. Set data link tables for the PT side on the NS-Designer

   The two setting methods below can be used. Use the appropriate method for the application.

   1) Specifying data link tables with NS-Designer:

      If the data link tables are set from the NS-Designer, then they cannot be changed via a network. Even if they are temporarily changed from the CX-Server or Controller Link Support Software, they will return to the tables set from the NS-Designer the next time the PT is started. To change the data link tables when they have been set from the NS-Designer, it is necessary to retransfer the project or setting file to the PT.

      Select ***Setting - System Setting*** on the NS-Designer, click the Controller Link Tab, and specify the data link tables created in step 1. Refer to *Section 7 System Settings* in the *NS-Designer Operation Manual*, for specifying the data link table file.

   2) Setting data link tables across a network:

      To do so, transfer the data link tables in the Controller Link Interface Unit from the CX-Server or Controller Link Support Software, and do not specify data link tables from the NS-Designer. If data link tables are set via a network, then they can later be changed via a network as required. For details on the transfer method, refer to the *CX-Net Operation Manual* (W361) and the *Controller Link Support Software Operation Manual* (W369).

3. Transfer the project created on NS-Designer to the PT.

Starting and Stopping Data Links

The PT starts and stops data links according to the status of the data links when participating in the network. If the data links are started when entering the network, the PT will start its data links. If network has stopped data links, the PT will not start data links. The PT cannot control starting/stopping data links independently. Control starting/stopping data links on the Controller Link network using the startup node or CX-Server.

Note

- The data link mode (manual setting or automatic setting) and data link method are determined according to the data link setting in the startup node. In the startup node, set the data link tables if manual settings are being used and data link automatic setting parameters if automatic settings are being used. If the settings are incorrect, the data links will not start.

Caution

- Check the following items before starting data links.
  1. Manually Set Data Links
     Check the data link tables in each node participating in the data link to see that they are correct. Be sure that data link tables are deleted from nodes that are not participating in the data links.
  2. Automatically Set data Links
     Be sure that the correct DM parameters have been set in the data link startup node.

  If incorrect data link tables or parameters are set, injury may result due to unexpected operation of the system.
- Even if the correct data link tables or parameters have been set, do not start or stop data links before verifying that there will be no adverse influence on the system.

Setting Routing Tables

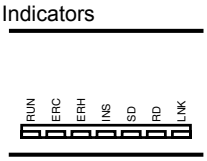
Routine tables that define the communications path from the local node to the network connected to the destination. Routine tables must be set for the following items.

- Local node
- All relay nodes that are included for the communication path from local node to the destination.

Make settings for routing tables on the NS-Designer. Refer to *Section 7 System Settings* in the *NS-Designer Operation Manual* for details on setting routing tables. For details on setting routing tables for the PLC, refer to the *Controller Link Unit Operation Manual* (W309).

5-2-4 Troubleshooting Using Indicators

The errors indicated by indicators on the Controller Interface Unit and remedies are explained in this section.



RUN: Operating
ERC: Communications error
ERH: EEPROM Error
INS: Network participation
LNK: Data link

Troubleshooting with RUN, ERC, ERH, and INS Indicators

The RUN, ERC, ERH, and INS indicators can be used to check whether the Controller Link Interface Unit and network participation are operating normally.

Note
- Always turn OFF the power to the PT before performing any of the following operations.
- Connecting/Disconnecting a Board or a connector.
- Securing a Board or a connector.
- Setting hardware switches.

Indicators				Probable cause	Remedy
RUN	**ERC**	**ERH**	**INS**		
Lit	Not lit	Not lit	Lit	The Unit operating normally. Network participation normal.	———
Not lit	Lit	–	–	Controller Link Interface Unit is faulty.	If ERC indicator lights even after mounting on another PT, replace the Controller Link Interface Unit
Not lit	Not lit	Not lit	Not lit	Power is not being supplied to PT normally.	Check the power supply voltage and supply at the recommended voltage.
				The Controller Link Interface Unit has become loose.	Secure the Controller Link Interface Unit firmly.
				Controller Link Interface Unit is mounted in the wrong slot.	Refer to *3-8 Installing Controller Link Interface Unit*, and mount the Board correctly.
				Controller Link Interface Unit is faulty.	If indicators do not light when the Board is mounted on another PT, replace the Controller Link Interface Unit
Lit	Lit	–	Not lit	The same node address is being used in the same network.	Reset so that each node address is used only once within the same network.

Indicators				Probable cause	Remedy
RUN	**ERC**	**ERH**	**INS**		
Lit	–	Lit	–	Routing table setting error.	Remake and set the routing tables correctly, referring to *Section 7 System Settings* in the *NS-Designer Operation Manual*. When the routing tables are not being used, delete the routing tables.
				EEPROM error.	Send a FINS command to the Controller Link Interface Unit to read status, correct the data where the error has occurred, and reset the Board. If the error occurs again, replace the Controller Link Interface Unit.
Lit	–	–	Not lit	Terminating resistance is not set correctly.	Turn ON the terminating resistance at the nodes at both ends of the network and turn it OFF at all other nodes.
				Cables are not connected correctly.	Check the cable connections and reconnect correctly.
				The node address is larger than the maximum node address set for the network parameters.	Either reset the maximum node address using Controller Link Support Software or reset the node address to below the maximum.
				No other nodes exist.	Ensure that 2 or more nodes exist within the Network.
				No nodes have been set as polling node.	Set the polling node using the CX-Server.
				The set baud rate is different from other nodes.	Reset the baud rate for the Controller Link in the System Settings of the NS-Designer. Refer to *Section 7 System Settings* in the *NS-Designer Operation Manual*.

Troubleshooting with LNK Indicator

- Data Links Cannot Be Started

The following table describes the LNK indicator and remedies when a data link cannot be started.

Starting a data link depends on the Controller Link Interface Unit operating normally and participating in the network. Refer to *Troubleshooting with RUN, ERC, ERH, and INS Indicators* earlier in this section and check operation before using the following table.

Indicator	Probable cause	Remedy
LNK		
Lit	Data link operating normally.	———
Flashing	There is an error in the data link tables.	If ERH or ERR indicator is lit, reset the data link tables.
	When manual setting is used, either data link tables have not been created for the startup node or there is an error in the data link tables.	Create the data link tables for the startup node using the CX-Server.
Not lit	Manually set data links are already operating on the same Network.	Set data link tables for the local node.
	Automatically set data links are already operating on the same Network.	Stop the data links, review and set the parameters in the startup node's DM area, and then restart. The PT cannot be the startup node for automatic settings. Settings must be performed at Controller Link Unit on the PLC.

- Node Cannot Participate in Data Links

The following table describes the LNK indicator and remedies when a Node cannot participate in the data links.

Data link participation in the network depends on the Controller Link Interface Unit operating normally and participating in the network. Refer to *Troubleshooting with RUN, ERC, ERH, and INS Indicators* earlier in this section and check operation before using the following table.

Indicator	Probable cause	Remedy
LNK		
Lit	Data Link operating normally.	———
Flashing	When manual setting is used, there is an error in the data link table.	Reset data link tables using the CX-Server.
Not lit	When manual setting is used, there are no Data Link Tables set for the local node.	Set the data link tables for the local node.
	When automatic setting is used, the setup node is not set to participate in the data links.	Stop the data links, remake and set the parameters in the Startup node's DM Area, and then restart the data links. Setting must be performed at PLC on the Controller Unit side, because the Controller Link Interface Unit cannot be the startup node for automatic settings. For details, refer to the *Controller Link Units Operation Manual*.

Section 6

System Menu Operations

This section describes the methods for operating the System Menu.

This section also provides details on functions that are useful for NS-series PT applications and for system maintenance.

6-1 Operating Modes and System Menu

The System Menu can be used to set various PT settings by operating the touch switches on the screen. The following diagram shows the menu configuration in the System Menu. Refer to *6-1-4 Using the System Menu* for details on System Menu operations.

6-1-1 Mode Configuration

The NS-series PTs have the following operating modes.

- Mode
  - System Menu : Displays the System Menu, and sets each of the settings for the PT.
  - RUN mode: Displays screens, allows data input, and communicates with each device.
  - TRANSFER mode:
    - Data transfer with NS-Designer: Uploads and downloads screen data and system programs between the NS-Designer (computer) and PT.
    - Memory Card transfer : Uploads and downloads screen data and system programs via the Memory Card.
  - ERROR mode:
    - Fatal error: Stops processing (operating) and displays error message.
    - Non-fatal error: Continues processing (operating) without displaying error message.

6-1-2 System Menu Configuration

The System Menu items and functions are as follows:

- System Menu
  - Initialize: Initializes operation log, alarm/event histories, data log, error log, and formats screen data and sets the system language.
  - PT: Sets the system startup waiting time, screen saver, key press sound, buzzer, backlight, contrast (NS7 only), and calendar check.
  - Project: Displays the project title, number of labels, history recording method, and addresses allocated to the system memory. Displays and sets the screen numbers displayed at startup time.
  - Password: Sets and changes passwords for permitting functional object input.
  - Comm: Sets the communications conditions for serial ports A and B and for Ethernet and for Controller Link.
  - Data Check: Checks the stored screen contents without communications.
  - Special Screen: Displays the operation log, alarm history, error log, device monitor, communication test, and version display, and performs video configuration.
    This function also starts external applications.
  - Hardware Check: Performs a hardware check, such as checking that the touch panel is operating properly.

6-1-3 Overview of Menu Items

The following tables show the eight menu items and provide an overview of their contents.

1. Initialize Data Tab

Item	Function	Page
Screen Data Area	Formats project data, such as screen data.	P. 6-8
Alarm/Event History	Initializes alarm/event history data that has been generated during operation.	P. 6-9
Data Log	Initializes the data log data that registers changes to the contents of an address.	P. 6-10
Operation Log	Initializes operation log data, such as that for functional object operations and screen switching.	P. 6-11
Error Log	Initializes error log data that is generated by macro errors.	P. 6-13
System language	The language to display system menus, input keypads, error messages, etc., can be set to Japanese or English.	P. 6-14

2. PT Operation Settings Tab

Item	Function	Page
Start-up Waiting Time	Sets the system startup waiting time. Communications are not performed during this specified time when the power is turned ON or the PT is reset. The default is 0 s.	P. 6-16
Screen Saver	Sets the screen saver to ON or OFF. The default setting is OFF.	P. 6-16
Screen Saver Start-up Time	Sets the amount of time after which the screen saver is started. The default setting is 15 min.	P. 6-16
Key Press Sound	Sets whether a sound will be heard when a touch switch is pressed. The default setting is ON.	P. 6-17
Buzzer Sound	Sets whether a buzzer will be heard when a command from the host is received or an error occurs. The default setting is ERR ON.	P. 6-17
Backlight	Sets the backlight brightness to one of three levels. The brightness cannot be adjusted much. The default setting is *High*	P. 6-18
Calendar Check	Displays and sets the date and time for the internal clock.	P. 6-18
Contrast (NS7 only)	Adjusts the screen contrast.	P. 6-19

3. Project Tab

Item	Function	Page
Project Title	Displays the project title.	P. 6-20
Number of Labels	Displays the number of corresponding labels.	P. 6-20
Initial Screen	Sets and displays the screen numbers first displayed after the power is turned ON.	P. 6-20
Initial Label	Sets and displays the label number shown on the screen after the power is turned ON.	P. 6-20
Alarm/Event Recording Method	Displays the method for recording the alarm/event histories.	P. 6-20
Data Log Recording Method	Displays the method for recording the data log.	P. 6-20
Operation Log Recording Method	Displays the method for recording the operation log.	P. 6-21
Error Log Recording Method	Displays the method for recording the error log.	P. 6-21
System Memory ($SB)	Displays the allocated addresses of the system bit memory ($SB).	P. 6-21
System Memory ($SW)	Displays the allocated address of the system word memory ($SW).	P. 6-21

4. Password Tab

Item	Function	Page
Level 1	Changes the level 1 password.	P. 6-23
Level 2	Changes the level 2 password.	P. 6-23
Level 3	Changes the level 3 password.	P. 6-23
Level 4	Changes the level 4 password.	P. 6-23
Level 5	Changes the level 5 password.	P. 6-23

5. Comm Tab

Item	Function	Page
Comms. Auto-return	Selects whether automatic recovery is used when a communications error occurs.	P. 6-24
Timeout internal	Sets and displays the timeout monitor time.	P. 6-24
Retry Counts	Sets and displays the number of communications retries.	P. 6-24
Serial Port A	Sets and displays whether serial port A is used, the communications method, and other details.	P. 6-25
Serial Port B	Sets and displays whether serial port B is used, the communications method, and other details.	P. 6-25
Ethernet	Sets and displays whether Ethernet is used and communications details.	P. 6-27
Controller Link	Sets and displays whether Controller Link is used and communications details.	P. 6-28

6. Data Check Tab

Item	Function	Page
Screen Number	Sets the screen number that is displayed as a sample.	P. 6-30
Show Address	Displays the communications addresses set for the sample display.	P. 6-30

7. Special Screen Tab

Item	Function	Page
Alarm History	Displays the alarm history screen.	P. 6-32
Operation Log	Displays the screen for recording the operation log.	P. 6-33
Error Log	Displays the screen for recording the error log.	P. 6-34
Special Functions	Displays the device monitor screen and communications test screen. This function also starts external applications and performs Video Configuration.	P. 6-35
System Version	Displays the version display screen.	P. 6-40

8. Hardware Check Tab

Item	Function	Page
LCD Check	Checks the LCD.	P. 6-41
Touch Switch Check	Checks the touch switches.	P. 6-42

6-1-4 Using the System Menu

Information on using the menus, such as displaying the System Menu, and selecting menu items, is provided here.

Reference The system settings set in the project data are given priority over those set in the System Menu.

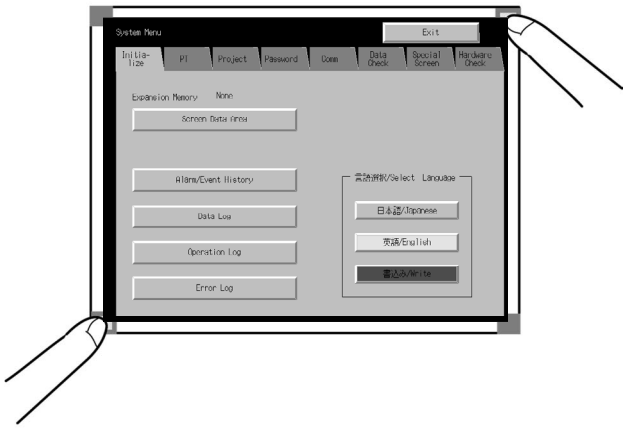
● Displaying the System Menu

The System Menu can be displayed in four ways, as follows:

1. Press two of the four corners of the touch panel.
2. Press the command button in the System Menu display.
3. Press a command button set to switch the screen to the system menu.
4. Specify screen number 4002 and switch the screen.

1. Pressing the Corners of the Touch Panel

The System Menu can be displayed by pressing two of the four corners of the PT touch panel simultaneously, as shown in the following diagram.



When pressing the corners of the touch panel, however, first press a corner that does not have a functional object displayed. If the position of a functional object is pressed, its function will be performed. If the command button for switching screens is kept pressed after the screen has been switched, it will be detected as if the button has been released.

The second corner pressed can be any of the other three corners. The System Menu will be displayed even if functional objects are displayed.

2. Pressing the Command Button in the System Menu

While creating screens, if a command button for displaying the System Menu is created in the screen, the System Menu can be displayed by pressing this command button.

3. Pressing Command Buttons to Switch Screens

The *Screen Switch* command button functions include a *Indirect Specification of Screen No.* function. Store the BCD value 4002 in the communications address for indirect specification and press the command button.

Refer to *2-9 Buttons* in the *Programming Manual* for information on command buttons.

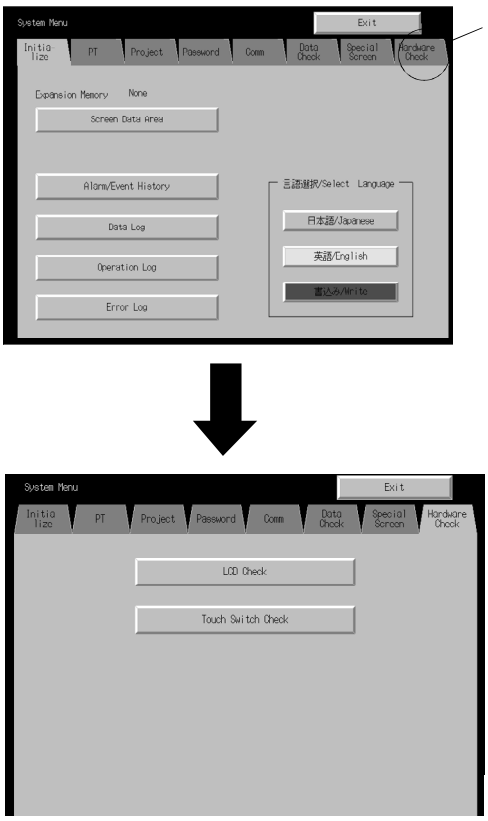
4. Storing 4002 in $SW0 (in System Memory)

A value of 4002 can be stored in $SW0 (in System Memory). Refer to *2-4 System Memory* in the *NS Series Programming Manual* for information on the system memory.

● Selecting Menu Items

Items in the System Menu can be displayed by simply pressing the tab of the menu item to be displayed.

Example: Press the **Hardware Check** Tab in the System Menu to display the Hardware Check Screen.



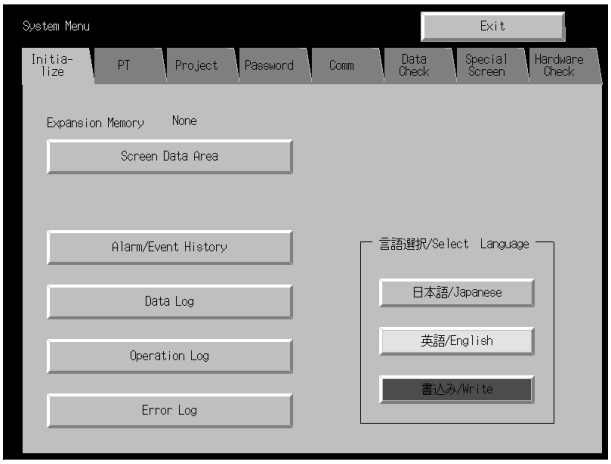
● Switching to RUN Status from the System Menu

Press the **Exit** Button to return to RUN mode.

6-2 Initializing Data

The PT can be initializes for the following data and the system language can be specified. Initialize the PT whenever necessary.

- Screen data area format
- Alarm/event history initialization
- Data log initialization
- Operation log initialization
- Error log initialization



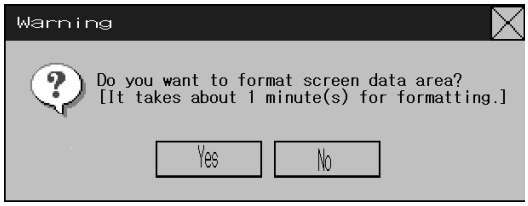
6-2-1 Screen Data Area Format

This function formats the PT screen data. Screen data must be formatted if it is corrupted and cannot start up properly. The data recorded for the operation log, alarm history, data log, and error log is not initialized when screen data is formatted.

Note Before formatting screen data, check that the screen data has been backed up from the NS-Designer.

Format the screen data by using operations from the Initialize Data Tab Page in the System Menu, as follows:

1. Press the **Screen Data Area** Button.
   A confirmation message will be displayed. Press the **Yes** Button to format the data. Press the **No** Button to cancel the initialize function.
   The NS7 finishes formatting instantly.



2. When the PT has completed formatting screen data, a dialog box will be displayed indicating that the screen data has finished being formatted.

3. An error message will be displayed if the System Menu is closed while screen data is being formatted. Always transfer the screen data from the NS-Designer or Memory Card after formatting.

Reference
- The PT must be restarted after screen data has been transferred.

6-2-2 Alarm/Event History Initialization

This function initializes the alarm/event histories saved in the PT.

Use this function when screen data has been changed, or for initializing history data.

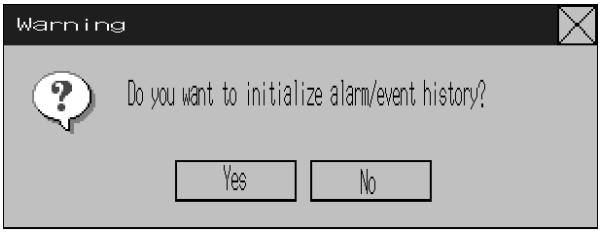
While the PT is running, the alarm/event histories continually check the status of bits registered as alarms/events and record the date, time, and number of times the bits turned ON/OFF.

Up to 1,024 alarms/events can be recorded.

Reference
- The alarm/event histories can also be initialized by turning ON $SB32 in system memory from the host.
- The alarm/event histories will be deleted when project data or system programs are downloaded.

Initialize alarm/event histories by using operations from the Initialize Tab Page in the System Menu, as follows:

1. Press the **Alarm/Event History** Button.
   A confirmation message will be displayed. Press the **Yes** Button to initialize the data. Press the **No** Button to cancel the initialize function.



2. When the PT has completed initializing the alarm/event histories, a dialog box will be displayed indicating that the alarm/event histories have finished being initialized.

6-2-3 Data Log Initialization

This function initializes the data log saved in the PT.

Use this function when screen data has been changed, or for initializing history data. The data log is used to record changes over time to the contents of an address that is registered in the log.

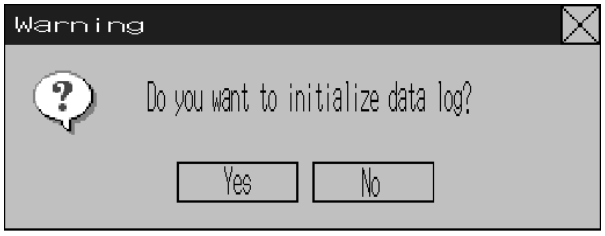
Up to 1,000 events can be recorded for each address.

Reference

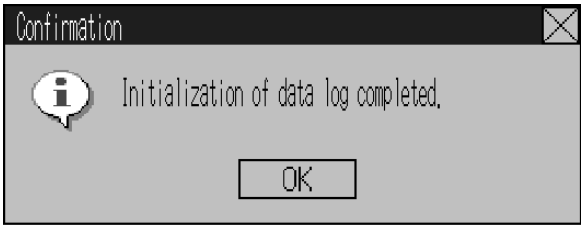
- The data log can also be initialized by turning ON $SB35 in system memory from the host. Refer to *2-4 System Memory* in the *PT Programming Manual* for details.
- The data log will be deleted when project data or system programs are downloaded.

Initialize the data log by using operations from the Initialize Tab Page in the System Menu, as follows:

1. Press the **Data Log** Button.
   A confirmation message will be displayed. Press the **Yes** Button to initialize the data. Press the **No** Button to cancel the initialize function.



2. When the PT has completed initializing the data log, a dialog box will be displayed indicating that the data log has finished being initialized.



6-2-4 Operation Log Initialization

This function initializes the operation log saved in the PT.

Up to 1,024 operations can be recorded in order of occurrence.

Use this function when screen data has been changed, or for initializing log data.

The operation log is used to record number of times the following operations are performed and the order in which they occur.

- Functional object operation history
- Screen display history
- Macro execution history

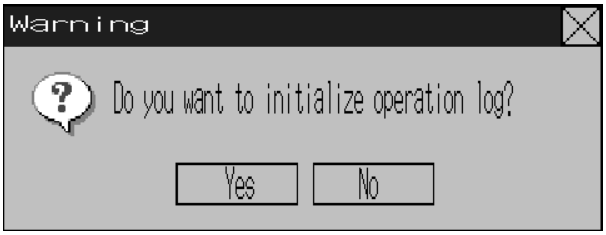
Refer to *2-4 System Memory* in the *PT Programming Manual* for details.

Reference

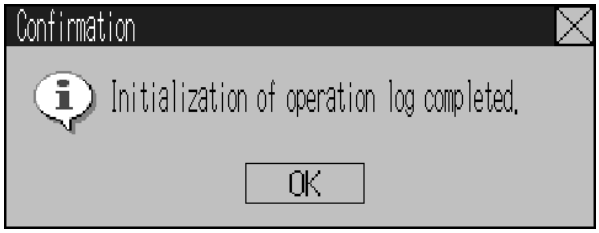
- The functional objects that can be recorded are ON/OFF buttons, word buttons, Numeral Display & Input, String Display & Input, and thumbwheel switches.
- The operation log data can also be initialized by setting the system bit memory address $SB37 to ON from the host. Refer to *2-4 System Memory* in the *PT Programming Manual* for details.
- The operation log will be deleted when project data or system programs are downloaded.

Initialize the operation log by using operations from the Initialize Tab Page in the System Menu, as follows:

1. Press the **Operation Log** Button.
   A confirmation message will be displayed. Press the **Yes** Button to initialize the data. Press the **No** Button to cancel the initialize function.



2. When the PT has completed initializing the operation log, a dialog box will be displayed indicating that the operation log has finished being initialized.



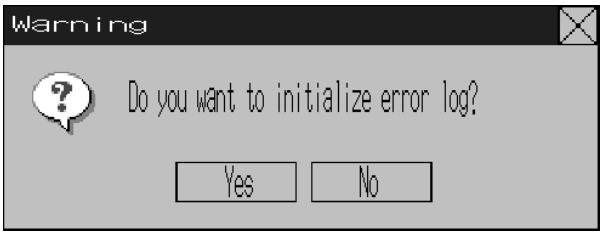
6-2-5 Error Log Initialization

This function initializes the macro error history saved in the PT.

Up to 100 errors can be recorded in the error log. The number of errors that can be recorded, however, also depends on the free space in the memory.

The error log records the errors that occur when the macro function is executed. Initialize the error history by using operations from the Initialize Tab Page in the System Menu, as follows:

1. Press the **Error Log** Button.
   A confirmation message will be displayed. Press the **Yes** Button to initialize the data. Press the **No** Button to cancel the initialize function.



2. When the PT has completed initializing the error log, a dialog box will be displayed indicating that the error log has finished being initialized.

Reference The error log is deleted when project data or system programs are downloaded.

6-2-6 Language Selection

The system language can be set to either Japanese or English. The system language will be used on the system menu, input keypads, message dialog boxes, etc, on the PT.

The system language is set from the **Initialize** Tab Page in the System Menu Window using the following procedure.

1. Select either Japanese or English in the *Select Language* Area.

2. After specifying the language, click the **Write** Button. The system language will be switched after the new setting has been saved.

Reference If ASCII codes are set as the character display format for String Display & INPUT, list display, or data block tables (character fields), the following character codes will be used depending on the system language that is set.

System Language	Character display	Example (character code B5)
Japanese	Shift-JIS code	ｲ
English	Latin 1code	µ

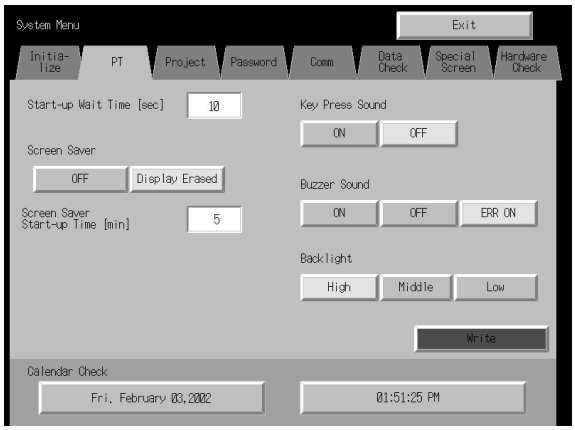
The above codes will also be used when indirect specifications are made for label strings for label objects.

6-3 PT Operating Settings

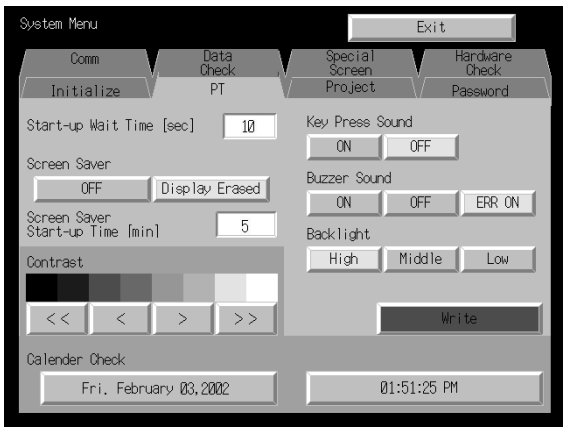
The PT Tab Page is used to set the following functions.

- Start-up wait time
- Screen saver
- Key press sound
- Buzzer sound
- Backlight
- Contrast (NS7 only)
- Calendar check

PT Tab Page for the NS12



PT Tab Page for the NS10 and NS7
(NS10 has no contrast adjustment.)



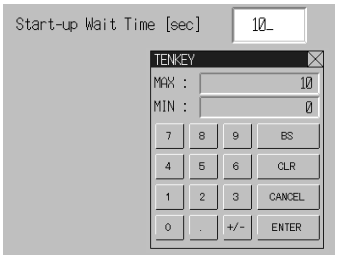
6-3-1 Start-up Wait Time

The start-up wait time refers to the waiting time before the PT starts communicating with the host after the PT power is turned ON or the PT is reset Set the system startup waiting time when the host requires time before it starts running.

The setting range is between 0 and 10 s and the default is 0 s.

Set the system startup waiting time by using operations from the PT Tab Page in the System Menu, as follows:

1. Set the waiting time in the *Start-up Wait Time* field in second units.
   Input the value in the dialog box that is displayed by pressing the setting input column.



2. After setting, press the **Write** Button to save the setting.

Reference

- Nothing is displayed during the system startup waiting time.
- The system startup waiting time is calculated from when initialization finishes. Therefore, if the startup waiting time is set to 0 s, the PT will not start actual communications with the host immediately after the power is turned ON.

6-3-2 Screen Saver

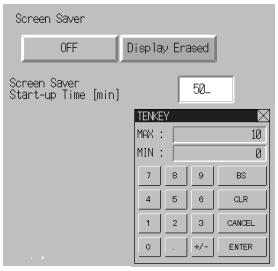
To extend the life of the backlight, the screen saver function turns OFF the screen display when operations are not performed for a fixed period of time.

The default setting is for no screen saver.

The time before the screen saver function is activated can be set in one-minute units between 1 and 255 minutes. The default setting is 15 min.

Set the screen saver movement by using operations from the PT Tab Page in the System Menu, as follows:

1. Select either ***OFF*** or ***Display Erased*** for the screen saver.
2. If ***Display Erased*** is selected, set the screen saver startup time.
   Input the value in the dialog box that is displayed by pressing the setting input column.



3. After setting, press the **Write** Button to save the setting.

Reference Pressing any part of the touch panel will cancel the screen saver and display the previously displayed screen. When canceling the screen saver, If the part of the touch panel corresponds to the input for a functional object, the screen saver will be cancelled only. The input for the functional object will not be processed.

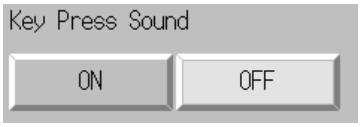
6-3-3 Key Press Sound

This function sets whether an input sound is heard when the touch switches that allow input functions for the PT are pressed.

ON: Input sound is heard when the touch switches that allow input functions for the PT are pressed.
OFF: Input sound is not heard when the touch switches that allow input functions for the PT are pressed.

The default setting is ON.

1. Select either ***ON*** or ***OFF*** for the touch switch input sound.



2. After setting, press the **Write** Button to save the setting.

6-3-4 Buzzer Sound

The buzzer is used at times such as when a command from the host is received or an error occurs. This function is set to ON or OFF in the System Menu.

ON: Buzzer turns ON when a command is received from the host or an error occurs.
OFF: Buzzer is OFF.
ERR ON: Buzzer turns ON when an error occurs only.

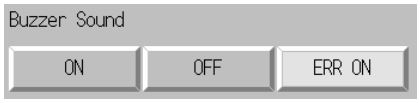
The default setting is ERR ON.

Reference

- Other commands and settings associated with the buzzer exist, but the settings here have the highest priority.
- When the buzzer is set to ON or ERR ON, the buzzer will be heard when messages are displayed with a cross (X) or exclamation mark (!) icon.
- Refer to *2-17 Special Functions* in the *Programming Manual* for details on the buzzer function.

Set the buzzer to ON/OFF by using operations from the PT Tab Page in the System Menu, as follows:

1. Select either ***ON***, ***OFF***, or ***ERR ON*** for the buzzer setting.



2. After setting, press the **Write** Button to save the setting.

6-3-5 Backlight

This function sets the backlight brightness to one of three levels.

The default setting is high.

Set the brightness of the backlight by using operations from the PT Tab Page in the System Menu, as follows:

1. Select one of the three backlight brightness levels to set to high, middle, or low.

2. After setting, press the **Write** Button to save the setting.

6-3-6 Calendar Check

This function displays the time and date of the PT's internal system clock.

The factory settings for the date and time are not correct.

Set and display the date and time by using operations from the PT Tab Page in the System Menu, as follows:

1. The currently set date and time will be displayed in the *Date and Time Setting* field.
2. To change the date/time, set the date/time in the dialog box that is displayed by pressing the date and time field.

- Use the following input format to set the date:
  yyyy.mm.dd (yyyy: year, mm: month, dd: day)
  Set the year using four digits.
  Example: Set March 15, 2002 as **2002.3.15**. (Adding 0 prefix to single-digit settings is not required.)

- Use the following input format to set the time.
  hh.mm.ss (hh: hour, mm: minute, ss: second)
  Set the year using the 24-hour clock.
  Example: Set 06:01:01 p.m. as **18.1.1**. (Adding 0 prefix to single-digit settings is not required.)

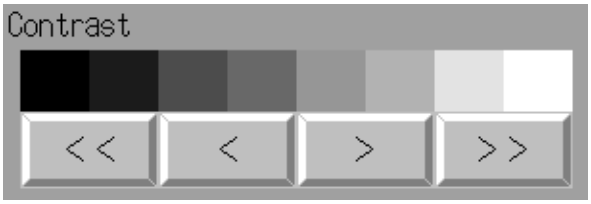
3. Press the **Enter** Button to enable the settings.

6-3-7 Contrast (NS7 Only)

This function adjusts the screen contrast. Contrast can be adjusted in 100 degrees.

Adjust the contrast by using operations from the PT Tab Page in the System Menu, as follows:

1. Change the contrast setting using the left and right arrow buttons (<<, <, >, >>) for contrast adjustment. The contrast will change as soon as the buttons are pressed.



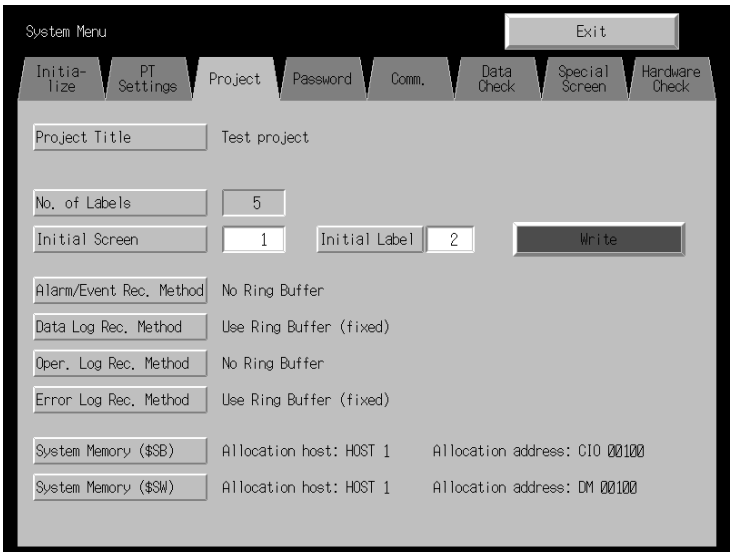
<< Button: Decreases the contrast by ten degrees.
< Button: Decreases the contrast by one degree.
> Button: Increases the contrast by one degree.
>> Button: Increases the contrast by ten degrees.

Check the contrast from the sample display of eight shades above the arrow buttons.

6-4 Project Settings

The Project Tab Page is used to display and set the following functions.

- Project title
- Number of labels
- Initial screen
- Initial label
- Alarm/event history recording method:
  Method for recording log of generated and deleted alarms/events.
- Data log recording method:
  Method for recording log of changes to addresses.
- Operation log recording method:
  Method for recording log of functional object operations, screen switching, and macro executions.
- Error log recording method:
  Method for recording log of macro execution errors.
- System memory:
  The addresses allocated in system memory will be displayed.



6-4-1 Project Title

This function displays title of projects that are registered in the PT.

The title is read-only and cannot be edited.

6-4-2 Number of Labels

Multiple label data can be created in each project. This function displays the number of labels set for the project that is registered in the PT.

The number of labels is read-only and cannot be edited.

Reference
- Refer to *3-9 Project Properties in the NS-Designer Operation Manual* for information on setting multiple labels for a project.
- Refer to Labels in *2-8 Common Functional Object Functions* in the Programming Manual for information on how to set multiple labels for a functional object.

6-4-3 Initial Screen

This function displays and sets the screen number of the screen that is first displayed when the PT is started.
Display and set the initial screen number by using operations from the Project Tab Page in the System Menu, as follows:

1. The number of the screen that is displayed when the PT is started is displayed in the initial screen field.
2. To change the initial screen number, input the value using the tenkey, which is displayed by pressing the display area.
3. After setting, press the **Write** Button to save the setting.

Reference The initial screen number can also be set from the NS-Designer.

6-4-4 Initial Label

This function displays and sets the label number that is shown on the screen when the PT is started.

Reference This initial label number can also be set from the NS-Designer.

6-4-5 Alarm/Event History Recording Method

This function displays the method for recording the alarm/event histories. The alarm/event history recording method is read-only and cannot be edited.
This alarm/event history recording method is set from the NS-Designer.

If a ring buffer is used, when the specified number of records is exceeded, the oldest data is deleted and the new data is recorded.

If the ring buffer is not used, the PT stops collecting history data when the specified number of records has been reached. Initialize the alarm/event histories to reopen the history records.

Reference Refer to *6-2-2 Alarm/Event History Initialization* for details on initializing the alarm/event histories.

6-4-6 Data Log Recording Method

This function displays the data log recording method.

The data log recording method is read only and cannot be edited.

The use of a ring buffer for the data log recording method is fixed.

When the specified number of log entries is exceeded, the oldest data is deleted and the new data is recorded.

Use the NS-Designer to set the number of log entries.

Reference Refer to *6-2-3 Data Log Initialization* in this manual and Data Log Function in *2-18 Special Functions* in the Programming Manual for details on the data log.

6-4-7 Operation Log Recording Method

This function displays the method for recording the operation log. The operation log recording method is read only and cannot be edited. This operation log recording method is set from the NS-Designer.

If *Save in Ring Buffer Format* is set, when the specified number of items is exceeded, the oldest data is deleted and the new data is recorded.

If the log is not saved in ring buffer format, the PT stops collecting log data when the specified number of items has been reached. Initialize the operation log to reopen the record.

Reference Refer to *6-2-4 Operation Log Initialization in* this manual and Operation Log Function in *2-18 Special Functions* in the Programming Manual for details on the operation log.

6-4-8 Error Log Recording Method

This function displays the error log recording method. The error log recording method is read only and cannot be edited. The use of a ring buffer for the error log recording method is fixed.

When the maximum number of items is exceeded, the oldest data is deleted and the new data is recorded.

Reference Refer to *6-2-5 Error Log Initialization* in this manual and Error Log Function in *2-18 Special Functions* in the Programming Manual for details on the error log.

6-4-9 System Memory

The system memory is used to control the PT and exchange information between the host and the PT, such as notifying the host of PT status. The system memory can be allocated to host addresses or to PT memory.

Allocating the system memory as host addresses allows operations such as controlling the PT from the host. The allocated location in the host is displayed in the System Memory and cannot be edited.

The location where the system bit memory and system word memory is allocated (allocated host and address) is displayed in the System Bit Memory ($SB) and System Word Memory ($SW).

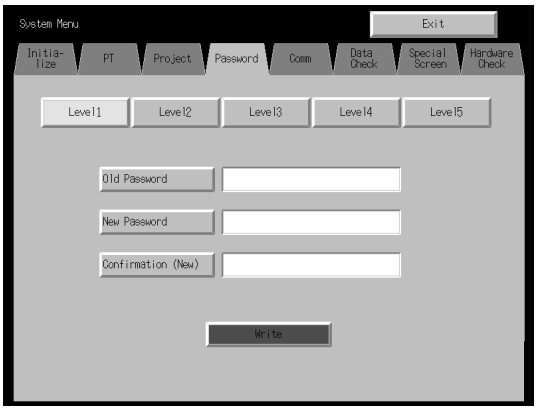
Reference Refer to *2-4 System Memory* in the PT Programming Manual for details on the system memory.

6-5 Setting Passwords

NS-series PTs can be set to request a password for operating functional objects. The passwords are set from the NS-Designer and up to five passwords can be set for a single project. The passwords cannot be changed from the System Menu.

Change passwords using the following procedure from the System Menu.

1. Select the **Password** Tab.



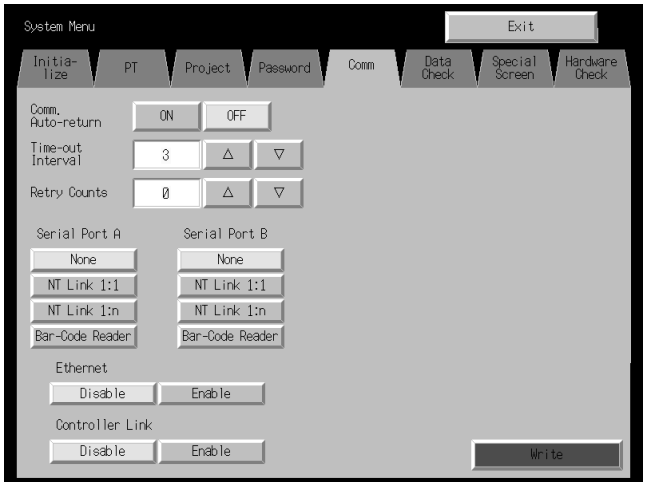
2. Select the password to be changed using the **Level 1** to **Level 5** Buttons.
3. Input the old password and new password in the corresponding fields, and then input the new password again in the confirmation field. Input the password using the virtual keyboard (text input dialog box) that is displayed by pressing the input column.

4. After changing the password, press the **Write** Button to save the setting. Save separately for each password level that is changed.

Note When changing passwords, do not reset the PT or turn OFF the power until the write operation has been completed (i.e., the **Write** Button has returned to the status before being pressed). If the password is not saved properly, the screen may malfunction.
If the password is forgotten, it cannot be checked from the PT. Check the password using the NS-Designer.

6-6 Communications Settings

The methods for setting the communications conditions with the host are described here.



6-6-1 Communications Conditions

Set the communications conditions by using operations from the Comm Tab Page in the System Menu, as follows:

After inputting the communications conditions, press the **Write** Button to save the settings.

Changed settings are enabled after the PT is restarted.

● Communications Conditions Setting Items

The setting items for the communications conditions between the PT and host are as follows:

- **Communications Auto-return**

Select whether or not to use communications auto-return using the **ON** and **OFF** Buttons.

ON: The PT will automatically return to RUN mode when a communications error occurs, without displaying an error message dialog box.

OFF: The PT will stop running when a communications error occurs and an error message dialog box will be displayed. Press the **OK** Button in the error message dialog box to return to RUN mode. The default setting is OFF.

- **Time-out Interval**

Set the time before a timeout error occurs when a response is not received from the host. The timeout interval can be set to between 1 and 10 (unit: s). Input the value by using the tenkey or the Up (△) and Down (▽) buttons that are displayed by pressing the display area.

The default setting is 3 s.

- **Retry Counts**

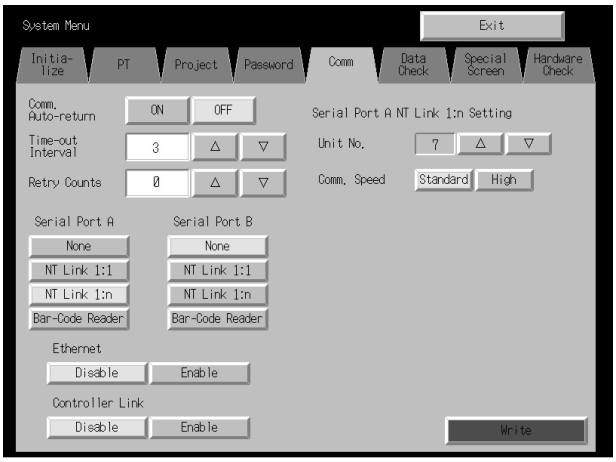
Set the number of retries for communications before an error screen will be displayed, when a communications error occurs while communicating with the host. If communications are un-

successful after the number of communications retries specified here have been executed, processing set for the communications auto return will be executed. The number of retries can be set to between 0 and 255 times. Input the value by using the tenkey or the Up (△) and Down (▽) buttons that are displayed by pressing the display area.

The default setting is 5 retries.

- **Port Communications Method and Communications Type**

Set the communications method for serial ports A and B, for Ethernet and for Controller Link. The right half of the screen will change according to the settings.



Reference To change the communications method for another port, the **Write** Button must be pressed before continuing. The settings will not be saved if the communications method is switched without pressing the **Write** Button.

● Supported Communications Method Combinations

Serial ports A and B cannot be used at the same time as a Bar Code Reader.

Serial ports A and B, Ethernet and Controller Link can be used in any combination with other communications methods.

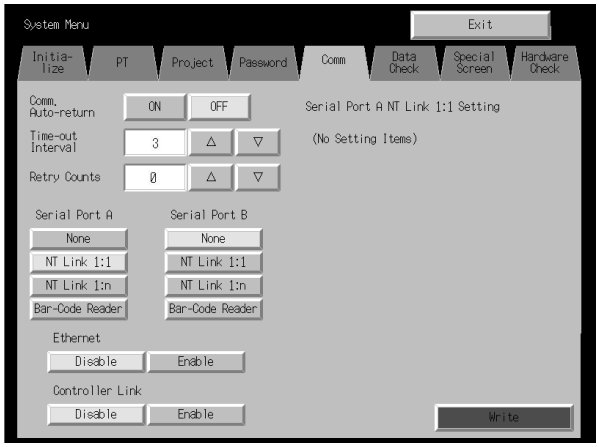
Serial ports A and B, Ethernet and Controller Link, however, cannot be all used simultaneously (except when using a Bar Code Reader).

Reference Serial ports A and B, Ethernet and Controller Link can be set to be used simultaneously, but proper operations cannot be guaranteed (except when using a Bar Code Reader). Therefore, do not set all the ports to be used simultaneously.

6-6-2 Setting 1:1 NT Link

Select the **Comm** Tab from the System Menu, and press the **NT Link 1:1** Button as the communications method for serial port A or B.

After setting, press the **Write** Button to save the setting.



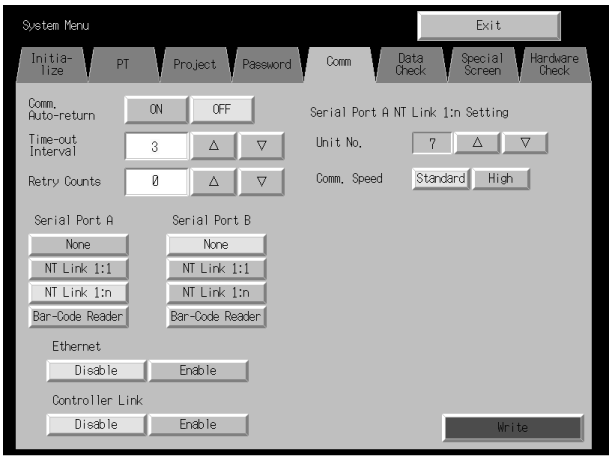
When 1:1 NT Link is selected, there are no details settings.

6-6-3 Setting High-speed 1:N NT Links (Standard, High-speed)

Select the **Comm** Tab from the System Menu, and press the **NT Link 1:N** Button as the communications method for serial port A or B.

The setting items for high-speed 1:N NT Links will be displayed on the right side of the screen. Set the unit number and communications speed.

After setting, press the **Write** Button.



- **Communications Conditions for 1:N NT Links**

Setting item	Function	Settings
Unit number	Sets the unit number.	0 to 7
Communications Speed	Sets the baud Communications speed.	Standard, high-speed

Reference The unit number is the number used by the host to identify each PT when more than one PT is connected to a single host.

The unit numbers that can be set depend on the type of host used, as follows:

- C200HE(-Z):
  Unit numbers 0 to 3 (up to four PTs for each port of the host)
- C200HG(-Z), C200HX(-Z), CS1G/H, CS1G/H-H, CQM1H, CJ1G, and CJ1G/H-H:
  Unit numbers 0 to 7 (up to eight PTs for each port of the host)

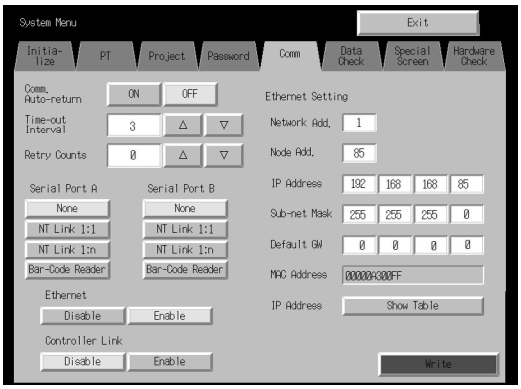
Refer to *4-2 1:N Connection to the Host* for the host settings.

6-6-4 Setting Ethernet

To use Ethernet, select the **Comm** Tab from the System Menu and press the **Enable** Button.

The setting items for Ethernet will be displayed on the right side of the screen. Display and set the network address, node address, IP address, subnet mask, and default gateway. Display the MAC address and IP address table display.

After setting, press the **Write** Button.



• Setting Ethernet Communications Conditions

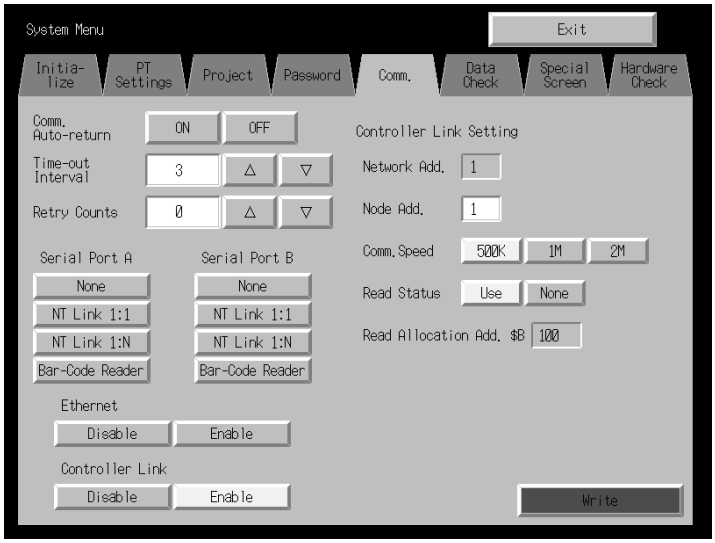
Setting item	Function	Settings
Network Add.	Sets the network address used for Ethernet communications.	1 to 127
Node Add.	Sets the local node address.	0 to 126
IP address	Sets the local IP address.	0.0.0.0 to 255.255.255.255 (See note.)
Sub-net	Sets the subnet mask of the local node.	0.0.0.0 to 255.255.255.255
Default gateway	Sets the IP router.	0.0.0.0 to 255.255.255.255
MAC address	Displays the MAC address (device-specific information to identify each device connected to the network.)	Read-only.
IP address table display	Displays the node number and IP address of other nodes connected to Ethernet.	Read-only.

Note: Do not set the following values for the IP address.
Host ID with all bits set to 0 or 1 (e.g., **192.168.21.0**).
Net ID with all bits set to 0 or 1 (e.g., **255.255.21.16**).
Subnet ID with all bits set to 1 (e.g., **192.168.255.16**).
IP addresses that begin with 127 (e.g., **127.35.21.16**).

6-6-5 Setting the Controller Link Network

If using a Controller Link Network is enabled for the project, settings for the network will be displayed on the right side of window. Set the node address and baud rate (Comm. Speed).

Click the **Write** Button after setting these items. The Controller Link is supported by the NS12 and NS10 PTs only, and is not supported by the NS7 PTs.



・Setting Communications Conditions for the Controller Link Network

Item	Function	Setting
Network Add.	Displays the network address used for Controller Link.	Display only
Node Address	Sets the local node address.	1 to 32
Comm. Speed	Sets the baud rate.	500K, 1M, or 2M
Read Status	Displays whether Controller Link status is read (display only).	
Read Allocation Add.	Displays address where status is read (display only).	

Note: Using the Controller Link network and the network number cannot be changed at the PT. If you change the setting, select ***System Setting*** on NS-Designer, change the setting, and then transfer the project to the PT.

6-6-6 Setting Bar Code Readers

The PT has a Bar Code Reader input function allowing input of barcode data as character strings in the String Display & Input object.

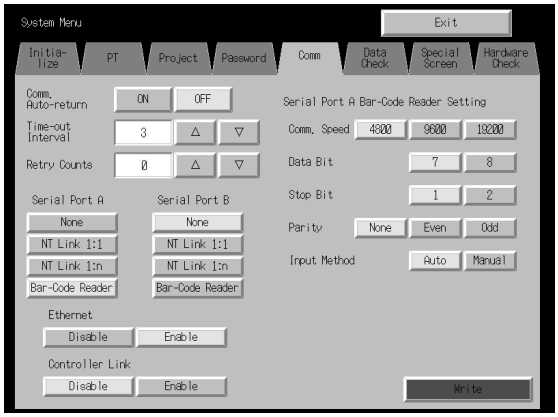
The methods for setting the communications conditions with the Bar Code Reader are described here.

Reference

- Refer to *3-4 Connecting to Bar Code Readers* for information on methods for connecting Bar Code Readers.
- The Bar Code Reader can be connected to either serial port A or serial port B only.

Set the communications conditions and confirmation method for the Bar Code Reader using the following procedure from the System Menu.

Set the Bar Code Reader's communications method for serial port A or serial port B.
The setting items for the Bar Code Reader will be displayed on the right side of the screen. Set the Communications speed, data bits, stop bits, parity, and input method.
After setting, press the **Write** Button to save the settings.



- **Setting Communications Conditions for Bar Code Reader Mode**

Setting item	Function	Settings
Communication speed	Sets the Communications speed for communications with the Bar Code Reader.	4800, 9600, or 19200 (bps)
Data bits	Sets the data bit length.	7 or 8 bits
Stop bits	Sets the data stop bit length.	1 or 2 bits
Parity	Sets the data parity bits.	None, odd, or even
Input method	Sets the confirmation method used after inputting data in the input column.	Auto or manual confirmation

6-7 Screen Data Check

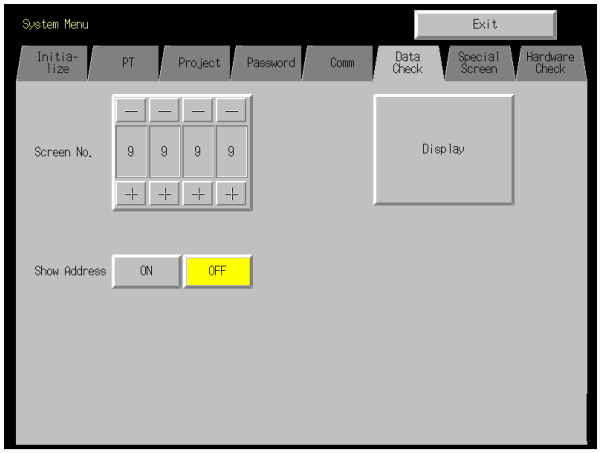
Registered screens (numbers 0 to 3,999) can be displayed and checked using operations from the System Menu.

Reference

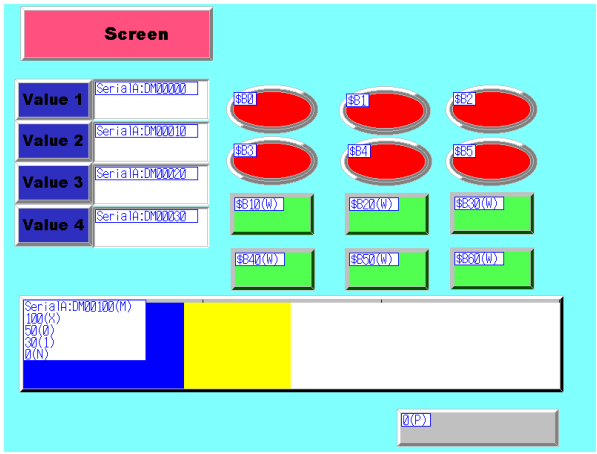
- The screen displayed when checking screen data is a sample and cannot be used to communicate with the host. The flicker function is also disabled.
- Only the user screens (0 to 3,999) can be displayed. System screens cannot be displayed.

Display check screens by using the following procedure from the System Menu.

1. Select the **Data Check** Tab.



2. Set the screen number and press the **Display** Button to display the screen as a sample.
3. Press the **ON** Button next to the *Show Address* heading and display the sample screen to display the set address instead of the functional object label.



4. Press any part of the sample screen that is displayed to return to the Screen Data Check Screen.

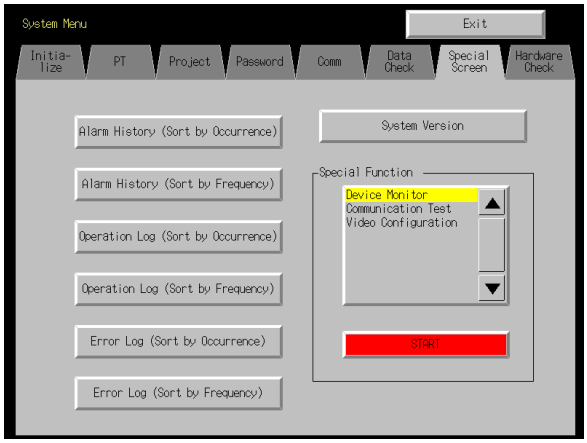
Reference Addresses are not displayed for data block tables.

6-8 Special Screens

These screens are used to display the data histories, device monitor, communications test, and version information.

Item		Function
Alarm history		Displays the alarm history.
Operation log		Displays the operation log.
Error log		Displays the error log.
Special function		Performs the following special functions.
	Device monitor	Switches PLC operating modes, displays and changes specified PLC addresses, and displays and deletes PLC error data. Refer to *6-8-4 Device Monitor* for information on how to display the Device Monitor Screen. Refer to *Device Monitor* in *2-18 Special Functions* in the *Programming Manual* for details on the device monitor.
	Communications test	Checks the PT communications functions.
	Video Configuration	Performs video configuration.
	External applications	Starts external applications.
System Version		Displays information on the PT version.

Details on how to use the functions are explained here.

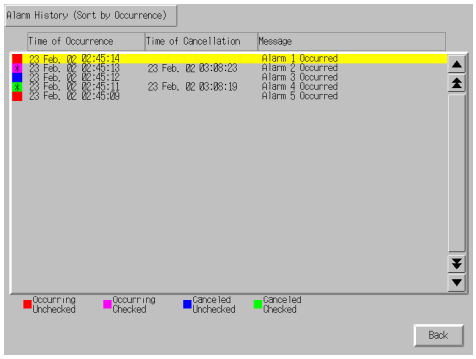


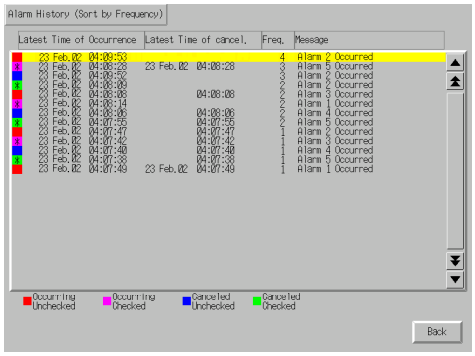
6-8-1 Alarm History

This function displays the alarm history. The alarm history can be displayed in order of occurrence or frequency.

Display alarm history data by using operations from the Special Screen Tab Page in the System Menu, as follows:

1. Press the **Alarm History (Sort by Occurrence)** Button or **Alarm History (Sort by Frequency)** Button to display the history contents.





2. Press the **Back** Button to return to the Special Screen.

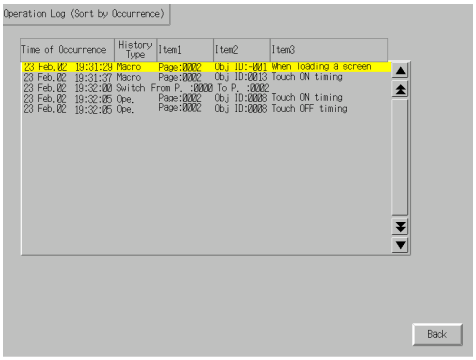
Reference Refer to *Alarm/Event History* in *2-18 Special Functions* in the *Programming Manual* for details on the alarm history function.

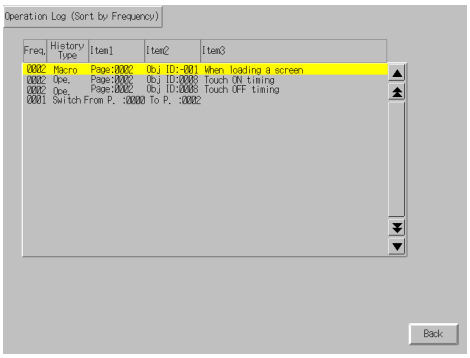
6-8-2 Operation Log

This function displays the operation log. The operation log can be displayed in order of occurrence or frequency.

Display operation log data by using operations from the Special Screen Tab Page in the System Menu, as follows:

1. Press the **Operation Log (Sort by Occurrence)** Button or **Operation Log (Sort by Frequency)** Button to display the operation log contents.





2. Press the **Back** Button to return to the Special Screen.

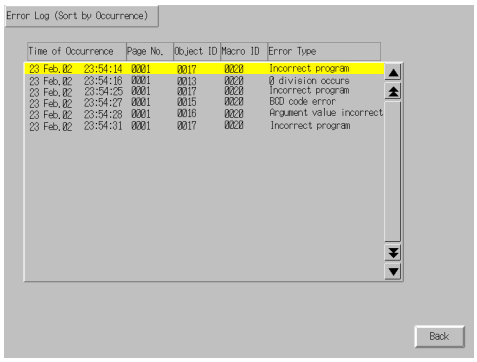
Reference Refer to *6-2-4 Operation Log Initialization* in this manual and *Operation Log* in *2-18 Special Functions* in the *Programming Manual* for details on the operation log.

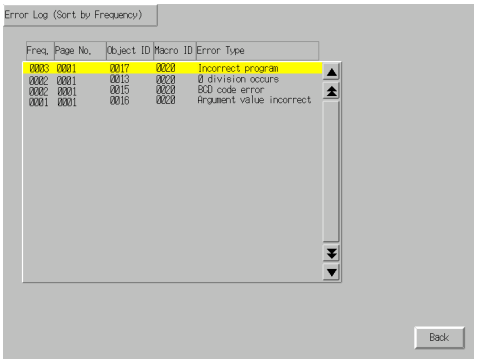
6-8-3 Error Log

This function displays the macro error history. Macro errors can be displayed in order of occurrence or frequency.

Display error log data by using operations from the Special Screen Tab Page in the System Menu, as follows:

1. Press the **Error Log (Sort by Occurrence)** Button or **Error Log (Sort by Frequency)** Button to display the error log contents.





2. Press the **Back** Button to return to the Special Screen.

Reference Refer to *6-2-5 Error Log Initialization* in this manual and *Error Log* in *2-18 Special Functions* in the *Programming Manual* for details on the error log.

6-8-4 Device Monitor

The device monitor is an expansion function of the PT. This function is supported by CPM1A, CPM2A, CPM2C, CQM1, CQM1H, C200HS, C200HX/HG/HE(-Z), CS1G/CS1H-H, and CJ1G PLCs.

The device monitor has the following functions.

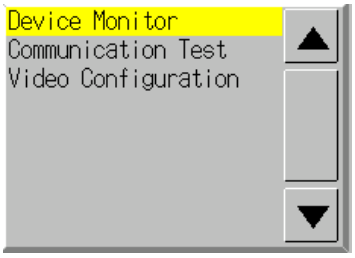
- Switches the PLC operating modes.
- Displays, changes, and performs force-sets/resets of current values in specified addresses (registered monitor).
- Displays a list of the current values (continuous monitor) in consecutive addresses (DM, EM, and WR Area words).
- Displays PLC error information (error logs) and deletes the errors (error information).

Details on methods of opening the Device Monitor Screen are explained here. Refer to *Device Monitor* in *2-18 Special Functions* in the *Programming Manual* for details on the function and operation methods.

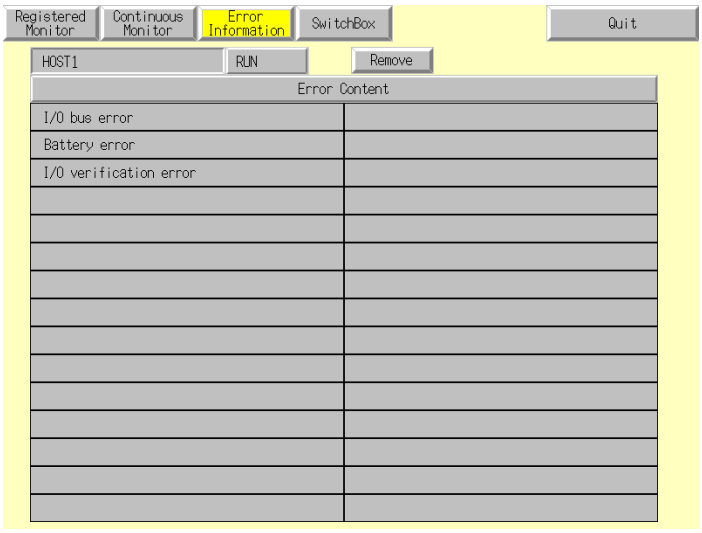
Note Always check carefully that the system is safe before performing the following operations using the device monitor.
- Changing the monitor data and timer/counter current values.
- Switching operating modes.
- Performing force-sets/resets
- Changing timer/counter set values.

The Device Monitor Screen is displayed by using operations from the Special Screen Tab Page from the System Menu, as follows:

1. Select ***Device Monitor*** from the *Special Functions* List box, and press the **START** Button.



2. The Device Monitor Screen will be displayed.



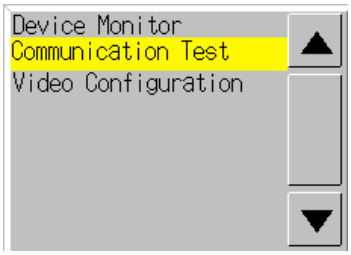
3. Press the **Quit** Button to return to the Special Screen.

6-8-5 Communication Test

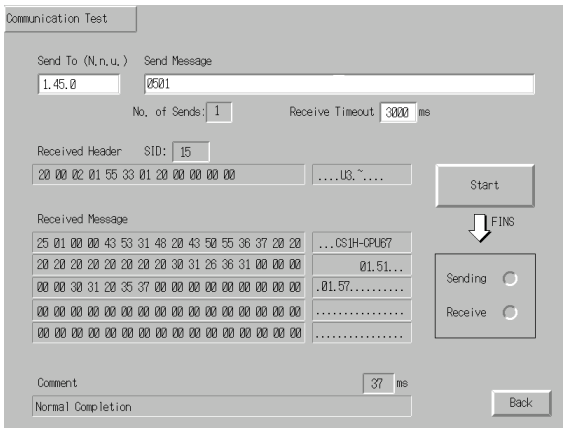
This function checks whether communications are enabled, by performing simple communications.

Display the Communication Test Screen by using operations from the Special Screen Tab Page in the System Menu, as follows:

1. Select ***Communication Test*** from the *Special Functions* List Box, and press the **START** Button.



2. Press the **Communication Test** Button to switch to the Communications Test Screen.



3. Set each of the setting items, as follows:

- **Setting and Display Items in Communication Test Screen**

Item	Details
Send to	Sets the address of the transmission destination in the format **(network address).(node address).(unit number)**. Sets the following addresses when performing a communications test for a node connected to serial port A or B. Serial port A: **111.1.0** Serial port B: **112.1.0**
Send message	Sets the FINS command being to be sent.
Number of sends	Displays the number of times messages are transmitted. The number of times is fixed to 1.
Receive Timeout	Sets the time before the message timeout occurs. Displays an error message when the timeout time is exceeded after transmission. The setting time is applicable for Ethernet only. For serial communications, the timeout monitor time set from the Comm Tab is used.

4. Press the **Start** Button to start transmission.
   The sending indicator will remain lit until the transmission is completed.
   After transmission, the Receiving indicator will remain lit until reception is completed.
5. If communications are normal, a response will be received from the transmission destination and the following items will be displayed. Refer to the *FINS Command Reference Manual (W227)* for details on FINS commands and information displayed in comments.

- **Display Items in Communication Test Screen**

Item	Details
SID (See note 1.)	The SID used for transmission is displayed as a hexadecimal. The SID is incremented between 0 and 0xFF and returns to 0 after 0xFF is exceeded.
Received header	Displays the FINS header that is received. (See note 2.)
Received message	Displays the received message.
ms	Displays the time lapsed in ms from sending the FINS command until receiving the FINS response.
Comment	Displays the status, such as “normal completion,” according to the completion code after reception.

Note 1. SID is the source process ID.
2. The FINS header is the header that precedes the FINS command.

Refer to the *FINS Command Reference Manual (W227)* for details on FINS commands.

6. Press the **Back** Button to return to the Special Screen.

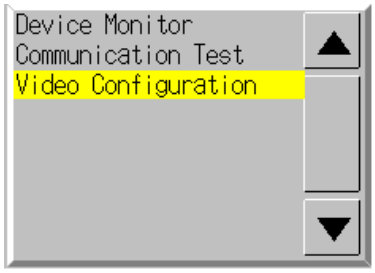
6-8-6 Video Configuration

A Video Input Unit can be mounted to the NS12 and NS10 to display images on the PT by connecting video devices. The user can adjust the image and output signals to a Vision Sensor from this window.

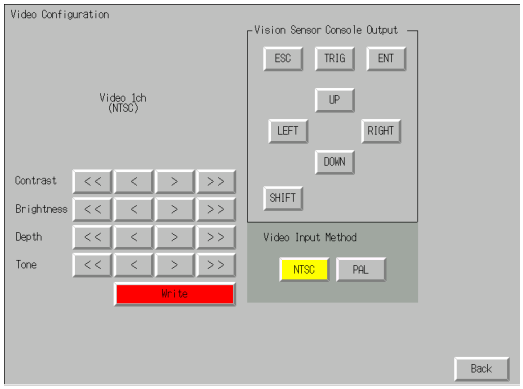
This section describes only the procedure for opening the window. For details, refer to *2-18-10 Video Configuration* in the *NS Series Programming Manual*.

The Video Configuration Window can be access by selecting the ***System Menu*** and clicking the **Special Screen** Tab as shown below.

1. Select ***Video Configuration*** from the list under *Special Function*, and click the **Start** button.



The Video Configuration Window will be displayed.



2. Press the **Back** Button to return to the **Special** Window.

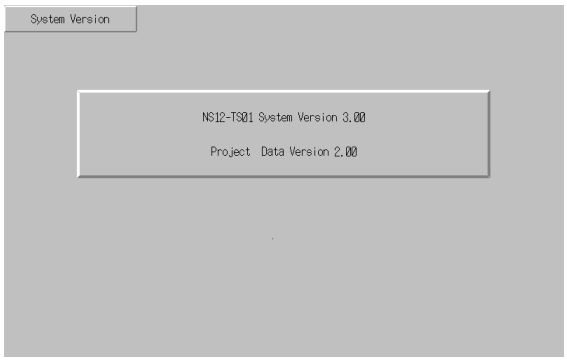
Reference	Press the **Write** Button to save the adjustments to the displayed image. When starting the PT next time, the saved settings for the adjustments will be automatically reflected on the display.

6-8-7 Version Display

This function displays information on the PT version.

Display the Version Display Screen by using operations from the Special Screen Tab Page in the System Menu, as follows:

1. Press the **System Version** Button to switch to the Version Display Screen.
2. The product model and version will be displayed.

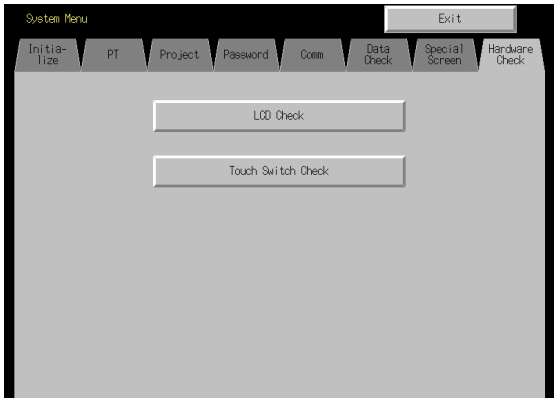


3. Press the **Back** Button to return to the Special Screen.

6-9 Hardware Check

The hardware check is used to check the following functions.

Item	Function
LCD check	Checks the LCD.
Touch switch check	Checks touch panel input.

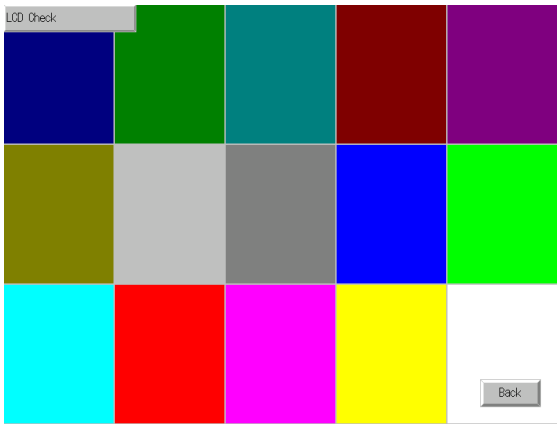


6-9-1 LCD Check

This function checks whether the LCD (screen display) is operating normally.

Check the LCD by using operations from the Hardware Check Tab Page in the System Menu, as follows:

1. Press the **LCD Check** Button to switch to the LCD Check Screen.



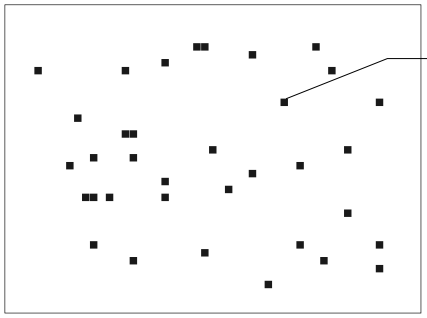
2. Press the ***Back*** Button to return to the Hardware Check Screen.

6-9-2 Touch Switch Check

This function checks whether the touch switches are operating normally.

Check the touch panel by using operations from the Hardware Check Tab Page in the System Menu, as follows:

1. Press the **Touch Switch Check** Button to switch to the Touch Switch Check Screen.
2. Press the screen. If the part of the screen touched is shown in inverse display, the touch switch is operating normally.



3. Press the button in the top right corner to return to the Hardware Check Screen.

Reference Two points cannot be touched at the same time on the Touch Panel Check Screen.

6-10 Starting Operations

The host and PT connected to it start operating after the project data has finished being transferred and the System Menu settings (communications conditions with the host, etc.) have been completed.

Note Start actual operation only after sufficiently checking the operation of the screen data and host programming.

● Switching to RUN Mode and Starting Up

Pressing the Exit Button at the top right of the screen in the System Menu will display the screen that was displayed before moving to the System Menu, change the status to RUN mode, and start running the PT. The pop-up screens that were open before switching to the System Menu, however, will not be displayed.

Reference The error message indicating a project read error will be displayed if the System Menu is closed while screen data is being initialized. Always transfer the screen data from the NS-Designer or Memory Card after initializing screen data.

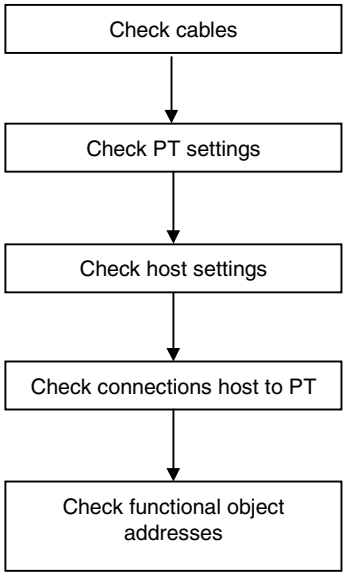
● Checking Communications with the Host

Execute the host program and check that the following operations are normal.

- Check that the PT screens will switch according to the host program.
  If the screen displays cannot be switched normally, check whether the PT and host are connected properly, and whether the hardware settings are correct. For details, refer to *Section 4 Connecting the Host to the Serial Port* or *Section 5 Connecting to Host via Ethernet or Controller Link*.
- Use the Support Software (CX-Programmer, etc.) to display the details on words and bits to check that the results of PT button operations and numerical/character string input operations have been properly transmitted to the host.
- If the operation results are not transmitted to the host properly, check the object settings. Refer to the object descriptions in the *PT Programming Manual* for details on object settings.

● Communications Not Established with Host

Use the following procedure to check communications if the PT and host are not communicating normally.



Check the cable models and cable pins.
Refer to *Appendix 5 Preparing Connecting Cables.*

Check the communications settings under the System Menu.
Refer to *6-6 Communications Settings.*

Check the host settings using the CX-Programmer or other Programming Device. Refer to *Section 4 Connecting to Host with Serial Port* and *Section 5 Connecting to Host via Ethernet or Controller Link.*

Check the connections between the PT and the host. Refer to *Section 4 Connecting to the Host with Serial Port* and *Section 5 Connecting to Host via Ethernet or Controller Link*.

Check the addresses and host names set for functional objects. Be sure that all address settings are within range.

Note The whole system may stop, depending on the method used to turn the power ON and OFF. Always follow the specified procedure when turning the power ON or OFF.

Section 7

Maintenance and Troubleshooting

This section describes the maintenance and inspection methods for preventing errors occurring, and troubleshooting measures when errors occur in the PT.

7-1 Maintenance

Perform maintenance operations to maintain the PT in optimum condition.

⚠ WARNING

Do not attempt to take the Unit apart and do not touch any internal parts while the power is being supplied. Doing either of these may result in electrical shock.

● Backing up Project Data

Always back up project data and store it in a safe place when the PT malfunctions and needs to be sent out for repair, or when replacing the Unit.

● Spare Units

Prepare a spare PT to allow quick recovery of the system at such times as when the PT malfunctions, or the service life of the backlight has expired causing poor screen visibility.

● Backlight

The backlight must be replaced when the brightness of the display backlight dims and the display becomes difficult to see. The backlight cannot be replaced by the user.

Contact your nearest OMRON representative.

- **Backlight Replacement Guidelines**

Replace the backlight according to the following guidelines under normal conditions.

After 50,000 hours of use at room temperature and humidity.

The service life of the backlight will be especially shortened if used in a low-temperature environment. Replace the backlight when the brightness dims and the display becomes difficult to see.

7-1-1 Replacing the Battery

Use a lithium battery to back up data other than screen data, such as calendar, clock, and log data.

The battery service life is approximately five years at 25°C. The service life will be shortened if the battery is used at higher temperatures. Replace the battery periodically, according to the operating environment.

Keep a spare battery available, so that the battery can be replaced immediately when required.

- **Battery Models**

C500-BAT08 (For both NS12 and NS10)

CPM2A-BAT01 (For NS7)

- **Replacement Guidelines**

The guidelines for replacing the battery are as follows:

- Replace when five years have lapsed since a new battery was installed in the Unit.
- Replace within five days after the RUN indicator lights orange.

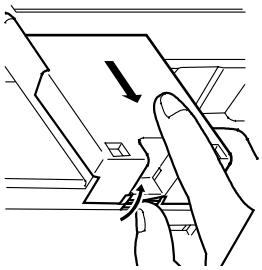
Note Never use batteries that have been subjected to a severe shock, such as being dropped on the ground. Batteries subjected to shock may leak.

- **Replacement Method**

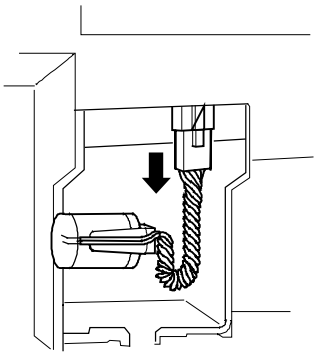
Perform the following procedure within five minutes to replace the battery.

The shape of the battery cover and the direction for installing the connector depend on the PT model.

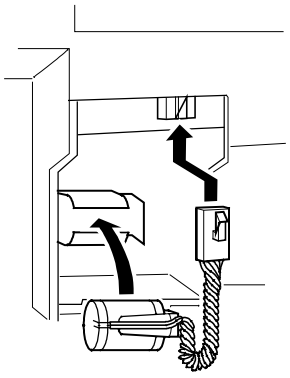
1. After power to the PT has been turned ON and at least five minutes have lapsed, turn OFF the power.
2. Open the battery cover on the rear panel of the PT.



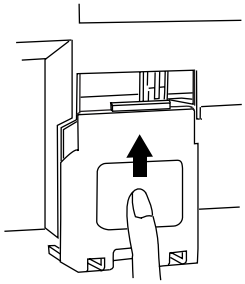
3. Remove the battery that is secured under the battery cover, grasp the cable, and pull the connector out straight to remove it.



4. Connect the new battery connector, and insert the battery into the battery holder.



5. Close the battery cover, being careful not to squash the battery cable.



7-2 Inspection and Cleaning

Clean and inspect the PT periodically to maintain it in optimum condition for use.

● Cleaning Methods

The screen visibility will be impaired if the display becomes dirty. Clean the display periodically using the following methods:

- For daily cleaning, wipe with a soft, dry cloth. Attempting to remove heavy dirt with the cloth may scratch the front panel sheet. Use a damp cloth and wipe the surface again to remove dirt.
- If dirt cannot be removed using a dry cloth, dampen the cloth sufficiently with a neutral cleaning agent solution (approximately 2%), squeeze the cloth out, and then wipe the surface.
- Materials such as rubber, vinyl, or tape that are attached to the Unit will leave stains if left for a long time. If such material is attached to the Unit, remove when cleaning.

Note Never use benzene, thinner, or other volatile solvents, or chemical cloths to clean the PT.

● Inspection Methods

Inspect the PT once every six to twelve months. Shorten the interval between inspections when using the PT in extreme conditions, such as under high temperatures, high humidity, or environments subject to large quantities of dust.

- **Inspection Items**

Inspect the PT for the following items to check whether the PT is operating within the specified criteria. If the PT is outside the criteria, use measures such as improving the operating environment to conform to the standards, or tightening screws.

Inspection items	Inspection details	Criteria	Inspection means
Power supply	Power terminal voltage fluctuation	Allowable voltage range (24 VDC ±15%)	Tester
Ambient environment	Ambient temperature (temperature in control panel)	0 to 50°C (Refer to *Appendix 2.*)	Thermometer
	Ambient humidity (temperature in control panel)	35% to 85% (Refer to *Appendix 2.*)	Temperature meter
	Presence of dust	No dust accumulated.	Visual inspection
	Presence of oil	No oil between front panel sheet and molding.	Visual inspection
Mounting conditions	Looseness of fixed mounting bracket	Specified torque.	Phillips screwdriver
	Connection status of Connecting Cable Connectors	Fully inserted, locked, and with No looseness.	Phillips screwdriver
	Looseness of external wiring screws	No looseness.	Phillips screwdriver
	Status of external connecting cables	No breaks or other damage	Visual inspection, tester
Parts with limited service life	Backlight brightness	Sufficient brightness. Backlight life (at room temperature of 25°C) is 50,000 hours, as a guideline.	Visual inspection
	Battery	5 years (at room temperature of 25°C).	Replace every 5 years

Note
- Do not disassemble, repair, or modify the PT.
- Follow all local government regulations, where applicable, when disposing of the Unit and used batteries.

7-3 Troubleshooting and Maintenance

When an error occurs while operating the PT, search for the symptom in the following table and take measures according to those provided.

Errors during Data Transfer

Symptoms at PT	Causes	Measures
Serial transfer not possible between NS-Designer and PT.	The NS-Designer is not connected to the PT.	Check the wiring conditions of the connecting cable. (Refer to *3-3 Connecting the NS-Designer*.)
	FinsGateway setting is incorrect.	Change the setting according to the following procedure. 1. Select *Start/Program/FinsGateway/Service Manager* from the Windows menu. 2. The PLC icon will be displayed in the bottom right of the screen. Right-click the icon and select *Setting*. 3. Click *Services* in the Basic Tab Page. Select *Serial Unit* under *Service Settings*, and then click the Start Button. 4. Click *Network* in the Basic Tab Page. Double-click *SerialUnit/COM1* under *Network and Unit Settings*. 5. Click the Network Tab Page in the SerialUnit Provider dialog box. Check that the network number is set to 1 or higher and is not the same as any other network number, that the *Exclusive* field is checked, and that the *Protocol* is set to ToolBusCV. Then click the OK Button. 6. Right-click the PLC icon in the bottom right of the screen and select *Terminate Service Manager*.

Errors during PT Startup

Symptoms at PT	Causes	Measures
Indicators do not light.	Power is not being supplied to the PT.	Check the connection points and supply power to the PT correctly. (Refer to *3-1 Installing the PT*.)
	The fuse is broken.	Contact your nearest OMRON representative.
	The system program is corrupted (fatal error).	Contact your nearest OMRON representative.
The indicator is lit orange and the screen is blank.	The system program is corrupted (fatal error).	Contact your nearest OMRON representative.
The indicator is lit green and the screen is blank.	The system program is corrupted (non-fatal error).	Reinstall the system program. (Refer to *3-6 Using Memory Cards*.) Contact your nearest OMRON representative if the same problem occurs after reinstalling the system program.
The indicator is flashing green and the buzzer repeatedly turns ON and OFF.	The backlight has malfunctioned.	The backlight must be replaced, so contact your nearest OMRON representative.
The screen is blank and the indicator is flashing green.	Automatic upload/download has ended normally.	This is not an error. Turn OFF all the DIP switch pins and turn ON the power to the PT again.
The screen is blank and the indicator is flashing red.	Automatic upload/download has ended abnormally.	The system program may be corrupted. Reinstall the system program. (Refer to *3-6 Using Memory Cards*.) Contact your nearest OMRON representative if the same problem occurs after reinstalling the system program.

Errors while Connecting to the Host

Symptoms at PT	Causes	Measures
PT cannot communicate with the host. (An error message is displayed.)	The settings for Ethernet connection, such as node number, network number, and IP address, are not set correctly.	Set the settings correctly, referring to *Section 5 Connecting to Host via Ethernet or Controller Link*.
	The protocol settings for the host and the settings at the PT do not match.	Set the communications settings using the NS-Designer.
	The PT is not connected to the host properly.	Check that the type, length, and wiring of the connecting cables meet the specifications. (Refer to *Section 4 Connecting Host to Serial Port*.)
	For 1:N NT Link connections, two or more Units have the same unit number.	Reset so that each Unit has a unique unit number. (Refer to *6-6 Communications Settings*.)

Errors during PT Operation

Symptoms at PT	Causes	Measures
RUN indicator does not light.	Power is not being supplied to the PT.	Check the connection points and supply power to the PT correctly. (Refer to *3-1 Installing the PT*.)
	The fuse is broken.	Contact your nearest OMRON representative.
The screen is blank.	The PT is in system startup waiting status.	This is not an error. Information will be displayed when the waiting time has lapsed.
	The screen saver function is operating.	This is not an error. Touch the screen, or operate the system memory for switching the screen from the host to switch the screen as follows: • Set the screen number in $SW0. • Set the pop-up screen number in $SW1, 4 and 7. (Refer to *2-4 System Memory* in the *PT Programming Manual* for details on the system memory.)
	The backlight is OFF.	Turn ON the backlight by setting system memory bits $SB6 to 8 for adjusting backlight brightness to ON. (Refer to *2-4 System Memory* in the *PT Programming Manual* for details on the system memory.)
	The backlight has malfunctioned.	The backlight must be replaced, so contact your nearest OMRON representative.
The display update is slow.	Screen switching, opening and closing pop-up screens, and switching frames are being performed frequently.	If screens are opened and closed frequently, the display update may take some time and communications may be delayed. Adjust the interval between screen switches so that the system is not overloaded.
	The message communications interval is too long.	On the NS-Designer, select ***Settings*** - ***System Setting***, click the **Comm-All** Tab, press the **Comm. Details** Button, and set a shorted communications interval. (Refer to *Section 7 System Settings* of the *NS-Designer Operation Manual.*)
The touch panel does not respond.	PT has malfunctioned due to external noise.	Reset the PT, and wire it according to noise prevention measures.
	The touch panel is damaged.	Test the touch panel using the hardware check in the System Menu. If an error has occurred, contact your nearest OMRON representative.
The display is dark.	The brightness setting is too low.	Increase the backlight brightness in the PT Tab Page of the System Menu.
	The backlight is faulty or its service life has expired.	The backlight must be replaced. Contact your nearest OMRON representative.
Cannot enter the device monitor function.	The communications settings are incorrect.	When using the device monitor, set the communications mode as follows: • C-series PLCs: 1:1 NT Link or 1:N NT Links • CS1-series PLCs: 1:N NT Links (normal, high speed) The device monitor function is not supported for Ethernet or Controller Link.
	The PLC does not support the device monitor function.	The PLCs that support the device monitor function are restricted. Check the PLC model being used. (Refer to *6-8-4 Device Monitor*.)

Errors during Object Operation

Symptoms at PT	Causes	Measures
The numerical and character string update is slow.	Communications are unstable due to external noise.	Perform noise countermeasures such as separating communications cables from power lines.
	There are too many Numeral Display & Input objects and String Display & Input objects in the display.	Reduce the number of Numeral Display & Input and String Display & Input objects in the screen where update is slow.
	For RS-422A communications, the branch is incorrect or the terminating resistance is not set properly.	Wire correctly, referring to *Appendix 4 Using NS-AL002 RS-232C/RS-422A Converters*.
	The host is processing a large volume of data and the cycle time is long.	Shorten the host cycle time.
	The message communications interval is too long.	On the NS-Designer, select ***Settings*** - ***System Setting***, click the **Comm-All** Tab, press the **Comm. Details** Button, and set a shorted communications interval. (Refer to *Section 7 System Settings* of the *NS-Designer Operation Manual*.)
Some objects in the screen configuration are not displayed.	A communications error has occurred.	Check the communications settings again.
Some objects in the screen configuration are not displayed.	The control flags set in the object include Hide Display Flags.	Display the control flags for the objects set to be not displayed, as follows: Display the Expansion Tab from the functional object property setting using the NS-Designer. Select *Display* from *Display/Hide* in the Control Flags Tab Page. Turn ON the indirect address of the control flag set for the object.
The Log Flag display does not match the actual log timing.	The communications address set for the event of log timing is turning ON and OFF at high speed.	Set the ON/OFF cycle of the communications address for events to a longer time.
Cannot input numerical values.	The numerical value input upper and lower limit check function is running.	Display the Expansion Tab from the functional object property setting using the NS-Designer. Check the set values in the Input Upper and Lower Limits Tab Page and correct if necessary.
Cannot input for some functional objects.	The control flags set in the objects include Input Prohibit Flags.	Display the Expansion Tab from the functional object property settings using the NS-Designer. Select *Enable* for *Input* in the Control Flag Tab Page. Turn ON the indirect address of the control flag set for the object.
	A password has been set.	Input the password in the password input dialog box that is displayed.

Symptoms at PT	Causes	Measures
The function of the functional object is not executed when pressed.	Input is disabled by the control flag.	Input is not possible when the functional object is set to be disabled. Correct the screen data using the NS-Designer. If the communications address set by the indirect specification is set to OFF, set the address to ON.
Cannot input to any functional object.	PT is set to input prohibit mode.	Set system memory bit $SB19 to OFF. Touch the screen and input the password to cancel disabling inputs.
Cannot move to System Menu.	Moving to System Menu is prohibited.	Set system memory bit $SB3 to OFF.
The list selection and bitmap object are blank.	There is no reference file.	Use the NS-Designer to check whether the folder storing project data contains a reference file, and resend the screen data to the PT.
	The number of rows specified in the first row of the list selection is above the maximum.	Set the number of rows to less than the maximum.

7-4 Requesting a Replacement PT

Always observe the following precautions when faults are detected during inspection and the PT is to be replaced.

- Create a backup of the PT project data.
  Project data may be deleted when the PT is repaired by OMRON.
- Always turn OFF the power before replacing the PT.
- After replacing the PT, check to confirm that the new PT has no faults.
- When returning a faulty PT for repair, include a document with the Unit that provides as many details on the fault as possible, and send to your OMRON representative.

Appendices

Appendix 1 Quick Reference

The following table provides a quick reference to NS-Designer functions and the manual sections that describe them.
In the *Manual section* column "Programming" indicates the *NS Series Programming Manual* (V073-E1-□) and "Reference" indicates the *NS Series Macro Reference* provided with the NS-Designer CD.

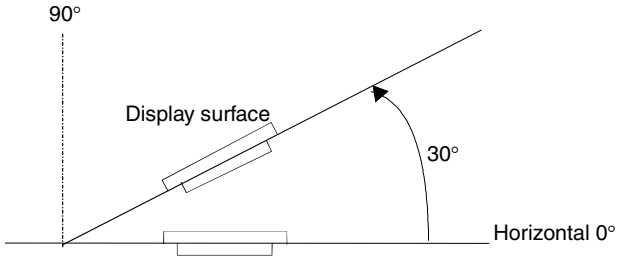
Item		Application method	Manual section
Fixed objects	Displaying straight lines or continuous straight lines	***Fixed Object - Straight Line*** or ***Fixed Object - Polyline***	Operation: 5-2 Programming: 2-6
	Displaying rectangles	***Fixed Object - Rectangle***	Operation: 5-2 Programming: 2-6
	Displaying triangles, polygons, trapezoids, or diamonds	***Fixed Object - Polygon***	Operation: 5-2 Programming: 2-6
	Displaying circles or ovals	***Fixed Object - Circle/Oval***	Operation: 5-2 Programming: 2-6
	Displaying arcs	***Fixed Object - Arc***	Operation: 5-2 Programming: 2-6
	Displaying sector	***Fixed Object - Sector***	Operation: 5-2 Programming: 2-6
	Filling graphics	**Tiling** Tab on the Fixed Object Property Dialog Box (***Setting - Object Properties***)	Programming: 2-6
	Displaying bitmaps	Use a bitmap object (***Functional Objects - Bitmap***) Either BMP or JPEG files can be displayed.	Programming: 2-12
	Using the same graphics in many applications	1. Select the objects to be used and register them in the library using ***Tools - Register Library***. 2. Display the library object using ***Tools - Use Library.***	Operation: 5-13
	Displaying special symbols and characters	1. Create the image in a BMP or JPEG file. 2. Use a bitmap object to display the image (***Functional Objects - Bitmap***).	Programming: 2-12
	Displaying the same graphics in many locations or on many screens	1. Select the objects to be used and register them in the library using ***Tools - Register Library***. 2. Display the library object using ***Tools - Use Library.***	Operation: 5-13
	Changing the shape of a graphic based on conditions	1. Create a bitmap object (***Functional Objects - Bitmap***). 2. Use an indirect specification for the display file, enabling the displayed graphic to be changed according to changes in the PLC or PT.	Programming: 2-12
		1. Create a word button object (***Functional Objects - Word Button***). 2. Specify *Select Shape* for the button shape on the **General** Tab Page. 3. On the **Color/Shape** Tab Page, specify the *Normal shape, Pressed,* and *Same as value.*	Programming: 2-9

Appendix 2 Specifications

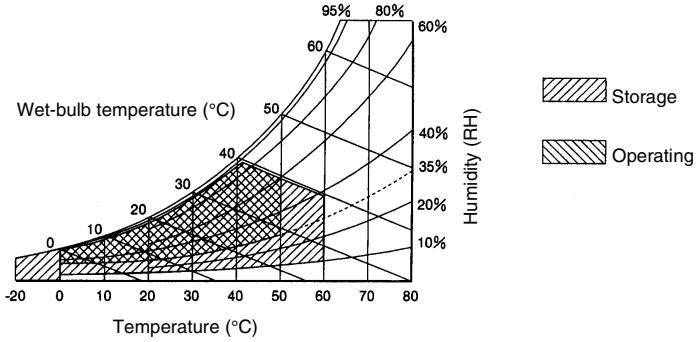
A-2-1 General Specifications

Item	Specifications		
	NS12-TS0□	**NS10-TV0□**	**NS7-SV0□**
Rated power supply voltage	24 VDC		
Allowable voltage range	20.4 to 27.6 VDC (24 VDC ±15 %)		
Allowable input power interruption time	No restriction.		
Power consumption	20 W max		
Ambient operating temperature	0 to 50°C (See notes 1 and 2.)	0 to 50°C (See notes 1 and 2.)	0 to 50°C (See notes 1 and 2.)
Storage temperature	–20 to 60°C (See note 2.)	–20 to 60°C (See note 2.)	–20 to 60°C (See note 2.)
Ambient operating humidity]	35% to 85% (0 to 40°C) with no condensation 35% to 60% (40 to 50°C) with no condensation		
Operating environment	No corrosive gases.		
Noise immunity	Conforms to IEC61000-4-4, 2 KV (power lines)		
Vibration resistance (during operation)	10 to 57 Hz with 0.075 mm amplitude and 57 to 150 Hz with 9.8 m/s^2 acceleration for 30 min in each of X, Y, and Z directions		
Shock resistance (during operation)	147 m/s^2 3 times in each of X, Y, and Z directions.		
Dimensions	315 × 241 × 48.5 mm (W × H × D)		232 × 177 × 48.5 mm (W × H × D)
Panel cutout dimensions	Width 302 $^{+1}_{0}$ × Height 228 $^{+1}_{0}$ mm Panel thickness: 1.6 to 4.8 mm	Width 302 $^{+1}_{0}$ × Height 228 $^{+1}_{0}$ mm Panel thickness: 1.6 to 4.8 mm	Width 220.5 $^{+0.5}_{0}$ × Height 165.5 $^{+0.5}_{0}$ mm Panel thickness: 1.6 to 4.8 mm
Weight	2.5 kg max.		2.0 kg max.
Enclosure rating	Front panel: Equivalent to IP65F (NEMA4) (See note 3.)		
Battery life	5 years (at 25°C) The SRAM and RTC will be backed up for 5 days after the battery runs low (indicator lights orange). The SRAM and RTC will be backed up by a super capacitor for 5 minutes after removing the old battery (i.e., after turning ON power after 5 minutes).		
International standards	UL1604 Class 1, Division 2, and EC Directives. C-Tick		

Note 1. The operating temperature is subject to the following restrictions according to the mounting angle.
Mounting angle of 0 to 30° to the horizontal: Operating temperature range of 0 to 45°C (0 to 40°C for the Video Input Unit or Controller Link Interface Unit)
Mounting angle of 30° to 90° to the horizontal:
Operating temperature range of 0 to 50°C



2. Operate the PT within the temperature and humidity ranges shown in the following diagram.



3. May not be applicable in locations with long-term exposure to oil.

A-2-2 Characteristics

● Display Specifications

Item		Specifications		
		NS12-TS0□	**NS10-TV0□**	**NS7-SV0□**
Display panel	Display device	High-definition TFT color LCD	High-definition TFT color LCD	STN color LCD
	Number of dots	800 dot horizontal × 600 dot vertical	640 dot horizontal × 480 dot vertical	640 dot horizontal × 480 dot vertical
	Display color	256 colors		
	Display area	Width 246.0 mm × height 184.5 mm (12.1 inches)	Width 211.2 mm × height 158.4 mm (10.4 inches)	Width 160.42 mm × height 121.06 mm (7.7 inches)
	View angle	Left/right ±60° Top 45°, bottom 55°	Left/right ±60° Top 35°, bottom 65°	Left/right ±50° Top 40°, bottom 30°
Backlight (See note 4.)	Life expectancy	50,000 hours min. (See note 1.)		40,000 hours min. (See note 1.)
	Brightness adjustment	There are 3 levels of adjustment by operating the touch panel. (See note 2.)		
	Backlight error detection	Error is detected automatically, and the RUN indicator flashes green as notification. (See note 3.)		
Front panel indicators	RUN	Lit green: PT is operating normally. Flashing green: The Memory Card transfer has ended normally or a backlight error was detected immediately after power was turned ON. Lit orange: Immediately after power turns ON, indicates file system check in progress, battery low, or disconnected and operating normally. Flashing orange: Memory Card transfer in progress. Flashing red: Memory Card transfer has ended abnormally.		

Note 1. This is the estimated time before brightness is reduced by half at room temperature and humidity. It is not a guaranteed value.
The life expectancy will be drastically shortened if PT is used at low temperatures. For example, using the PT at temperatures of 0°C will reduce the life expectancy to approximately 10,000 hours (reference value).
2. The brightness cannot be adjusted much.
3. This function does not detect service life expectancy.
It detects when the backlight is not lit due to a disconnection or other errors. Backlight error detection indicates that all backlights (2) are OFF.
4. Contact your nearest OMRON representative to replace the backlight.

● Operating Specifications

Item	Specifications		
	NS12-TS0□	**NS10-TV0□**	**NS7-SV0□**
Touch panel (Matrix type)	Method: Resistive membrane		
	Number of switches: 1900 (50 horizontal × 38 vertical) 16 × 16 dots for each switch.	Number of switches: 1200 (40 horizontal × 30 vertical) 16 × 16 dots for each switch.	Number of switches: 768 (32 horizontal × 24 vertical) 20 × 20 dots for each switch.
	Input: Pressure-sensitive		
	Service life: 1,000,000 touch operations.		

● External Interface Specifications

Item	Specifications		
	NS12-TS0□	**NS10-TV0□**	**NS7-SV0□**
Expansion memory interface (See note.)	1 slot for expanding screen data capacity. 8-Mbytes/16-Mbytes expansion		–
Memory card interface	1 ATA-Compact Flash interface slot. Used to transfer and store screen data and to store history data.		
Expansion interface	For Expansion Interface Units Used to install a Controller Link Interface Unit or Video Input Unit.		

Note: This interface is for NS-series PTs only. Units not specified in this manual cannot be installed.

● Programming Device (Software for Creating Screen Data)

Item	Specifications
Name	NS-Designer
Model	NS-NSDC1-V□

A-2-3 Communications Specifications

- **Serial Communications**

Item	Specifications
Port A	Conforms to EIA RS-232C. D-Sub female 9-pin connector 5-V output (250 mA max.) through pin 6 (See note.)
Port B	Conforms to EIA RS-232C. D-Sub female 9-pin connector 5-V output (250 mA max.) through pin 6. (See note.)

Note: The 5-V output of serial ports A and B cannot be used at the same time.

- **1:1 NT Link**

Item	Specifications
Communications standards	Conforms to EIA RS-232C.
Connectors	D-Sub female 9-pin connector (Serial ports A and B)
Number of Units connected	1:1
Transmission distance	Up to 15 m. (See note 1.)

- **1:N NT Links**

Item	Specifications
Communications standards	Conforms to EIA RS-232C.
Connectors	D-Sub female 9-pin connector (Serial ports A and B)
Number of Units connected	1:1 to 8
Transmission distance	Up to 15 m. (See note 2.)

Note 1. When using an NS-AL002 Adapter, the transmission distance is as follows:
RS-422A cable: Up to 500 m total extended length.
2. The NS-AL002 is required when connecting two or more PTs to the host.
RS-422A cable: Up to 500 m total extended length.

- **Bar Code Reader**

<table>
<tr><th>Item</th><th colspan="3">Specifications</th></tr>
<tr><td>Communications standards</td><td colspan="3">Conforms to EIA RS-232C.</td></tr>
<tr><td>Communications settings</td><td colspan="3">Start-stop synchronization
Baud rate: 4,800, 9,600, or 19,200 bps
Data length: 7 or 8 bits
Stop bits: 1 or 2 bits
Parity: None, odd, or even
Flow control: RS/CS control</td></tr>
<tr><td>Ports that can be connected</td><td colspan="3">Either port A or port B only.</td></tr>
<tr><td>Number of Units connected</td><td colspan="3">1:1</td></tr>
<tr><td rowspan="2">Transmission distance</td><td colspan="2">Using PT serial port and D-Sub 6-pin</td><td>Using external power supply</td></tr>
<tr><td colspan="2">2 m</td><td>15 m</td></tr>
<tr><td>Communications protocol</td><td colspan="3">No protocol mode</td></tr>
<tr><td>Data format</td><td colspan="3"><table><tr><td>[STX]</td><td>Data (0 to 40 bytes)</td><td>[ETX]</td></tr></table></td></tr>
<tr><td rowspan="2">Power supply</td><td colspan="2">Using PT serial port and D-Sub 6-pin</td><td>Using external power supply</td></tr>
<tr><td colspan="2">5 V ±5% 250 mA max.</td><td>Depends on Bar Code Reader specifications.</td></tr>
</table>

● Ethernet Specifications (NS12-TS01(B), NS10-TV01(B), NS7-SV01(B))

Item	Specifications
Conformance standards	Conforms to IEEE 802.3 / Ethernet (10Base-T).
Transmission medium	2 pair Cat 3 UTP 22 to 26AWG
Transmission distance	100 m (node-to-hub and hub-to-hub)
Connector	8-pin modular connector

• Ethernet

Item	Specifications
Network address	1 to 127
Node address	1 to 126
UDP port number	1024 to 65535 (See note 1.)
IP address	0.0.0.0 to 255.255.255.255 (See note 2.)
Subnet mask	0.0.0.0 to 255.255.255.255
Default gateway	0.0.0.0 to 255.255.255.255
IP proxy address	“”(blank), 0.0.0.0 to 255.255.255.255
Conversion table	Node address: 1 to 253 IP address: 0.0.0.0 to 255.255.255.255

Note 1. The default UDP port number is 9600.

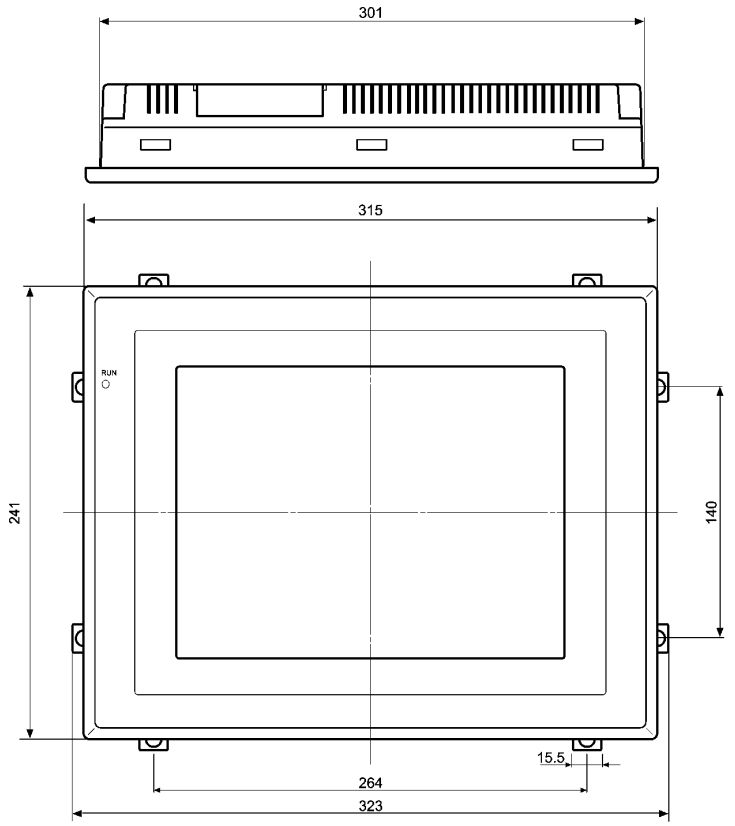
2. Do not set the following values for the IP address.
   - Host ID with all bits set to 0 or 1. (Example: **192.168.21.0**)
   - Net ID with all bits set to 0 or 1. (Example: **255.255.21.16**)
   - Subnet ID with all bits set to 1. (Example: **192.168.255.16**)
   - IP addresses that begin with 127. (Example: **127.35.21.16**)

● Controller Link Specifications (with NS-CLK21 Controller Link Interface Unit Mounted)

Item	Specification
Communications method	N:N token bus
Code	Manchester code
Modulation	Baseband code
Synchronization	Flag synchronization (conforming to HDLC frames)
Transmission path type	Multidrop (bus)
Baud rate and maximum transmission distance	The maximum transmission distances depends on the baud rate setting as follows: 2 Mbits/s: 500 m 1 Mbits/s: 800 m 500 Kbits/s:1 km
Media	Specified shielded twisted-pair cable 2 signal lines and 1 shield
Connections to nodes	PLCs : Connected via terminal block Personal computers: Connected via special connector (provided)
Max. number of nodes	32 modes
Communications functions	Data links and message service
Number of data link words	• Transmission area per node: 1,000 words max. (2,000 bytes) • Send/receive data link areas per SYSMAC CS-series PLC: 12,000 words max. (24,000 bytes) • Send/receive data link areas per SYSMAC C200HX/HG/HE, CVM1, or CV-series PLC: 8,000 words max. (16,000 bytes) • Send/receive data link areas per personal computer: 32,000 words max. (64,000 bytes) • Total send data link words on entire network: 32,000 words max. (64,000 bytes)
Data link areas	Bit (CIO, and LR Area) , data memory (DM Area) , expansion data memory (EM Area)
Message length	2,012 bytes max.
RAS functions	• Polling unit backup function • Self-diagnosis (hardware check at startup) • Internode tests and broadcast test (via FINS commands) • Watchdog timer • Error log
Error correction	Manchester code check CRC check (CCITT $X^{16}+X^{12}+X^{5}+1$)

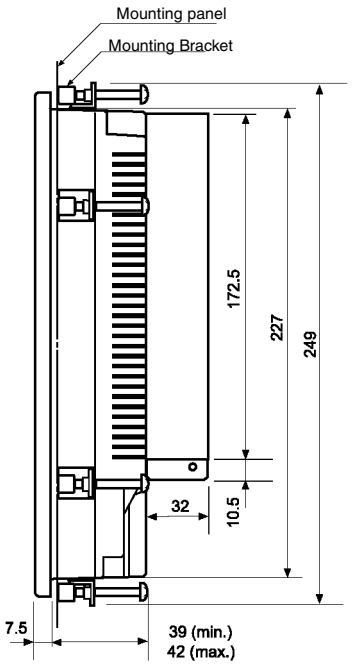
Appendix 3 Dimensions

● NS12/NS10 (Includes Mounting Dimensions)

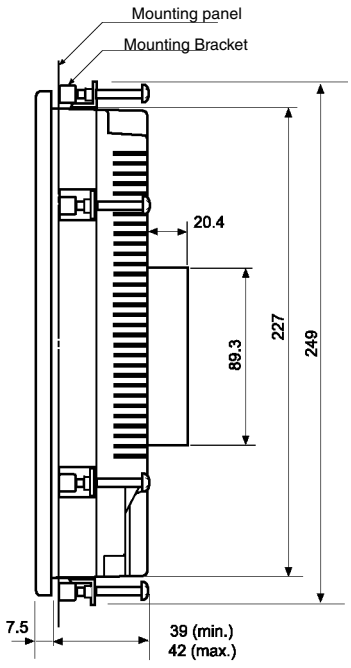


(Unit: mm)

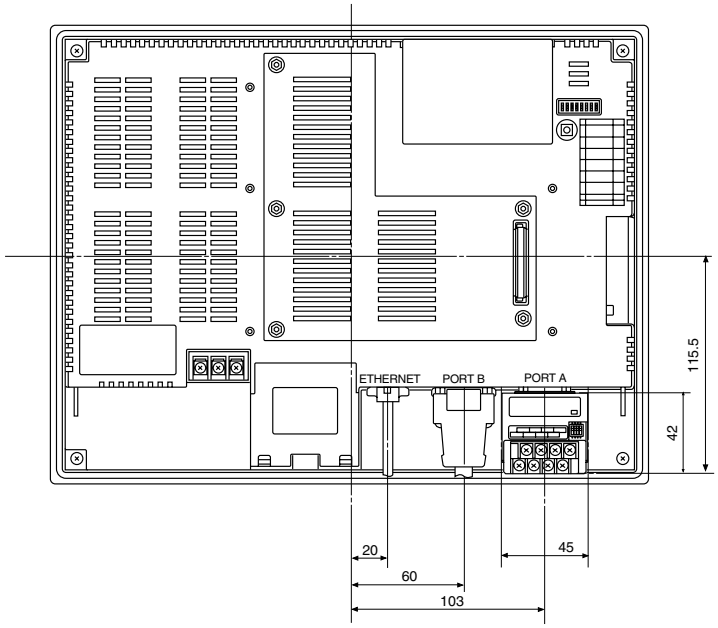
With Controller Link Interface Unit Mounted



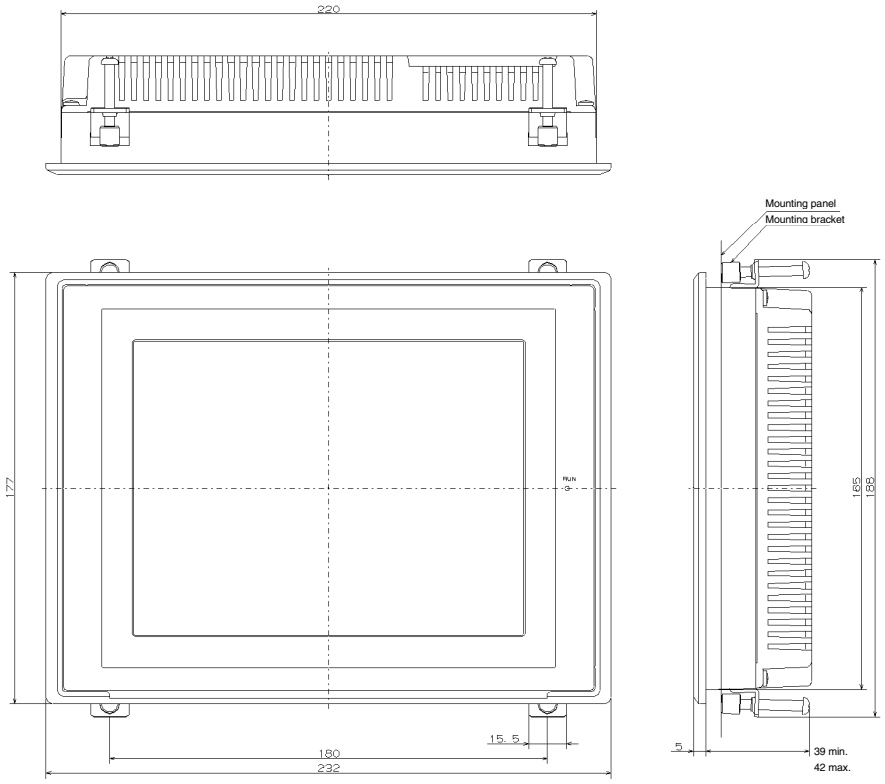
With Video Input Unit Mounted



● NS12/NS10 Cable Connection Dimensions

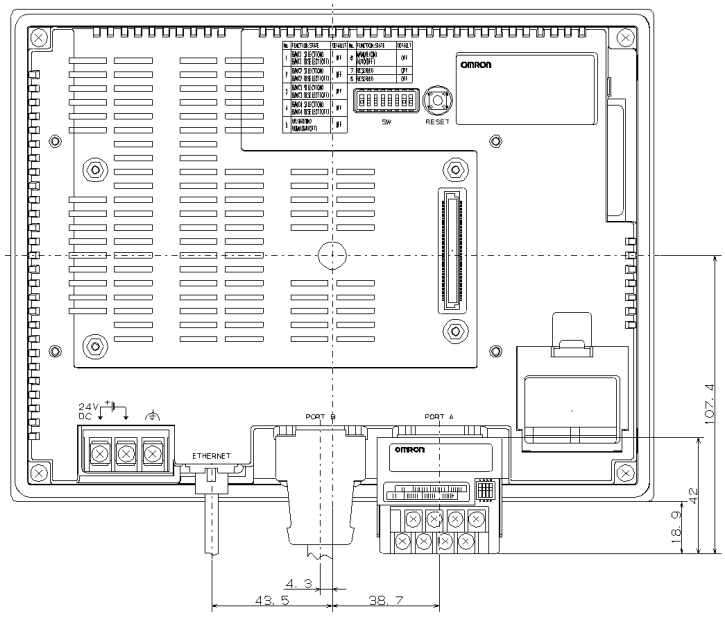


● NS7 (Includes Mounting Dimensions)



(Unit: mm)

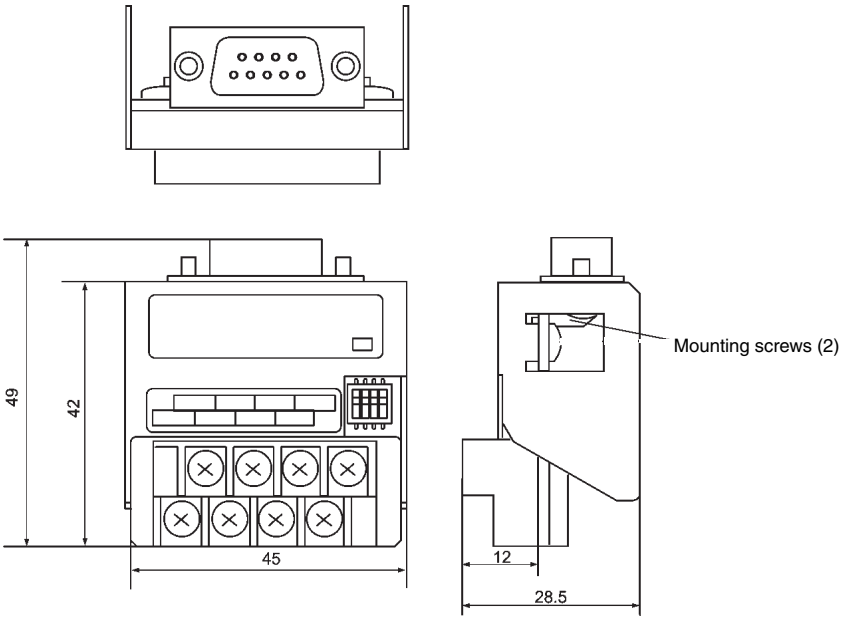
● NS7 Cable Connection Dimensions



Appendix 4 Using NS-AL002 RS-232C/RS-422A Converters

The NS-AL002 RS-232C/RS-422A Converter is connected directly to RS-232C port A or B of the PT, and converts RS-232C communications to RS-422A/RS-485. Power is supplied from the PT through pin 6 of the RS-232C connector, so an externally connected power supply is not required. A summary of the NS-AL002 external dimensions, mounting and removal methods, and specifications are provided here. Refer to this information when designing the control panel. Refer to the operation manual included with the NS-AL002 for details.

A-4-1 Dimensions



A-4-2 Mounting and Removing

Connect the NS-AL002 directly to port A or port B of the PT. Two NS-AL002 Adapters cannot be connected to ports A and B simultaneously.
Mount the Adapter by tightening and securing the mounting screws on both of the D-Sub connectors. The correct tightening torque is 0.3 N • m. The correct tightening torque for the terminal block is 0.5 N • m.
To remove the Adapter, loosen the screws and pull out the Adapter.

Note
- Always turn OFF the power to the PT before removing the Adapter.
- Do not touch the surface or the mounted parts of the Board with bare hands. Always discharge any static electricity from your body before handling the Board.

A-4-3 Specifications

The following table shows the general specifications and communications specifications of the Adapter.

● General Specifications

Item	Specifications
Dimensions	45 × 49 × 28.5 mm (W × H × D)
Weight	50 g max.
Ambient operating temperature	0 to 50°C
Storage temperature	−20 to 60°C
Ambient operating humidity	35% to 85% (without condensation)
Rated power supply	5 V ±10% (through pin 6 of the RS-232C connector)
Power consumption	150 mW max.
Operating environment	No corrosive gases.
Vibration resistance	Conforms to PT specifications.
Shock resistance	Conforms to PT specifications.

Reference RS-485 (two-wire) communications are not supported by the NS Series. Always use RS-422A (four-wire)
The NS-AL002 cannot be used with NT-series PTs or PLCs.

● Communications Specifications

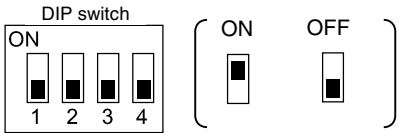
- **RS-422A Interface**

Item	Specifications
Baud rate	115.2 kbps max.
Transmission distance	500 m total length
Terminal block format	8-terminal terminal block, M3.0
Insulation	No insulation (See note.)

Note: The RS-422A and RS-232C are not insulated.

A-4-4 DIP Switch Settings

The Adapter has four DIP switch pins for setting the RS-422A communications conditions. Set the DIP switch pins before connecting the cables to the Adapter.



The factory setting for the DIP switch is all pins set to OFF.

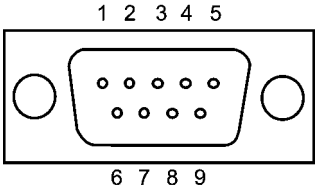
Pin	Function	ON	OFF
Pin 1	Transmission mode	RS/CS control	Normal transmission
Pins 2 and 3	Two-wire/four-wire method selection	Two-wire method	Four-wire method
Pin 4	Terminating resistance	Yes	None

For 1:1 NT Link, set the RS-422A transmission mode to normal transmission (pin 1 OFF). For 1:N NT Links (normal, high speed), set the RS-422A transmission mode to RS/CS control (pin 1 ON).

A-4-5 Pin Arrangement

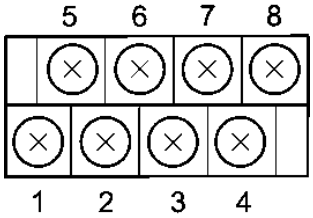
The Adapter has a connector for RS-232C interface connection and a terminal block for RS-422A/485 interface connection.
The pin arrangements for the RS-232C connector and RS-422A/485 terminal block are as follows:

● RS-232C Connector



Terminal block pin number	Signal name	Signal direction Adapter ⇔ PT
1	NC	
2	RD	←
3	SD	→
4	CS	← (RS signal short-circuited internally)
5	RS	→
6	5 V (30 mA max.)	←
7 or 8	NC	(Pins 7 and 8 are short-circuited.)
9	SG	–
Connector hood	FG	Connects to functional ground terminal of PT.

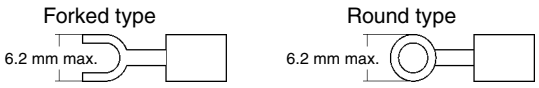
● RS-422A Terminal Block



Terminal block pin number	Signal name	Signal direction Adapter ⇔ Host
1	FG	Connects to functional ground terminal of PT.
2	RDB (+)	←
3	SDB (+)	→
4	RSB (+)	→
5	NC	---
6	RDA (–)	←
7	SDA (–)	→
8	RSA (–)	→

● Crimp Terminals

Use M3 crimp terminals.



Applicable Crimp Terminal Examples

Forked type

Manufacturer	Model	Recommended cable size
J.S.T. Mfg. Co., Ltd.	V1.25-N3A	AWG22 to 16 (0.25 to 1.65 mm^2)
Molex	VSY1.25-3.5L	AWG22 to 16 (0.3 to 1.65 mm^2)

Round type

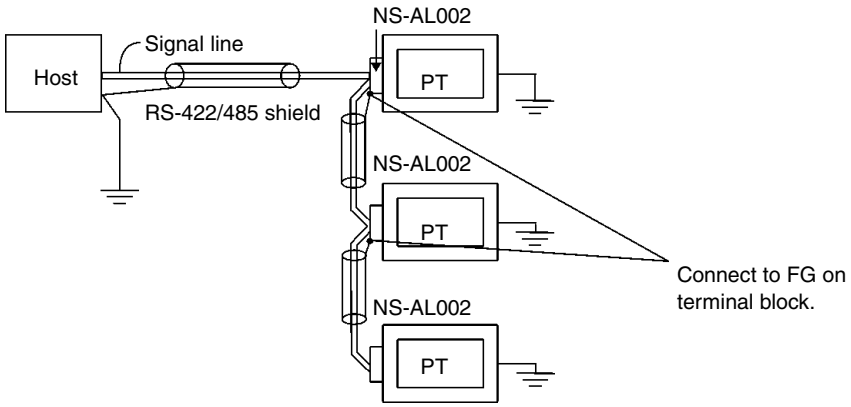
Manufacturer	Model	Recommended cable size
J.S.T. Mfg. Co., Ltd.	V1.25-MS3	AWG22 to 16 (0.25 to 1.65 mm^2)
Molex	RAV1.25-3	AWG22 to 16 (0.3 to 1.65 mm^2)

Recommended Cable

Manufacturer	Model
Tachii Electric Wire Co., Ltd.	TKV VBS4P-03

A-4-6 Preparing Shield of RS-422A/485 Cables

For RS-422A/485 long-distance transmission, if both ends of the shield are grounded, a large current may flow to the shield due to the difference in ground potential. Therefore, ground the shields on one end of the cable only.

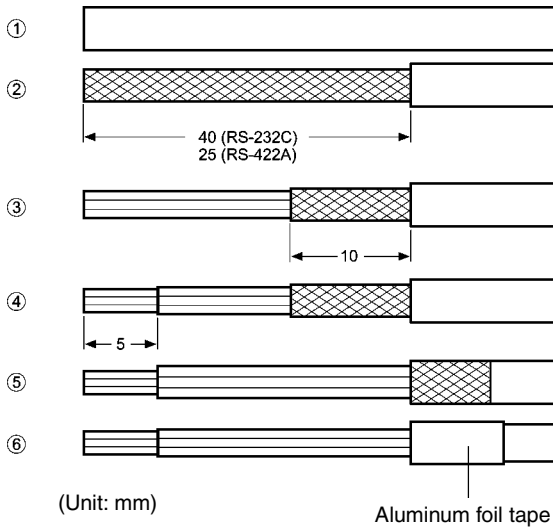


Appendix 5 Preparing Connecting Cables

Use the following procedure to prepare connecting cables.
Refer to this cable preparation method to prepare cables for the RS-232C/RS-422A Converter.

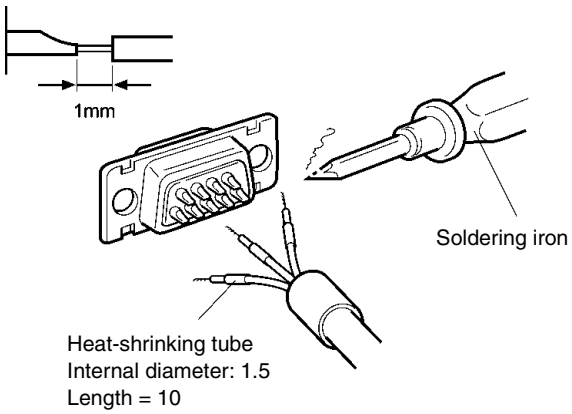
A-5-1 Cable Preparation

1. Cut the cables to the required length.
2. Remove the vinyl cable covering using a razor blade or other tool.
   Use care not to damage the shield (braided mesh).
3. Cut the shield using scissors.
4. Strip back to the core of each wire using a stripper.
5. Bend back the shields.
6. Wrap the section of the shields that is bent back with aluminum foil tape.

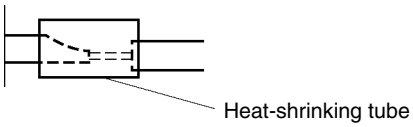


A-5-2 Soldering

1. Pass a heat-shrinking tube over each wire.
2. Pre-solder each wire and connector terminal.
3. Solder each of the wires to the connector terminals.

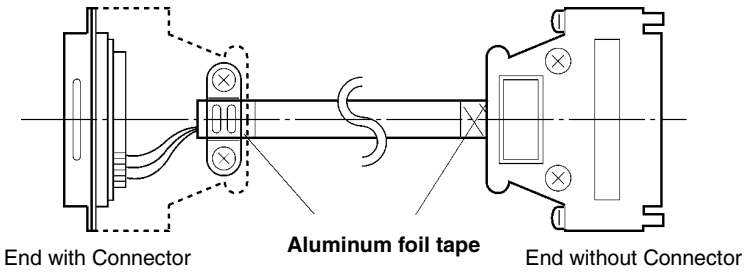


4. Replace the heat-shrinking tube up to the soldered section, and shrink the tube onto the wire by applying heat using a soldering gun.



A-5-3 Hood Assembly

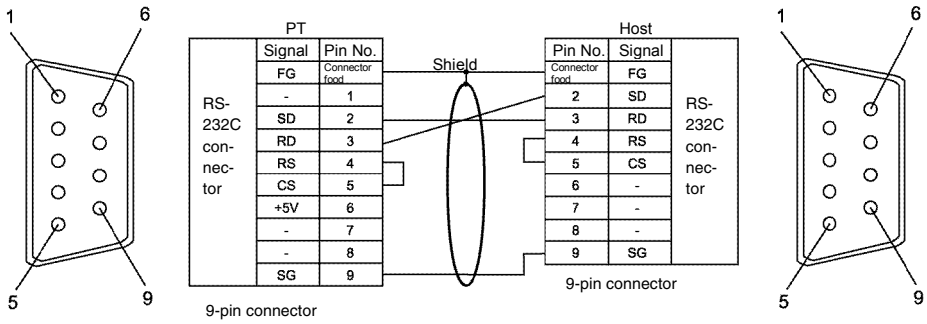
Assemble the hood as shown in the following diagram.



A-5-4 Preparing Connecting Cables for Host Connection

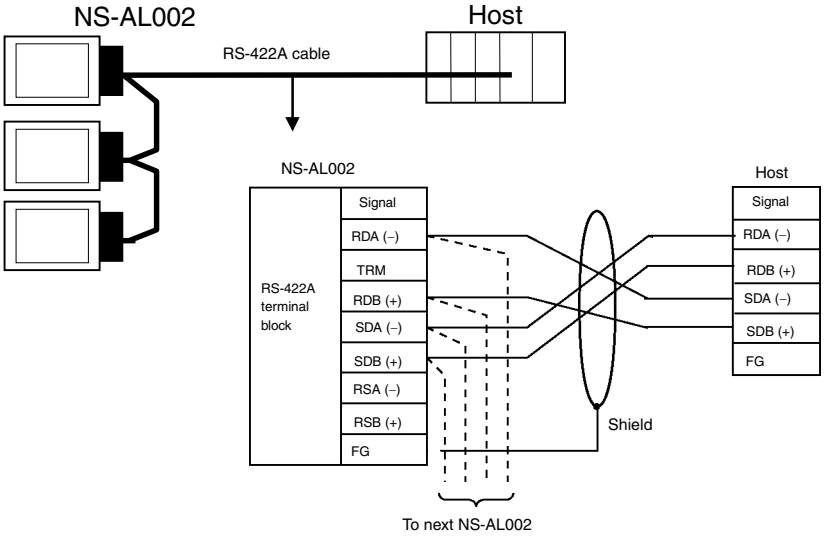
Refer to the following information when preparing the connecting cables for connecting the PT to the host.

● Wiring Layout between PT and Host (RS-232C)

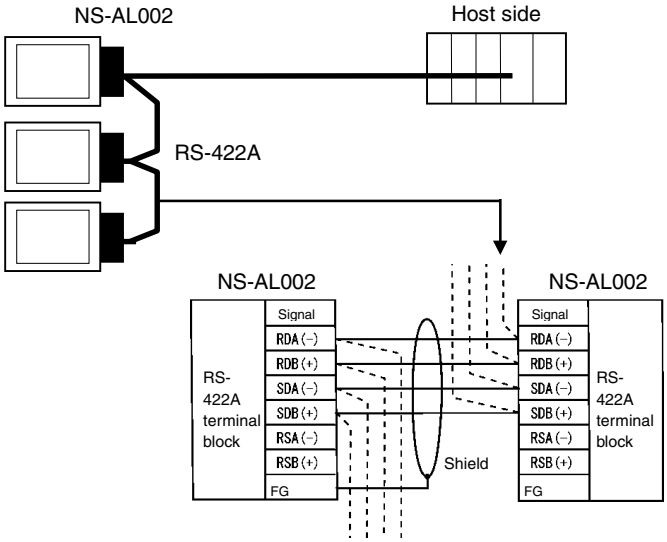


(Serial port A, B)

● Wiring Layout between NS-AL002 and Host (RS-422A)



● Wiring Layout between NS-AL002 and NS-AL002 (RS-422A)



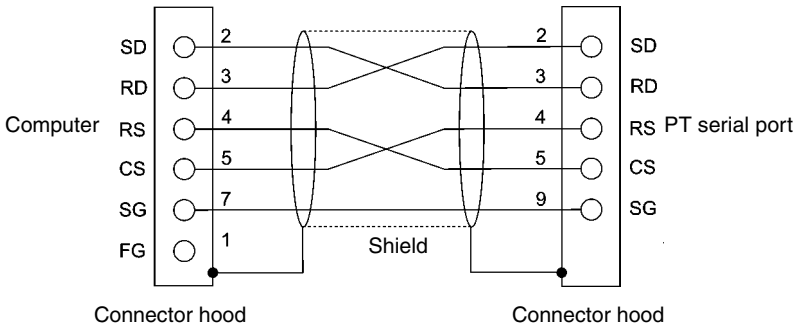
Appendix 6 Preparing Cables for Computer Connection

Refer to the following information when preparing the NS-Designer connecting cables.

A-6-1 Connecting Cable Assembly

Wire the RS-232C connector to the DOS or 98-NX computer according to the type, as follows:

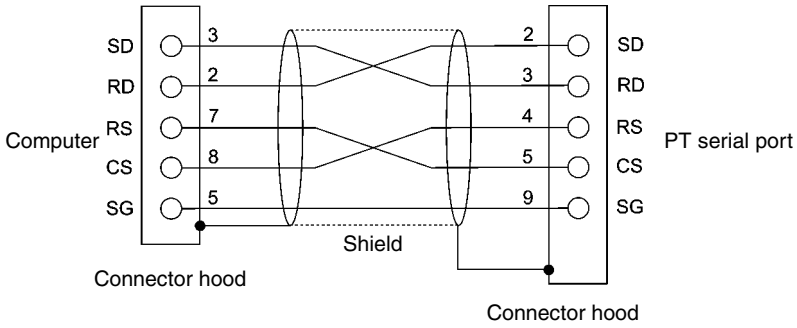
- **25-pin Connector**



Use the following products to assemble the connecting cable.

Name	Model	Details
Connector	XM2D-2501	25-pin type Manufactured by OMRON (computer side)
	XM2A-0901	9-pin type Manufactured by OMRON (PT side)
Connector hood	XM2S-2511	25-pin type Manufactured by OMRON (computer side)
	XM2S-0911	9-pin type, mm screws Manufactured by OMRON (PT side)
Cable	AWG28 × 5P IFVV-SB	Multiconductor shielded cable Manufactured by Fujikura Densen.
	CO-MA-VV-SB 5P × 28AWG	Multiconductor shielded cable Manufactured by Hitachi Densen.

- **9-pin Connector**



Use the following products to assemble the connecting cable.

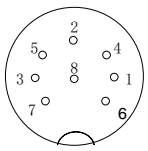
Name	Model	Details
Connector	XM2D-0901	9-pin type Manufactured by OMRON (computer side)
	XM2A-0901	9-pin type Manufactured by OMRON (PT side)
Connector hood (See note.)	XM2S-0911	9-pin type, mm screws Manufactured by OMRON.
	XM2S-0913	9-pin type, inch screws Manufactured by OMRON.
Cable	AWG28 × 5P IFVV-SB	Multiconductor shielded cable Manufactured by Fujikura Densen.
	CO-MA-VV-SB 5P × 28AWG	Multiconductor shielded cable Manufactured by Hitachi Densen.

Note: Use a connector hood for the computer that conforms to the standards for the screws of the computer connector.

Appendix 7 Preparing Connecting Cables for Bar Code Readers

Refer to the following information when preparing the connecting cables for connecting the V520-RH21-6 Bar Code Reader.

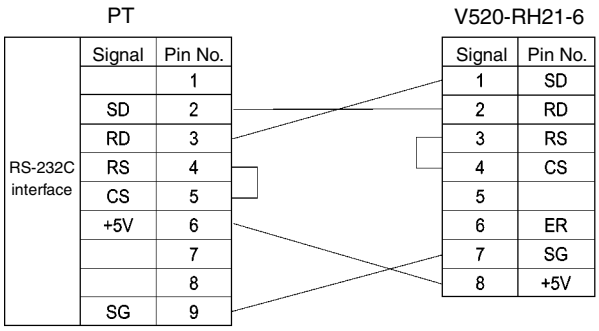
- **Connector Pin Arrangement**



Connector pin arrangement at computer

Pin number	Signal name	Abbreviation	Signal direction V520-RH21-6 PT
1	Send data	SD (TXD)	→
2	Receive data	RD (RXD)	←
3	Request to send	RS (RTS)	→
4	Clear to send	CS (CTS)	←
5	Not connected.		
6	Data terminal ready	ER (DTR)	→
7	0 V	SG	
8	Power supply (Vcc)	+5 V	

- **Wiring Method**



When connecting to the 5-V output of the PT's serial port, use a cable length of less than 2 m. If the cable is 2 m or longer, connect pins 7 and 8 of the Bar Code Reader to an external power supply.

- **Connector Types**

Use the following products to assemble the connecting cable.

Name	Model	Details
Connector	XM2A-0901	9-pin type Manufactured by OMRON (PT side)
	TCS2280-01-2011	8-pin DIN type Hoshiden, Co., Ltd. Panel-mounting type
Connector hood	XM2S-0911	9-pin type Manufactured by OMRON.
Cable	AWG28 × 5P IFVV-SB	Multiconductor shielded cable Manufactured by Fujikura Densen.
	CO-MA-VV-SB 5P × 28AWG	Multiconductor shielded cable Manufactured by Hitachi Densen.

Appendix 8 Standard Models

Programmable Terminals (PTs)

Model	LCD				Ethernet	Pre-install system		Case
	Type	Size	Color	Number of dots		Language	Applicable PLC	Color
NS12-TS01	TFT	12.1 inch	Color	800 × 600	10Base-T	English/ Japanese	OMRON	Ivory
NS12-TS01B	TFT	12.1 inch	Color	800 × 600	10Base-T	English/ Japanese	OMRON	Black
NS12-TS00	TFT	12.1 inch	Color	800 × 600	Not supported.	English/ Japanese	OMRON	Ivory
NS12-TS00B	TFT	12.1 inch	Color	800 × 600	Not supported.	English/ Japanese	OMRON	Black
NS10-TV01	TFT	10.4 inch	Color	640 × 480	10Base-T	English/ Japanese	OMRON	Ivory
NS10-TV01B	TFT	10.4 inch	Color	640 × 480	10Base-T	English/ Japanese	OMRON	Black
NS10-TV00	TFT	10.4 inch	Color	640 × 480	Not supported.	English/ Japanese	OMRON	Ivory
NS10-TV00B	TFT	10.4 inch	Color	640 × 480	Not supported.	English/ Japanese	OMRON	Black
NS7-SV01	STN	7.7 inch	Color	640 × 480	10Base-T	English/ Japanese	OMRON	Ivory
NS7-SV01B	STN	7.7 inch	Color	640 × 480	10Base-T	English/ Japanese	OMRON	Black
NS7-SV00	STN	7.7 inch	Color	640 × 480	Not supported.	English/ Japanese	OMRON	Ivory
NS7-SV00B	STN	7.7 inch	Color	640 × 480	Not supported.	English/ Japanese	OMRON	Black

Serial Communications Units

Model	Specifications	Applicable PLC
CS1W-SCU21	• RS-232C (2 ports) • Base-mounting type	CS-series CS1G/H and CS1G/H-H

CPU Units (1:1 NT Link Connection)

Model	Specifications
CPM1A-10CD□-□ (-V1) CPM1A-20CD□-□ (-V1) CPM1A-30CD□-□ (-V1) CPM1A-40CD□-□ (-V1)	Connects to RS-232C cable using RS-232C Adapter CPM1-CIF01.
CPM2A-30CD□□-□ CPM2A-40CD□□-□ CPM2A-60CD□□-□	With RS-232C connector (9-pin type)
CPM2C-10□□□□□□-□ CPM2C-20□□□□□□-□	Connects to RS-232C connector branched using CPM2C-CN111 with converting cable.
CQM1-CPU41-V1 CQM1-CPU42-V1 CQM1-CPU43-V1 CQM1-CPU44-V1 CQM1-CPU45-EV1	With RS-232C connector (9-pin type)
CQM1H-CPU21 CQM1H-CPU51 CQM1H-CPU61	With RS-232C connector (9-pin type)
C200HS-CPU21 C200HS-CPU23 C200HS-CPU31 C200HS-CPU33	With RS-232C connector (switching/9-pin type)
C200HE-CPU32(-Z) (See note.) C200HE-CPU42(-Z)	With RS-232C connector (switching/9-pin type)
C200HG-CPU33(-Z) (See note.) C200HG-CPU43(-Z) C200HG-CPU53(-Z) (See note.) C200HG-CPU63(-Z)	With RS-232C connector (switching/9-pin type)
C200HX-CPU34(-Z) (See note.) C200HX-CPU44(-Z) C200HX-CPU54(-Z) (See note.) C200HX-CPU64(-Z) C200HX-CPU65-Z C200HX-CPU85-Z	With RS-232C connector (switching/9-pin type)
CV500-CPU01-V1 CV1000-CPU01-V1 CV2000-CPU01-V1 CVM1-CPU01-V2 CVM1-CPU11-V2 CVM1-CPU21-V2	With RS-232C connector (switching/9-pin type)

Note: A C200HW-COM02/COM04/COM05/COM06(-V1) Communications Board is required.

CPU Units (1:N NT Link Connection)

Model	Specifications
CQM1H-CPU51 (See note 1.) CQM1H-CPU61 (See note 1.)	With RS-232C connector (9-pin type)
C200HE-CPU32(-Z) (See note 2.) C200HE-CPU42(-Z)	With RS-232C connector (switching/9-pin type)
C200HG-CPU33(-Z) (See note 2.) C200HG-CPU43(-Z) C200HG-CPU53(-Z) (See note 2.) C200HG-CPU63(-Z)	With RS-232C connector (switching/9-pin type)
C200HX-CPU34(-Z) (See note 2.) C200HX-CPU44(-Z) C200HX-CPU54(-Z) (See note 2.) C200HX-CPU64(-Z) C200HX-CPU65-Z C200HX-CPU85-Z	With RS-232C connector (switching/9-pin type)
CS1G-CPU42(-V1) CS1G-CPU43(-V1) CS1G-CPU44(-V1) CS1G-CPU45(-V1)	With RS-232C connector (9-pin type)
CS1H-CPU63(-V1) CS1H-CPU64(-V1) CS1H-CPU65(-V1) CS1H-CPU66(-V1) CS1H-CPU67(-V1)	With RS-232C connector (9-pin type)
CS1G-CPU42H CS1G-CPU43H CS1G-CPU44H CS1G-CPU45H	With RS-232C connector (9-pin type)
CS1H-CPU63H CS1H-CPU64H CS1H-CPU65H CS1H-CPU66H CS1H-CPU67H	With RS-232C connector (9-pin type)
CJ1G-CPU44 CJ1G-CPU45	With RS-232C connector (9-pin type)

Note 1. A CQM1H-SCB41 Serial Communications Board is required.
2. A C200HW-COM02/COM04/COM05/COM06-V1 Communications Board is required.

CPU Units (High-speed 1:N NT Link Connection)

Model	Specifications
CS1G-CPU42-V1 (See note.) CS1G-CPU43-V1 (See note.) CS1G-CPU44-V1 (See note.) CS1G-CPU45-V1 (See note.)	With RS-232C connector (9-pin type)
CS1H-CPU63-V1 (See note.) CS1H-CPU64-V1 (See note.) CS1H-CPU65-V1 (See note.) CS1H-CPU66-V1 (See note.) CS1H-CPU67-V1 (See note.)	With RS-232C connector (9-pin type)
CS1G-CPU42H CS1G-CPU43H CS1G-CPU44H CS1G-CPU45H	With RS-232C connector (9-pin type)
CS1H-CPU63H CS1H-CPU64H CS1H-CPU65H CS1H-CPU66H CS1H-CPU67H	With RS-232C connector (9-pin type)
CJ1G-CPU44 CJ1G-CPU45	With RS-232C connector (9-pin type)

Note: CS1-series CPU Units without the -V suffix cannot be connected.

CPU Units (Ethernet Connection)

Model	Specifications
CV500-CPU01-V1 CV1000-CPU01-V1 CV2000-CPU01-V1 CVM1-CPU01-V2 CVM1-CPU11-V2 CVM1-CPU21-V2	Mount a CV500-ETN01 Ethernet Unit. 10Base-5 A 10Base-T cable can also be used by connecting a 10Base-T Adapter to the Ethernet Unit.
CS1G-CPU42(-V1) CS1G-CPU43(-V1) CS1G-CPU44(-V1) CS1G-CPU45(-V1)	Mount a CS1W-ETN01 Ethernet Unit. 10Base-5 A 10Base-T cable can also be used by connecting a 10Base-T Adapter to the Ethernet Unit.
CS1H-CPU63(-V1) CS1H-CPU64(-V1) CS1H-CPU65(-V1) CS1H-CPU66(-V1) CS1H-CPU67(-V1)	Mount a CS1W-ETN11 Ethernet Unit. 10Base-T
CS1G-CPU42H CS1G-CPU43H CS1G-CPU44H CS1G-CPU45H	Mount a CS1W-ETN01 Ethernet Unit. 10Base-5 A 10Base-T cable can also be used by connecting a 10Base-T Adapter to the Ethernet Unit.
CS1H-CPU63H CS1H-CPU64H CS1H-CPU65H CS1H-CPU66H CS1H-CPU67H	Mount a CS1W-ETN11 Ethernet Unit. 10Base-T
CJ1G-CPU44 CJ1G-CPU45	Mount a CS1W-ETN11 Ethernet Unit. 10Base-T

CPU Units Supporting Controller Link Connection

Model	Specifications
CV500-CPU01-V1 CV1000-CPU01-V1 CV2000-CPU01-V1 CVM1-CPU01-V2 CVM1-CPU11-V2 CVM1-CPU21-V2	With CVM1-CLK21 Controller Link Unit mounted
CS1G-CPU42H CS1G-CPU43H CS1G-CPU44H CS1G-CPU45H CS1H-CPU63H CS1H-CPU64H CS1H-CPU65H CS1H-CPU66H CS1H-CPU67H	With CS1W-CLK21/11Controller Link Unit mounted
C200HE-CPU32 (-Z) C200HE-CPU42 (-Z) C200HG-CPU33 (-Z) C200HG-CPU43 (-Z) C200HG-CPU53 (-Z) C200HG-CPU63 (-Z) C200HX-CPU34 (-Z) C200HX-CPU44 (-Z) C200HX-CPU54 (-Z) C200HX-CPU64 (-Z) C200HX-CPU65-Z C200HX-CPU85-Z	With C200HW-CLK21 Controller Link Unit mounted
CQM1H-CPU61 CQM1H-CPU51 CQM1H-CPU21 CQM1H-CPU11	With CQM1H-CLK21 Controller Link Unit mounted
CJ1H-CPU66H CJ1H-CPU65H CJ1G-CPU45H CJ1G-CPU44H CJ1G-CPU43H CJ1G-CPU42H CJ1G-CPU45 CJ1G-CPU44	With CJ1W-CLK21 Controller Link Unit mounted

RS-232C/RS-422A Converters

Model	Specifications
NT-AL001	RS-232C: 9-pin connector RS-422A: 8-pin terminal block
NS-AL002	RS-232C: 9-pin connector RS-422A: 8-pin terminal block

Support Tools

Name	Model	Details
NS-Designer (See note.)	NS-NSDC1-V□	DOS Computer For Windows 95, 98, ME, NT, 2000, or XP (Windows 98, Windows NT Ver. 4.0 Service Pack 3 or later.) CD-ROM
Optional products	NS12-KBA04	(Anti-reflection Sheets for NS12/NS10)
	NS7-KBA04	Anti-reflection Sheets for NS7
	NS12-KBA05	Protective Cover for NS12 and NS10
	NS7-KBA05	Protective Cover for NS7
	NS-MF081	Expansion Memory Board (8 Mbytes)
	NS-MF161	Expansion Memory Board (16 Mbytes)
	C500-BAT08	Replacement Battery for NS12/NS10
	CPM2A-BAT01	Replacement Battery for NS7
	HMC-EF172	Memory Card (15 Mbytes)
	HMC-EF372	Memory Card (30 Mbytes)
	HMC-EF672	Memory Card (64 Mbytes)
	HMC-AP001	Memory Card Adapter (for connecting Personal Computer PC Card Reader/Writer)

Note: The NS-Designer includes a transfer program and standard PT system program.

Reference
- NEC PC98-series computers are not supported.
- Use the NEC PC98NX Series, however, in the same way as IBM PC/AT compatible computers.

Connecting Cables and Connectors

Cable with Connector (PT-to-PLC)

Model	Cable length	Applicable Units	Communications method	Specifications
XW2Z-200T	2 m	Units with 9-pin connector and built-in 1:1 NT Link function.	NT Link (RS-232C only)	9-pin-to-9-pin
XW2Z-500T	5 m			
XW2Z-200T-2	2 m	CPM2C peripheral port	NT Link (RS-232C only)	9-pin-to-CPM2C peripheral port
XW2Z-500T-2	5 m			

Cable with Connector (PT-to-Personal Computer)

Model	Cable length	Applicable computer	Specifications
XW2Z-S002	2 m	DOS and 98NX computers	Female 9-pin-to-male 9-pin

Ethernet Cable (PT-to-Personal Computer)

Particular models are not specified, but use a cable that meets the following specifications.

Item	Specifications
Conformance standards	Conforms to IEEE 802.3 / Ethernet (10Base-T).
Transmission medium	2 pair Cat 3 UTP 22-26AWG
Transmission distance	100 m (node-to-hub and hub-to-hub)
Connector	8-pin modular connector

RS-232C Connecting Cable

Model	Specifications
AWG28 × 5P IFVV-SB	Multiconductor shielded cable Manufactured by Fujikura Densen.
CO-MA-VV-SB 5P × 28AWG	Multiconductor shielded cable Manufactured by Hitachi Densen.

Controller Link Communications Cable

Use one of the twisted-pair cables listed below as the communications cable.

Model	Manufacturer	Remarks
Li2Y-FCY2x0.56qmm	KROMBERG & SHUBERT, Department KOMTEC	German company
1x2xAWG-20PE+Tr. CUSN+PVC	DRAKA CABLES INDUSTRIAL	Spanish company
#9207	BELDEN	American company
ESVC0.5x2C	Bando Densen Co.	Japanese company

Applicable Connectors for RS-232C

Name	Model	Specifications
Connector	XM2A-2501	25-pin type (male) Manufactured by OMRON.
	XM2D-2501	25-pin type (female) Manufactured by OMRON. (for DOS computers)
	XM2A-0901	9-pin type (male) Manufactured by OMRON.
	XM2D-0901	9-pin type (female) Manufactured by OMRON. (for DOS computers)
	DB-25P	25-pin type (male) Manufactured by JAE.
Connector hood	XM2S-2511	25-pin type, mm screws Manufactured by OMRON.
	XM2S-2513	25-pin type, inch screws Manufactured by OMRON.
	XM2S-0911	9-pin type, mm screws Manufactured by OMRON.
	XM2S-0911-E	9-pin type, mm screws Manufactured by OMRON.
	XM2S-0913	9-pin type, inch screws Manufactured by OMRON.
	DB-C2-J9	25-pin type Manufactured by JAE.

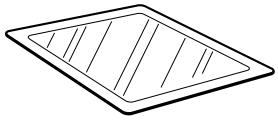
Cables for CS1-series PLC Peripheral Port

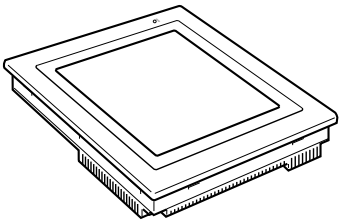
Model	Specifications
CS1W-CN118	Manufactured by OMRON (CS1-series peripheral port-to-D-Sub female 9-pin connector)

Appendix 9 List of Optional Products

A-9-1 Anti-reflection Sheets: NS12-KBA04, NS7-KBA04

Attached to the display to prevent random reflection and dirt. The sheets are all colorless and transparent. One set contains five sheets.

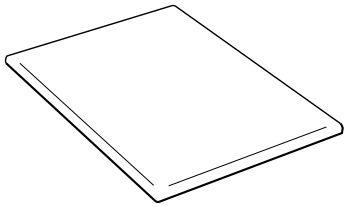


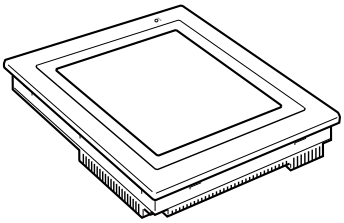


Model	Specifications
NS12-KBA04	Anti-reflection Sheets for NS12/NS10
NS7-KBA04	Anti-reflection Sheets for NS7

A-9-2 Protective Cover: NS12-KBA05, NS7-KBA05

This cover is transparent and protects the display surface from oil, dust, and finger marks.



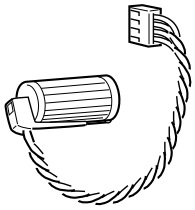


Material	Polyester film
Fitting method	Double-sided tape

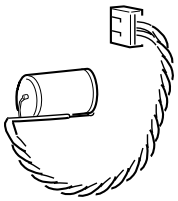
Model	Specifications
NS12-KBA05	Protective Cover for NS12 and NS10
NS7-KBA05	Protective Cover for NS7

A-9-3 Replacement Battery: C500-BAT08, CPM2A-BAT01

This is a lithium battery for backing up the contents of the memory.



C500-BAT08

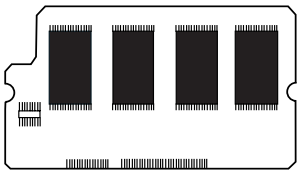


CPM2A-BAT01

Model	Specifications
C500-BAT08	Replacement Battery for NS12/NS10
CPM2A-BAT01	Replacement Battery for NS7

A-9-4 Expansion Memory Board: NS-MF081/161

This Board is used for expanding the area in the PT that contains the screen data. The memory can be expanded up to 8 Mbytes (MF081) or 16 Mbytes (MF161).



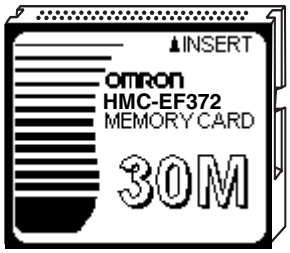
A-9-5 Recommended Memory Cards:

HMC-EF172, HMC-EF372, and HMC-EF672

A-9-6 Recommended Memory Card Adapter: HMC-AP001

The Memory Card is an external memory that can save and read screen data, log data, and system programs between the PT and computer. By using the HMC-AP001, this data can be exchanged with computers that are connected to PC Cards.
The memory capacity depends on the model of the Memory Card used.

Model	Capacity
HMC-EF172	15 Mbytes
HMC-EF372	30 Mbytes
HMC-EF672	64 Mbytes



A-9-7 NS-CLK21 Controller Link Interface Unit

This Expansion Unit enables Controller Link communications with PLCs and FA computers. It can be mounted to the NS12-TS0□ or NS10-TV0□.

A-9-8 NS-CA001 Video Input Unit

This Expansion Unit enables displaying video images from video cameras or Vision Sensors on the PT.
It can be mounted to the NS12-TS0□ or NS10-TV0□.

A-9-9 System Memory List

System memory is used for exchanging information between the host and the PT, such as controlling the PT and notifying the host of PT status.
The system memory is divided into bit and word sections.

System Bit Memory ($SB)

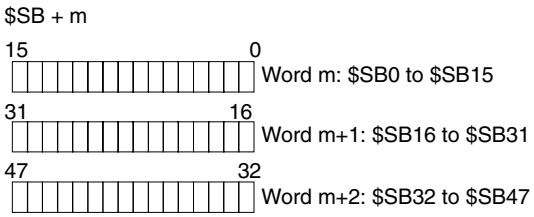
System bit memory ($SB) is used for exchanging information between the host and the PT in bit units, such as controlling the PT and notifying the host of PT status.
The system bit memory contains 48 bits with predefined functions.
The system bit memory is listed in the following table.

Address	Classification	Function
$SB0	Notification	RUN signal (Pulse)
$SB1	Notification	RUN signal (Always ON)
$SB2	Notification	Screen switch strobe
$SB3	Control	Prohibit Shifting to System Menu
$SB4	–	Reserved
$SB5	Notification	Data Input Detector
$SB6	Control	Brightness adjust, high
$SB7	Control	Brightness adjust, medium
$SB8	Control	Brightness adjust, low
$SB9	–	Reserved
$SB10	Control	Control Backlight Flashing
$SB11	Notification	Backlight status
$SB12	Control	Continuous buzzer
$SB13	Control	Short intermittent buzzer
$SB14	Control	Long intermittent buzzer
$SB15	–	Reserved
$SB16	Control	Processing Priority Registration for Port A (NT Link 1:N)
$SB17	Control	Processing Priority Registration Port B (NT Link 1:N)
$SB18	Control	Display keypad with temporary input
$SB19	Control	Prohibit input
$SB20	Control	Contrast adjustment (+10) (For NS7 only)
$SB21	Control	Contrast adjustment (+1) (For NS7 only)
$SB22	Control	Contrast adjustment (–1) (For NS7 only)
$SB23	Control	Contrast adjustment (–10) (For NS7 only)
$SB24	Notification/control	Video Capture
$SB25 to $SB31	–	Reserved
$SB32	Notification/control	Initialize Alarm/Event History
$SB33	Notification/control	Save Alarm/Event History
$SB34	–	Reserved
$SB35	Notification/control	Initialize Data Log
$SB36	Notification/control	Save Data Log
$SB37	Notification/control	Initialize Operation Log
$SB38	Notification/control	Save Operation Log
$SB39	Control	Log Functional Object Operation
$SB40	Control	Log Switch Screen Operation
$SB41	Control	Log Macro Operation
$SB42	Notification/control	Initialize Error Log
$SB43	Notification/control	Save Error Log
$SB44	–	Reserved
$SB45	Control	Macro error dialog control

Address	Classification	Function
$SB46	Notification	Notification of Macro Error
$SB47	Notification	Logging Process or Video Capture Error Flag

The notification words are not write prohibited. In addition, the system will not restore values, except when the status has changed.

System memory is allocated to PLC areas as shown below.
Allocated Addresses for System Memory under NS-Designer ***Settings/Initialize***



System Word Memory ($SW)

System word memory ($SW) is used for exchanging information between the host and the PT in word units, such as controlling the PT and notifying the host of PT status.
The system word memory contains 37 items with predefined functions.
The system word memory is listed in the following table.

Address	Classification	Function
$SW0	Notification/control	Current screen number
$SW1	Notification/control	Display pop-up screen 1 number
$SW2	Notification/control	Pop-up screen 1 display position (X coordinate)
$SW3	Notification/control	Pop-up screen 1 display position (Y coordinate)
$SW4	Notification/control	Display pop-up screen 2 number
$SW5	Notification/control	Pop-up screen 2 display position (X coordinate)
$SW6	Notification/control	Pop-up screen 2 display position (Y coordinate)
$SW7	Notification/control	Display pop-up screen 3 number
$SW8	Notification/control	Pop-up screen 3 display position (X coordinate)
$SW9	Notification/control	Pop-up screen 3 display position (Y coordinate)
$SW10	Notification/control	Display label number
$SW11	–	Reserved
$SW12	–	Reserved
$SW13	Control	Password number for input prohibit clear
$SW14	Notification	Current time (min, s)
$SW15	Notification	Current date and time (day, hour)
$SW16	Notification	Current date (year, month)
$SW17	Notification	Current day (day of the week)
$SW18	Notification	No. of generated alarms and events
$SW19	Notification	ID number for generated alarms and events
$SW20	Notification	ID number for cleared alarms and events
$SW21	Notification	Alarm/event ID when alarm/event object macro executed
$SW22	–	Reserved
$SW23	Notification	Macro execution error number
$SW24	Notification	Macro error screen number
$SW25	Notification	Macro error object ID number
$SW26	Notification	Error macro execution timing
$SW27	Control	Offset value for index I0
$SW28	Control	Offset value for index I1
$SW29	Control	Offset value for index I2
$SW30	Control	Offset value for index I3

Address	Classification	Function
$SW31	Control	Offset value for index I4
$SW32	Control	Offset value for index I5
$SW33	Control	Offset value for index I6
$SW34	Control	Offset value for index I7
$SW35	Control	Offset value for index I8
$SW36	Control	Offset value for index I9

The notification words are not write prohibited. In addition, the system will not restore values, except when the status has changed.

System word memory is allocated to PLC areas as shown below.
Allocated Addresses for System Memory under NS-Designer ***Settings/Initialize***

$SW = n

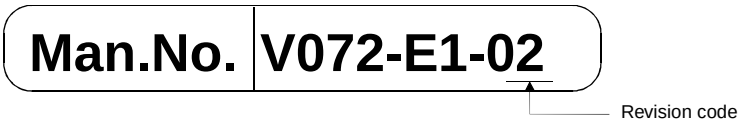
Word n: $SW0

Word n+1: $SW1

Word n+36: SW36

Revision History

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



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	May 2002	Original production
02	January 2003	Added information on transferring data through networks. Added information on Switch Box function. Contents revised to reflect the upgrade from version 2.0 to version 3.0.

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NS-Series Programmable Terminals

SETUP MANUAL

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