OMRON

Programmable Terminal

NS-B-series

Host Connection User's Manual

NB15W-TW01B-V1-S
NB10W-TW01B-V1-S
NB7W-TW01B-V1-S
NB5Q-TW01B-V1-S



V131-E1-01

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Introduction

Thank you for purchasing an NS-B-series Programmable Terminal.

This manual contains information that is necessary to use the NS-B-series Programmable Terminal. Please read this manual and make sure you understand the functionality and performance of the NS-B-series Programmable Terminal before you attempt to use it in a control system.

Keep this manual in a safe place where it will be available for reference during operation.

Based on the assumption that many users will use the NS-B-series PT as a replacement for their NS-series PT, the products other than PT that may have already been discontinued are described in this manual. If you are considering purchasing these products, check that the relevant product has not been discontinued.

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

Applicable Products

This manual covers the following products.

- NS-B-series Programmable Terminal
  NB15W-TW01B-V1-S, NB10W-TW01B-V1-S, NB7W-TW01B-V1-S, and NB5Q-TW01B-V1-S

Relevant Manuals

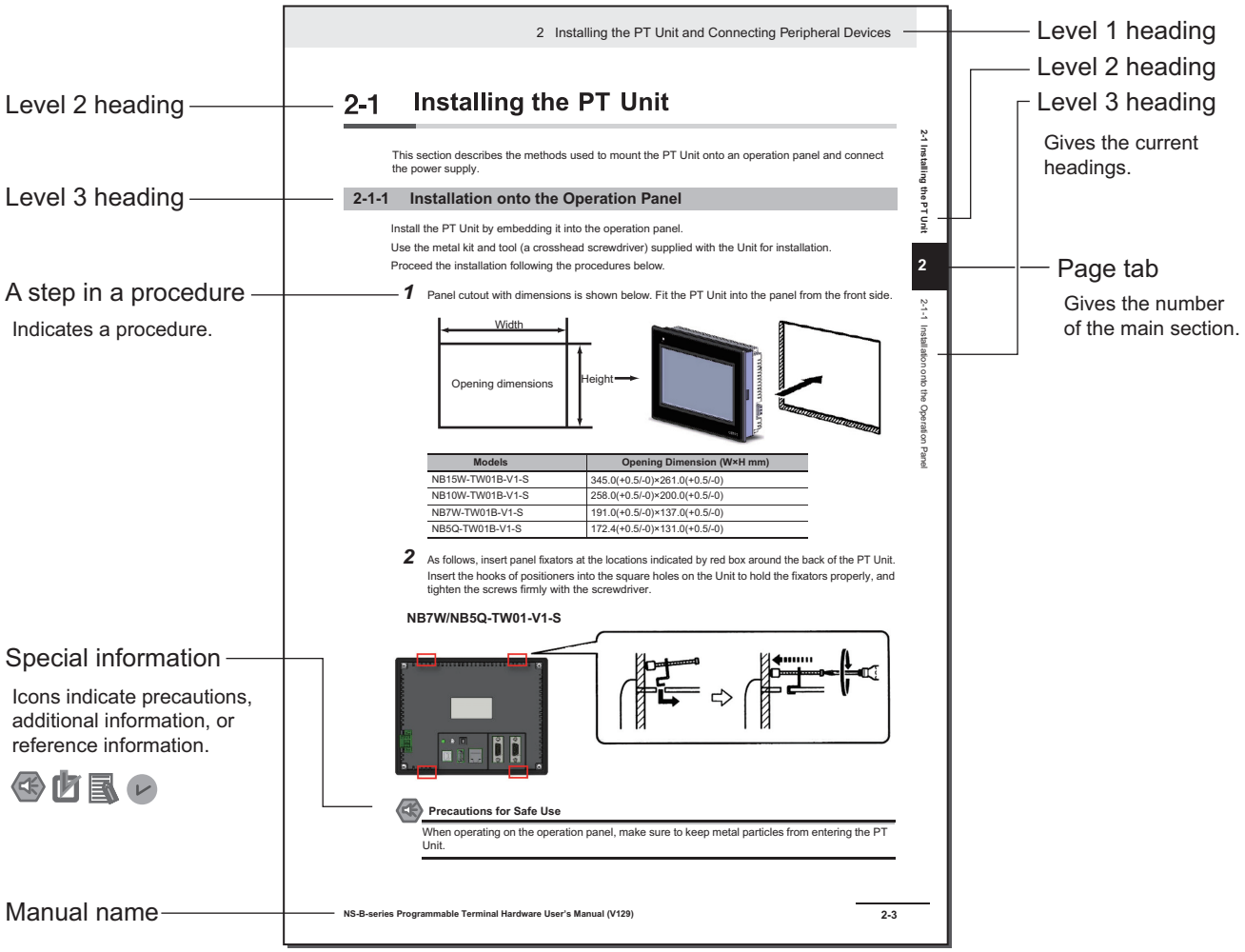
The basic information required to use an NS-B-series PT is provided in the following manuals.

- *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*
- *NS-B-series Programmable Terminal Software User's Manual (Cat. No. V130)*
- *NS-B-series Programmable Terminal Host Connection User's Manual (Cat. No. V131)*
- *NS-B-series Programmable Terminal Macro Reference Manual (Cat. No. V132)*
- *CX-Designer Version 4.□ Operation Manual (Cat. No. V133)*

Manual Structure

Page Structure

The following page structure is used in this manual.



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

Special Information

Special information in this manual is classified as follows:



Precautions for Safe Use

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



Precautions for Correct Use

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



Additional Information

Additional information to read as required.

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



Version Information

Information on differences in specifications and functionality for different versions of the CX-Designer is given.

Precaution on Terminology

In this manual, “download” refers to transferring data from the CX-Designer to the PT Unit and “upload” refers to transferring data from the PT Unit to the CX-Designer.

Sections in this Manual

1 Connecting the CS/CJ/CP Series to Serial Port (NT Link)

2 Connecting to CS/CJ/CP/NJ/NX-series via Ethernet

3 Connecting to CS/CJ/CP Series by Serial Port (Host Link)

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Safety Precautions

Refer to the following manuals for safety precautions.

- *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*

Precautions for Safe Use

Refer to the following manuals for precautions for safe use.

- *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*

Precautions for Correct Use

Refer to the following manuals for precautions for correct use.

- *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*

Regulations and Standards

Refer to the following manuals for regulations and standards.

- *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*

Related Manuals

The followings are the manuals related to this manual. Use these manuals for reference.

Manual name	Cat. No.	Models	Applications	Description
NS-B-series Programmable Terminal Hardware User's Manual	V129	NB□□□-TW01B-V1-S	Learning the specifications and settings required to install an NS-B-series PT and connect peripheral devices.	Information is provided on NS-B-series Programmable Terminal specifications, part names, installation procedures, and procedures to connect an PT Unit to peripheral devices. Information is also provided on maintenance after operation and troubleshooting.
NS-B-series Programmable Terminal Software User's Manual	V130	NB□□□-TW01B-V1-S	Learning about NS-B-series PT pages and object functions.	Describes the pages and object functions of the NS-B-series Programmable Terminals.
NS-B-series Programmable Terminal Host Connection User's Manual	V131	NB□□□-TW01B-V1-S	Learning the specifications required to connect devices to an NS-B-series PT.	Information is provided on connection procedures and setting procedures to connect an NS-B-series PT to a Controller or other device.
NS-B-series Programmable Terminal Macro Reference Manual	V132	NB□□□-TW01B-V1-S	When you wish to know the language specifications of the macros used with the NS-B-series PT.	Describes the language specifications and functions of the macros used with the NS-B-series PT.
CX-Designer Version 4.□ Operation Manual	V133	CXONE-AL□□C-V4 CXONE-AL□□D-V4	When you wish to know how to create screens in CX-Designer and how to download to the PT Unit.	Describes how to create screens in CX-Designer and the procedure to download to the PT Unit.

Refer to the following manual for other related manuals.

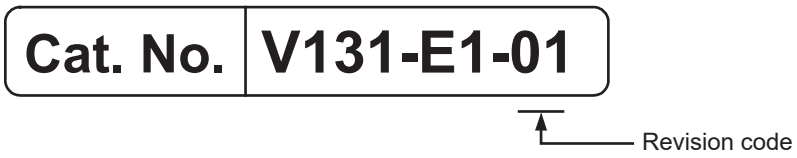
- *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*

Terminology

Term	Description
PT Unit	In this manual, indicates an NS-B-series Programmable Terminal.
PLC	Indicates Programmable Controllers in the OMRON SYSMAC CS/CJ, C, or CVM1/CV Series of Programmable Controllers.
CS Series	Indicates Programmable Controllers in the OMRON SYSMAC CS Series of Programmable Controllers: CS1G, CS1H, CS1G-H, or CS1H-H
C Series	Indicates Programmable Controllers in the OMRON SYSMAC C Series of Programmable Controllers: C200HS, C200HX/HG/HE-E/-ZE, CQM1, CQM1H, CPM1A, CPM2A, CPM2C
CVM1/CV Series	Indicates Programmable Controllers in the OMRON SYSMAC CV/CVM1 Series of Programmable Controllers: CV500, CV1000, CV2000, CVM1
CJ Series	Indicates Programmable Controllers in the OMRON SYSMAC CJ Series of Programmable Controllers: CJ1G, CJ1G-H, CJ1H-H, CJ1M, CP1H, CP1L, CP1E, CP2E, CJ2H, CJ2M References to “CJ1H-H” in this manual indicate the CJ1H-CPU□□H-R and CJ1H-CPU□□H. References to “CJ1H-H-R” indicate the CJ1H-CPU□□H-R. “CJ2” is used when referring specifically to only the CJ2 CPU Units.
NJ Series	Indicates a Controller in the OMRON NJ Series of Controllers: (Only models that can be connected to NS-B-series PTs are given.): NJ101, NJ301, NJ501
NX Series	Indicates Controllers in the OMRON NX Series of Controllers: (Only models that can be connected to NS-B-series PTs are given.): NX701, NX102, or NX1P2
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-E/-ZE PLC.
CPU Unit	Indicates a CPU Unit in the OMRON SYSMAC CS/CJ, C, or CVM1/CV Series of Programmable Controllers.
CX-Designer	Indicates the OMRON CX-Designer.
Host	Indicates the PLC, FA computer, or personal computer functioning as the control device and interfaced with the NS-B-series PT.
Removable media	Indicates a USB memory.
Project	Indicates a collection of files containing screen data, settings, and other information for the NS-B-series that are created in CX-Designer.

Revision History

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



Revision code	Date	Revised content
01	October 2026	Original production

1

Connecting the CS/CJ/CP Series to Serial Port (NT Link)

This section describes the methods for connecting the CS/CJ/CP Series to the serial port (NT Link) of the PT Unit.

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1-4 Recommended Connector Cables 1-28

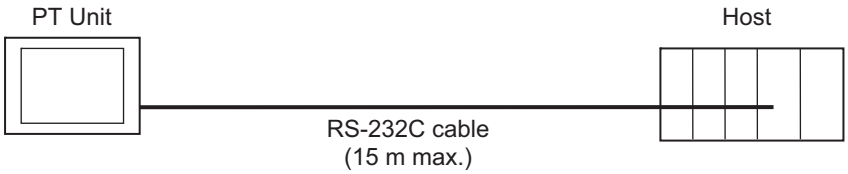
1-1 1:1 Host Connection

1-1-1 Connection Methods

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

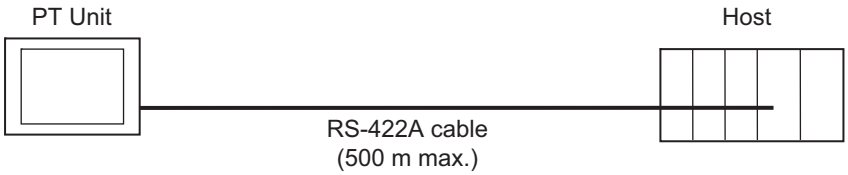
- Direct Connection using RS-232C

  This is the easiest connection method. OMRON cables with connectors can be used, depending on the host being connected.



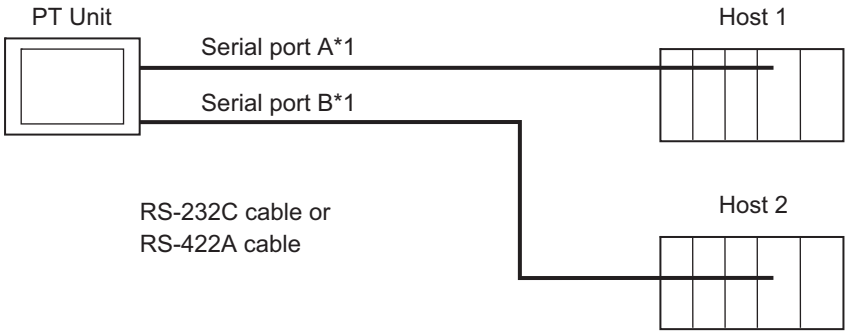
- Direct connection using RS-422A*1

  This connection method allows an extended communications distance of up to 500 m*1.



*1. Only serial port B is supported.

The NS-B-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 Unit.



*1. Each port allows 1:N connection.

Precautions for Safe Use

- Always tighten the connector screws after connecting communications cables.
- Do not pull on the cables or bend the cables beyond their natural limit.

  Do not place heavy objects on top of the cables or other wiring lines. Doing so may break the cables.

Supported RS-232C Host Units

Some models and series of OMRON PLCs have a built-in 1:1 NT Link function. Some PLCs can also be connected in a 1:1 NT Link by adding a Serial Communications Board or Communications Board.

When connecting the PT Unit to a PLC, check the series and model of the PLC and the model of the Board mounted to the PLC.

Refer to *A-1 Connection Device List* on page A-2 for details on the Units that can be connected to NS-B-series PTs as hosts using RS-232C or RS-422A communications in a 1:1 NT Link.



Additional Information

CS/CJ series CPU Units cannot be connected in a 1:1 NT Link. Use a 1:1 connection through 1:N NT Links (normal or high speed). For details, refer to *1-2 1:N Host Connection* on page 1-8 or *1-3 High-speed 1:N NT Link* on page 1-19.

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 Unit to the host.

Refer to *A-1 Connection Device List* on page A-2 for details on the Units that can be connected to NS-B-series PTs as hosts and support a 1:1 NT Link using RS-422A.



Additional Information

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

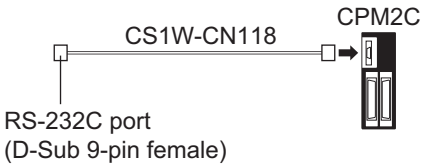
Connecting to CPM2C PLCs

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

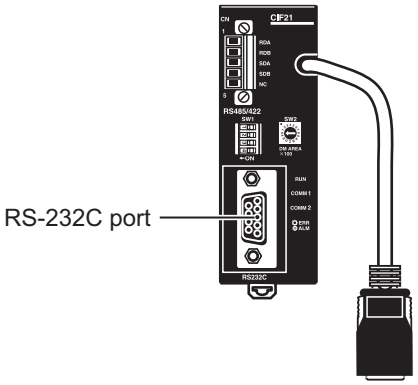
Refer to the *SYSMAC CPM2C Operation Manual (Cat. No. W356)* for details.

Use CS1W-CN118 Connecting Cable to connect the CPM2C to the NS-B-series PT using the built-in RS-232C port of the CPM2C. The peripheral port cannot be used to connect the PT Unit.

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



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



1-1-2 Unit Setting Methods

The methods for setting each Unit are as follows:

Connecting C Series, C200HS, C200HX/HG/HE(-Z), CQM1, CPM2A, CPM2C, CQM1H PLCs, or CVM1/CV Series(-V□)

● 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)*1 Port 1 of CQM1H*2	DM 6555		
Port B of C200HX/HG/HE(-Z)*1	DM 6550		

*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)*1	DM 6555	4000	Uses 1:1 NT Link
Port 2 of CQM1H*2	DM 6550	4000	

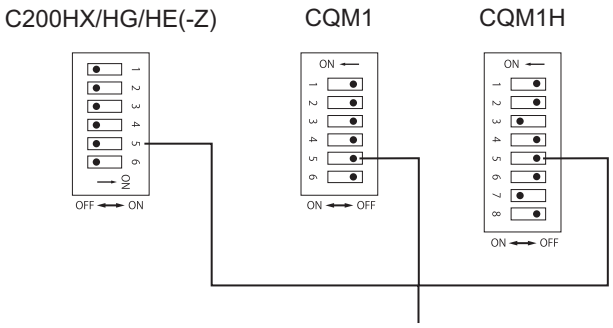
*1. RS-422A port of Communications Board.

*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.

● Setting the C200HX/HG/HE(-Z)/CQM1/CQM1H Front Panel DIP Switch (Using RS-232C)

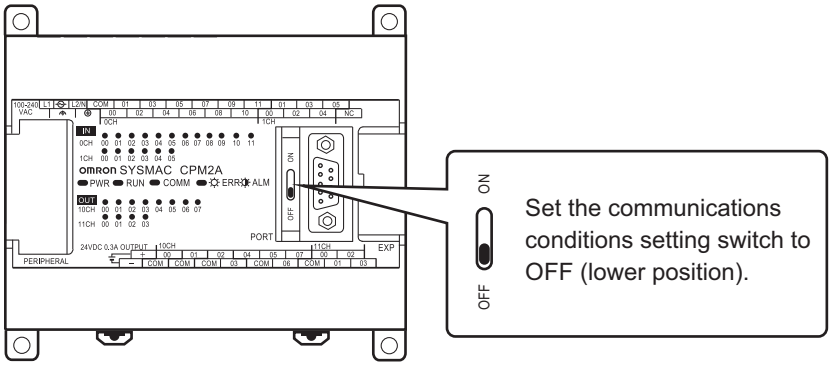
When using C200HX/HG/HE(-Z), CQM1, or CQM1H PLCs, set the DIP switch on the front panel to enable the PLC Setup Area (Data Memory) settings, as follows:



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

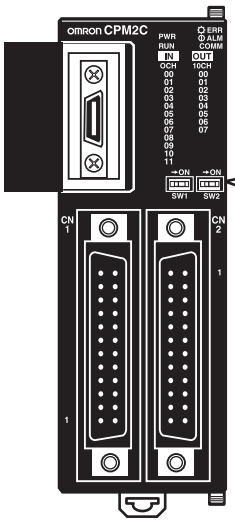
● Setting the CPM2A Front Panel DIP Switch

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



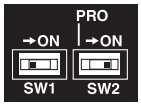
Setting the CPM2C Front Panel DIP Switches

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



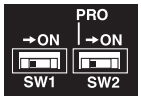
Set the switches according to whether the peripheral port or the built-in RS-232C port is used, as follows:

- Connecting the PT Unit to the built-in RS-232C port
  (The peripheral port is used to connect devices that require non-standard communications settings.)



SW1: OFF
SW2: ON

- Connecting the PT Unit to the built-in RS-232C port
  (The peripheral port is used to connect the Programming Console.)



SW1: OFF
SW2: OFF

Setting the C200HX/HG/HE(-Z) Communications Board Switches (Using RS-422A)

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

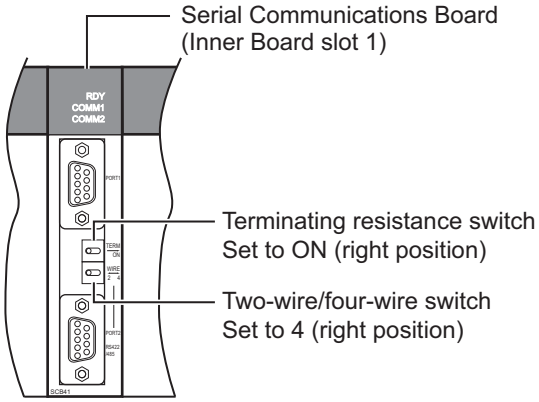
Switch 1: “4” (Four-wire method = RS-422A)

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)



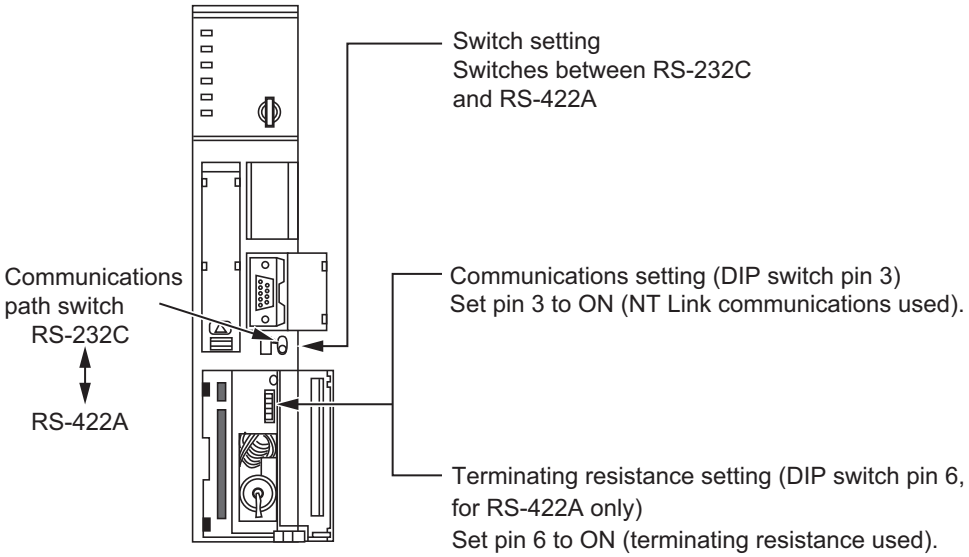
● Connecting to CVM1/CV-series(-V□) PLCs (Using RS-232C/RS-422A)

- PLC Setup

  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.



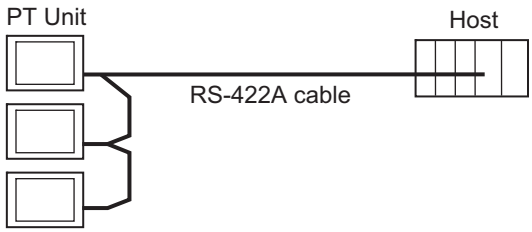
1-2 1:N Host Connection

1-2-1 Connection Methods

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

The total transmission distance is 500 m when using the RS-422A port.



● Supported Host Units

The OMRON PLCs that can be connected in 1:N NT Links are limited to the CS-series, CJ-series, NJ-Series, and C-series PLCs. CS-series PLCs can also be connected in 1:N NT Links by using a Serial Communications Unit. CJ-series PLCs can also be connected in 1:N NT Links by using a Serial Communications Unit. NJ-series PLCs can be connected in 1:N NT Links by using a Serial Communications Unit.

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

For details on the Units used as hosts that can be connected in 1:N NT Links, refer to *A-1 Connection Device List* on page A-2.

Additional Information

- RS-485 (two-wire) of the NS-B-series does not support NT Links. Always use RS-422A (four-wire).
- 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 *1-3 High-speed 1:N NT Link* on page 1-19 for details.

1-2-2 Unit Setting Methods

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.*3
Port A of C200HX/HG/HE(-Z)*1 Port 1 of CQM1H*2	DM 6555		
Port B of C200HX/HG/HE(-Z)*1	DM 6550		

*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)*1	DM 6555	5□00	Uses 1:N NT Link □: Largest unit number (1 to 7) of the connected PTs.*3
Port 2 of CQM1H*2	DM 6550	5□00	

*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.

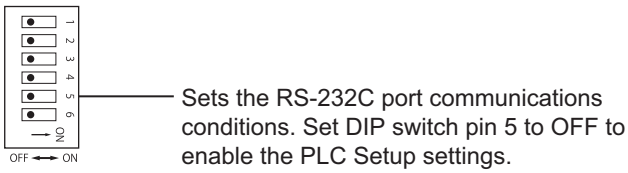
Refer to the manuals of the PLC being used for details on using the PLC Setup Area.

Additional Information

- 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.
- When setting a 1:N NT Link in the CX-Programmer, set the baud rate to 38,400 bps.

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:



Setting the Communications Board Switches (Using RS-422A)

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

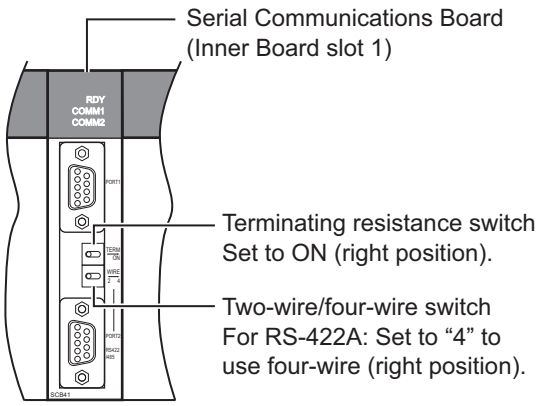
Switch 1: “4” (Four-wire method = RS-422A)

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 a CS-series CPU Unit

When a CS-series CPU Unit is connected, settings are required in the PLC Setup and on the front-panel switches of the CPU Unit.

● PLC Setup

There are two methods that can be used to change the parameters in the PLC Setup.

- CX-Programmer
- Programming Console

Using the CX-Programmer

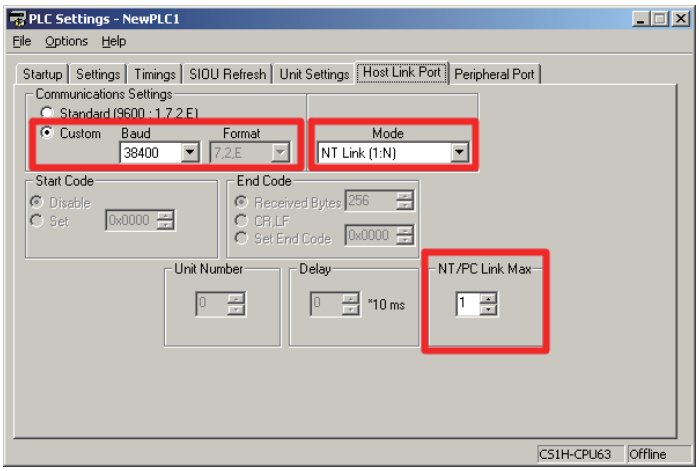
Precautions for Safe Use

If one or more parameters in the PLC Setup in the CPU Unit has been previously changed, always upload the PLC Setup from the CPU Unit and make any new changes in the uploaded copy so that you do not overwrite the previous changes.

1 Open the project file in the CX-Programmer and select **PLC - PLC Information - PLC Settings** from the menus.

2 The PLC Settings Dialog Box will be displayed. Click the tab for the port to which the PT Unit is connected and change the following three parameters.

(The following screen capture is provided as an example. The parameters that are actually displayed will depend on the model of the CPU Unit and the port.)



Item	Description
Baud	Select the Custom Option and set the baud rate to 38,400 bps (Standard 1:N NT Link Mode). The format does not need to be changed.
Mode	Set the mode to the 1:N NT Link Mode.
NT/PLC Link Max.	If only one PT Unit is connected to the port and it has a unit number of 0, set this parameter to 1. Otherwise, set the highest unit number of all the PT Units that are connected.

Using a Programming Console

If the PT Unit is connected to the Host Link port (RS-232C port), connect the Programming Console to the CPU Unit and set the following values at the specified addresses of the PLC Setup.

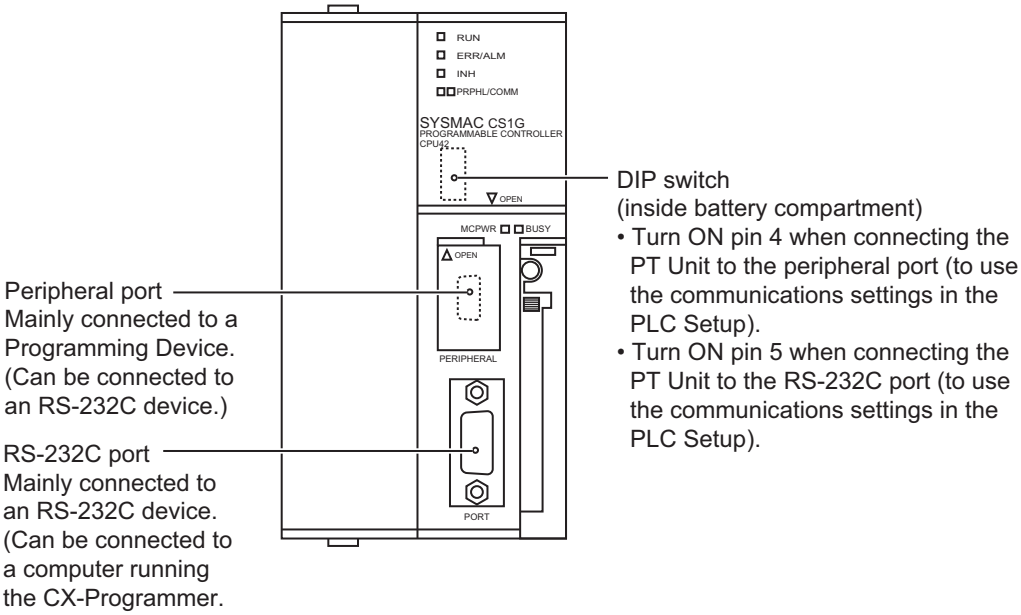
PLC Setup address	Setting to write	Description
160	8200 hex	Specifies using the Host Link port in 1:N NT Link Mode.
161	0000 to 0009 hex	Specifies the standard communications speed (38,400 bps). It does not matter what value between 0000 and 0009 is set.
166	000□ hex	If only one PT Unit is connected to the port and it has a unit number of 0, replace the box at the left with 1. Otherwise, replace the box with the highest unit number of all the PT Units that are connected.

Additional Information

If the PT Unit is connected to the peripheral port make the above settings in words 144, 145, and 150 of the PLC Setup instead of 160, 161, 166.

● 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 Unit is connected, as follows:



Connecting a CJ-series CPU Unit

When a CJ-series CPU Unit is connected, settings are required in the PLC Setup and on the front-panel switches of the CPU Unit.

● PLC Setup

There are two methods that can be used to change the parameters in the PLC Setup.

- CX-Programmer
- Programming Console (CJ1 CPU Units only)

Using the CX-Programmer

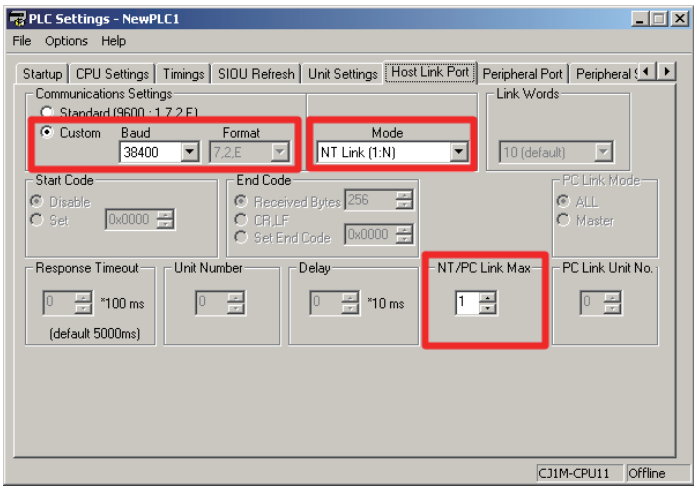
Precautions for Safe Use

If one or more parameters in the PLC Setup in the CPU Unit has been previously changed, always upload the PLC Setup from the CPU Unit and make any new changes in the uploaded copy so that you do not overwrite the previous changes.

1 Open the project file in the CX-Programmer and select **PLC - PLC Information - PLC Settings** from the menus.

2 The PLC Settings Dialog Box will be displayed. Click the tab for the port to which the PT Unit is connected and change the following three parameters.

(The following screen capture is provided as an example. The parameters that are actually displayed will depend on the model of the CPU Unit and the port.)



Item	Description
Baud	Select the Custom Option and set the baud rate to 38,400 bps (Standard 1:N NT Link Mode). The format does not need to be changed.
Mode	Set the mode to the 1:N NT Link Mode.
NT/PLC Link Max.	If only one PT Unit is connected to the port and it has a unit number of 0, set this parameter to 1. Otherwise, set the highest unit number of all the PT Units that are connected.

Using a Programming Console (CJ1 CPU Units Only)

If the PT Unit is connected to the Host Link port (RS-232C port), connect the Programming Console to the CPU Unit and set the following values at the specified addresses of the PLC Setup.

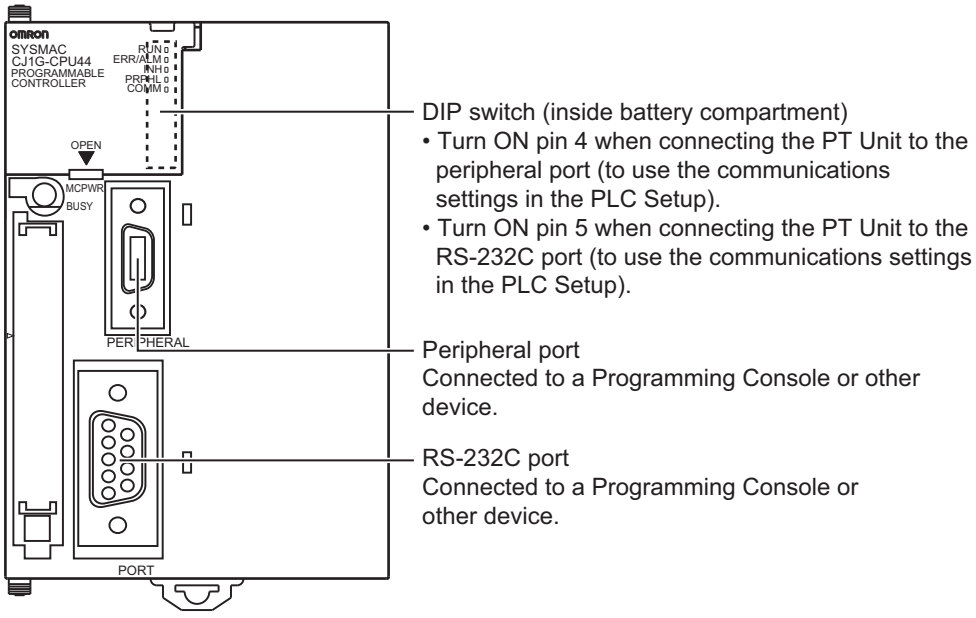
PLC Setup address	Setting to write	Description
160	8200 hex	Specifies using the Host Link port in 1:N NT Link Mode.
161	0000 to 0009 hex	Specifies the standard communications speed (38,400 bps). It does not matter what value between 0000 and 0009 is set.
166	000□ hex	If only one PT Unit is connected to the port and it has a unit number of 0, replace the box at the left with 1. Otherwise, replace the box with the highest unit number of all the PT Units that are connected.

Additional Information

If the PT Unit is connected to the peripheral port of the CPU Unit, make the above settings in words 144, 145, and 150 of the PLC Setup instead of 160, 161, 166.

● 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 Unit is connected, as shown below. (The following figure shows a CJ1G CPU Unit. The arrangement depends on the CPU Unit, but the DIP switch settings are the same.)



Connecting to CS-series Serial Communications Boards

- 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*1	Baud rate (normal)
DM32006	DM32016	000☐	☐: Largest unit number (1 to 7) of the connected PT Units.*2

*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.)

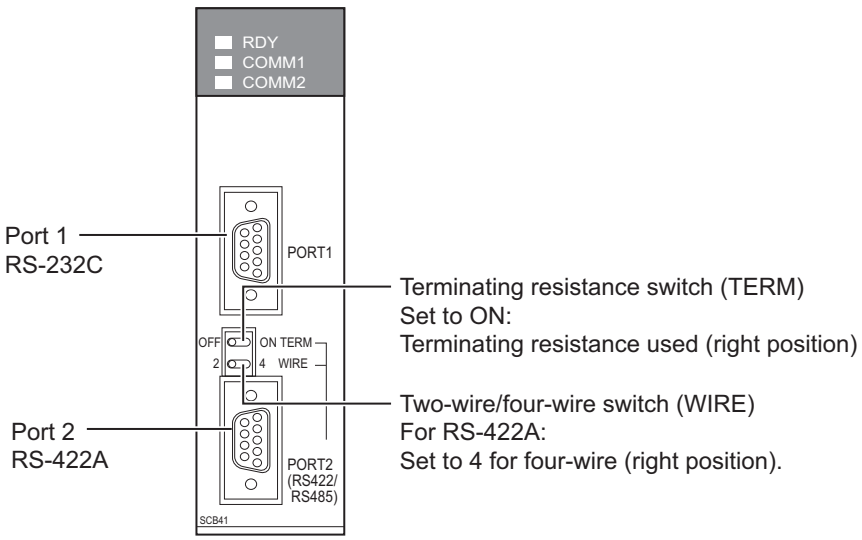
*2. When using a 1:N connection, set the value for ☐ to 1 or higher.

For example, to connect PT Units 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.

Additional Information

When setting a 1:N NT Link in the CX-Programmer, set the baud rate to 38,400 bps.

● 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.)
- CS1W-SCU31 (Both ports 1 and 2 are RS-422A 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*1	Baud rate (normal)
DM m + 6	DM m + 16	000☐	☐: Largest unit number (1 to 7) of the connected PT Units.*2

*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.)

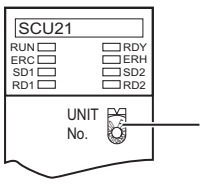
*2. When using a 1:N connection, set the value for ☐ to 1 or higher.

Additional Information

When setting a 1:N NT Link in the CX-Programmer, set the baud rate to 38,400 bps.

● 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.

Connecting to CJ-series Serial Communications Units

- CJ1W-SCU21/22 (Both ports 1 and 2 are RS-232C ports.)
- CJ1W-SCU31/32 (Both ports 1 and 2 are RS-422A ports.)
- CJ1W-SCU41/42 (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*1	Baud rate (normal)
DM m + 6	DM m + 16	000□	□: Largest unit number (1 to 7) of the connected PT Units.*2

*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.)

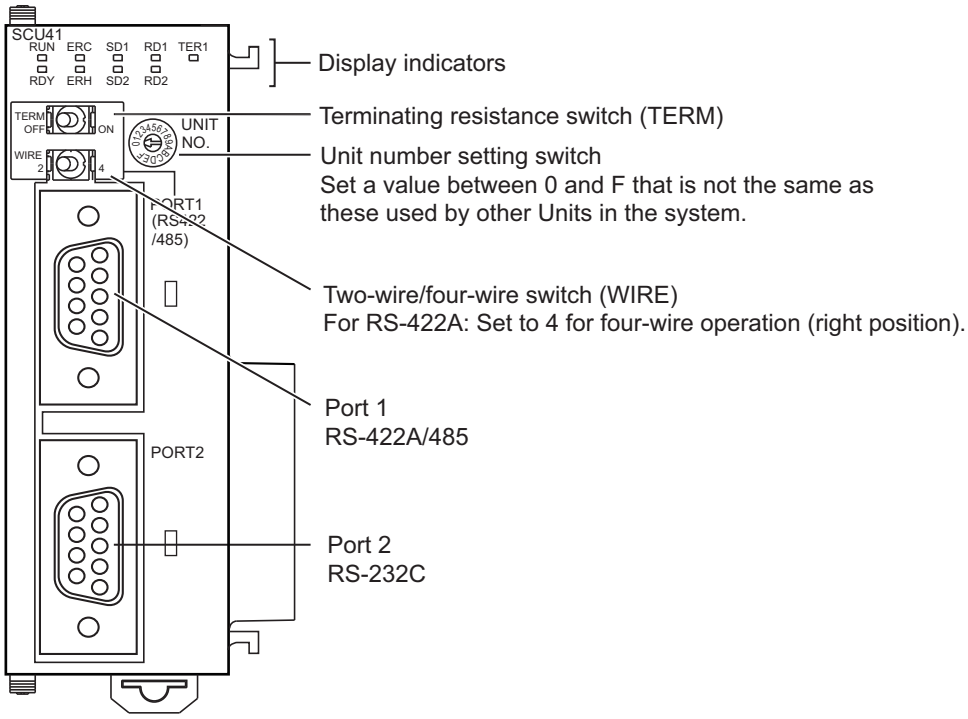
*2. When using a 1:N connection, set the value for □ to 1 or higher.

Additional Information

When setting a 1:N NT Link in the CX-Programmer, set the baud rate to 38,400 bps.

● Setting the Front Panel Switches

CJ1W-SCU41



1-3 High-speed 1:N NT Link

Supported Host Units

The OMRON PLCs that can be connected to high-speed 1:N NT Links using RS-232C are as follows:

- CS-series PLCs: CS1G/H-V1 and CS1G/H-H
- CJ-series PLCs: CJ1G, CJ1G/H-H, CJ1M, CJ2H, CJ2M and CJ3M
- NJ-series PLCs: NJ501, NJ301, and NJ101

CS-series PLCs can also be connected in high-speed 1:N NT Links by using a Serial Communications Unit or Serial Communications Board. (CS-series PLCs without a -V1 suffix can also be connected in high-speed 1:N NT Links if a Serial Communications Board/Unit is used.)

CJ-series PLCs can also be connected in high-speed 1:N NT Links by using a Serial Communications Unit. NJ-series PLCs can be connected in high-speed 1:N NT Links by using a Serial Communications Unit.

The OMRON PLCs that can be connected in high-speed 1:N NT Links using RS-422A are as follows:

- CS-series PLCs: CS1G/H and CS1G/H-H
- CJ-series PLCs: CJ1G/H-H, CJ1G, CJ1M, CJ2H, CJ2M and CJ3M
- NJ-series PLCs: NJ501, NJ301, and NJ101

CS-series PLCs can also be connected in high-speed 1:N NT Links by using a Serial Communications Unit or 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/Unit is used.) CJ-series PLCs can also be connected in high-speed 1:N NT Links by using a Serial Communications Unit. NJ-series PLCs can be connected in high-speed 1:N NT Links by using a Serial Communications Unit.

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

For details on the PLCs that can be connected, refer to *A-1 Connection Device List* on page A-2.

1-3-1 Unit Setting Methods

The methods for setting each Unit are as follows:

Connecting a CS-series CPU Unit

When a CS-series CPU Unit is connected, settings are required in the PLC Setup and on the front-panel switches of the CPU Unit.

● PLC Setup

There are two methods that can be used to change the parameters in the PLC Setup.

- CX-Programmer
- Programming Console

Using the CX-Programmer

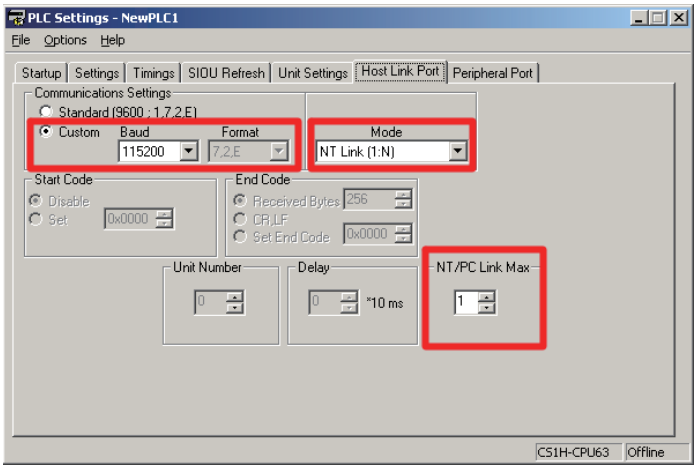
Precautions for Safe Use

If one or more parameters in the PLC Setup in the CPU Unit has been previously changed, always upload the PLC Setup from the CPU Unit and make any new changes in the uploaded copy so that you do not overwrite the previous changes.

1 Open the project file in the CX-Programmer and select **PLC - PLC Information - PLC Settings** from the menus.

2 The PLC Settings Dialog Box will be displayed. Click the tab for the port to which the PT Unit is connected and change the following three parameters.

(The following screen capture is provided as an example. The parameters that are actually displayed will depend on the model of the CPU Unit and the port.)



Item	Description
Baud	Select the Custom Option and set the baud rate to 115,200 bps (High-speed 1:N NT Link Mode). The format does not need to be changed.
Mode	Set the mode to the 1:N NT Link Mode.
NT/PLC Link Max.	If only one PT Unit is connected to the port and it has a unit number of 0, set this parameter to 1. Otherwise, set the highest unit number of all the PT Units that are connected.

Using a Programming Console

If the PT Unit is connected to the Host Link port (RS-232C port), connect the Programming Console to the CPU Unit and set the following values at the specified addresses of the PLC Setup.

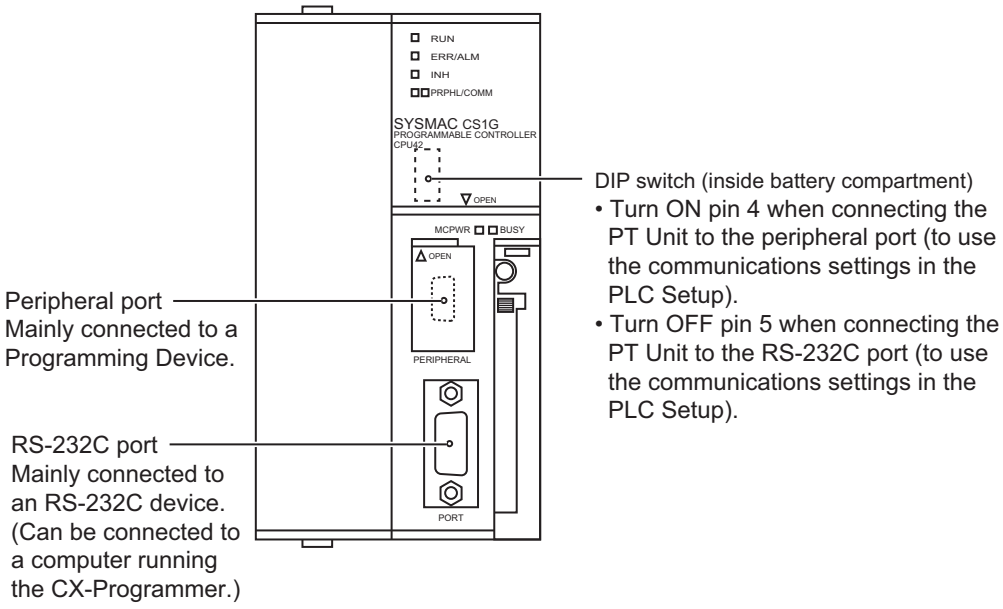
PLC Setup address	Setting to write	Description
160	8200 hex	Specifies using the Host Link port in 1:N NT Link Mode.
161	000A hex	Baud rate: High-speed (115,200 bps)
166	000□ hex	If only one PT Unit is connected to the port and it has a unit number of 0, replace the box at the left with 1. Otherwise, replace the box with the highest unit number of all the PT Units that are connected.

Additional Information

If the PT Unit is connected to the peripheral port make the above settings in words 144, 145, and 150 of the PLC Setup instead of 160, 161, 166.

● 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 Unit is connected, as follows:



Connecting a CJ-series CPU Unit

When a CJ-series CPU Unit is connected, settings are required in the PLC Setup and on the front-panel switches of the CPU Unit.

● PLC Setup

There are two methods that can be used to change the parameters in the PLC Setup.

- CX-Programmer
- Programming Console (CJ1 CPU Units only)

Using the CX-Programmer

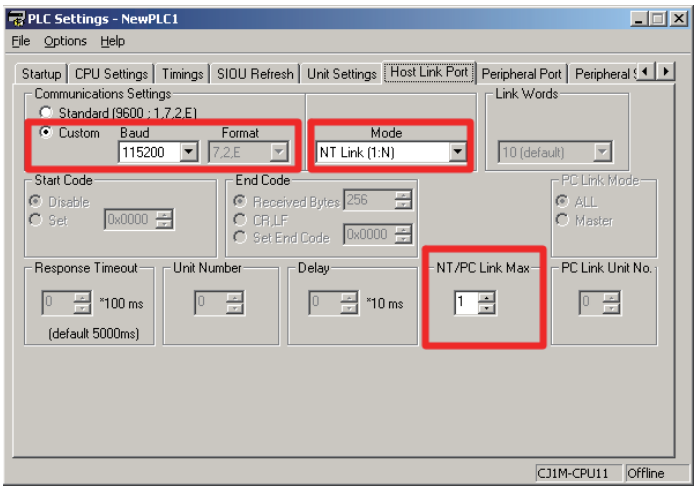
Precautions for Safe Use

If one or more parameters in the PLC Setup in the CPU Unit has been previously changed, always upload the PLC Setup from the CPU Unit and make any new changes in the uploaded copy so that you do not overwrite the previous changes.

1 Open the project file in the CX-Programmer and select **PLC - PLC Information - PLC Settings** from the menus.

2 The PLC Settings Dialog Box will be displayed. Click the tab for the port to which the PT Unit is connected and change the following three parameters.

(The following screen capture is provided as an example. The parameters that are actually displayed will depend on the model of the CPU Unit and the port.)



Item	Description
Baud	Select the Custom Option and set the baud rate to 115,200 bps (High-speed 1:N NT Link Mode). The format does not need to be changed.
Mode	Set the mode to the 1:N NT Link Mode.
NT/PLC Link Max.	If only one PT Unit is connected to the port and it has a unit number of 0, set this parameter to 1. Otherwise, set the highest unit number of all the PT Units that are connected.

Using a Programming Console (CJ1 CPU Units Only)

If the PT Unit is connected to the Host Link port (RS-232C port), connect the Programming Console to the CPU Unit and set the following values at the specified addresses of the PLC Setup.

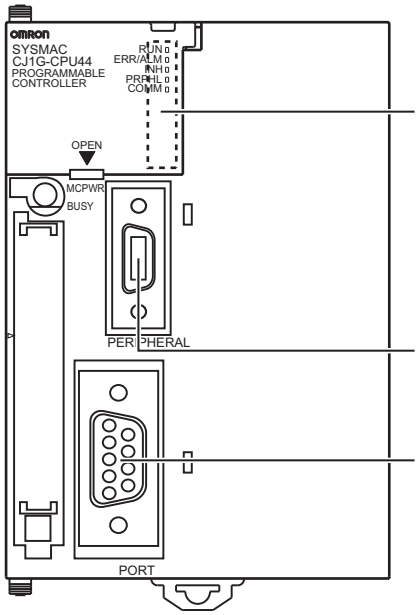
PLC Setup address	Setting to write	Description
160	8200 hex	Specifies using the Host Link port in 1:N NT Link Mode.
161	000A hex	Baud rate: High-speed (115,200 bps)
166	000□ hex	If only one PT Unit is connected to the port and it has a unit number of 0, replace the box at the left with 1. Otherwise, replace the box with the highest unit number of all the PT Units that are connected.

Additional Information

If the PT Unit is connected to the peripheral port of the CPU Unit, make the above settings in words 144, 145, and 150 of the PLC Setup instead of 160, 161, 166.

● 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 Unit is connected, as shown below. (The following figure shows a CJ1G CPU Unit. The arrangement depends on the CPU Unit, but the DIP switch settings are the same.)



DIP switch (inside battery compartment)
- Turn ON pin 4 when connecting the PT Unit to the peripheral port (to use the communications settings in the PLC Setup).
- Turn OFF pin 5 when connecting the PT Unit to the RS-232C port (to use the communications settings in the PLC Setup).

Peripheral port
Connected to a Programming Console or other device.

RS-232C port
Connected to a Programming Console or other device.

Connecting to CS-series Serial Communications Boards

- 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.)



Additional Information

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 PT Units.*1

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

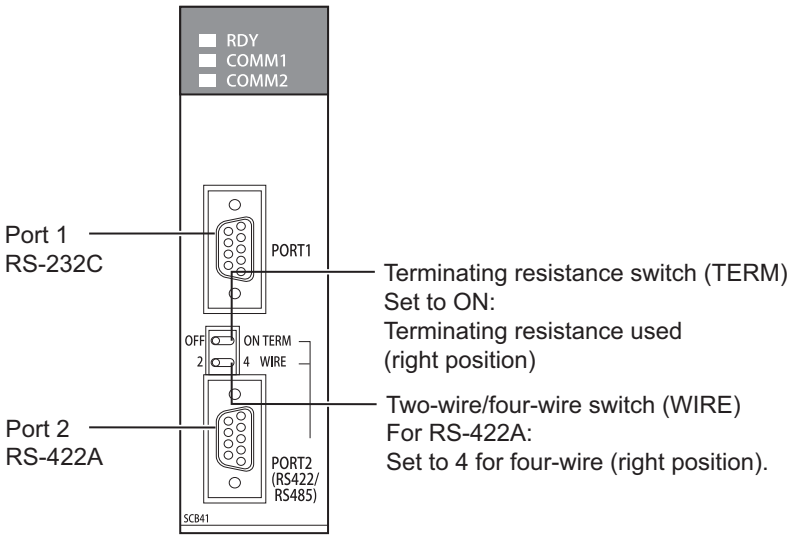
For example, to connect PT Units with unit numbers 3 to 6 to Port 1 in 1:N NT Links, set DM32000 to 8200 Hex, DM32001 to 000A Hex, and DM32006 to 0006 Hex.



Additional Information

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-422A)



Connecting to CS-series Serial Communications Units

- CS1W-SCU21
- CS1W-SCU31

Additional Information

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 PT Units.*1

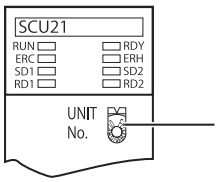
*1. When connecting a single Unit in a 1:N connection, set the value of ☐ to 1 or higher.

Additional Information

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

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

- CJ1W-SCU21/22 (Both ports 1 and 2 are RS-232C ports.)
- CJ1W-SCU31/32 (Both ports 1 and 2 are RS-422A ports.)
- CJ1W-SCU41/42 (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 PT Units.*1

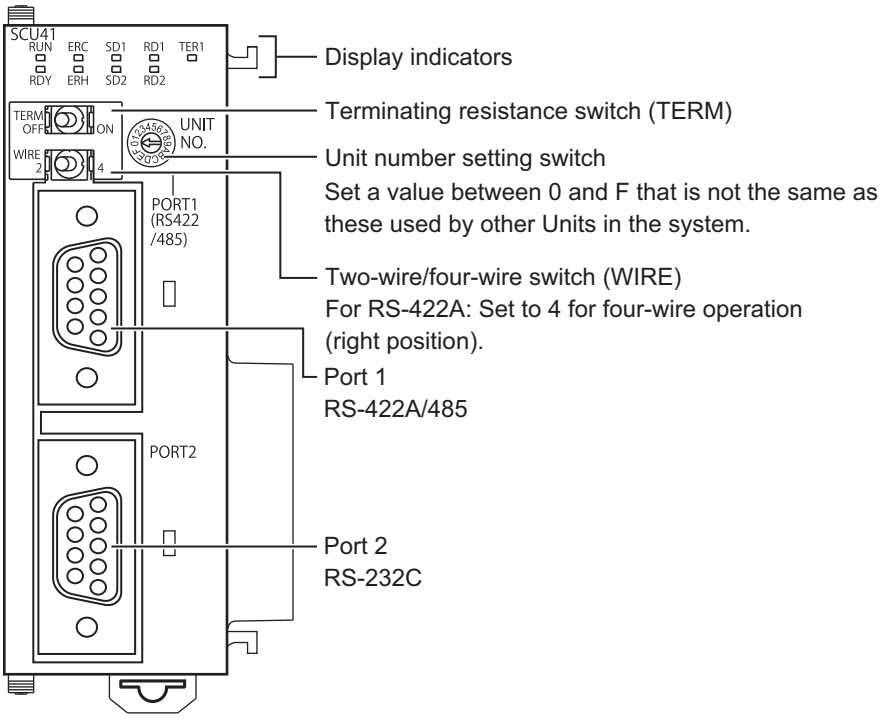
*1. When connecting a single Unit in a 1:N connection, set the value of □ to 1 or higher.

Additional Information

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

CJ1W-SCU41



1-4 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	XM3A-0921 or equivalent	9-pin type made by OMRON.	C-series CQM1 and C200HS C200HX/HG/HE(-Z) CVM1/CV-series CPU Units CV500-LK201
	XM3A-2521 or equivalent	25-pin type made by OMRON.	CV500-LK201 C200H-LK201-V1
Connector Hood	XM2S-0911 or equivalent	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 or equivalent	9-pin type made by OMRON.	
	XM2S-0913 or equivalent	9-pin type made by OMRON. (inch screws)	
	XM2S-2511 or equivalent	25-pin type made by OMRON.	CV500-LK201 C200H-LK201-V1
Cable	AWG28 × 5P IFVV-SB	Multiconductor shielded cable made by Fujikura, Ltd.	
	CO-MA-VV-SB 5P × 28AWG	Multiconductor shielded cable made by Proterial, Ltd.	

Precautions for Safe Use

Do not pull on the cables or bend the cables beyond their natural limit.

Do not place heavy objects on top of the cables or other wiring lines. Doing so may break the cables.

● 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-500T-2	5 m	

2

Connecting to CS/CJ/CP/NJ/NX-series via Ethernet

This section describes the methods for connecting the PT Unit to the CS/CJ/CP/NJ/NX-series using the Ethernet interface.

2-1 Connecting to Host Via Ethernet 2-2
2-1-1 Host Types and Settings 2-4
2-2 Connecting to Host via EtherNet/IP 2-19
2-2-1 What is EtherNet/IP? 2-19
2-2-2 Selecting Network Configuration Devices 2-20
2-2-3 Network Installation 2-23
2-2-4 Host Types and Settings 2-25

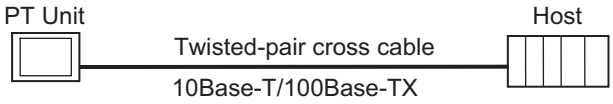
2-1 Connecting to Host Via Ethernet

To connect to the network using Ethernet, the network number, node number, and IP address must be set. Use the CX-Designer to set the settings. For details, refer to *System Settings and Project Properties* in the CX-Designer's Online Help.

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

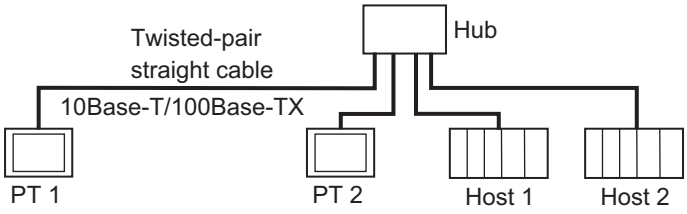
- Connecting PT Unit Directly to the Host

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



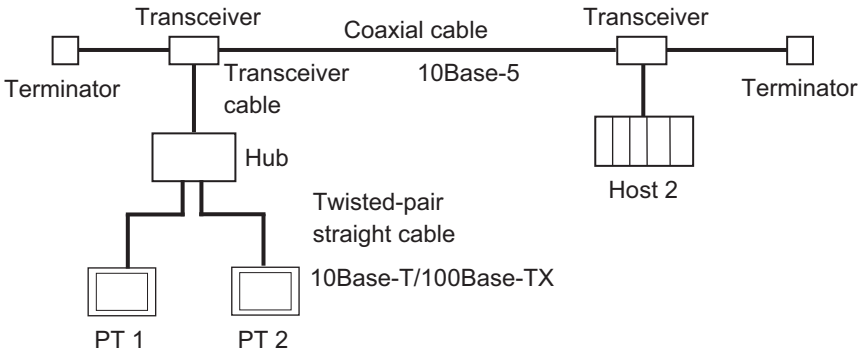
- Connecting PT Unit to Host with a Hub

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



- Connecting PT Unit and Host Using Transceivers

  PT Units 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/100Base-TX 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.

Recommended Network Configuration Devices

The following products are recommended for configuring the network when an Ethernet Unit is used.

Configuration devices	Maker	Model
Hub	Phoenix Contact	Contact the manufacturer.
Twisted-pair cable	TONICHI KYOSAN CABLE	NETSTAR-C5E SAB 0.5×4P
	KURAMO ELECTRIC Co., Ltd.	KETH-SB
Connectors (Modular plug)	Panduit Corp.	MPS588
Boots	TSUKO	MK Boots (IV) LB

2-1-1 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.

For details on the hosts that can be connected to NS-B-series PTs via the Ethernet, refer to *A-1 Connection Device List* on page A-2.

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

Host Settings

The following settings must be set at the host.

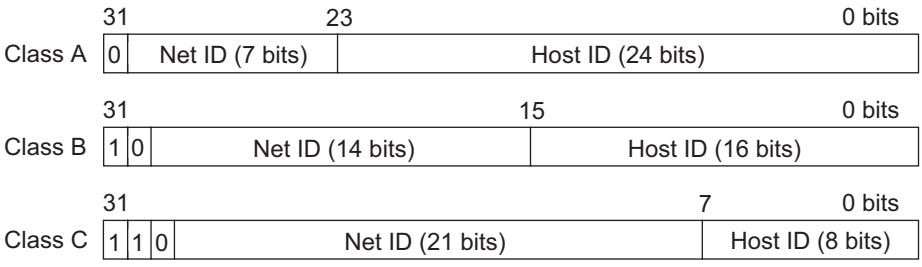
Item	Host Settings
Network number	1 to 127
Conversion table	Node number: 1 to 254 IP address: 0.0.0.0 to 255.255.255.255
UDP port number	1 to 65535, default is 9600.
IP address	0.0.0.0 to 255.255.255.255
Subnet mask	0.0.0.0 to 255.255.255.255
Default gateway	0.0.0.0 to 255.255.255.255
IP proxy address	“” (blank), 0.0.0.0 to 255.255.255.255
Node number	1 to 254
Routing tables	Define communications paths for FINS messages. Routing tables are set from the CX-Programmer.

● IP Address Settings

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

Additional Information

- 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.

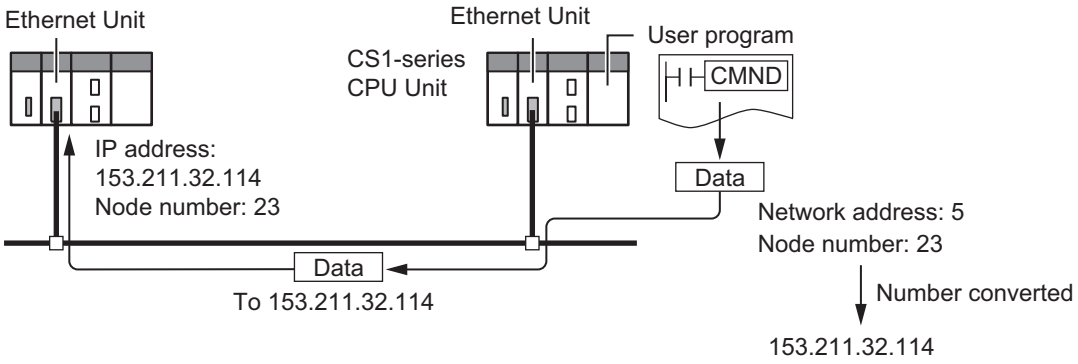
Example: 11111111 11111111 11111111 00000000 → FFFFFF00

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 (Cat. No. W343)* and the *SYSMAC CVM1/CV Series Ethernet Unit Operation Manual (Cat. No. 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.

  a) This method is applicable for addresses with the same net ID only.

  b) The remote host ID is restricted to the range of FINS node numbers (1 to 126[*1]).

  c) The Ethernet Unit's host ID and node number must be set to the same value.

  *1.Up to 46 hosts can be set on the CX-Designer.

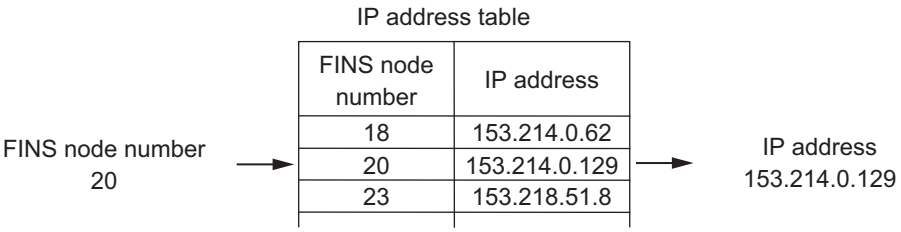
  Automatic generation is set as the default address conversion method, so it does not need to be set from the CX-Programmer.

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 (Cat. No. W343)* and *SYSMAC CVM1/CV Series Ethernet Unit Operation Manual (Cat. No. W242)* for details on setting methods.

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



- IP Address Table Method Characteristics

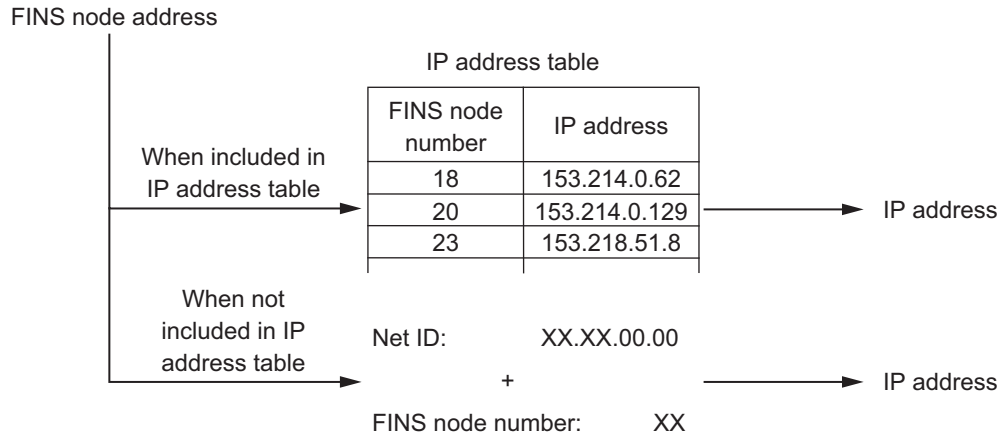
  The IP address table method simply prepares a conversion table, offering the advantage of allowing the correspondence between FINS node numbers and IP addresses to be created freely.

  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.

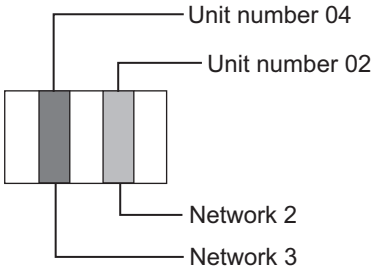


Setting Routing Tables

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

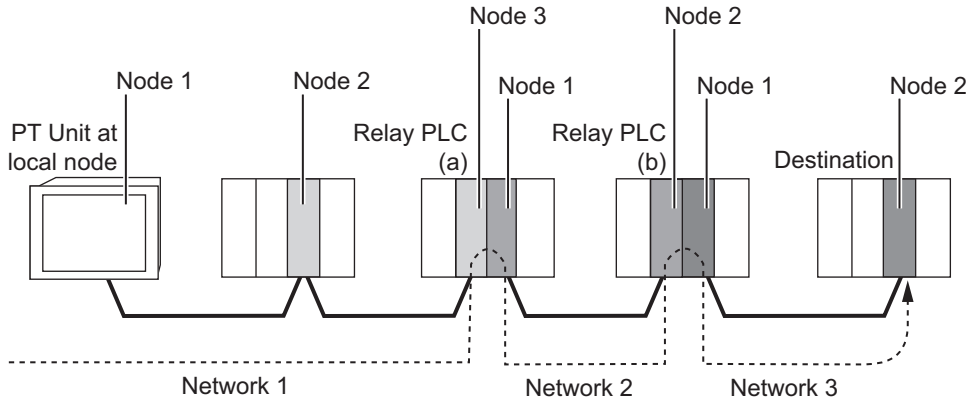


Local network table

Local network address	Unit number
2	02
3	04

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.



Relay Network Table for Local PT Unit

Destination network address	Relay network address	Gateway node address
3	1	3

Meaning: To go to network 3,
first go to node 3 of network 1.

Relay Network Table for PLC (a)

Destination network address	Relay network address	Gateway node address
3	2	2

Meaning: To go to network 3,
first go to node 2 of network 2.

Relay Network Table for PLC (b)

Destination network address	Relay network address	Gateway node address
1	2	1

Meaning: To go to network 1,
first go to node 1 of network 2.

Relay Network Table for Destination

Destination network address	Relay network address	Gateway node address
1	3	1

Meaning: To go to network 1,
first go to node 1 of network 3.

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

CS-series PLCs

Precautions for Safe Use

- 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

CS1W-ETN21

● 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.

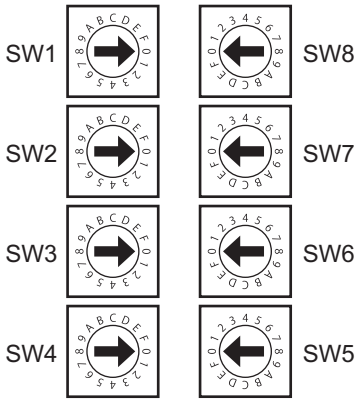
The factory setting is 01.

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 *Setting the Rear Panel Switches* on page 2-11. 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: Setting 130.58.17.32 (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	

Additional Information

- 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.

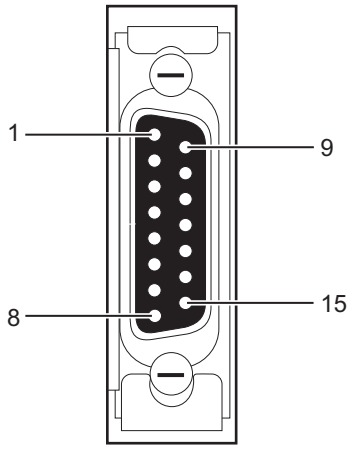
  The ERC indicator will flash if the value of the IP address host ID does not correspond to the node number value.
- Set the subnet mask in the CPU Bus Unit Setup Area using the CX-Programmer.

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.



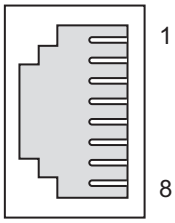
Connector Pin	Signal name	Abbreviation	Signal direction
1	Signal ground	GND	---
2	Collision detection signal +	COL+	Input
3	Send data +	TX+	Output
4	Signal ground	GND	---
5	Receive data +	RX+	Input
6	Voltage common Power ground (common with signal ground)	VC	---
7	Not used.	---	
8	Signal ground	GND	---
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

CS1W-ETN21

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

Precautions for Safe Use

- 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

CJ1W-ETN21

● 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.

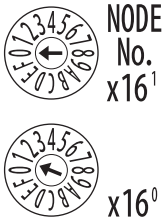
Use a small screwdriver to set the rotary switches, being careful not to damage them. The factory setting is 0.



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 (Cat. No. W343)* for details on setting methods.

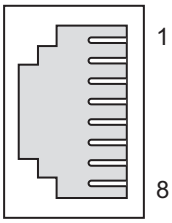
● Ethernet Connectors

CJ1W-ETN11

CJ1W-ETN21

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.	---	---

CP-series PLCs (Except for the CP1E)

CP2E-N14

CP2E-N20

CP2E-N30

CP2E-N40

CP2E-N60

<CP-series Ethernet Option Board>

CP1W-CIF41

● Setting Node Numbers

Set the node number to a unique value. Do not set it to the same value as any other Ethernet node on the same Ethernet network.

Refer to the following manuals for the setting procedures.

- CP1H: *SYSMAC CP Series CP1H CPU Unit Operation Manual (Cat. No. W450)*
- CP1L: *SYSMAC CP Series CP1L CPU Unit Operation Manual (Cat. No. W462)*
- CP2E: *SYSMAC CP Series CP2E CPU Unit Software User's Manual (Cat. No. W614)*

Setting Local IP Addresses

Use a Web browser to set the local IP address of the CP-series Ethernet Option Board. For CP2E Series Built-in Ethernet port, set the local IP address from the CX-Programmer or other supporting Software for the CPU Unit.

Refer to the following manuals for the setting procedures.

- CP1H: *SYSMAC CP Series CP1H CPU Unit Operation Manual (Cat. No. W450)*
- CP1L: *SYSMAC CP Series CP1L CPU Unit Operation Manual (Cat. No. W462)*
- CP2E: *SYSMAC CP Series CP2E CPU Unit Software User's Manual (Cat. No. W614)*

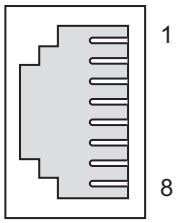
Ethernet Connector

CP2E-N14/N20/N30/N40/N60 Built-in Ethernet port

CP1W-CIF41

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

- Electrical Characteristics: Conform to the IEEE 802.3 standard.
- Connector Layout: RJ45 8-pin modular connector (conforms to ISO8877.)



Connector Pin	Signal name	Abbrevia-tion	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.	---	---

Additional Information

- The CP1W-CIF41 cannot be used to connect an NS-B-series PT to a CP1E or CP2E PLC.
- To use the CP1W-CIF41 or CP2E series, the *Use CP1W-CIF41* Option must be selected in the Ethernet host settings of the communications settings in the CX-Designer.
- When connecting to the CP2E series, it is possible to connect only within the same network.

CV/CVM1-series PLCs

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

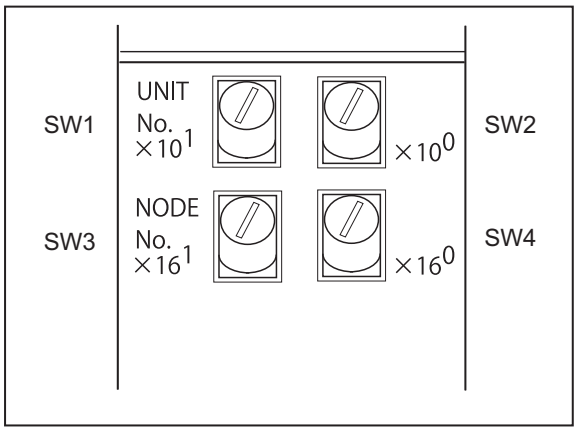
CV500-ETN01

● 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)

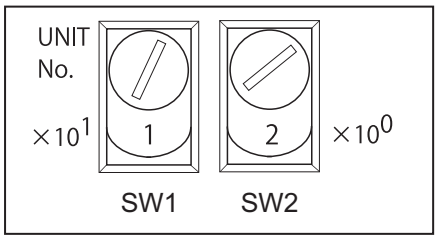
Setting Unit Numbers

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.



Additional Information

- 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 ERC 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

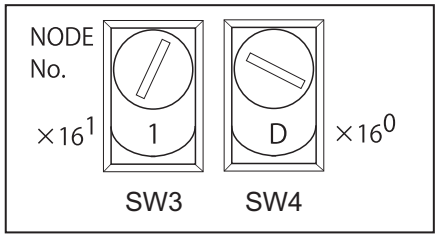
The node number is used to identify PLCs when more than one PLC is connected to the Ethernet. This setting is the node number used for FINS communications.

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)



Additional Information

- 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 ERC 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 (Cat. No. 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).



Additional Information

- For details on operating the Support Software, refer to the CPU Bus Unit Setup Area in the *SYSMAC Support Software Operation Manual: Networks (Cat. No. W201)* and S*YSMAC Support Software Operation Manual: CV Series (Cat. No. 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.

2-2 Connecting to Host via EtherNet/IP

2-2-1 What is EtherNet/IP?

EtherNet/IP is a multi-vendor industrial network protocol that uses Ethernet. The specification is an open standard managed by the ODVA (Open DeviceNet Vendor Association), as is DeviceNet, and it is used for a variety of industrial devices.

NS-B-series PTs can communicate with CS/CJ-series EtherNet/IP Units and CJ2H-CPU□□-EIP, CJ2M-CPU3□, CJ3M-CPU3□ and NJ□01-□□00, NX□0□-□□□□, or NX1P2-□□□□ Units with built-in EtherNet/IP ports.

Also, it is possible to perform tag message communications when using a CPU Unit with a built-in EtherNet/IP port. These CPU Units contain a tag name server, so if tag names and an address table are stored in advance in the CPU Unit, it is possible to perform access using only the tag names.

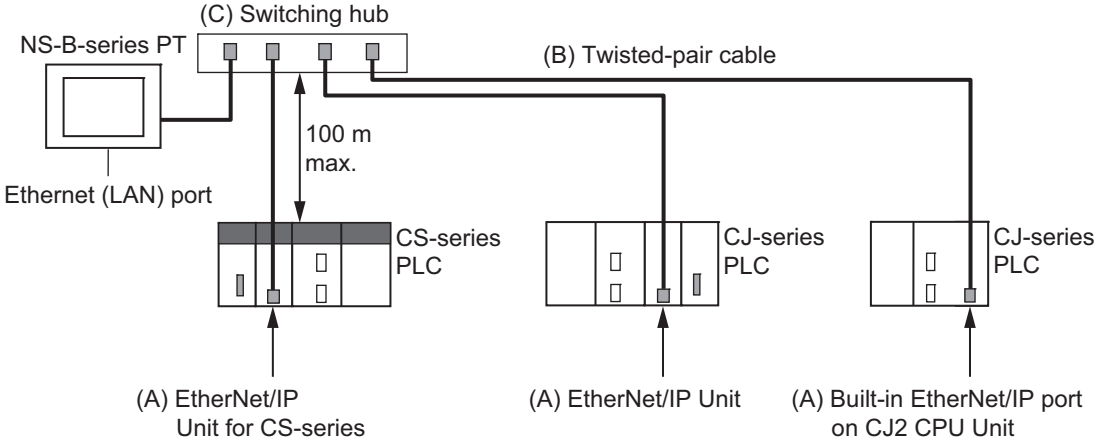
For details on the controllers that can be connected to the NS-B-series via EtherNet/IP, refer to *A-1 Connection Device List* on page A-2.

2-2-2 Selecting Network Configuration Devices

Devices Required to Construct a Network

The basic configuration for an EtherNet/IP system includes one Ethernet switch to which nodes are attached in star configuration using twisted-pair cable.

<Configuration Example>



The following devices are required to configure a network using an EtherNet/IP Unit and must be purchased separately. Prepare the devices in advance.

Network device	Function
(A) Per Node • NX Series CPU Unit (built-in EtherNet/IP port) • NJ-series CPU Unit (built-in EtherNet/IP port) • CJ2 CPU Unit (built-in EtherNet/IP port) • CJ3 CPU Unit (built-in EtherNet/IP port) • CJ-series CJ1W-EIP21 EtherNet/IP Unit • CS-series CS1W-EIP21 EtherNet/IP Unit	These Units are used to connect to an EtherNet/IP network.
(B) Twisted-pair cable	The twisted-pair cable has a RJ45 Modular Connector at each end. This cable is used to connect the built-in EtherNet/IP port or EtherNet/IP Unit to a Ethernet switch. Use an STP (shielded twisted-pair) cable of category 5, 5e, or higher.
(C) Ethernet switch	This is a relay device that connects multiple nodes in a star LAN.

Recommended Network Devices

The following table shows the devices recommended for use with the EtherNet/IP.

● Ethernet Switches

<Ethernet Switches from OMRON>

Model	Specifications OK: Supported, ---: Not supported.	
	Description	Number of ports
W4S1-05D	Packet priority control (QoS): EtherNet/IP control data priority 10BASE-T/100BASE-TX, auto-negotiation	5

<Ethernet Switches from Other Companies>

Manufacturer	Model
Cisco Systems, Inc.	Consult the manufacturer.
CONTEC USA Inc.	Consult the manufacturer.
Phoenix Contact USA	Consult the manufacturer.

● Twitsted-pair Cables (100Base-TX) and Connectors (Modular Plugs and STP Plugs)

Product		Manufacturer	Model
Sizes and conductor pairs: AWG 24 × 4 pairs	Cables	Tonichi Kyosan Cable, Ltd.	NETSTAR-C5E SAB 0.5 × 4P
		Kuramo Electric Co., Ltd.	KETH-SB
	RJ45 Connectors	Panduit Corporation	MPS588
Sizes and conductor pairs: 0.5 mm × 4 pairs	Cables	Fujikura Ltd.	F-LINK-E 0.5mm × 4P
	RJ45 Connectors	Panduit Corporation	MPS588

● Boots

Manufacturer	Model
TSUKO	MK Boots (IV) LB

Ethernet Switch Types

Unmanaged Layer 2 (L2) Ethernet Switches

These Ethernet switches use the Ethernet MAC address to switch ports. Ordinary Ethernet switches have this function. Ethernet switch functions and settings cannot be changed.

Managed Layer 2 (L2) Ethernet Switches

These Ethernet switches use the Ethernet MAC address to switch ports. Ethernet switch functions and settings can be changed with special software tools for Ethernet switches running on a network node. You can also collect analytical data. These Ethernet switches provide more-advanced functions than unmanaged layer 2 Ethernet switches.

Ethernet Switch Functions

This section describes the Ethernet switch functions that are important for an EtherNet/IP network.

For a built-in EtherNet/IP port, consider whether the Ethernet switch supports these functions when you select the Ethernet switch.

- Multicast filtering
- QoS (Quality of Service) for TCP/UDP port numbers (L4)

Multicast Filtering

Multicast filtering transfers multicast packets to the specific nodes only. This function is implemented in the Ethernet switch as IGMP snooping or GMRP.

“Specific nodes” are nodes equipped with an IGMP client that have made transfer requests to the Ethernet switch. (OMRON built-in EtherNet/IP ports are equipped with an IGMP client.)

When the Ethernet switch does not use multicast filtering, multicast packets are sent to all nodes, just like broadcast packets, which increases the traffic in the network.

Settings must be made in the Ethernet switch to enable this function. There must be enough multicast filters for the network.

QoS (Quality of Service) Function for TCP/UDP Port Numbers (L4)

This function controls the priority of packet transmissions so that packets can be sent with higher priority to a particular IP address or TCP (UDP) port. The TCP and UDP protocols are called transport layer protocols, leading to the name L4 (layer 4) QoS function.

Support for the above two functions is as follows for the different types of Ethernet switches.

Ethernet switch type	Multicast filtering	L4 QoS	Remarks
Unmanaged L2 Ethernet switches	None	None	---
Managed L2 Ethernet switches	Provided.	Provided.	Both functions must be set with a special software tool.
OMRON W4S1-series Ethernet Switches	None	Provided.	L4 QoS is set with a switch. No software tool is necessary.

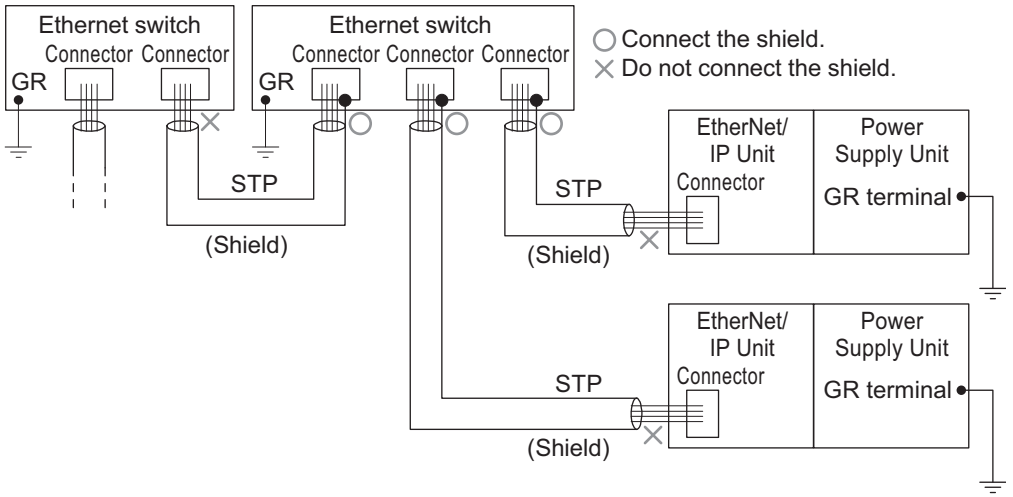
2-2-3 Network Installation

Basic Installation Precautions

- Take the greatest care when you install the Ethernet system. Be sure to follow ISO 8802-3 specifications. Be sure you understand them before attempting to install an Ethernet System.
- Unless you are already experienced in installation of communications systems, we strongly recommend that you employ a professional to install your system.
- Do not install Ethernet equipment near sources of noise. If a noisy environment is unavoidable, take adequate measures against noise interference, such as installation of network components in metal cases or the use of optical cable in the system.

Precautions on Laying Twisted-pair Cable

- Noise immunity may be reduced by ground loops, which can occur due to improper shield connections and grounding. Ground the shield at one location, as shown in the following diagram.
- Do not connect the shield to the PT Unit's connector.
- If a cable connects two Ethernet switches, connect the shield at only one end.



- Press the cable connector in firmly until it locks into place at both the Ethernet switch and the EtherNet/IP port.
- Do not lay the twisted-pair cable together with high-voltage lines.
- Do not install the network or network devices near devices that generate noise.
- Do not install the network or network devices in locations subject to high temperatures or high humidity.
- Do not install the network or network devices in locations subject to excessive dirt and dust or to oil mist or other contaminants.

Ethernet Switch Installation Environment Precautions

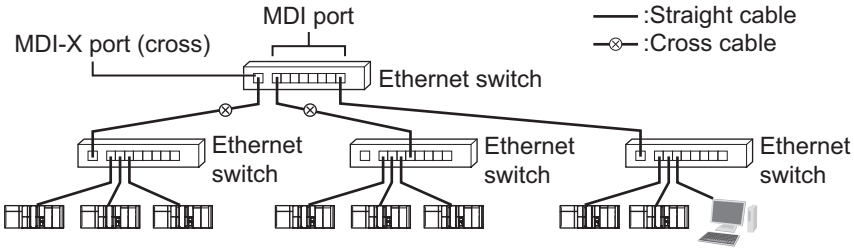
- Do not ground the Ethernet switch in the same location as a drive-system component, such as an inverter.
- Always use a dedicated power supply for the Ethernet switch's power supply. Do not use the same power supply for other equipment, such as an I/O power supply, motor power supply, or control power supply.
- Before installation, check the Ethernet switch's environmental resistance specifications, and use a Ethernet switch that is appropriate for the ambient conditions. Contact the Ethernet switch manufacturer for details on Ethernet switch's environmental resistance specifications.

Ethernet Switch Connection Methods

- Connect two Ethernet switches to each other as follows:

  Connect an MDI port to an MDI-X port with a straight cable.

  Connect two MDI ports or two MDI-X ports with a cross cable.



- Some Ethernet switches can automatically distinguish between MDI and MDI-X. When this kind of Ethernet switch is used, straight cable can be used between Ethernet switches.

2-2-4 Host Types and Settings

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

When connecting an EtherNet/IP 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.

For details on the hosts that can be connected to NS-B-series PTs via the EtherNet/IP, refer to *A-1 Connection Device List* on page A-2.

Refer to the following manual for host parameter settings: *SYSMAC CS/CJ-series Ether-Net/IP Units Operation Manual (Cat. No. W465)*, *SYSMAC CJ-series CJ2 CPU Units Operation Manual (Cat. No. W472)*, *SYSMAC CJ-series CJ3 CPU Units Operation Manual (Cat. No. W664)*, *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)*, or *CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit (Cat. No. W495)*.

Connecting to a CJ-series CPU Unit

Precautions for Safe Use

- 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 CPU Unit (Built-in EtherNet/IP Port)>

CJ2H-CPU□□-EIP

CJ2M-CPU3□

CJ3M-CPU3□

● Setting Local IP Addresses

Set the local IP address with the CX-Programmer or other Support Software.

Refer to the *SYSMAC CS/CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for details on setting methods.

● Setting the Front Panel Switches

Setting the Unit Number

Set a unique unit number for the CJ2/CJ3 CPU Unit built-in EtherNet/IP port. The same unit number cannot be used by any other CPU Bus Unit connected to the CJ2/CJ3 CPU Unit.

Use a small screwdriver to make the setting, and be sure not to damage the rotary switch.

The unit number is factory-set to 0.



Setting range
0 to F

Node Address Setting Switches

Set a FINS address for the built-in EtherNet/IP port.

With the FINS communications service, multiple EtherNet/IP Units (including the CJ2/CJ3 Unit built-in EtherNet/IP port) connected by Ethernet are identified by their node addresses.

Using the node address switches, set a unique node address in hexadecimal. The same node address cannot be used by any other EtherNet/IP Unit or Ethernet Unit connected on the same Ethernet network. As long as it does not duplicate any other address, the node address can be set from 01 to FE (1 to 254 in decimal).



Setting range
01 to FE hex (1 to 254 decimal)

Note The node address is factory-set to 01.

With the default setting, the values set on these switches become the last two digits of the built-in EtherNet/IP port's IP address.

The default IP address is 192.168.250.node_address.

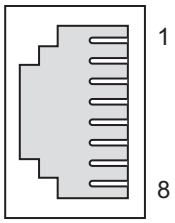
With the factory-set node address of 01, the default IP address is 192.168.250.1.

The node address can be set to any number in the setting range (01 to FE), as long as the same address is not set on another node in the network.

● Ethernet Connectors

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 ISO 8877).



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.	---	---

Connecting to an NJ/NX-series CPU Unit

NJ101-□□□□

NJ301-□□□□

NJ501-□□□□

NX701-□□□□

NX102-□□□□

NX1P2-□□□□

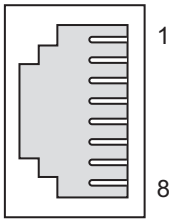
● Setting Local IP Address

Set the local IP address with the Sysmac Studio or other Support Software. Refer to the *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. 506)* for details on setting methods.

● Ethernet Connectors

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

- Electrical Characteristics: Conform to the IEEE 802.3 standard.
- Connector Layout: RJ45 8-pin modular connector (conforms to ISO 8877.)



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.	---	---

Connecting to a CS-series EtherNet/IP Unit

Precautions for Safe Use

- 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.

<CS-series EtherNet/IP Unit>

CS1W-EIP21

● 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

Use the node address switches to set the node address to a unique hexadecimal value. Do not set it to the same value as any other EtherNet/IP Unit or built-in port on the same Ether-Net/IP network. As long as it does not duplicate the address of any other EtherNet/IP Unit or built-in port, the node address can be set from 01 to 7E hex (1 to 126 decimal).



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 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

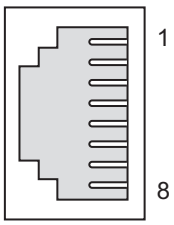
Set the local IP address with the CX-Programmer or other Support Software.

For the setting procedure, refer to the *SYSMAC CS/CJ-series EtherNet/IP Units Operation Manual (Cat. No. W465)*.

● Ethernet Connectors

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 ISO 8877).



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.	---	---

Connecting to a CJ-series EtherNet/IP Unit or NJ-series CPU Unit

Precautions for Safe Use

- 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/IP Unit>

CJ1W-EIP21

● 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

Use the node address switches to set the node address to a unique hexadecimal value. Do not set it to the same value as any other EtherNet/IP Unit or built-in port on the same Ether-Net/IP network. As long as it does not duplicate the address of any other EtherNet/IP Unit or built-in port, the node address can be set from 01 to 7E hex (1 to 126 decimal).



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 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.

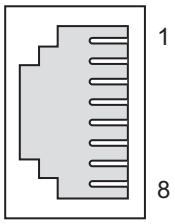
● Setting Local IP Addresses

Set the local IP address with the CX-Programmer or other support software. Refer to the *Ether-Net/IP Unit Operation Manual (Cat. No. W465)* or the *CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit (Cat. No. W495)* for details on setting methods.

● Ethernet Connectors

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	Abbrevia-tion	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.	---	---

3

Connecting to CS/CJ/CP Series by Serial Port (Host Link)

This section describes the methods for connecting to the CS/CJ/CP series by using the serial ports (Host Link) on the NS-B-series.

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3-1 Overview

This section provides an overview of connecting an PT Unit to an OMRON Programmable Controller that supports Host Link communications.

The PT Unit is connected 1:1 to the CPU Unit or a Host Link Unit of an OMRON PLC. Host Link communications are used to read and display or write the words and settings in the host PLC.

PT Unit serial ports A and B can both be connected to a host by means of the Host Link protocol.



Additional Information

When an PT Unit and a PLC are connected by Host Link, it is not possible to change to RUN Mode. If the PLC is set for RUN Mode, it is automatically switched to Monitor Mode. For example, if a compatible Programming Console is connected to the PLC and the PLC operating mode is switched to RUN mode, the password display for the Monitor Mode will be displayed at the Programming Console.

3-2 Connection Configuration

This section describes the system configuration required for connecting to the host by Host Link communications.

Communications Setup

The following table shows the communications settings required at the PT Unit and the host to connect to the host by means of Host Link communications.

Setup location	Settings*1
PT Unit	Baud rate: 9,600 or 19,200 bps*2
Host	Start bits: 1 bit Data: 7 bits Stop bits: 2 bits Parity: Even Host Link unit number: 0 Baud rate: 9,600 or 19,200 bps*2

*1. Use the 1:N protocol setting.

*2. The baud rate settings must be the same for both the PT Unit and the host.

3-2-1 Applicable PLCs

The OMRON PLCs listed below can be connected as hosts using Host Link communications.

The connection can be made either directly to the built-in serial port on the CPU Unit or to a Host Link Unit mounted to the PLC.

- C Series

  C200HS, C200HX/HG/HE(-Z), CQM1, CQM1H, CPM2A/CPM2C, CPM1/CPM1A, C500, C1000H, C2000H
- CV Series

  CV500, CV1000, CV2000, CVM1
- CS/CJ Series

  CS1G/CS1H, CS1G-H/CS1H-H, CJ1G, CJ1G-H/CJ1H-H, CJ1M, CP1H/CP1L, CJ2H, CJ2M, CJ3M

3-3 Connecting to the Host

The types of host that can be connected to a PT Unit by using the serial ports on the NS-B-series PT and connecting to an RS-232C port at the host are described here.

3-3-1 Connecting to an RS-232C Port at the Host

Compatible Host Units

Some models and series of OMRON PLCs have the host link function built in. In the CS-series or CQM1H PLCs, the host link method can be used by installing a Serial Communications Board.

In addition, some C200HX/HG/HE(-Z)E have an integral CPU Unit that can be connected in the host link method by installing a Communications Board.

Check the model and series of the PLC, the type of installed Serial Communications Board or Serial Communications Unit before making a connection.

The PLC Units/Boards that can be connected to an NS-B-series PT through a Host Link connection using RS-232C ports on both the PLC Unit/Board and PT Unit are listed in the following table.

PLC Series	CPU Units with Built-in Host Link Function	CPU Units Connectable with Host Link Units or Expansion Communications Board	Host Link Unit/Communications Board
CS Series	CS1G-CPU42/43/44/45-EV1 CS1H-CPU63/64/65/66/67-EV1	CS1G-CPU42/43/44/45-EV1 CS1H-CPU63/64/65/66/67-EV1	CS1W-SCU21-V1 CS1W-SCB21-V1 CS1W-SCB41-V1
	CS1G-CPU42H/43H/44H/45H CS1H-CPU63H/64H/65H/66H/67H	CS1G-CPU42H/43H/44H/45H CS1H-CPU63H/64H/65H/66H/67H	
CJ Series	CJ1G-CPU44/CPU45	CJ1G-CPU44/CPU45	CJ1W-SCU21/41-V1
	CJ1G-CPU42H/43H/44H/45H CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ2H-CPU64/65/66/67/68(-EIP)	CJ1G-CPU42H/43H/44H/45H CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ2H-CPU64/65/66/67/68(-EIP)	
	CJ1M-CPU11/12/13/21/22/23 CJ2M-CPU11/12/13/14/15 CJ3M-CPU11/12/13/14/15	CJ1M-CPU11/12/13/21/22/23 CJ2M-CPU11/12/13/14/15/31/32/33/34/35 CJ3M-CPU11/12/13/14/15/31/32/33/34/35	
		CP1H-XA40DR-A/XA40DT-D/XA40DT1-D/X40DR-A/X40DT-D/X40DT1-D/Y20DT-D	CP1W-CIF01
		CP1L-L14DR-A/L14DR-D/L14DT-D/L14DT1-D/L20DR-A/L20DR-D/L20DTD/L20DT1-D/M30DR-A/M30DR-D/M30DT-D/M30DT1-D/M40DR-A/M40DRD/M40DT-D/M40DT1-D	

PLC Series	CPU Units with Built-in Host Link Function	CPU Units Connectable with Host Link Units or Expansion Communications Board	Host Link Unit/Communications Board
C Series		C1000H-CPU01-EV1 C2000H-CPU01-EV1	C120-LK201-EV1
		C200HS-CPU01/03/21/23/31/33-E C200HE-CPU11/32/42-E C200HE-CPU11/32/42-ZE C200HG-CPU33/43/53/63-E C200HG-CPU33/43/53/63-ZE C200HX-CPU34/44/54/64-E C200HX-CPU34/44/54/64/65/85-ZE	C200H-LK201-EV1
	C200HS-CPU21/22/31/33-E		
	C200HE-CPU42-E C200HE-CPU42-ZE	C200HE-CPU32/42-E C200HE-CPU32/42-ZE	C200HW-COM02/04/05/06-EV1
	C200HG-CPU43/63-E C200HG-CPU43/63-ZE	C200HG-CPU33/43/53/63-E C200HG-CPU33/43/53/63-ZE	
	C200HX-CPU44/64-E C200HX-CPU44/64/65/85-ZE	C200HX-CPU34/44/54/64-E C200HX-CPU34/44/54/64/65/85-ZE	
		C1000H-CPU01-EV1 C2000H-CPU01-EV1	C500-LK201-EV1
		C1000H-CPU01-EV1 C1000HF-CPUA1-EV1 C2000H-CPU01-EV1	C500-LK203
	CPM1-10/20/30CDR-□+CPM1-CIF01		
	CPM1A-10/20/30/40CD□-□+CPM1-CIF01		
	CPM2A-30/40/60CD□□-□+CPM1-CIF01 (Peripheral port connection)		
	CPM2C-10/20□□□□□□-□ *1		
	CQM1-CPU21-E CQM1-CPU41/42/43/44-EV1		
	CQM1H-CPU11/21/51/61*2	CQM1H-CPU51/61	CQM1H-SCB41

PLC Series	CPU Units with Built-in Host Link Function	CPU Units Connectable with Host Link Units or Expansion Communications Board	Host Link Unit/Communications Board
CV Series*3	CV500-CPU01-EV1	CV500-CPU01-EV1	CV500-LK201
	CV1000-CPU01-EV1	CV1000-CPU01-EV1	
	CV2000-CPU01-EV1	CV2000-CPU01-EV1	
CVM1 Series*3	CVM1-CPU01-EV2	CVM1-CPU01-EV2	CV500-LK201
	CVM1-CPU11-EV2	CVM1-CPU11-EV2	
	CVM1-CPU21-EV2	CVM1-CPU21-EV2	
CompoBus/S master control unit	SRM1-C02-V2		

*1. Use a CPM2C-CN111 or CS1W-CN114/118 Connecting Cable, CPM1-CIF01 RS-232C Adapter, or CPM1-CIF11 RS-422A Adapter to connect.

*2. The CQM1H-CPU11 does not have a built-in RS-232C port, so connect to the peripheral port to the PT Unit with a CS1W-CN118 Connecting Cable.

*3. CPU Units of CVM1/CV-series PLCs without the suffix -EV□ cannot be connected.

Settings at the Host

When using the host link method, the settings shown below must be made at the host (depending on the unit, some of these settings may not be necessary, or settings not shown here may be necessary).

Item	Switch Setting
I/O port	RS-232C
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Transfer code	ASCII, 7 data bits, 2 stop bits
Parity	Even
1-to-1/1-to-N	1-to-N*2
Command level	Level 1, 2, 3
Unit #	00

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

*2. The 1-to-N setting enables using a BCC (Block Check Character). It is not actually possible to connect more than one NS-B-series PT in a single Host Link.

The setting methods for each type of unit are described in the following.

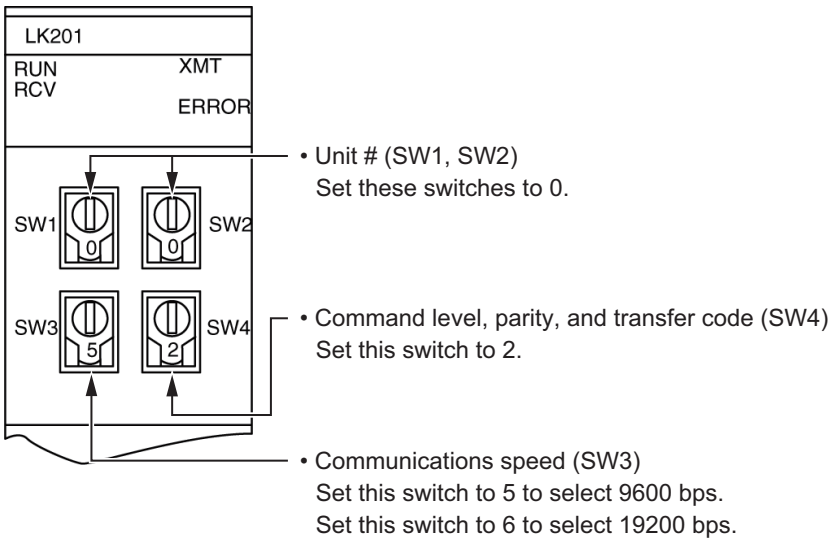
● Connecting to a C-series Host Link Unit

<C200H/C200HS/C200HE(-Z)E/C200HG(-Z)E/C200HX(-Z)E Rack-mounted type>

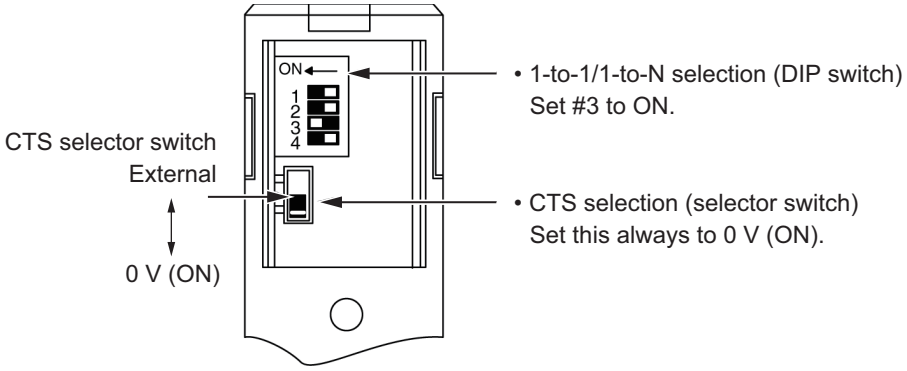
C200H-LK201-V1

[Setting the Front Switches]

Set each switch with a flat blade screwdriver so that the values or symbols in the setting value window agree with the following.



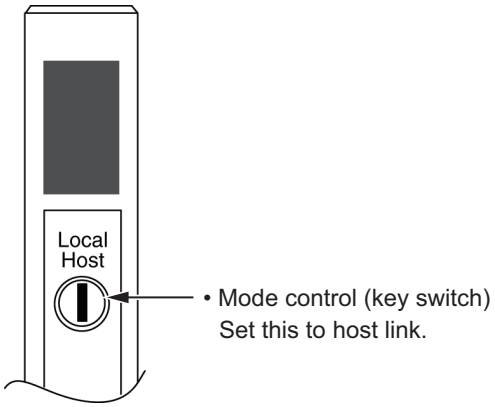
[Setting the Rear Switches]



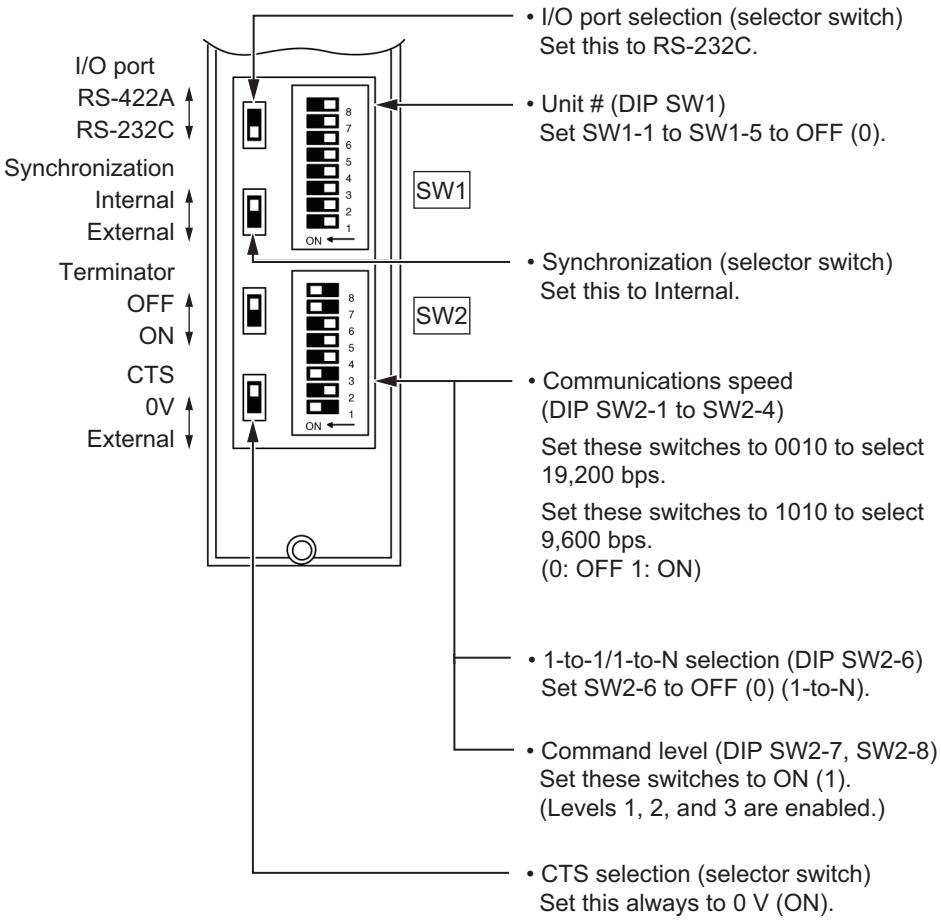
<C1000H/C2000H Rack-mounted type>

C500-LK201-EV1

[Setting the Front Switches]



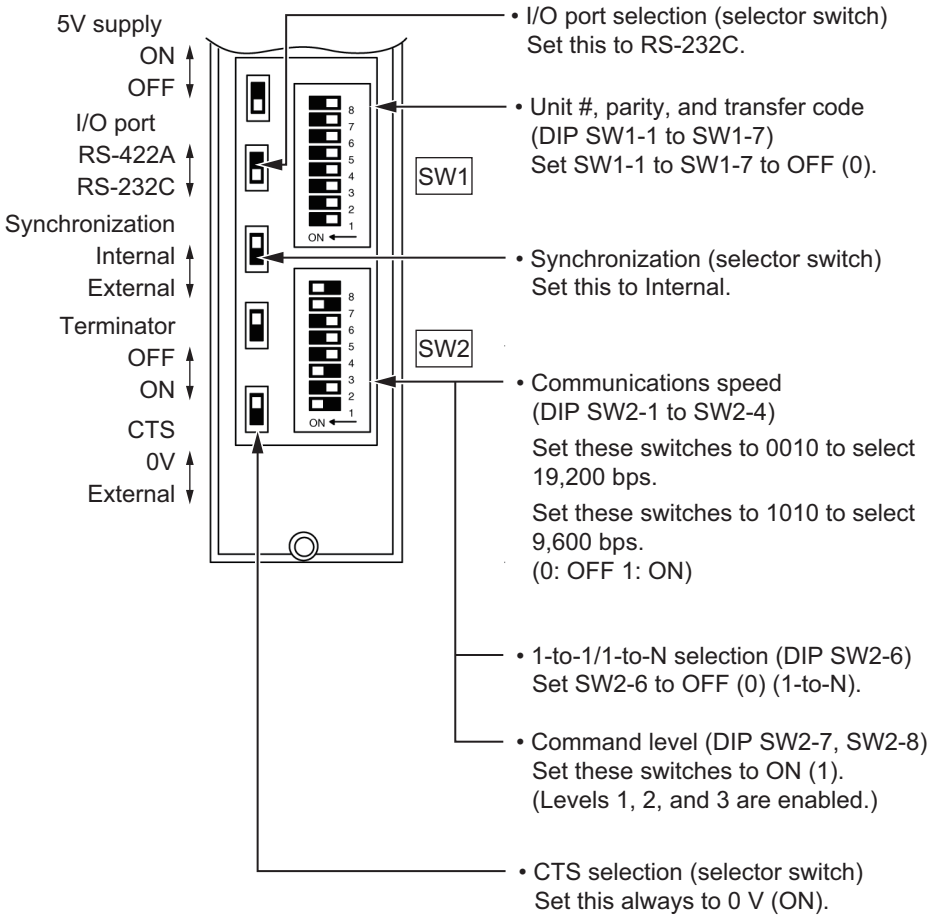
[Setting the Rear Switches]



<C1000H(F)/C2000H Rack-mounted type>

C500-LK203

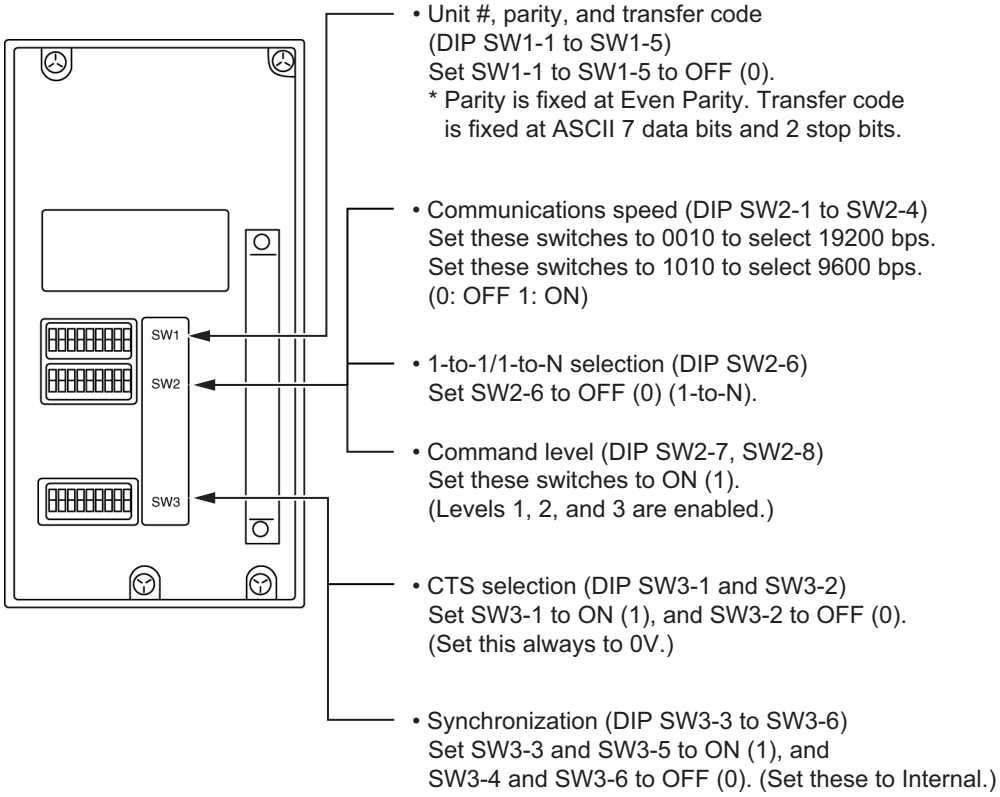
[Setting the Rear Switches]



<C200H/C1000H/C2000H CPU Unit-mounted Type>

C120-LK201-EV

[Setting the Rear Switches]



● Connecting to a CVM1/CV-series Host Link Unit

<CVM1/CV-series Rack-mounted type>

CV500-LK201

A CVM1/CV series host link unit (CV500-LK201) has two connectors (communications ports 1 and 2). Either of these ports can be used for connection to an NS-B-series PT by the RS-232C method. However, since the connectors at these ports are of different types, a cable that matches the connector must be prepared.

- Communications port 1

  Communications port 1 is a 25-pin connector for RS-232C use only.

- Communications port 2

  Communications port 2 is a 9-pin connector which allows selection of the RS-232C or RS-422A method. When this port is used with the RS-232C method, the I/O port selector switch on the front of the unit must be set to RS-232C (the upper position).

[CPU Bus Unit Settings]

When connecting to a CVM1/CV series host link unit, set the following communications conditions for the CPU Bus Unit settings.

Item	Setting at Host
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Transfer code	ASCII, 7 data bits, 2 stop bits
Parity	Even

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

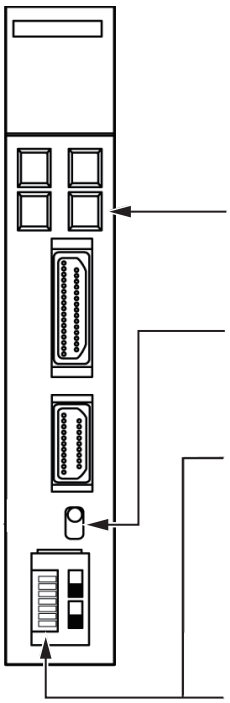
Additional Information

The 1-to-N setting enables using a BCC (Block Check Character). It is not actually possible to connect more than one PT Unit in a single Host Link.

Set the CPU Bus Unit settings directly from a Programming Device (e.g. CX-Programmer).

For details on the CPU Bus Unit settings, refer to the *SYSMAC CVM1/CV-series Host Link Unit Operation Manual (Cat. No. W205)*.

[Setting The Front Switches]



• Unit # (SW3, SW4)
When using communication port 2, set these switches to 0.

• I/O port selection (selector switch)
Set this to RS-232C.

• CTS selection (DIP SW2 and SW3)
Set SW2 or SW3 to ON. (Set this always to 0V.)
To use communication port 1, set SW2. To use communication port 2, set SW3.

• Communication condition setting (DIP SW1)
Set this switch to OFF.
Communication is executed in accordance with the CPU bus unit system settings made at the PLC. The initial values for the system settings are as follows.
- Communications speed: 9600 bps
- Parity: Even
- Xon/Xoff control: Not executed
- Communication method: Full duplex
- Stop bits: 2 stop bits
- Data length: 7 bits

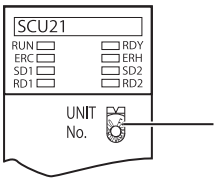
● Connecting to a CS-series Serial Communications Unit

<CS-series Rack-mounted type>

CS1W-SCU21(-V1)

[Setting the Front Switches]

Set the unit number of the Serial Communications Unit by using the rotary switch located on the front panel. Set each switch with a flat blade screwdriver so that the values or symbols in the setting value window agree with the following.



Set the unit number to 0 through F so that it will not overlap with the numbers used in other units.

[Allocation DM Area Settings in CPU Unit]

Settings are written from the Programming Device (a Programming Console or CX-Programmer) directly into the allocation DM area (system setting area) of the CPU Unit. After the settings are written, they become effective by turning the power ON, restarting the unit, restarting the communications port, or execution of the STUP command.

In the following, the words allocated in the DM area and the settings are shown.

m = DM 30000 + 100 × unit number (word address)

Allocation DM area word		Writing Value	Settings
Port 1	Port 2		
m	m+10	8000	Host link mode, 2 stop bits, even parity, data length 7 bits
m+1	m+11	0000	Communications speed 9600 bps.
		0007	Communications speed 19200 bps.
m+2	m+12	0000	Transmit delay time 0 ms.
m+3	m+13	0000	No CTS control Unit No.0 for host link

Connecting to a CJ-series Serial Communications Unit

<CJ-series Rack-mounted Type>

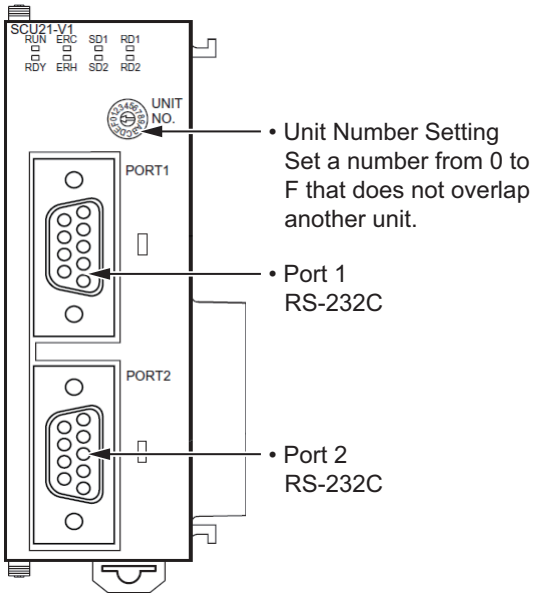
CJ1W-SCU21/41-V1

[Setting the Front Switches]

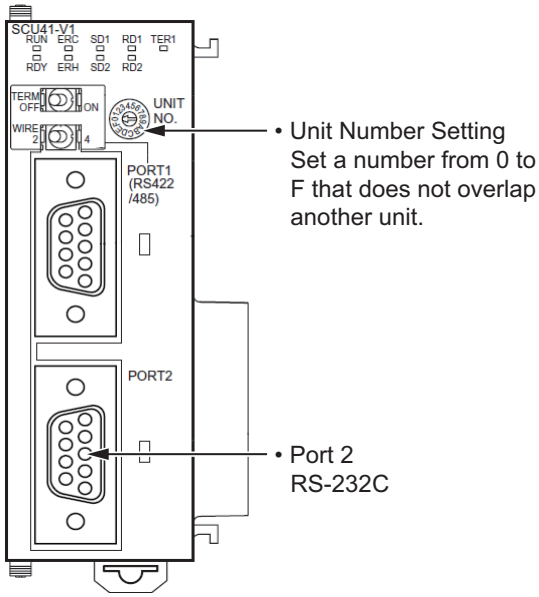
Set the unit number for the Serial Communications Unit using the rotary switch on the front of the Unit. Follow the procedure below use a flat-head screwdriver (-) to set the number and sign in the setting display window.

Port 2 on the CJ1W-SCU41-V1 is an RS-232C port.

CJ1W-SCU21-V1



CJ1W-SCU41-V1



[Setting CPU Unit Allocation DM Area Words]

Settings can be directly written to the Allocation DM Area (System Setup Area) by using a Programming Device, such as a Programming Console or the CX-Programmer. After the settings are written, the settings will become valid by performing any of the following: turning on the power supply again, restarting the Unit, restarting the communications port, or executing a STUP instruction.

The following table shows words allocated in the DM Area and setting details.

m = D30000 + 100 × unit number (word address)

Allocation DM area word		Writing Value	Setting details
Port 1	Port 2		
m	m+10	8000	Host link mode, 2 stop bits, even parity, 7-bit data length
m+1	m+11	0000	Baud rate: 9,600 bps
		0007	Baud rate: 19,200 bps
m+2	m+12	0000	Transmission delay time: 0 ms
m+3	m+13	0000	No CTS control, Unit number 0 for host link

● Connecting to a CPU Unit

<CV-series and CVM1/CV-series (-EV□) CPU Units>

CV500-CPU01-EV1/CV1000-CPU01-EV1/CV2000-CPU01-EV1

CVM1-CPU01-EV2/CVM1-CPU11-EV2/CVM1-CPU21-EV2

[PLC Setup]

When connecting to a CVM1/CV series CPU Unit, set the following communications conditions for the PLC Setup.

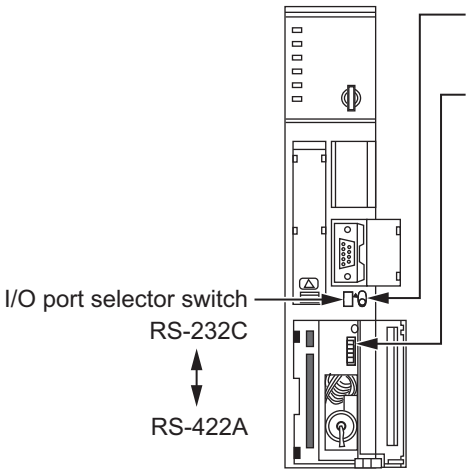
Item	Setting at Host
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

Either set PLC Setup directly from a Programming Device (e.g. CX-Programmer), or transmit the PLC Setup made at a Programming Device to the CPU UNIT.

For details on the PLC Setup, refer to the *SYSMAC CVM1/CV500/1000/2000 Operation Manual: Ladder Diagrams (Cat .No. W202)*.

[Setting the Front Switches]



• I/O port selection (selector switch)
Set this to RS-232C.

• System setting (DIP SW4)
To effect the existing DIP switch settings, set SW4 to ON.
To effect the existing PC Setup, set SW4 to OFF.

Note

For CPUs manufactured before or during June 1995 (lot No. □□65), the existing DIP switch settings differ from the existing PC Setup as follows.

- DIP switch settings:
  2,400 bps, 1 stop bit, even parity, 7 bit data length
- PC Setup:
  9,600 bps, 2 stop bits, even parity, 7 bit data length

For CPUs manufactured from July 1995 onward (lot No. □□75), the stipulated values in the DIP switch settings also are 9,600 bps and 2 stop bits.

<C-series C200HS, C200HX/HG/HE(-Z)E, CPM1, CPM2A, CPM2C, CQM1, CQM1H CPU Units, SRM1>

The connection method depends upon the model of PLC being used, as shown in the following table.

PLC model	Connection method
C200HS, CQM1	Connect to the CPU Unit's built-in RS-232C port.
C200HX/HG/HE(-Z)E	• Connect to the CPU Unit's built-in RS-232C port. • Connect to one of the RS-232C ports (port A or port B) on a Serial Communications Board.
CQM1H	• Connect to the CPU Unit's built-in RS-232C port. • Connect to the peripheral port through a CS1W-CN118 Connecting Cable. • Connect to the RS-232C port (port 1) on a Serial Communications Board.
CPM1	Connect to the peripheral port through a CPM1-CIF01 RS-232C Adapter.
CPM2A, SRM1	• Connect to the CPU Unit's built-in RS-232C port. • Connect to the peripheral port through a CPM1-CIF01 RS-232C Adapter.
CPM2C	Connect to the CPU Unit's RS-232C port or the peripheral port through a Connecting Cable (CPM2C-CN111, CS1W-CN118, or CS1W-CN114). (The CPM2C-CN111 splits the Unit's communications port into an RS-232C port and a peripheral port. A CPM1-CIF01 RS-232C Adapter is also required to connect to this peripheral port.)

[PLC Setup Area Settings]

When connecting to a C200HS, C200HX/HG/HE(-Z)E, CPM1, CPM2A, CPM2C, CQM1, or CQM1H CPU Unit, or SRM1, set the following communications conditions for the PLC Setup area.

Item	Setting at Host
Communications mode	Host link mode
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

Set the PLC Setup area settings directly from a Programming Device (e.g. CX-Programmer).

For details on operations relating to the PLC Setup area, refer to the manual for the PLC which is used.

The PLC Setup area word numbers and settings to be made depending on the unit and port to which the connection is made are shown below.

CPM2A, CPM2C, CQM1H, or SRM1: Peripheral port connection

Word	Writing Value	Settings
DM6650	0001	Host link mode, no CTS control, communications conditions set by the contents of DM
DM6651	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6653	0000	Unit # 00

C200HS, C200HX/HG/HE(-Z)E, CPM2A, CPM2C, CQM1, CQM1H (other than the CPU11), or SRM1: Built-in RS-232C port connection

Word	Writing Value	Settings
DM6645	0001	Host link mode, no CTS control, communications conditions set by the contents of DM
DM6646	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6648	0304	Unit # 00

C200HX/HG/HE(-Z)E: Serial Communications Board port A, CQM1H: Serial Communications Board port 1

Word	Writing Value	Settings
DM6555	0001	Host link mode, no CTS control, communications conditions set by the contents of DM area
DM6556	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6558	0000	Unit # 00

C200HX/HG/HE(-Z)E: Board Port B Connection

Word	Writing Value	Settings
DM6550	0001	Host link mode, no CTS control, communications conditions set by the contents of DM
DM6551	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6553	0000	Unit # 00

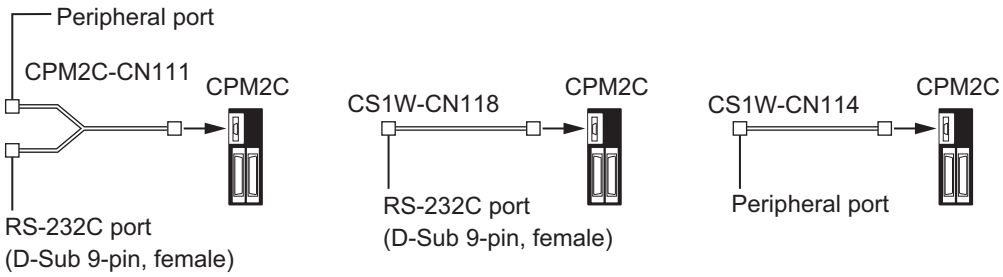
CPM1 Connection

Word	Writing Value	Settings
DM6650	0001	Host link mode, communications conditions set by the contents of DM area
DM6651	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6653	0000	Unit # 00

[Connecting to a CPM2C]

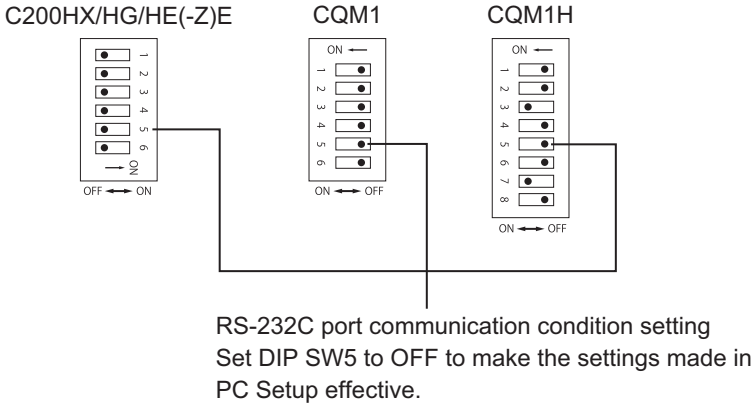
The CPM2C PLCs do not have the same kind of port connectors found on CS-series PLCs. The CPM2C's communications port handles both RS-232C and peripheral port connections which are divided internally. Therefore, when using the CPM2C, it is necessary to select RS-232C or peripheral port connections, according to the kind of cable and port (on the cable) used, as shown in the following table. Refer to the *SYSMAC CPM2C Operation Manual (Cat. No. W356)* for more details.

Port connecting to PT Unit	PLC Setup
RS-232C port (D-Sub 9-pin) of CPM2C-CN111	Built-in RS-232C port settings
Peripheral port of CPM2C-CN111	Peripheral port settings
RS-232C port (D-Sub 9-pin) of CS1W-CN118	Built-in RS-232C port settings
Peripheral port of CS1W-CN114	Peripheral port settings



[Setting the DIP Switches of a C200HX/HG/HE(-Z)E, CQM1 or CQM1H]

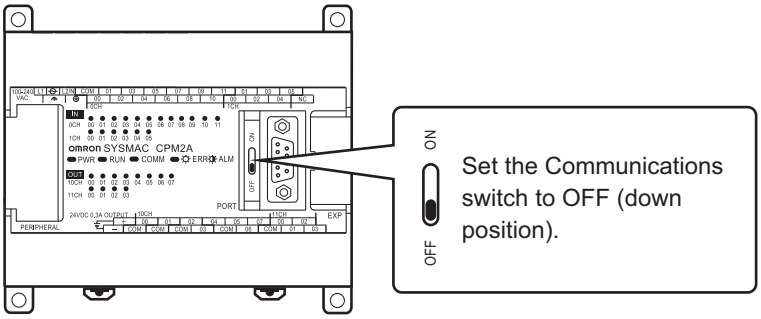
When using a C200HX/HG/HE(-Z)E, CQM1, or CQM1H the DIP switches on the front panel must be set as shown below in order to make the settings in the PLC Setup area (data memory) effective.



When using the CQM1H's built-in peripheral port, turn ON SW7.

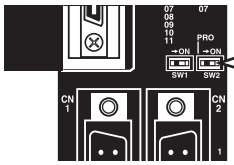
[Setting the Switches of a CPM2A]

When using a CPM2A, the switches on the front panel must be set as shown below in order to make the PLC Setup settings effective.



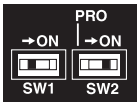
[Setting the Switches of a CPM2C]

When using a CPM2C, the switches on the front panel must be set as shown below in order to make the PLC Setup settings effective.



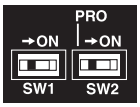
The settings for SW1 and SW2 depend upon the usage of the peripheral port and RS-232C port.

- Connecting PT Unit to peripheral port
- Connecting PT Unit to built-in RS-232C port
  (A device that requires non-standard communications settings is connected to the peripheral port.)



SW1: OFF
SW2: ON

- Connecting PT Unit to built-in RS-232C port
  (A Programming Console is connected to the peripheral port.)

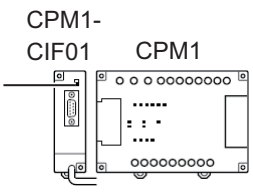


SW1: OFF
SW2: OFF

[Setting the Switches on a RS-232C Adapter]

When using a CPM1-CIF01 RS-232C Adapter, set the mode switch as shown in the following diagram.

Set the mode setting switch to HOST (upper position).



<CS-series CPU Unit type>

CS1G/H-CPU(-V1), CS1G/H-H

Connect to the built-in RS-232C port of the CPU Unit, or the RS-232C port of the Communications Board. Note that the connection to a peripheral port must be made via an RS-232C adapter (CS1W-CN118) specially designed for connecting to a peripheral port.

[PLC Setup]

When connecting to a CS-series CPU Unit, set the following communications conditions for the PLC Setup area. Since the settings shown below are the PLC default settings for the CPU Unit, no change to the PLC Setup is necessary as long as the communications speed is maintained at 9600 bps.

Item	Setting at Host
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Stop bits	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit No. for the host link	00

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

When the communications speed is set to 19200 bps., the PLC Setup of the CPU Unit need to be changed.

Either set the PLC Setup directly from a Programming Device (Programming Console), or transmit the PLC Setup made at a Programming Device (CX-Programmer) to the CPU Unit.

For details on PLC Setup, refer to the *SYSMAC CS series Operation Manual (Cat. No. W339)*.

When using the built-in RS-232C port of CS1G/H

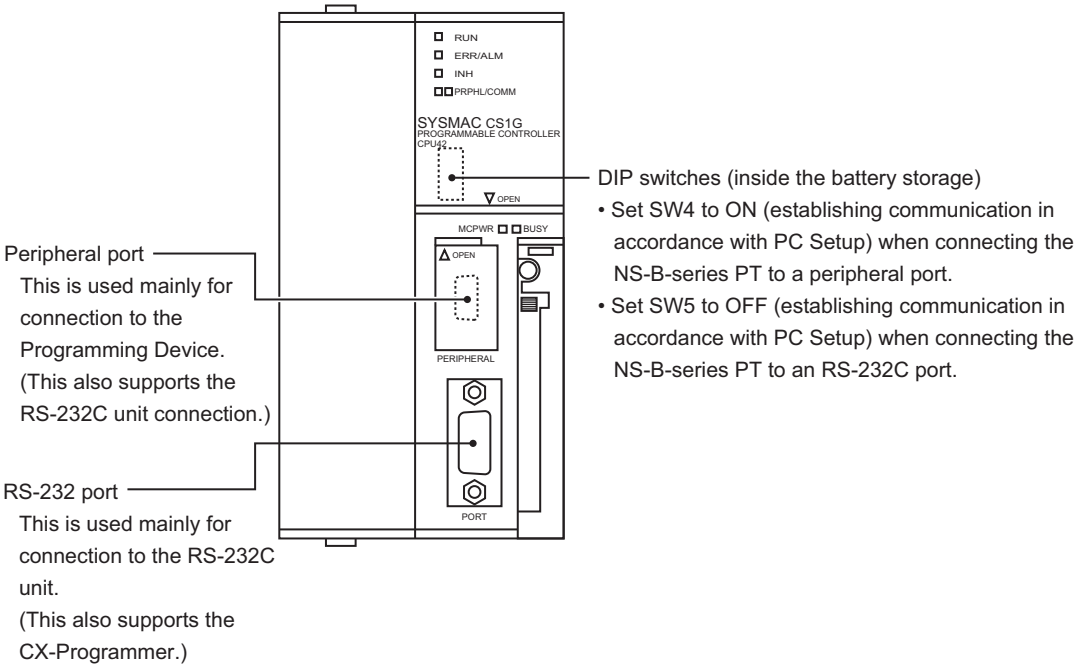
Word #	Writing Value	Settings
160	8000	Host link mode, data length 7 bits, 2 stop bits, even parity
161	0000	Communications speed: 9600 bps.
	0007	Communications speed: 19200 bps.
166	0000	Unit #00

When using the peripheral port of CS1G/H

Word #	Writing Value	Settings
144	8000	Host link mode, data length 7 bits, 2 stop bits, even parity
145	0000	Communications speed: 9600 bps.
	0007	Communications speed: 19200 bps.
150	0000	Unit #00

Setting the Front Switches

Set the CPU Unit DIP switches to 4 or 5 in accordance with the port the NS-B-series PT is connected to.



● Connecting to CS1-series Serial Communications Board

<Serial Communications Board equipped with an RS-232C port for CS-series CPU Units>

CS1W-SCB41/21-V1

[Allocation DM Area Settings in CPU Unit]

Settings are written from the Programming Device (a Programming Console or CX-Programmer) directly into the allocation DM area (system setting area) of the CPU Unit. After the settings are written, they become effective by turning the power ON, restarting the unit, restarting the communications port, or execution of the STUP command.

In the following, the words allocated in the DM area and the settings are shown.

Allocation DM area word		Writing Value	Settings
Port 1	Port 2		
D32000	D32010	8000	Host link mode, 2 stop bits, even parity, data length 7 bits
D32001	D32011	0000	Communications speed 9600 bps.
		0007	Communications speed 19200 bps.
D32002	D32012	0000	Transmit delay time 0 ms.
D32003	D32013	0000	No CTS control, Unit No. 0 for host link

3-3-2 Connecting to an RS-422A Port at the Host

Compatible Host Units

Some models and series of OMRON PLCs have the RS-422A type host link function built in.

- With the CS-series and CQM1H, the host link method can be used by installing a serial Communications Board.
- In addition, some C200HX/HG/HE(-Z)E devices have an integral CPU Unit that can be connected in the host link method by installing a Communications Board.
- With the CPM2A and CPM2C, an RS-422A type of 1:1 NT Link can be created through a CPM1-CIF11 RS-422A Adapter.

Check the model and series of the PLC and the type of the installed Board or Unit before making a connection.

The PLC Units that provide an RS-422A Host Link interface and that can be connected to an NS-B-series PT are listed in the following table.

PLC Series	CPU Units with Built-in Host Link Function	CPU Units Connectable with Host Link Units or Expansion Communications Board	Host Link Unit/Communications Board
CS Series		CS1G-CPU42/43/44/45-EV1 CS1H-CPU63/64/65/66/67-EV1	CS1W-SCB41-V1
		CS1G-CPU42H/43H/44H/45H CS1H-CPU63H/64H/65H/66H/67H	
CJ Series		CJ1G-CPU44/CPU45	CJ1W-SCU41-V1
		CJ1G-CPU42H/43H/44H/45H CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ2H-CPU64/65/66/67/68(-EIP)	
		CJ1M-CPU11/12/13/21/22/23 CJ2M-CPU11/12/13/14/15/31/32/33/34/35 CJ3M-CPU11/12/13/14/15/31/32/33/34/35	
		CP1H-XA40DR-A/XA40DT-D/XA40DT1-D/X40DR-A/X40DT-D/X40DT1-D/Y20DT-D	CP1W-CIF11
		CP1L-L14DR-A/L14DR-D/L14DTD/L14DT1-D/L20DR-A/L20DR-D/L20DT-D/L20DT1-D/M30DR-A/M30DR-D/M30DT-D/M30DT1-D/M40DR-A/M40DR-D/M40DT-D/M40DT1-D	

PLC Series	CPU Units with Built-in Host Link Function	CPU Units Connectable with Host Link Units or Expansion Communications Board	Host Link Unit/Communications Board
C Series		C1000H-CPU01-EV1 C2000H-CPU01-EV1	C120-LK202-EV1
		C200HS-CPU01/03/21/23/31/33-E C200HE-CPU11/32/42-E C200HE-CPU11/32/42-ZE C200HG-CPU33/43/53/63-E C200HG-CPU33/43/53/63-ZE C200HX-CPU34/44/54/64-E C200HXCPU34/44/54/64/65/85-ZE	C200H-LK202-EV1
		C200HE-CPU32/42-E C200HE-CPU32/42-ZE	C200HW-COM03/06-EV1
		C200HG-CPU33/43/53/63-E C200HG-CPU33/43/53/63-ZE	
		C200HX-CPU34/44/54/64-E C200HX-CPU34/44/54/64/65/85-ZE	
		C1000H-CPU01-EV1 C2000H-CPU01-EV1	C500-LK201-EV1
		C1000H-CPU01-EV1 C1000HF-CPUA1-EV1 C2000H-CPU01-EV1	C500-LK203
	CPM1-10/20CDR-□+CPM1-CIF11		
	CPM1A-10/20/30/40CD□-□+CPM1-CIF11		
	CPM2A-30/40/60CD□□-□+CPM1-CIF11 (Peripheral port connection)		
	CPM2C-10/20□□□□□□-□ *1		
		CQM1H-CPU51/61	CQM1H-SCB41
CV Series*2	CV500-CPU01-EV1	CV500-CPU01-EV1	CV500-LK201
	CV1000-CPU01-EV1	CV1000-CPU01-EV1	
	CV2000-CPU01-EV1	CV2000-CPU01-EV1	
CVM1 Series*2	CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2	CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2	CV500-LK201
SRM1	SRM1-C02-V2+CPM1-CIF11		

*1. Use a CPM2C-CN111 or CS1W-CN114/118 Connecting Cable, CPM1-CIF01 RS-232C Adapter, or CPM1-CIF11 RS-422A Adapter to connect.

*2. CPU Units of CVM1/CV-series PLCs without the suffix -EV□ cannot be connected.

Additional Information

When connecting using RS-485 (two-wire) on the NS-B-series, Host Link is not supported.

Settings at the Host

When using the RS-422A type host link method, the settings shown below must be made at the host (depending on the unit, some of these settings may not be necessary, or settings not shown here may be necessary).

Item	Setting at Host
I/O port	RS-422A
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Transfer code	ASCII, 7 data bits, 2 stop bits
Parity	Even
1-to-1/1-to-N	1-to-N*2
Command level	Level 1, 2, 3
Unit #	00

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

*2. The 1-to-N setting enables using a BCC (Block Check Character). It is not actually possible to connect more than one NS-B-series PT in a single Host Link.

The setting methods for each type of unit are described in the following.

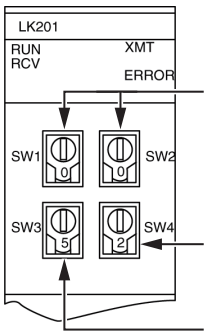
● Connecting to a C-series Host Link Unit

<C200H/C200HS/C200HE(-Z)E/C200HG(-Z)E/C200HX(-Z)E Rack-mounted Type>

C200H-LK202-V1

[Setting the Front Switches]

Set each switch with a flat blade screwdriver so that the values or symbols in the setting value window agree with the following:

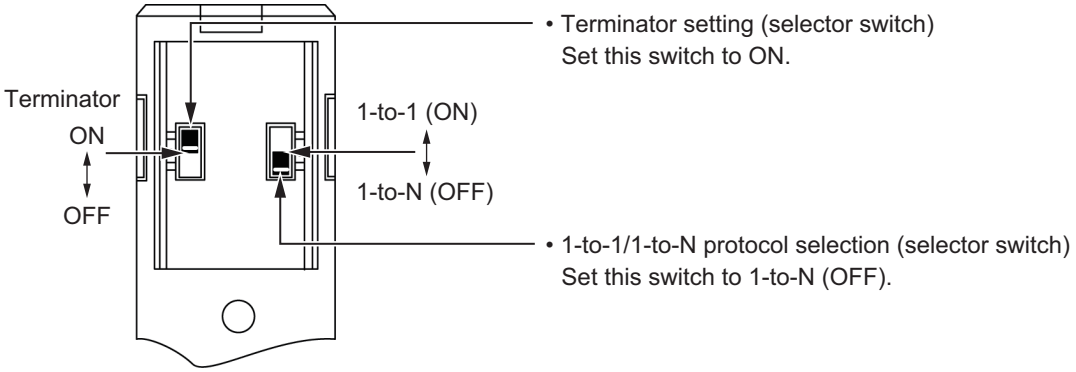


• Unit # (SW1, SW2)
Set these switches to 0.

• Command level, parity, and transfer code (SW4)
Set this switch to 2.

• Communications speed (SW3)
Set this switch to 5 to select 9600 bps.
Set this switch to 6 to select 19200 bps.

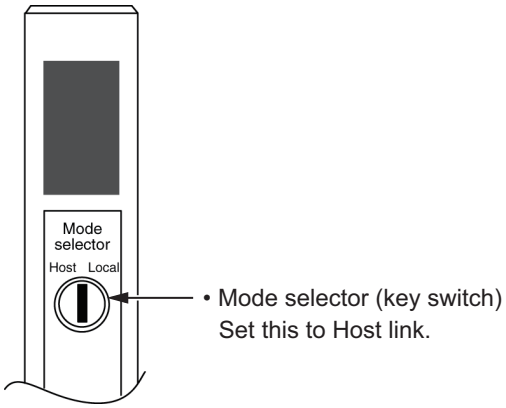
[Setting the Rear Switches]



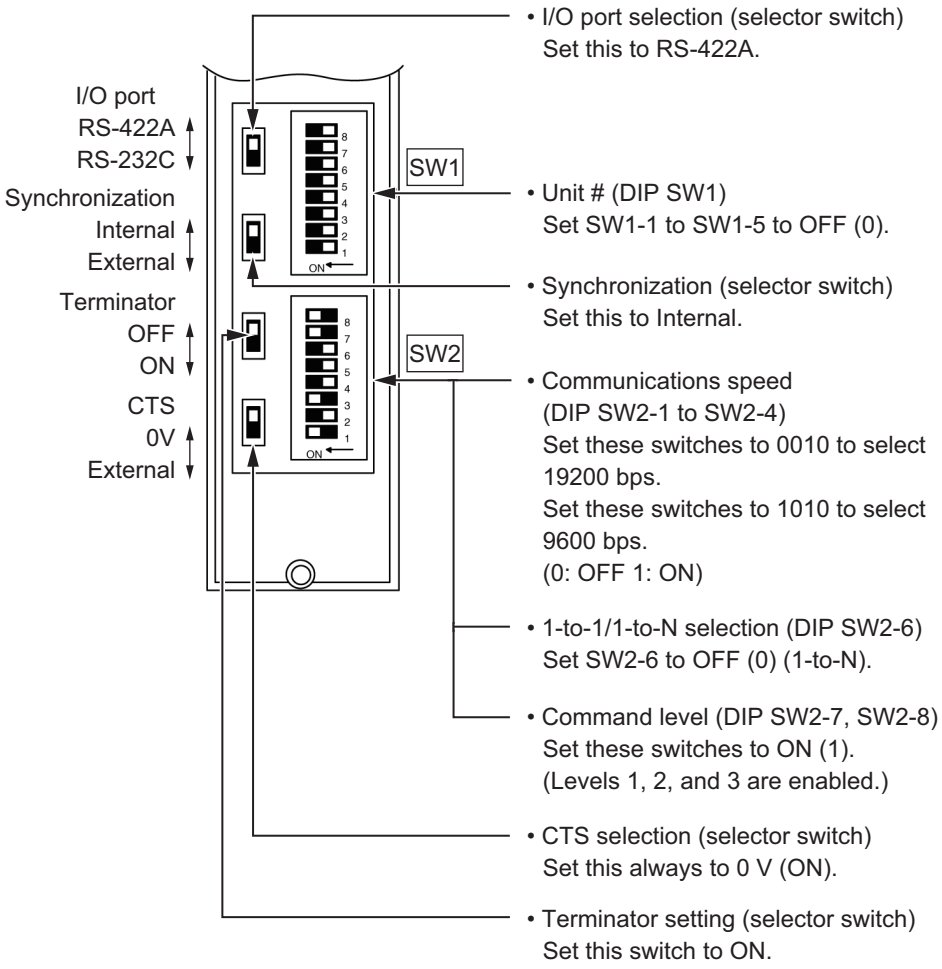
<C1000H/C2000H Rack-mounted Type>

C500-LK201-EV1

[Setting the Front Switches]



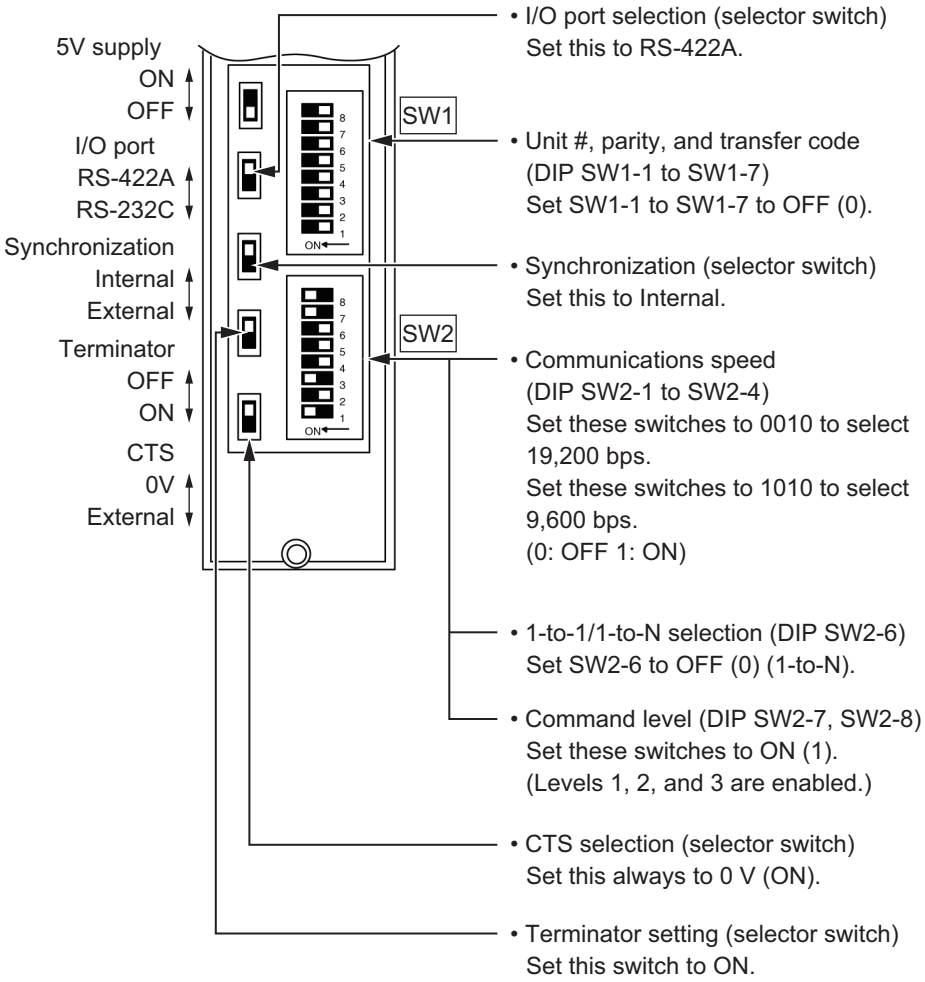
[Setting the Rear Switches]



<C1000H(F)/C2000H Rack-mounted Type>

C500-LK203

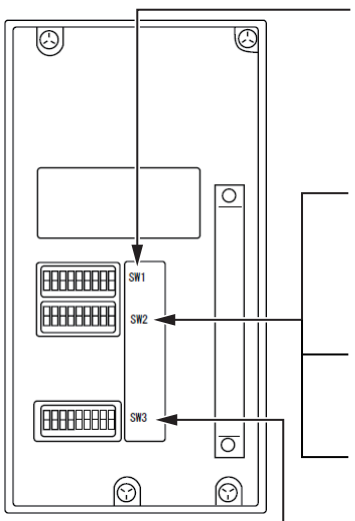
[Setting the Rear Switches]



<C200H/C1000H/C2000H CPU-mounted Type>

C120-LK202-EV1

[Setting the Rear Switches]



- Unit #, parity, and transfer code
  (DIP SW1-1 to SW1-5)
  Set SW1-1 to SW1-5 to OFF (0).
  * Parity is fixed at Even Parity. Transfer code is fixed at ASCII 7 data bits and 2 stop bits.
- Communications speed (DIP SW2-1 to SW2-4)
  Set these switches to 0010 to select 19200 bps.
  Set these switches to 1010 to select 9600 bps.
  (0: OFF 1: ON)
- 1-to-1/1-to-N selection (DIP SW2-6)
  Set SW2-6 to OFF (0) (1-to-N).
- Command level (DIP SW2-7, SW2-8)
  Set these switches to ON (1).
  (Levels 1, 2, and 3 are enabled.)
- Terminator setting (DIP SW3-1 to SW3-6)
  Set SW3-1, SW3-3, and SW3-5 to ON (1).
  Set SW3-2, SW3-4, and SW3-6 to OFF (0).
  (Set terminator ON.)

● Connecting to a CVM1/CV-series Host Link Unit

<CVM1/CV series Rack-mounted Type>

CV500-LK201

A CVM1/CV series host link unit (CV500-LK201) has two connectors (communications ports 1 and 2). To use the RS-422A type host link method, set communications port 2 to RS-422A.

Communications port 2 is a 9-pin connector which allows selection of the RS-232C or RS-422A method. When this port is used with the RS-422A method, the I/O port selector switch on the front of the unit must be set to RS-422A (the lower position).

[CPU Bus Unit Settings]

When connecting to a CVM1/CV series host link unit, set the following communications conditions for the CPU Bus Unit settings.

Item	Setting at Host
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Transfer code	ASCII, 7 data bits, 2 stop bits
Parity	Even

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

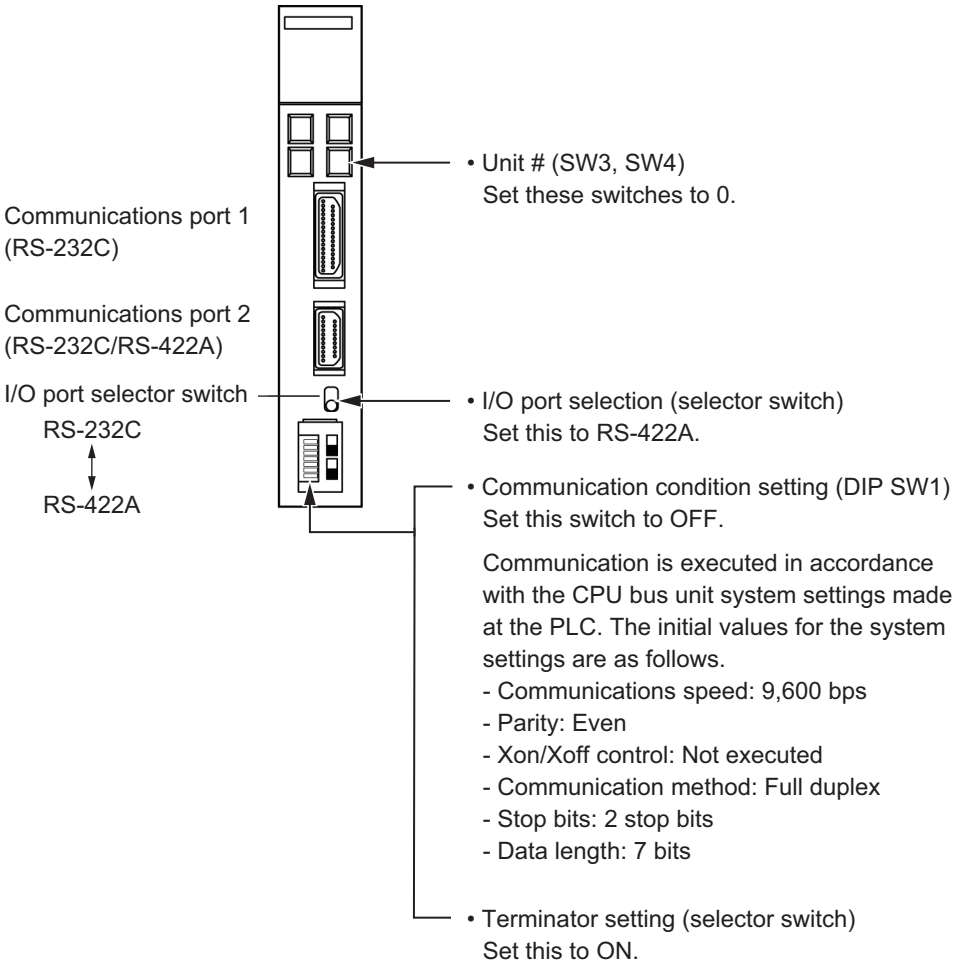
Additional Information

The 1-to-N setting enables using a BCC (Block Check Character). It is not actually possible to connect more than one PT Unit in a single Host Link.

Set the CPU Bus Unit settings directly from a Programming Device (e.g., CX-Programmer).

For details on the CPU Bus Unit settings, refer to the *SYSMAC CVM1/CV-series Host Link Unit Operation Manual (Cat. No. W205)*.

[Setting the Front Switches]



● Connecting to a CPU Unit

<CVM1/CV-series (-EV□) CPU Units>

CV500-CPU01-EV1/CV1000-CPU01-EV1/CV2000-CPU01-EV1

CVM1-CPU01-EV2/CVM1-CPU11-EV2/CVM1-CPU21-EV2

[PLC Setup]

When connecting to a CVM1/CV-series CPU Unit, set the following communications conditions for the PLC Setup.

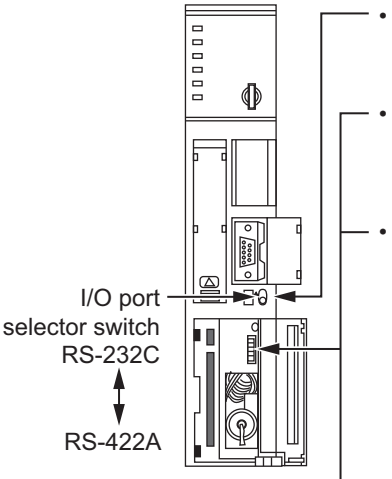
Item	Setting at Host
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

Either set the PLC Setup directly from a Programming Device (e.g. CX-Programmer), or transmit the PLC Setup made at a Programming Device to the CPU Unit.

For details on the PLC Setup, refer to the *SYSMAC CVM1/CV500/CV1000/CV2000 Operation Manual: Ladder Diagrams (Cat. No. W202)*.

[Setting the Front Switches]



• I/O port selection (selector switch)
Set this to RS-422A.

• Communication type setting (DIP SW3)
Set SW3 to OFF.
(for host link communication)

• Host link default value settings (DIP SW4)
To effect the existing DIP switch settings, set SW4 to ON.
To effect the values set in the PC Setup, set SW4 to OFF.

Note
For CPUs manufactured before or during June 1995 (lot No. □□65), the existing DIP switch settings differ from the PC Setup default values as follows.
- Existing DIP switch settings:
  2,400 bps, 1 stop bit, even parity, 7 bit data length
- PC Setup default values:
  9,600 bps, 2 stop bits, even parity, 7 bit data length

For CPUs manufactured from July 1995 onward (lot No. □□75), the stipulated values in the DIP switch settings also are 9600 bps and 2 stop bits.

• Terminator setting (DIP SW6)
Set this switch to ON.
(Set terminator ON.)

<C-series C200HX/HG/HE(-Z)E, CPM1, CPM2A, CPM2C, CQM1H, CPU Unit or SRM1>

The connection method depends upon the model of PLC being used, as shown in the following table.

PLC model	Connection method
C200HX/HG/HE(-Z)E	Connect to the RS-422A port (port A) on a Communications Board.
CQM1H	Connect to the RS-422A port (port 2) on a Serial Communications Board.
CPM1	Connect to the peripheral port through a CPM1-CIF11 RS-422A Adapter.
CPM2A, SRM1	Connect to the peripheral port through a CPM1-CIF11 RS-422A Adapter.
CPM2C	Connect to the peripheral port (on a CPM2C-CN111 or CS1W-CN114 Connecting Cable) through a CPM1-CIF11 RS-422A Adapter. (The CPM2C-CN111 splits the Unit's communications port into a RS-232C port and a peripheral port.)



Additional Information

- There are no Communications Boards for the C200HX/HG/HE(-Z)E in which port B is the RS-422A port.
- There are no Serial Communications Boards for the CQM1H in which port 1 is the RS-422A port.

[PLC Setup Area Settings]

When connecting to a C200HX/HG/HE(-Z)E or CPM1, CPM2A, CPM2C, CQM1H CPU Units or SRM1, set the following communications conditions for the PLC Setup area.

Item	Setting at Host
I/O port	RS-422A
Communications mode	Host link mode
Communications speed	Set the same baud rate as set at the NS-B-series PT*1
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1. Set the Host Link communications speed (baud rate) to 9600 bps or 19200 bps with the Communications Setting menu item in the CX-Designer and the System Menu for the NS-B-series PT. For details, refer to *3-4 Settings for Host Link* on page 3-35.

Set the PLC Setup area settings directly from a Programming Device (e.g. CX-Programmer).

For details on operations relating to the PLC Setup area, refer to the manual for the PLC which is used.

The PLC Setup area word numbers and settings to be made depending on the unit to which the connection is made are shown below.

When using port A of the Communications Board of C200HX/HG/HE(-Z)E

Word #	Writing Value	Settings
DM6555	0001	Host link mode, no CTS control, communications conditions set by the contents of DM area
DM6556	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6558	0000	Unit # 00

When using a CPM1, CPM2A, CPM2C, SRM1

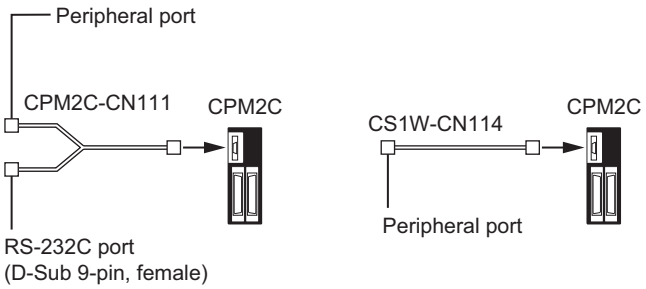
Word #	Writing Value	Settings
DM6650	0001	Host link mode, no CTS control, communications conditions set by the contents of DM area
DM6651	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6653	0000	Unit # 00

When using a CQM1H

Word #	Writing Value	Settings
DM6550	0001	Host link mode, no CTS control, communications conditions set by the contents of DM area
DM6551	0303	Data length 7 bits, 2 stop bits, even parity, communications speed: 9600 bps
	0304	Data length 7 bits, 2 stop bits, even parity, communications speed: 19200 bps
DM6553	0000	Unit # 00

[Connecting to a CPM2C]

The CPM2C PLCs do not have the same kind of port connectors found on CS-series PLCs. The CPM2C's communications port handles both RS-232C and peripheral port connections which are divided internally. Therefore, when using the CPM2C, it is necessary to select RS-232C or peripheral port connections, according to the kind of cable and port (on the cable) used, as shown in the following table. Refer to the *SYSMAC CPM2C Operation Manual (Cat. No. W356)* for more details.



[Setting Switches on a C200HX/HG/HE(-Z)E Communications Board]

Set the switches on a C200HX/HG/HE(-Z)E Communications Board as follows.

Switch 1: Set to 4 (4-wire type, for RS-422A)

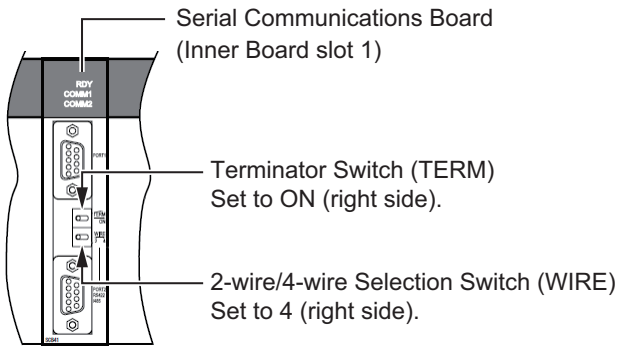
Switch 2: Set to ON for terminator ON (termination resistance applied)

[Setting Switches on a CQM1H Serial Communications Board]

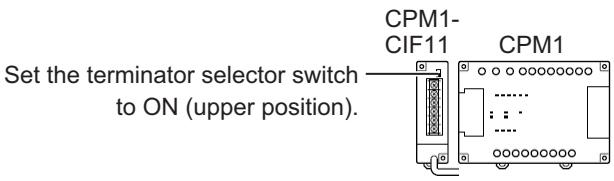
Set the switches on a CQM1H Serial Communications Board as follows.

2-wire/4-wire selection (WIRE): Set to 4 (4-wire type, for RS-422A)

Terminator (TERM): Set to ON for termination ON (termination resistance applied).



[Setting the Switches on an RS-422A Adapter]



Connecting to a CS-series Serial Communications Board

<Serial Communications Board with an RS-422A/485 port equipped for CS-series CPU Unit Type>

CS1W-SCB41(-V1) (The port 2 is an RS-422A/485 port.)

[Allocation DM Area Settings in CPU Unit]

Settings are written from the Programming Device (a Programming Console or CX-Programmer) directly into the allocation DM area (system setting area) of the CPU Unit. After the settings are written, they become effective by turning the power ON, restarting the unit, restarting the communications port, or executing the STUP command.

In the following, the words allocated in the DM area and the settings are shown.

Allocation DM area word	Writing Value	Settings
Port 2		
D32010	8000	Host link mode, 2 stop bits, data length 7 bits, even parity
D32011	0000	Communications speed 9600 bps.
	0007	Communications speed 19200 bps.
D32012	0000	Transmit delay time 0 ms.
D32013	0000	No CTS control, Unit No. 0 for host link

Connecting to a CJ-series Serial Communications Unit

<CJ-series Rack-mounted Serial Communications Unit>

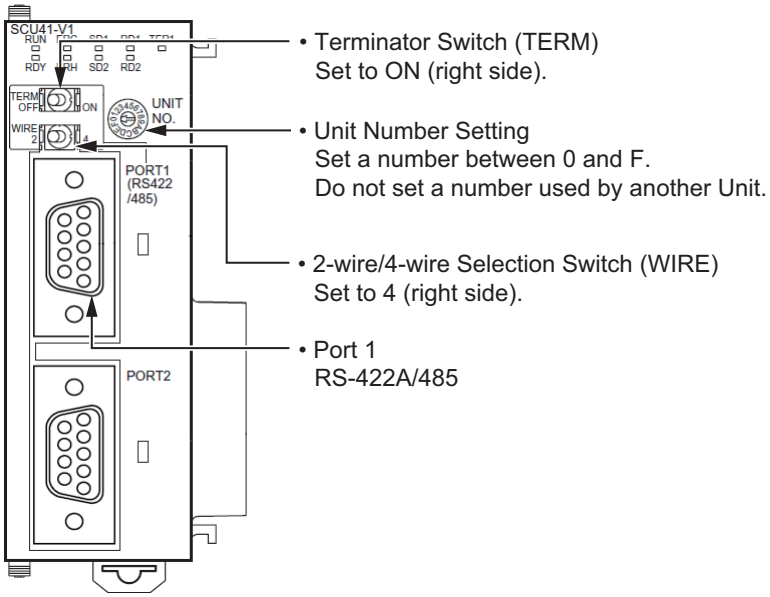
CJ1W-SCU41-V1 (Port 1 is an RS-422A/485 port.)

[Setting the Front-panel Switches]

Set the unit number for the Serial Communications Unit using the rotary switch on the front panel of the Unit. Use a flat-head screwdriver to set the unit number in the setting display window.

Set the terminator switch to ON (right side).

Set the 2-wire/4-wire selection switch to 4 (right side).



[Setting Parameters Allocated in the DM Area in the CPU Unit]

Settings can be directly written to the words allocated to the Serial Communications Unit in the DM Area (System Setup Area) by using a Programming Device, such as a Programming Console or the CX-Programmer. Any changes to the settings can be enabled by cycling the power supply, restarting the Unit, restarting the communications port, or executing a STUP instruction.

The following table lists the words allocated in the DM Area and setting details.

m = D30000 + 100 × unit number (word address)

Allocation DM Area word		Write value	Setting details
Port 1	Port 2		
m	m+10	8000	Host Link mode, 2 stop bits, even parity, 7-bit data
m+1	m+11	0000	Baud rate: 9,600 bps
		0007	Baud rate: 19,200 bps
m+2	m+12	0000	Transmission delay time: 0 s
m+3	m+13	0000	No CTS control, unit number 0 for Host Link

3-4 Settings for Host Link

This section describes the procedure for making the NS-B-series PT settings for connecting to the host by means of Host Link communications.

Use either serial port A or B. The flow of operations for connecting to the host is as follows:

(a) Design the screen data.

(b) Transfer the screen data.

(c) Set the communications method for serial port A or B

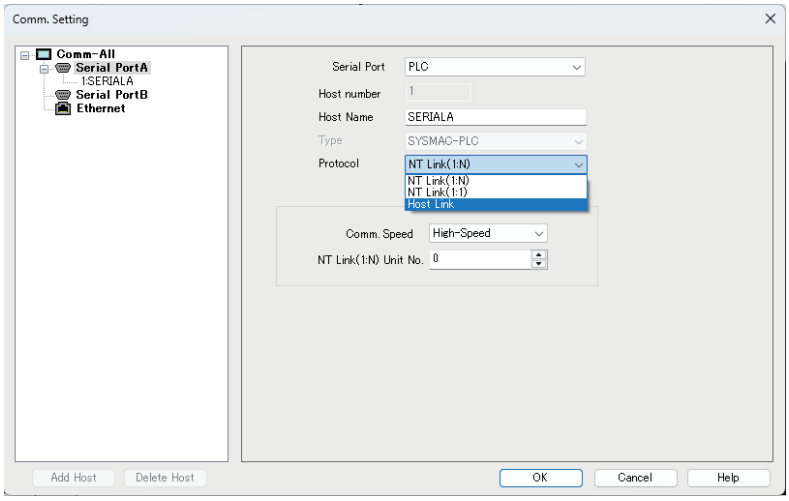
(d) Connect to the host.

3-4-1 Designing the Screen Data

Use the CX-Designer to create the screen data.

First, select **Communication Setting** from the PT Menu to display the Communication Setting Dialog Box.

Select *Serial Port A* or *Serial Port B*. Then set the serial port to *PLC* and the protocol to *Host Link*.



3-4-2 Transferring Screen Data

Use the transfer program to transfer the screen data to the PT Unit.

For details on transferring screen data, refer to *Transferring Data to the PT* in the CX-Designer online help.

3-4-3 Setting the Communications Method for Serial Port A or B

This procedure is not required if the method has already been set in *3-4-1 Designing the Screen Data* on page 3-35.

At the PT Unit, set Host Link as the communications method for the serial port that is to be used to connect to the host by means of Host Link communications.

Also set the baud rate to same value as the host.

These settings are made from the PT Unit's System Menu.

1. Press the **Comm**. Tab in the System Menu to display the Communications Setup Screen.

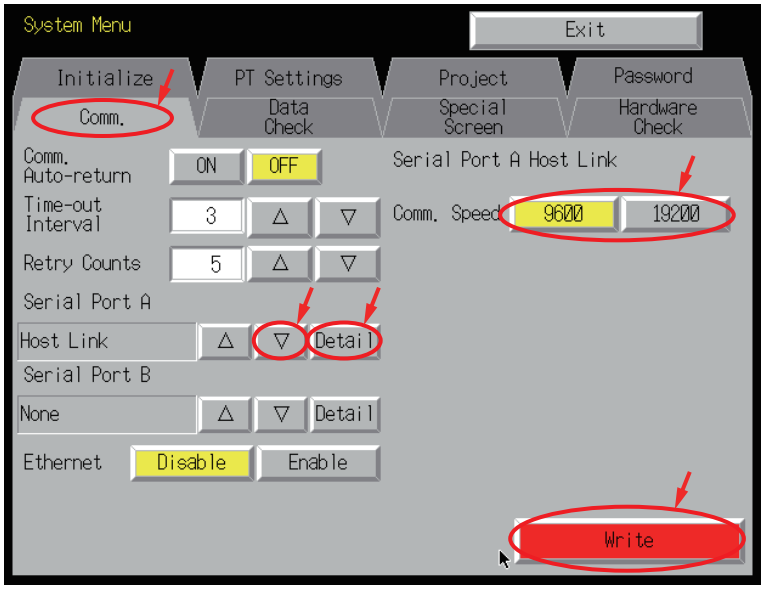
   (For the NB5Q-TW01B-V1-S, press the **Comm**. Button in the System Menu to display the screen, and then press the ← and → **Screen Switching** Buttons to display the screen for page (2/3).)

2. Press the drop-down menu button and set Host Link as the communications method for serial port A or B.

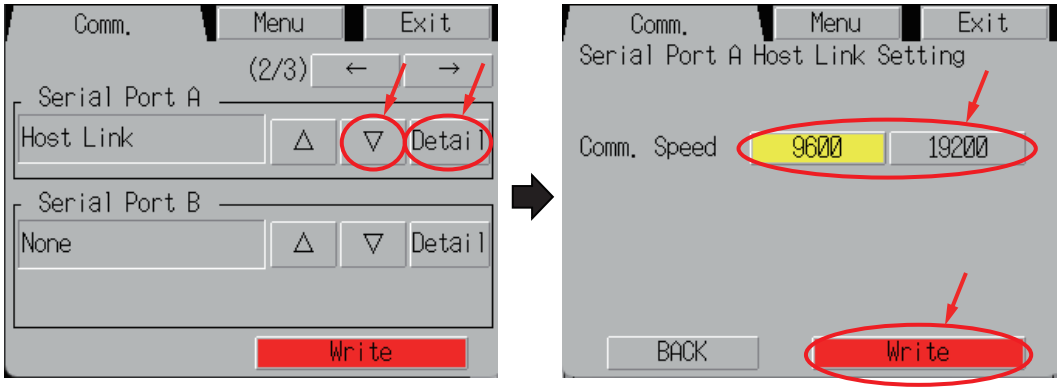
3. Press the **Detail** Button to display the Host Link settings, and select **Comm. Speed**.

4. Press the **Write** Button and press the **Yes** Button on the following dialog boxes to restart the PT Unit.

- When using other than NB5Q-TW01B-V1-S (the screen image differs slightly for each model)



- NB5Q-TW01B-V1-S



3-4-4 Connecting to the Host

Connect in the same way as for a 1:1 NT Link, and use the same cables that are used for a 1:1 NT Link connection.

If cables must be prepared, refer to the relevant manuals for the PLC or Host Link Unit, and to the *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*.

4

Connection of temperature controller

This section explains how to connect Omron temperature controllers (E5□N) and digital controllers (E5AR/ER) and which models to connect.

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4-2 Possible combinations 4-3

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4-7-3 Communications address set when functional part was copied using repeat command 4-15

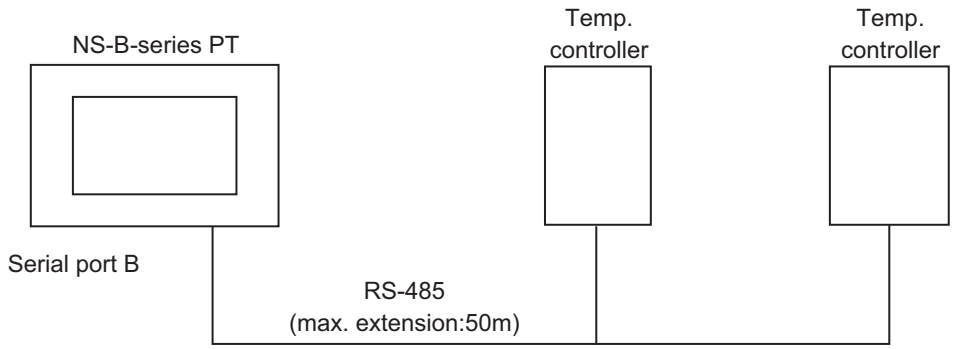
4-1 Outline

This explains how to connect temperature controllers.

Connectable are temperature controllers with a RS-485 port.

Use NS serial port B.

1 serial port can accommodate max. 31 temperature controllers.



By using another communications port, you can simultaneously connect temperature controllers and a host.

4-2 Possible combinations

4-2-1 Connectable temperature controller

Only models with RS-485 communications port that support CompoWay/F can be used.

The following models are connectable:

Name	Series	Model
Temperature controller	E5ZN	E5ZN-SCT24S (terminal unit)
	E5AN	E5AN-□□□03□-FLK
	E5EN	E5EN-□□□03□-FLK
	E5CN	E5CN-□□□03□-FLK
	E5GN	E5GN-□□□03□-FLK
Digital temperature controller	E5AR	E5AR-QC43DB-FLK
		E5AR-QQ43DW-FLK
		E5AR-CC43DWW-FLK
	E5ER	E5ER-QC43B-FLK
		E5ER-PRQ43F-FLK
		E5ER-QT3DW-FLK
		E5ER-CT3DW-FLK

4-2-2 Temperature controller Manuals

Manual name	Catalog No.
E5CN Temperature Controller User's Manual	H100-E1
E5GN Temperature Controller User's Manual	H101-E1
E5AN, E5CN, E5EN, E5GN Temperature Controller Communications Functions User's Manual	H102-E1
E5EN Temperature Controller User's Manual	H111-E1
E5AN Temperature Controller User's Manual	H112-E1
E5AR, E5ER Digital Controller User's Manual	Z182-E1

4-3 Configurations

4-3-1 Necessary parts

Crimp terminal

- **PT Unit side communications path terminator**

Phoenix Contact	AI-0.5-8WH-B	(serial No. 3201369)
Crimp tool	CRIMPFOX 6	(serial No. 1212034)

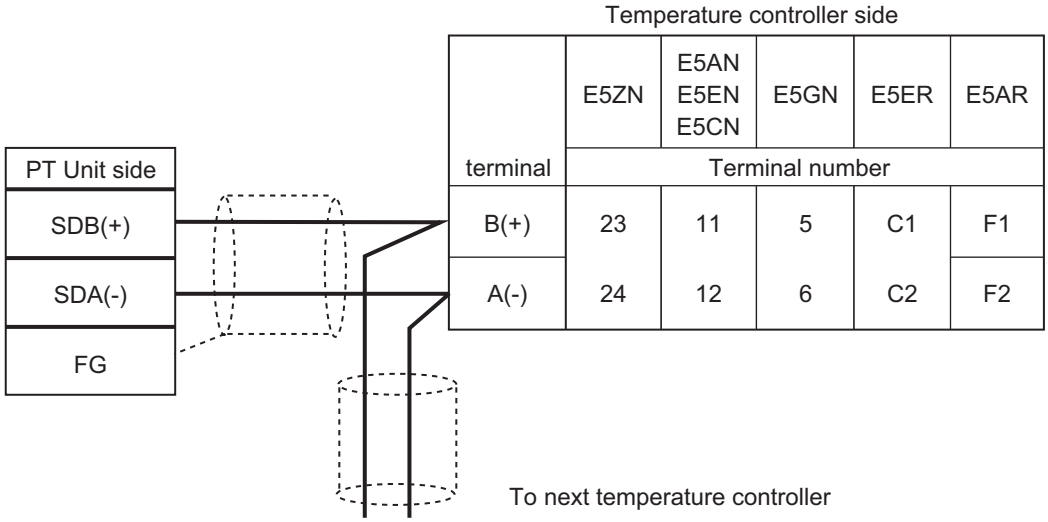
- **PT Unit side other than communications path terminator**

Phoenix Contact	AI-TWIN0.5-8WH	(serial No. 3201369)
Crimp tool	CRIMPFOX 10T-F	(serial No. 1134913)

- **Temperature controller side**

Model	Terminal block screw size	Terminal size
E5CN	M3.5	7.2 mm max.
E5GN		
E5EN		
E5AN		
E5ZN	M3	5.8 mm max.
E5ER/AR		

4-3-2 Wiring diagram



- Connection: 1:1 or 1:N. If 1:N, max. 32 units (PT Unit and temperature controllers combined) can be connected. (in case of E5ZN, the maximum is 16 units).
- Cable length: In total max. 50 m
- Use shielded twist pair cables (min. size AWG28)
- Connect terminating resistance (100 to 125 Ω (1/2W)) to both ends of the communications path. Furthermore, combined resistance must be 54 Ω min.

4-3-3 Temperature controller communications settings

This summarizes temperature controller communications settings.

For more details on settings and operation procedure of setting specifications, refer to the relevant temperature controller manual.

E5ZN

- Setup Switch on E5ZN panel

Unit number	0 to 15	When using multiple E5ZN units, be careful not the use the same number twice.
Baud rate	0	4800 bps
	1	9600 bps
	2	19200 bps

- Communications setting level

	CH	Value	
Data bits	C3 0013 or C3 0113	7	7 bits
Stop bits	C3 0014 or C3 0114	2	2 bits
Parity	C3 0015 or C3 0115	2	Even (EvEn)
Response Waiting time	C3 0016 or C3 0116	0 to 270FH (0 to 9999)	In ms

E5GN/E5AN/E5EN/E5CN/E5ER/E5AR

- Adjustment level L.Adj

Communications writing	CoWt	on	enable
		OFF	disable

- Communications setting level L.S

Baud rate	bPS	2.4 4.8 9.6 19.2 38.4	In kbps Set all communicating temperature controllers to match parameters of PT Unit E5ER/AR: choose between 9.6/19.2/38.4 E5□N: 38.4 cannot be selected.
Data bits	LEn	7	7 bits
Stop bits	Sbit	2	2 bits
Parity	Prty	EvEn	Even
Response Waiting time	SdWt	0 to 270FH (0 to 9999)	In ms E5AR/ER range: 0 to 63H (0 to 99)
Communications Unit No.	U-no	0 to 31	E5AR/ER only
Protocol select	PSEL	CyF	Compoway/F (E5AR/ER only)

4-3-4 PT Unit setting

You must use CX-Designer to configure the settings for the temperature controller connection in the project, and then download the project to the PT Unit. For project setting, refer to *4-4 Setting Project* on page 4-7.

With communications settings under system menu, you can set the speed of communications.

Baud rate	2400/4800/9600/19200/38400/57600/115200	bps

Of these values, 57600/115200 are for future use. Present temperature controllers cannot operate at these rates.

Set PT Unit and temperature controller baud rate values to match each other.

4-4 Setting Project

With this function, you set projects needed to connect temperature controllers.

Select **PT - Communication Setting**. The Comm. Setting dialogue appears.

1 Select Serial Port B in the left pane, and select Temperature Controller from the pull down menu for Serial Port.

2 Define temperature controller model to be connected from the pull down menu for Type.

Selectable models are:

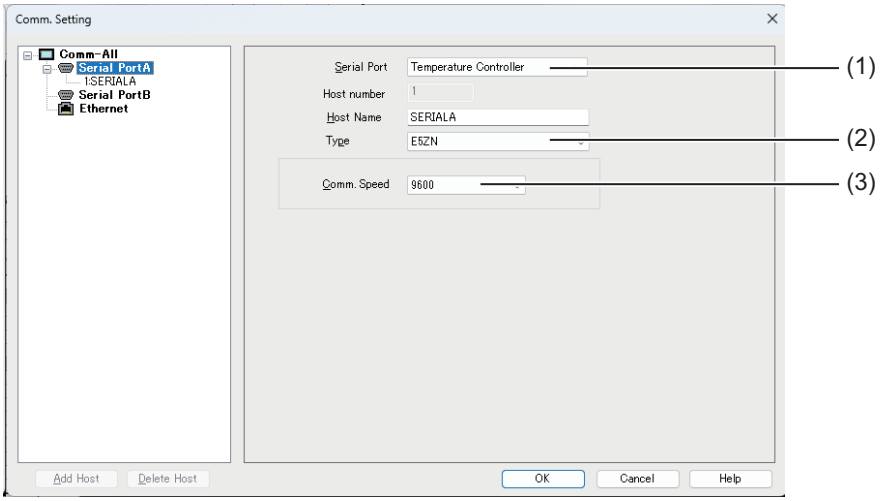
E5ZN, E5A/E/C/GN, or E5A/ER.

3 Select baud rate from the pull down menu for Comm. Speed.

Selectable baud rate values are:

2400/4800/9600/19200/38400/57600/115200 (in bps).

Baud rates 57600/115200 are for future use. Present temperature controllers cannot operate at these rates.



4-5 Monitor variables area in temperature controller

4-5-1 Variables area in temperature controller

Data stored in variable area of the temperature controller are: Present Value, SP, Heater burnout alarm status and such.

By reading/writing these data from PT Unit, you can monitor temperature controller status.

Values of variables you can display on PT Unit's screen as numbers and you can create save the changes of those as log data.

Temperature controller status (variable C0, address 0001) is information on bit level. You can show status by ON/OFF lamp and you can display/save the history log that shows status changes.

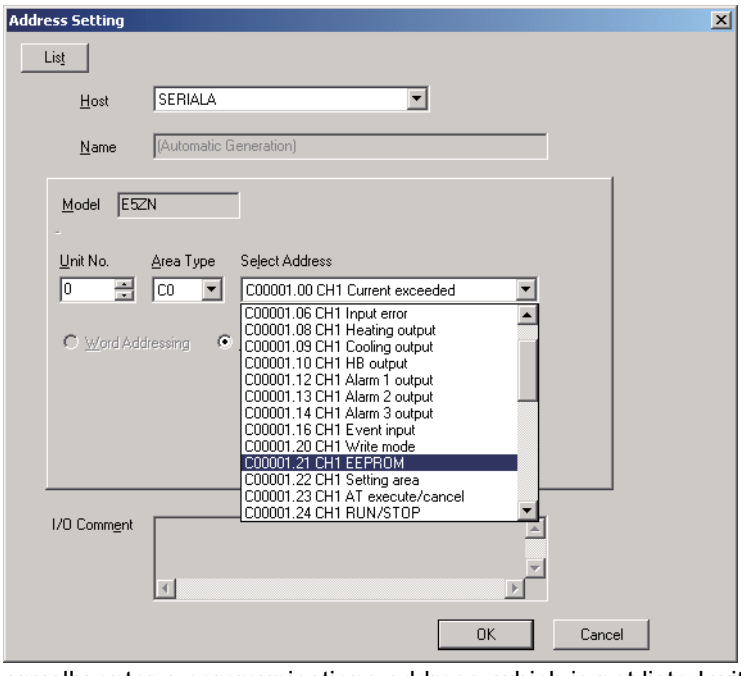
Address of variable are in a Temperature Controller should be assigned to the lamps, numeral display and input object, or graphs before monitoring the variable area.

Accessible address ranges vary with temperature controller models.

For details on accessible address ranges and definitions of settable address ranges, numerical values and contact status, refer to the following manuals.

Model	Manual
E5AN, E5EN, E5CN, E5GN	E5AN, E5CN, E5EN, E5GN Temperature Controller Communications Functions User's Manual (H102)
E5ZN	E5AN Temperature Controller User's Manual (H112)
E5AR, E5ER	E5AR, E5ER Digital Controller User's Manual (Z182)

CX-Designer shows accessible address range in accordance with the model specified in the Register Host dialog so that user can set an appropriate communication address.



You can also manually enter a communications address, which is not listed without opening Address Setting dialog. In this case, enter the desired address directly to the field shown in the property dialog.

4-5-2 Address notation in CX-Designer

- Address notation when accessed using word (address for word communications)
  <Port> : <Communications unit No.> # <Variable category> <Channel> <Address>
- Address when accessed using bit (address for bit communications)
  <Port> : <Communications unit No.> # <Variable category> <Channel> <Address> . <Bit position>

Item	Value range & definition	
<Port>	SerialA	Not applicable
	SerialB	Connected to serial port B
<Communications unit No.>	00 to 31	
<Variable type>	C0 to D7	
<Channel>	00 to 03	ch1 to ch4
<Address>	Variable category C0 to C3: Address range 00 to 3F Variable category C4 to CB: Address range 00 to 7F Variable category CC to D7: Address range 00 to 3F	
<Bit position>	00 to 31	

Example:

SerialB:24#C4001C	PortB: Unit No.24/area category C4/ch1/address 1CH
SerialB:17#D1036E.3	PortB: Unit No.17/area D1/ch4/address6EH/bit3

4-5-3 Use of double word numbers

Variable area in the Temperature Controller is composed of values in double-word format (32bit length).

Negative values are expressed as the two's complement.

Therefore, select DINT (signed 2 words) as storage type for the variable, which the decimal value will be stored. Select UDINT (unsigned 2 words) for the variable, which the hexadecimal value will be stored.

4-5-4 Communications writing enabled/disabled

Before you can write to variable area in temperature controller, you need to go to the adjustment level and set **Communications writing** on **Enabled: ON**. (Default setting is **Disabled: OFF**).

For monitoring only, so when no writing is carried out, the setting can be either **Disabled: OFF** or **Enabled: ON**.

Use either the panel on the Temperature Controller or Setting Tool to set "Communications Writing" parameter.

It can be also set with Smart Active Parts in the PT Unit.

4-6 Operation of Temperature Controller

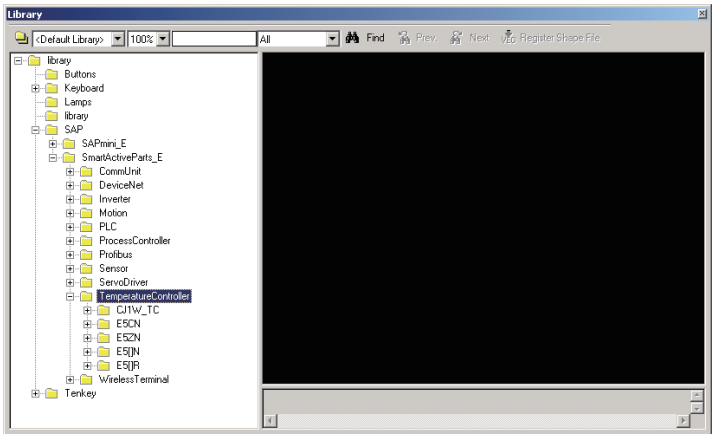
The use of Smart Active Parts, allows you to operate PT Unit's screen to change Temperature Controller running conditions and to disable/enable communications writing.

4-6-1 How to use a Smart Active Parts part

In CX-Designer, you open the arrange Smart Active Parts screen.

Open the Library Window. To display Smart Active Parts in the Library Window, refer to *CX-Designer Version 4.□ Operation Manual (Cat. No. V133)*.

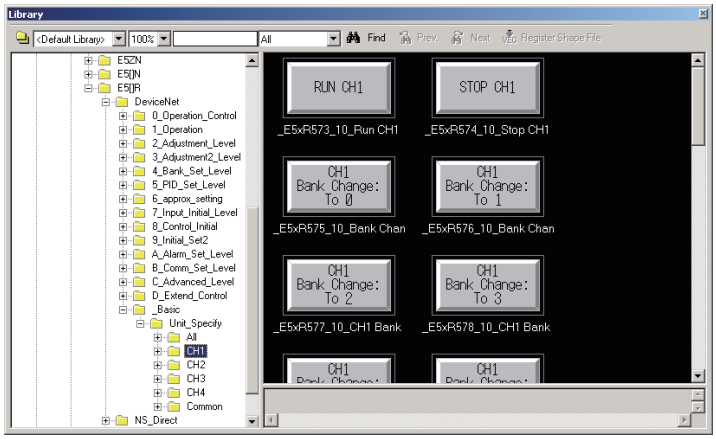
Smart Active Parts for temperature controller you can find under **Library → SAP → Smart Active Parts_E → Temperature Controller**.



Temperature controller is grouped by model, channel and broadcast. For each operation instruction, a Smart Active Parts part is available.

There are 2 categories: Instructions to the unit itself and broadcast.

When same instruction is given to all units, no results response is sent. For that reason error judgment is omitted.

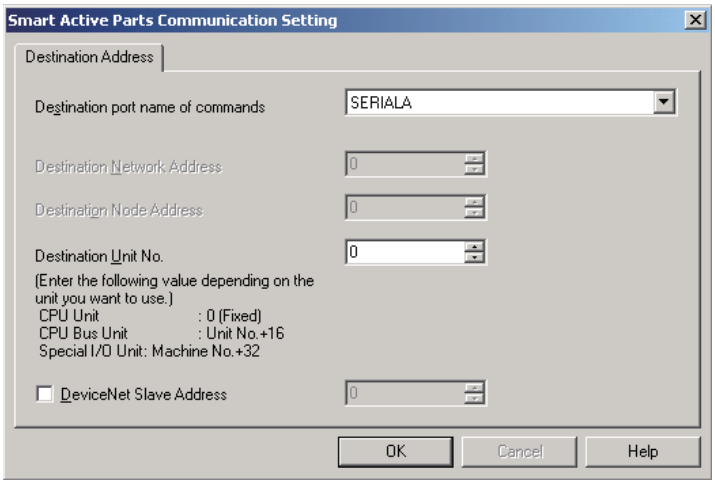


Selectable Smart Active Parts are shown in the preview box on the right. Title of the selected Smart Active Parts is shown below it.

Select appropriate Smart Active Parts and drag & drop it to the screen.

By doing so, the selected Smart Active Parts is pasted onto the screen that is being edited.

Then, double click the Smart Active Parts and set communications parameters.



Destination port name of commands	SERIALA: Not available
	SERIALB: when connected to serial port B
Destination Unit No.	0 to 31: Communications unit No. of the temperature controller you want to operate.
	With broadcast to all parts, this parameter is not used. Keep default value 0.
	Use the following table for serial connection.

SCU Unit No.	Port	Destination Unit No.	SCU Unit No.	Port	Destination Unit No.
0	1	128	8	1	160
0	2	129	8	2	161
1	1	132	9	1	164
1	2	133	9	2	165
2	1	136	A	1	168
2	2	137	A	2	169
3	1	140	B	1	172
3	2	141	B	2	173
4	1	144	C	1	176
4	2	145	C	2	177
5	1	148	D	1	180
5	2	149	D	2	181
6	1	152	E	1	184
6	2	153	E	2	185
7	1	156	F	1	188
7	2	157	F	2	189

When you want to change the label and color setting of the Smart Active Parts, select and right click on a Smart Active Parts, and select **Edit Smart Active Parts**. It is now in Smart Active Parts edit mode. Double click on the desired object to open the property dialog and the settings can be changed.

Do not change the communications address when editing the settings. Once it has been changed, the Smart Active Parts will not function properly anymore.

Furthermore, when it is in Smart Active Parts edit mode, you cannot set Smart Active Parts communications settings. So when you want to modify the communications settings, click any area except the Smart Active parts to exit from the edit mode.

4-6-2 Smart Active Parts Operations

Smart Active Parts for Temperature Controllers are grouped by Temperature Controller model, channel, instruction to single unit/broadcast, control details.

Smart Active Parts title indicates the operating instruction to be executed.

Communications writing enabled/disabled

You can either enable or disable the writing of set values from communications.

When communications writing is disabled, the writing of set values from communications and the execution of certain instructions is prohibited.

Default setting is set as **Disable**.

By executing Smart Active Parts **Enable communications writing/Disable communications writing**, you can switch between enabled/disabled.

If communications writing is not enabled before writing set values with numeral display & input object or word button, an error occurs.

Furthermore, by disabling communications writing, you can avoid that set values are being changed by accident.

A summary of executable/non executable instructions when communications writing is disabled, is given in table *Confirm command results* on page 4-13.

Setting area 0/setting area 1

Temperature controller communications has 2 operation modes: setting area 0 and setting area 1.

In setting area 0, control operations are conducted. You cannot modify any set values that negatively affect the control operations. When power supply is turned on, this mode is selected.

In Setting area 1, the control operations are stopped. You can modify the set values protected in Setting area 0.

You can switch to Setting area 1 by executing Smart Active Parts part ‘Move to setting area 1’.

To change from Setting area 1 to Setting area 0, you can either turn the power off and then back ON again or you can execute Smart Active Parts part: “Software Reset”.

Executable operating instructions vary depending on which mode is selected: setting area 0 or 1.

Non executable in setting Area 0	Non executable in setting Area 1
Initialize set values	AT execute/cancel
	Move to protect level
	Auto/manual
	PV hold

Confirm command results

Under certain conditions e.g. communications writing disabled, it can happen that a selected Smart Active Parts instruction cannot be executed.

But, when performing the broadcast, no response is given. In that case there is no check as to whether the action was completed successfully or not.

Therefore, adopt a method that checks if the operation was carried out properly, e.g. lamp indication.

Model	Title (operating instruction)		Addresses to be monitored	
Common	Communications writing disabled		ch1	C00001.25
	Communications writing enabled		ch2	C00101.25
	run		ch1	C00001.24
	stop		ch2	C00101.24
	AT execute		ch1	C00001.23
	AT cancel		ch2	C00101.23
	Writing mode: back-up		ch1	C00001.20
	Writing mode: RAM		ch2	C00101.20
	Move to setup area 1		ch1	C00001.22
			ch2	C00101.22
	auto		ch1	C00001.26
	manual		ch2	C00101.26
E5ZN	Cancel alarm 1 latch		ch1	C00001.12 to 15
	Cancel alarm 2 latch		ch2	C00101.12 to 15
	Cancel alarm 3 latch		*1	
	Cancel all alarm latches			
E5□R	Cancel alarm latch		ch1	C00001.12 to 15
			ch2	C00101.12 to 15
			ch3	C00201.12 to 15
			ch4	C00301.12 to 15
			*1	
	SP mode: local SP		ch1	C00001.27
	SP mode: remote SP		ch2	C00101.27
	Select bank: 0 to 7		ch1	C40408
			ch2	C41408
			ch3	C42408
			ch4	C43408
	AT execute (confirm executing PID group No.)		ch1	C4040A
			ch2	C4140A
			ch3	C4240A
			ch4	C4340A

*1. Confirm that alarm output has become OFF.

Under certain conditions such as PV that an alarm might be output, you cannot confirm because alarm output remains high even when the latch is cancelled.

For more information on each Smart Active Parts' functions and usage, refer to Smart Active Parts Library manuals: *Temperature Controller (CJ1W-TC), Temperature Controller (E5□N), Temperature Controller (E5□R), Temperature Controller (E5CN), Temperature Controller (E5ZN), and Temperature Controller (from Ver5 or earlier)*.

4-7 Restrictions

4-7-1 The behavior of 2 word number in the CX-Designer test function

In the temperature controller, a value equivalent to 2 words (32 bits) is stored for each communications address, but in the test function, the first 16 bits and the last 16 bits behave as one and the same value.

For that reason, test function will not operate successfully when 2 word numbers are designated.

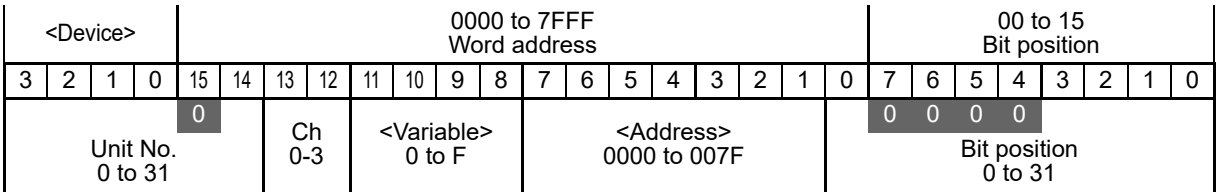
4-7-2 Address display when address error occurs

When faulty device is set to communications address set in functional object, this communications address is displayed in the device setting error dialogue.

If the communications address is allocated to the temperature controller, not the address for the temperature controller set with the CX-Designer, but the address in the PLC address format is displayed.

Addresses will be converted as shown below.

- Address displayed when faulty device is set to communications address



- CH address of temperature controller

<Device>	Unit No.	
DM	0	1
EM	2	3
EM0_	4	5
EM1_	6	7
EM2_	8	9
EM3_	10	11
EM4_	12	13
EM5_	14	15
EM6_	16	17
EM7_	18	19
EM8_	20	21
EM9_	22	23
EMA_	24	25
EMB_	26	27
EMC_	28	29
WR	30	31

<Variable>	Temp controller Variable		<Address>
0	C0	C1	0000 to 003F
1	C2	C3	0040 to 007F
2	C4		0000 to 007F
3	C5		
4	C6		
5	C7		
6	C8		
7	C9		
8	CA		
9	CB		
A	CC	CD	0040 to 007F
B	CE	CF	0000 to 003F
C	D0	D1	0040 to 007F
D	D2	D3	0000 to 003F
E	D4	D5	0040 to 007F
F	D6	D7	0000 to 003F

Device setting errors are not likely to occur. This because, setting is done using the method by which a selection is made from a list of accessible addresses for each temperature controller model.

However, in below cases in which the address is not selected from the list of accessible addresses an invalid address may have been assigned. In such a case, a device setting error may occur.

- Communications address set when functional object was copied using repeat command when index was assigned.
- Communications address set by 'Allocate Addresses Automatically' in the frame property.
- Communications address set by using the macro function.

Furthermore,

- Writing to read-only area
- Writing while communications writing was prohibited

cause device setting errors to occur.

4-7-3 Communications address set when functional part was copied using repeat command

In CX-Designer, you can select functional object and when you then execute 'repeat', you can copy while communications addresses are being added.

The temperature controller's address is a double word address. To increment a double word address by 1, you need to increment a single word address by 2.

Address in CX-Designer is expressed as a 1 word address. When repeat command is used to copy functional object, 1 word is added to 1 word address.

For that reason, when communications address offset width is 1 while repeat command is used, part with the same communications address is copied twice.

Actual address		Internal address	
Double word		Single word	
+0		+0	Address originally set for functional object
+0	(0.5)	+1	Omit figures below decimal 0.5→0
+1		+2	
+1	(1.5)	+3	Omit figures below decimal 0.5→0

For that reason, set always offset in multiples of 2 to specify communications address with single word access.

5

Connection via Memory Link

This chapter explains the Memory Link function and how to use it to connect host computer.

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5-1-3 Action when command is used 5-3
5-1-4 Notify Command Behavior 5-4
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5-1 How does Memory Link work

5-1-1 PT memory

With Memory Link you assign objects word and bit to PT memory. PT memory is an imaginary PLC area inside the PT Unit. PT Unit performs read/write operations to internal PT memory. Host reads/writes PT memory as required and so controls and monitors PT Unit.

PT memory consists of 2 territories: Bit ($B) and Word ($W). Furthermore, reading from and writing to both internal holding memory $HB and $HW are possible.

PT memory can be also used to store functional object display character strings or as data area for the macro function.

5-1-2 Command and response

With Memory Link, the following commands enable data transmission between host and PT Unit.

- Read-out command/response

  This is the command for reading out PT memory of PT Unit.

  When host gives command, PT Unit responds the contents of the designated data.

  There are 4 commands that vary with the type of PT memory.

Command	Title	Action
RM	Read out PT memory ($W)	Read out $W data in PT memory
RB	Read out PT memory ($B)	Read out $B data in PT memory
RD	Read out PT memory ($HW)	Read out $HW data in PT memory
RH	Read out PT memory ($HB)	Read out $HB data in PT memory

- Write command/response

  This is the command to write designated data to PT memory area in PT Unit.

  Host gives command. PT Unit responds whether or not the writing was completed successfully.

  The successful completion response may be omitted by particular setting the Response parameter in the communications conditions menu.

  The following 8 commands can be given:

Command	Title	Action
WM	Write to PT memory ($W)	Write data to PT memory $W
WB	Write to PT memory ($B)	Write data to PT memory $B
WD	Write to PT memory ($HW)	Write data to PT memory $HW
WH	Write to PT memory ($HB)	Write data to PT memory $HB
FM	FILL PT memory ($W)	Write designated data to multiple PT memory $W
FB	FILL PT memory ($B)	Write designated data (0 or 1) to Multiple PT memory $B.
FD	FILL PT memory ($HW)	Write designated data to multiple PT memory $HW
FH	FILL PT memory ($HB)	Write designated data (0 or 1) to Multiple PT memory $HB.

- Notify Command

  This is the command to communicate the results of PT Unit operations to host.

  PT Unit gives command. For that reason, there is no response.

  The following 4 commands can be given.

Command	Title	Action
SM	PT memory ($W) change notice	Notify host of PT memory $W changes.
SB	PT memory ($B) change notice	Notify host of PT memory $B changes.
SD	PT memory ($HW) change notice	Notify host of PT memory $HW changes.
SH	PT memory ($HB) change notice	Notify host of PT memory $HB changes.

- Error response

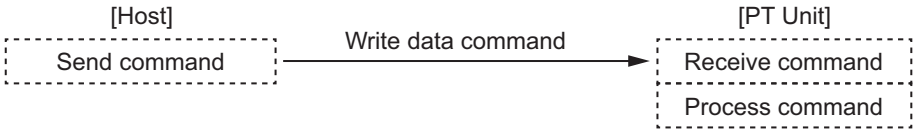
  Response from PT Unit when the received command is an invalid one.

Command	Title	Action
ER	Error response	Notify host of command error

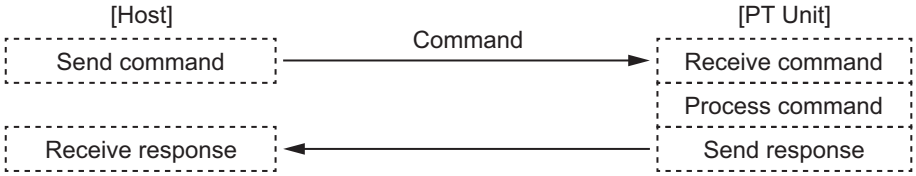
5-1-3 Action when command is used

There are 3 flows of communications between host and PT Unit, depending on the type of command and Response Settings in Communications conditions.

- Write data command while [response: OFF]



- Write Data command while [response: ON]
- Read-out data command
- Invalid command



- PT Unit to host communications

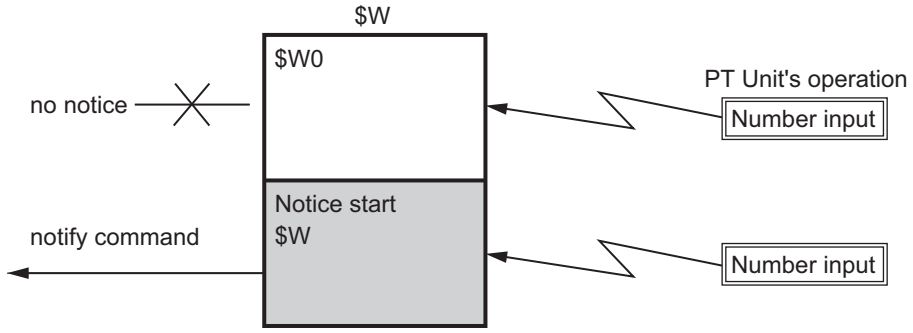


5-1-4 Notify Command Behavior

When anything has changed in the PT memory, by e.g. touch switch operation on PT Unit, numerical input or character string input, PT Unit sends change notice command to host.

In addition to Memory Link connection, PT memory serves other purposes as well. If all changes would be communicated to host, the host would be burdened more than is needed. For that reason, PT Unit communicates only changes from a designated number and up. Changes in PT memory areas with a lower number are not communicated.

Set the number in Communications conditions → **Notice Start $B**, **Notice Start $W**, **Notice Start $HB**, and **Notice Start $HW**.



Only changes from specified $W number and up are communicated to host using the change notice Command.

5-1-5 Flow control

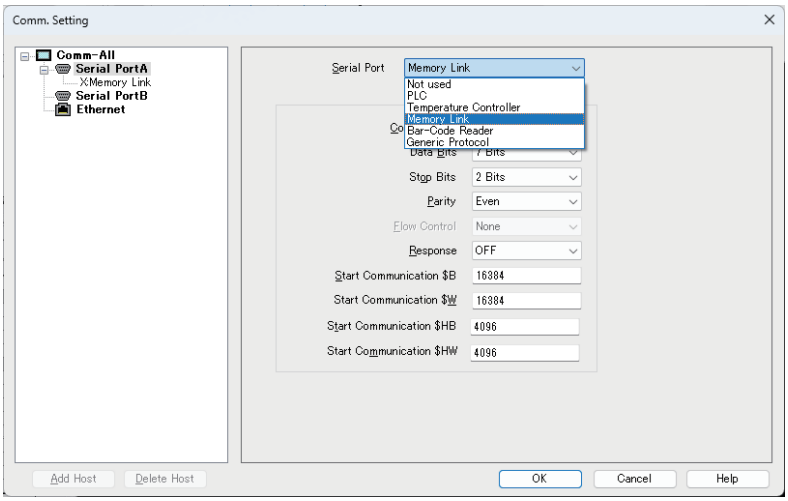
When too many commands are sent, PT Unit cannot process timely. Communications buffer overflows. Commands and command sequence get lost. Memory Link connection do not support flow control.

For that reason, if the interval frequency for issuing commands from the host to the PT Unit becomes high, set Response under the communications conditions to ON to reduce the command sending frequency by not sending commands unilaterally but timing sending in command and response pairs.

5-2 Settings

5-2-1 Making settings for the Project

Open a project created using CX-Designer, and select **PT - Communication Setting**. The Comm. Setting dialogue appears. Select Serial Port A (or Serial Port B) in the left pane, and select Memory Link from the pull down menu for Serial Port.



Both serial ports A and B cannot be set to Memory Link at the same time.

5-2-2 Communications conditions setting

In CX-Designer, select Serial Port A (or Serial Port B) in the Comm. Setting dialog box, and set to the following communications conditions.

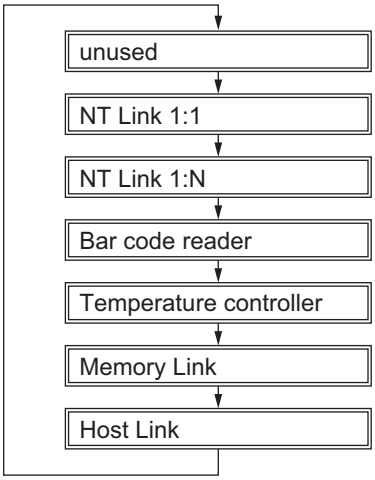
Parameter	Set value	Default value
Baud rate	9600bps/19200bps/38400bps	9600bps
Data bits	7/8	7
Stop bits	1/2	1
Parity	None/Even/Odd	Even
Response	OFF/ON	OFF
Notice start $B	0 to 32767	16384
Notice start $W	0 to 32767	16384
Notice start $HB	0 to 8191	4096
Notice start $HW	0 to 8191	4096

5-2-3 System menu operation

You can also use the system menu to set the communications conditions for the Memory Link connection.

Under system menu, click tab **Communications Setting**.

By pressing the key beside the Serial Port A or Serial Port B, you can switch between communications methods.



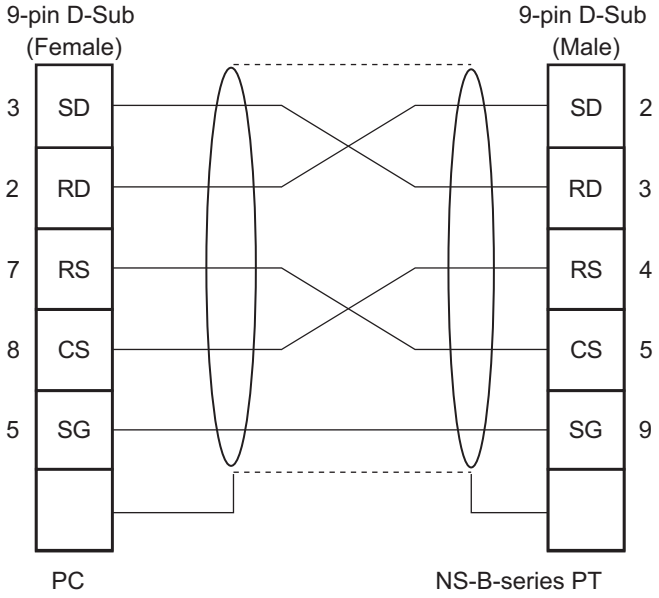
After you have thus set communications to Memory Link, use the **Details** key to set the communications conditions for the Memory Link connection (for details, refer to *5-2-2 Communications conditions setting* on page 5-5). However, with system menu you cannot set the **Notice start $B**, **Notice start $W**, **Notice start $HB**, and **Notice start $HW**.

Set values are not saved until you press the **Write** key. Also, setting changes will be effective when you turn the power OFF and then ON again.

5-2-4 Connection Diagram

Use either Serial Port A or B to connect host computer via Memory Link.
You cannot simultaneously set Serial Port A and B to Memory Link.

The connecting cable varies with the specifications of the host computer communications port.
Below is a typical example, which shows the wiring diagram when PC is connected.



If the cable length is conform, you can use the following cable with connector.

XW2Z-S002	Omron product Cable length 2m, 9-pin ⇔ 9-pin

5-3 Communications procedures

5-3-1 Memory Link Commands

Command/response formats are as mentioned below.

- Read/write/change notify command

ESC	command	*S	*A	*L	*D	SUM	CR

- Read/write command (In above-mentioned format, the *L is regarded as 1 (fixed))

ESC	command	*S	*A	*D	SUM	CR

- Write all (FILL) command

ESC	command	*S	*A	*B	*D	SUM	CR

- Read type command normal completion response format

ESC	command	*A	*L	*D	SUM	CR

- Other responses

ESC	command	*D	SUM	CR

ESC	($1B)	Initial Command: ESC ($1B) fixed
command	2 characters	1 English capital letters which display the type of command
*S	1 character	Designates SUM omission and *L omission. In some cases, specifies write to memory attributes as well. SUM OFF: SUM computing by host can be omitted. SUM ON: enables judgment if command is invalid as a result of noise interference.
*A	Hexadecimal 4 digits	Initial read/write address
*B	Hexadecimal 4 digits	Last Write all (FILL) address
*L	BCD 2 digits	Number of read/write elements
*D	Variable length	Data section
SUM	2 characters (may be abbreviated)	The checksum of the command response is the 2 digit code in hexadecimal which is indicated using lower one-byte of the total sum from the ESC to the *D. It can be abbreviated by specifying *S. Be sure that it is added when PT Unit is transmitting.
CR	($0D)	Command end: CR ($0D) fixed

Memory Link commands are as follows:

Command	Command title	Action
RM	Read PT memory ($W)	Read contents of $W data
RB	Read PT memory ($B)	Read contents of $B data
RD	Read PT memory ($HW)	Read contents of $HW data
RH	Read PT memory ($HB)	Read contents of $HB data
WM	Write PT memory ($W)	Write to $W data
WB	Write PT memory ($B)	Write to $B data
WD	Write PT memory ($HW)	Write to $HW data
WH	Write PT memory ($HB)	Write to $HB data
FM	Fill PT memory ($W)	Fill multiple sequential $W with the same value.
FB	Fill PT memory ($B)	Fill multiple sequential $B with the same value.
FD	Fill PT memory ($HW)	Fill multiple sequential $HW with the same value.
FH	Fill PT memory ($HB)	Fill multiple sequential $HB with the same value.
SM	PT memory ($W) change notice	Communicate $W changes to host
SB	PT memory ($B) change notice	Communicate $B changes to host
SD	PT memory ($HW) change notice	Communicate $HW changes to host
SH	PT memory ($HB) change notice	Communicate $HB changes to host

RM – Read PT memory ($W)

Read $W data in PT memory.

Per command, a maximum of 100 words can be read.

Response is up to 50 words per response.

When requesting command is parameter 2: number of words exceeds 51, then the response is split into two. The first response sends 50 words, the second response sends the remaining channels.

When entries were made on PT Unit in between the first and second response, change notice command is not sent until after the second response has been sent.

● Command format

ESC	com-mand		*S	*A				*L		SUM		CR
$1B	R	M										$0D

*S:

Settings		Description
	SUM value	
0	OFF	
1	ON	
8	OFF	Omit *L.
9	ON	Number of read-out words: 1 (fixed)

*A:

Settings	Description
0000 to 7FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Number of read-out words (BCD 2 digits) 00 indicates 100.

● Successful completion response format

ESC	com-mand		*A				*L		*D	SUM		CR
$1B	R	M							Variable length			$0D

*A:

Settings	Description
0000 to 7FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
01 to 50	Number of read-out words (BCD 2 digits)

*D:

Settings	Description
0 to FFFF	Word data (zero suppressed hexadecimal 1 to 4 digits)
“,”	From 2nd word onward, enter comma “,” ($2C) before the next data.

RB – Read PT memory ($B)

Read $B data in PT memory.

Per command, a maximum of 100 bits can be read.

After reading, bit data are displayed and returned per 8 bits as 8 bit value.

● Command format

ESC	com-mand		*S	*A				*L		SUM		CR
$1B	R	B										$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	
8	OFF	Number of tables: 1 (fixed). Omit Parameter2.
9	ON	

*A:

Settings	Description
0000 to 7FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Read-out bit number (BCD 2 digits) 00 indicates 100.

● Response format

ESC	com-mand		*A				*L		*D	SUM		CR
$1B	R	B							Variable length			$0D

*A:

Settings	Description
0000 to 7FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Number of bits (BCD 2 digits) 00 indicates 100.

*D:

Settings	Description
00 to FF	Bit data (hexadecimal 2 digit value of 8 bits each) 0:OFF, 1: ON Fills addresses in ascending order starting with first digit. Turns 8 bits into a binary 8 digit value and displays this as a hexadecimal 2 digit value. The next hexadecimal 2 digit value continues with the following 8 bits. Fills any of the last 8 bits that does not actually have a valid read-out data with 0. [example] from $B10 6 bits have read-out value $B10 11 12 13 14 15 * * 1 0 1 0 1 1 0 0 → AC (converted to hexadecimal form)

RD – Read PT memory ($HW)

Read $HW data in PT memory.

Per command, a maximum of 100 words can be read.

Response is up to 50 words per response.

When requesting command is parameter 2: number of words exceeds 51, then the response is split into two. The first response sends 50 words, the second response sends the remaining channels.

When entries were made on PT Unit in between the first and second response, change notice command is not sent until after the second response has been sent.

● Command format

ESC	com-mand		*S	*A				*L		SUM		CR
$1B	R	D										$0D

*S:

Settings		Description
	SUM value	
0	OFF	
1	ON	
8	OFF	Omit *L.
9	ON	Number of read-out words: 1 (fixed)

*A:

Settings	Description
0000 to 1FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Number of read-out words (BCD 2 digits) 00 indicates 100.

● Successful completion response format

ESC	com-mand		*A				*L		*D	SUM		CR
$1B	R	D							Variable length			$0D

*A:

Settings	Description
0000 to 1FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
01 to 50	Number of read-out words (BCD 2 digits)

*D:

Settings	Description
0 to FFFF	Word data (zero suppressed hexadecimal 1 to 4 digits)
","	From 2nd word onward, enter comma "," ($2C) before the next data.

RH – Read PT memory ($HB)

Read $HB data in PT memory.

Per command, a maximum of 100 bits can be read.

After reading, bit data are displayed and returned per 8 bits as 8 bit value.

● Command format

ESC	com-mand		*S	*A				*L		SUM		CR
$1B	R	H										$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	
8	OFF	Number of tables: 1 (fixed). Omit Parameter2.
9	ON	

*A:

Settings	Description
0000 to 1FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Read-out bit number (BCD 2 digits) 00 indicates 100.

● Response format

ESC	com-mand		*A				*L		*D	SUM		CR
$1B	R	H							Variable length			$0D

*A:

Settings	Description
0000 to 1FFF	Initial address No. (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Number of bits (BCD 2 digits) 00 indicates 100.

*D:

Settings	Description
00 to FF	Bit data (hexadecimal 2 digit value of 8 bits each) 0: OFF, 1: ON Fills addresses in ascending order starting with first digit. Turns 8 bits into a binary 8 digit value and displays this as a hexadecimal 2 digit value. The next hexadecimal 2 digit value continues with the following 8 bits. Fills any of the last 8 bits that does not actually have a valid read-out data with 0. [example] from $HB10 6 bits have read-out value $HB10 11 12 13 14 15 * * 1 0 1 0 1 1 0 0 → AC (converted to hexadecimal form)

WM – Write to PT memory ($W)

Write to $W data in PT memory.

Per command, a maximum of 50 words can be written.

As writing attribute you can select SET, AND, OR, or XOR.

● Command format

ESC	com-mand		*S	*A				*L		*D	SUM		CR
$1C	W	M								Variable length			$0D

*S:

Settings			Description
BCD 1 digit	SUM value	Writing attribute	
0	OFF	SET	Writes designated value just as it is.
1	ON		
2	OFF	AND	Ands present value of destination with designated value and writes outcome.
3	ON		
4	OFF	OR	Ors present value of destination with designated value and writes outcome
5	ON		
6	OFF	XOR	Xors present value of destination with designated value and writes outcome.
7	ON		
8	OFF	SET	Omits *L . Number of destination words : 1 (fixed)
9	ON		

*A:

Settings	Description
0000 to 7FFF	Initial address number (hexadecimal 4 digits)

*L:

Settings	Description
01 to 50	Number of destination words (BCD 2 digits)

*D:

Settings	Description
0000 to FFFF	Word data (zero suppressed hexadecimal, 1 to 4 digits)
","	From 2nd word on, enter comma "," ($2C) before next data.
	Data ending with comma cause error.

● Normal completion response format (only when response under communications conditions is ON).

ESC	command		*D		SUM		CR
$1B	W	M	0	0			$0D

*D:

Settings	Description
00 fixed	Indicates successful completion.

WB – Write PT memory ($B)

Write to $B data in PT memory.

Per command, a maximum of 100 bits can be written.

● Command format

ESC	command		*S	*A				*L		*D	SUM		CR
$1B	W	B								Variable length			$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	
8	OFF	Bit number: 1 fixed. Parameter 2 omitted.
9	ON	

*A:

Settings	Description
0000 to 7FFF	Initial address number (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Entry bit number (BCD 2 digits) When 00, 100 is meant.

*D:

Settings	Description
00 to FF	Bit data (hexadecimal 1 digit value for 4 bits each) 0: OFF, 1: ON Fills data in descending order starting with first digit. Turns 4 bits into a binary 4 digit value and displays this as a hexadecimal 1 digit value. The next hexadecimal 1 digit value continues with the following 4 bits. Fills any of the last 4 bits that does not actually have a valid read-out data with 0. [example] from $HB10, 6 bits have read-out value $HB10 11 12 13 14 15 * * 1 0 1 0 1 1 0 0 → AC (converted to hexadecimal form)

- **Normal completion response format (only when response under communications conditions is ON).**

ESC	command		*D		SUM		CR
$1B	W	B	0	0			$0D

*D:

Settings	Description
00 fixed	Indicates normal completion.

WD – Write to PT memory ($HW)

Write to $HW data in PT memory.

Per command, a maximum of 50 words can be written.

As writing attribute you can select SET, AND, OR, or XOR.

- **Command format**

ESC	command		*S	*A				*L		*D	SUM		CR
$1C	W	D								Variable length			$0D

*S:

Settings			Description
BCD 1 digit	SUM value	Writing attribute	
0	OFF	SET	Writes designated value just as it is.
1	ON		
2	OFF	AND	Ands present value of destination with designated value and writes outcome.
3	ON		

Settings			Description
BCD 1 digit	SUM value	Writing attribute	
4	OFF	OR	Ors present value of destination with designated value and writes outcome.
5	ON		
6	OFF	XOR	Xors present value of destination with designated value and writes outcome.
7	ON		
8	OFF	SET	Omits *L. Number of destination words: 1 (fixed)
9	ON		

*A:

Settings	Description
0000 to 1FFF	Initial address number (hexadecimal 4 digits)

*L:

Settings	Description
01 to 50	Number of destination words (BCD 2 digits)

*D:

Settings	Description
0000 to FFFF	Word data (zero suppressed hexadecimal, 1 to 4 digits)
","	From 2nd word on, enter comma "," ($2C) before next data. Data ending with comma cause error.

● Normal completion response format (only when response under communications conditions is ON).

ESC	command		*D		SUM		CR
$1B	W	D	0	0			$0D

*D:

Settings	Description
00 fixed	Indicates successful completion.

WH – Write PT memory ($HB)

Write to $HB data in PT memory.

Per command, a maximum of 100 bits can be written.

● Command format

ESC	command		*S	*A				*L		*D	SUM		CR
$1B	W	H								Variable length			$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	
8	OFF	Bit number: 1 fixed. Parameter 2 omitted.
9	ON	

*A:

Settings	Description
0000 to 1FFF	Initial address number (hexadecimal 4 digits)

*L:

Settings	Description
00 to 99	Entry bit number (BCD 2 digits) When 00, 100 is meant.

*D:

Settings	Description
00 to FF	Bit data (hexadecimal 1 digit value for 4 bits each) 0: OFF, 1: ON Fills data in descending order starting with first digit. Turns 4 bits into a binary 4 digit value and displays this as a hexadecimal 1 digit value. The next hexadecimal 1 digit value continues with the following 4 bits. Fills any of the last 4 bits that does not actually have a valid read-out data with 0. [example] from $HB10, 6 bits have read-out value $HB10 11 12 13 14 15 * * 1 0 1 0 1 1 0 0 → AC (converted to hexadecimal form)

- **Normal completion response format (only when response under communications conditions is ON).**

ESC	com-mand		*D		SUM		CR
$1B	W	H	0	0			$0D

*D:

Settings	Description
00 fixed	Indicates normal completion.

FM – Fill PT memory ($W)

Fills PT memory $W with the same word data. Range: first to last address number.

● Command format

ESC	com-mand		*S	*A				*B				*D				SUM		CR
$1B	F	M																$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	

*A:

Settings	Description
0000 to 7FFF	First address number (hexadecimal 4 digits)

*B:

Settings	Description
0000 to 7FFF	Last address number (hexadecimal 4 digits)

*D:

Settings	Description
0 to FFFF	Word data (zero suppressed hexadecimal 1 to 4 digits)

● Normal completion response format (only when response under communications conditions is ON).

ESC	com-mand		*D		SUM		CR
$1B	F	M	0	0	0	E	$0D

*D:

Settings	Description
00 fixed	Indicates normal completion.

FB – Fill PT memory ($B)

Fills PT memory $B with the same bit data. Range: first to last address number.

● Command format

ESC	com-mand		*S	*A				*B				*D	SUM		CR
$1B	F	B													$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	

*A:

Settings	Description
0000 to 7FFF	Initial address number (hexadecimal 4 digits)

*B:

Settings	Description
0000 to 7FFF	Last address number (hexadecimal 4 digits)

*D:

Settings	Description
0: OFF 1: ON	Bit data (hexadecimal 1 digit)

- **Normal completion response format (only when response under communications conditions is ON).**

ESC	com-mand		*D		SUM		CR
$1B	F	B	0	0			$0D

*D:

Settings	Description
00 fixed	Indicates normal completion.

FD – Fill PT memory ($HW)

Fills PT memory $HW with the same word data. Range: first to last address number.

- **Command format**

ESC	com-mand		*S	*A				*B				*D				SUM		CR
$1B	F	D																$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	

*A:

Settings	Description
0000 to 1FFF	First address number (hexadecimal 4 digits)

*B:

Settings	Description
0000 to 1FFF	Last address number (hexadecimal 4 digits)

*D:

Settings	Description
0 to FFFF	Word data (zero suppressed hexadecimal 1 to 4 digits)

● Normal completion response format (only when response under communications conditions is ON).

ESC	command		*D		SUM		CR
$1B	F	D	0	0	0	E	$0D

*D:

Settings	Description
00 fixed	Indicates normal completion.

FH – Fill PT memory ($HB)

Fills PT memory $HB with the same bit data. Range: first to last address number.

● Command format

ESC	command		*S	*A				*B				*D	SUM		CR
$1B	F	H													$0D

*S:

Settings		Description
BCD 1 digit	SUM value	
0	OFF	
1	ON	

*A:

Settings	Description
0000 to 1FFF	Initial address number (hexadecimal 4 digits)

*B:

Settings	Description
0000 to 1FFF	Last address number (hexadecimal 4 digits)

*D:

Settings	Description
0: OFF 1: ON	Bit data (hexadecimal 1 digit)

- **Normal completion response format (only when response under communications conditions is ON).**

ESC	com-mand		*D		SUM		CR
$1B	F	H	0	0			$0D

*D:

Settings	Description
00 fixed	Indicates normal completion.

SM – PT memory ($W) change notice

When PT memory $W changed as a result of PT Unit's operation and when this $W address is higher than the address designated with Notice start $W in the communications settings menu, this command is sent from PT Unit to host.

Response from host to PT Unit is not needed.

When sent from host to PT Unit, illegal command error occurs.

- **Command format**

ESC	com-mand		*A				*L		*D	SUM		CR
$1B	S	M							Variable length			$0D

*A:

Settings	Description
0000 to 7FFF	Changed address number (hexadecimal 4 digits)

*L:

Settings	Description
01 to 50	Number of changed words (BCD 2 digits)

*D:

Settings	Description
0000 to FFFF	Word data (zero suppressed hexadecimal 1 to 4 digits)
“,”	Divide multiple word data by comma “,” ($2C). Data ending with comma cause error.

SB – PT memory ($B) change notice

When PT memory $B changed as a result of PT Unit's operation and when this $B address is higher than the address designated with Notice start $B in the communications settings menu, this command is sent from PT Unit to host.

Response from host to PT Unit is not needed.

When sent from host to PT Unit, illegal command error occurs.

● Command format

ESC	com-mand		*A				*B		*D	SUM		CR
$1B	S	B					0	1				$0D

*A:

Settings	Description
0000 to 7FFF	Changed address number (hexadecimal 4 digits)

*B:

Settings	Description
01 fixed	Number of changed bits (hexadecimal 2 digits)

*D:

Settings	Description
0: OFF 1: ON	Bit data (hexadecimal 1 digit)

SD – PT memory ($HW) change notice

When PT memory $HW changed as a result of PT Unit's operation and when this $HW address is higher than the address designated with Notice start $HW in the communications settings menu, this command is sent from PT Unit to host.

Response from host to PT Unit is not needed.

When sent from host to PT Unit, illegal command error occurs.

● Command format

ESC	com-mand		*A				*L		*D	SUM		CR
$1B	S	D							Variable length			$0D

*A:

Settings	Description
0000 to 1FFF	Changed address number (hexadecimal 4 digits)

*L:

Settings	Description
01 to 50	Number of changed words (BCD 2 digits)

*D:

Settings	Description
0000 to FFFF	Word data (zero suppressed hexadecimal 1 to 4 digits)
","	Divide multiple word data by comma "," ($2C).
	Data ending with comma cause error.

SH – PT memory ($HB) change notice

When PT memory $HB changed as a result of PT Unit's operation and when this $HB address is higher than the address designated with Notice start $HB in the communications settings menu, this command is sent from PT Unit to host.

Response from host to PT Unit is not needed.

When sent from host to PT Unit, illegal command error occurs.

● Command format

ESC	com-mand		*A				*B		*D	SUM		CR
$1B	S	H					0	1				$0D

*A:

Settings	Description
0000 to 1FFF	Changed address number (hexadecimal 4 digits)

*B:

Settings	Description
01 fixed	Number of changed bits (hexadecimal 2 digits)

*D:

Settings	Description
0: OFF	Bit data (hexadecimal 1 digit)
1: ON	

ER – Error response

● Command format

ESC	com-mand		*D		SUM		CR
$1B	E	R					$0D

*D:

Description
Error codes listed below (hexadecimal 2 digits)

Error code	Error contents	Cause
01	Illegal command	Command contents lie outside the supported range
02	Command length error	Length of received command is illegal for that command.
03	Boundary value error	• Value set to parameter lies outside the supported range. • Parameter in BCD format includes others than 0 to 9
04	Illegal operand	Sum information Set value lies outside the effective range.
05	Command format error	• $W/$B command; Data section includes characters other than 0 to F and ",". • $W command; data section ends with ",".
10	SUM value error	Command with sum value ON. Computed sum value and the one in the command do not match.
12	Reception timeout error	After the initial ESC was received, the interval in between receiving one byte after the other until command end [CR] exceeded timeout monitoring time.

These commands are sent from PT Unit to host when the host sent an invalid command and when a communications error occurred.

6

Connecting via Serial to Modbus Devices

This section describes the methods for connecting to Modbus devices by using the serial ports on the NS-B-series.

6-1 Compatible Devices 6-2

6-2 Connection Configuration 6-3

6-2-1 Communication Setting for Project 6-3

6-2-2 Communication Settings 6-6

6-3 Communication Cables 6-7

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6-5 Changing Host Types 6-11

6-5-1 Changing Host Types between SYSMAC PLCs 6-11

6-5-2 Changing Host Types to Change an Address Input Method 6-11

6-6 Macro Function READCMEM and WRITECMEM Operations 6-14

6-1 Compatible Devices

Devices supporting the following function codes can be connected to the PT Unit in the slave (DCE) mode of Modbus RTU protocol. (Function codes you do not use do not have to be supported.) For the physical connection method, RS-232/RS-485 is supported.

Action	Function Code
Reading coils	01H (Read Coils)
Reading discete inputs	02H (Read Discrete Inputs)
Reading input registers	04H (Read Input Registers)
Reading holding registers	03H (Read Holding Registers)
Writing to coil(s)	0FH (Write Multiple Coils) or, 05H (Write Single Coil) At least one of them must be supported.
Writing to holding register(s)	10H (Write Multiple Registers) or, 06H (Write Single Register) At least one of them must be supported.

The devices to be connected must conform to “Modbus Serial Line Protocol and Implementation Guide V1.02” issued by Modbus-IDA (https://www.modbus.org/). To check whether the devices conform to it or not, refer to the manuals for these devices or contact the manufactures.

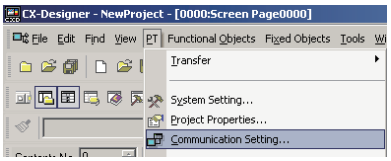
When the RS-485 is used, up to 32 devices can be connected to one serial port on the PT Unit. When connecting to a number of devices, please note that there may be an interruption of communication due to a decline in the performance of the PT Unit and degraded signal.

When the RS-232C is used, only one Modbus device can be connected to one serial port on the PT Unit.

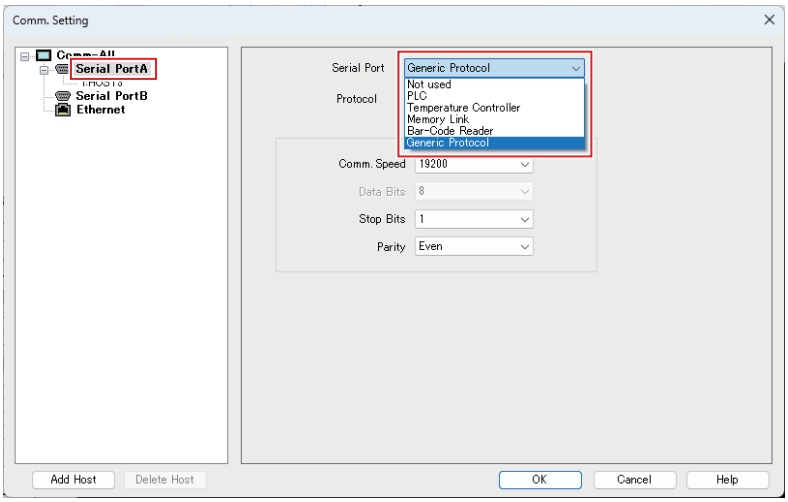
6-2 Connection Configuration

6-2-1 Communication Setting for Project

1 Create project with CX-Designer. Select **PT** Menu - **Communication Setting**.

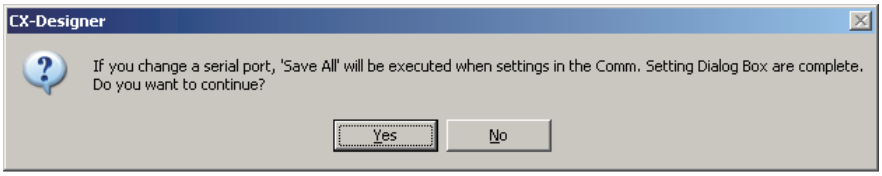


2 **Comm. Setting** Dialog Box will be displayed. In the left pane, click **Serial Port A** or **Serial Port B** depending on the port you want to connect the Modbus device to.

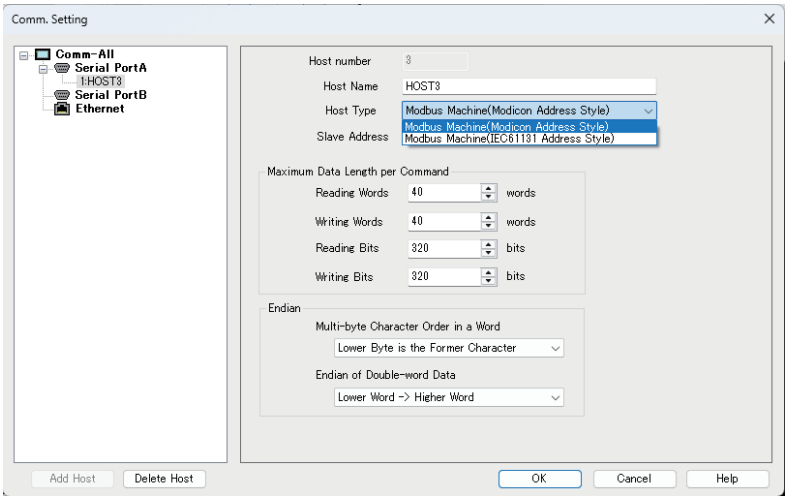


3 In the right pane, select **Generic Protocol** from **Serial Port**.

4 A confirmation message will be displayed. Press Yes.



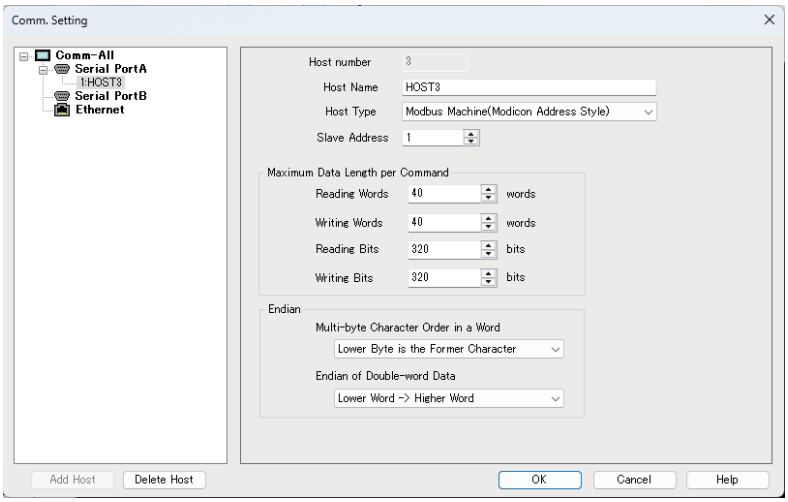
5 One host is registered under the serial port as shown below.



Select **Modbus Machine (Modicon Address Style)** or **Modbus Machine (IEC61131 Address Style)**.

Note **IEC61131 Address Style** supports addresses starting with 0 only.

6 Make the settings in **Maximum Data Length per Command** according to the device you connect.



Reading Words: Specify the number of words that can be read at once by the function codes 01h to 04h.

Writing Words: Specify the number of words that can be read at once by the function code 10h. When a device not supporting the function code 10h is connected, 1 word must be set. If 1 word is set, the PT Unit uses the function code 06h instead of 10h.

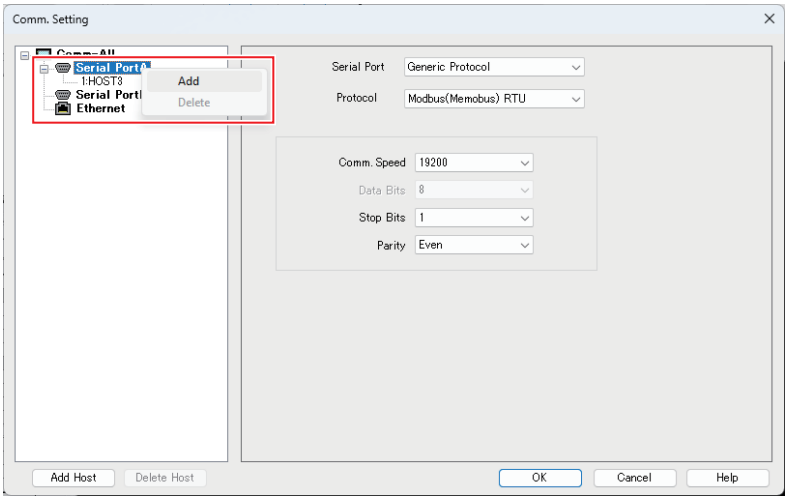
Reading Bits: Specify the number of bits that can be read at once by the function codes 01h and 04h.

Writing Bits: Specify the number of bits that can be read at once by the function code 0Fh. When a device not supporting the function code 0Fh is connected, 1 bit must be set. If 1 bit is set, the PT Unit uses the function code 05h instead of 0Fh.

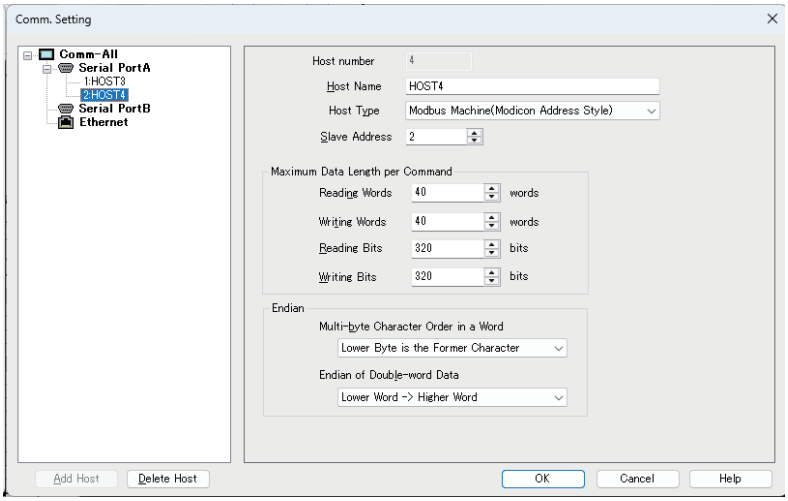
7 Make the settings in **Endian** according to the device you connect.

If the settings here are incorrect, double word values (DINT, UDINT, REAL, etc.) and multi-byte strings are not displayed properly. When an unexpected value or string is displayed, please check these settings first.

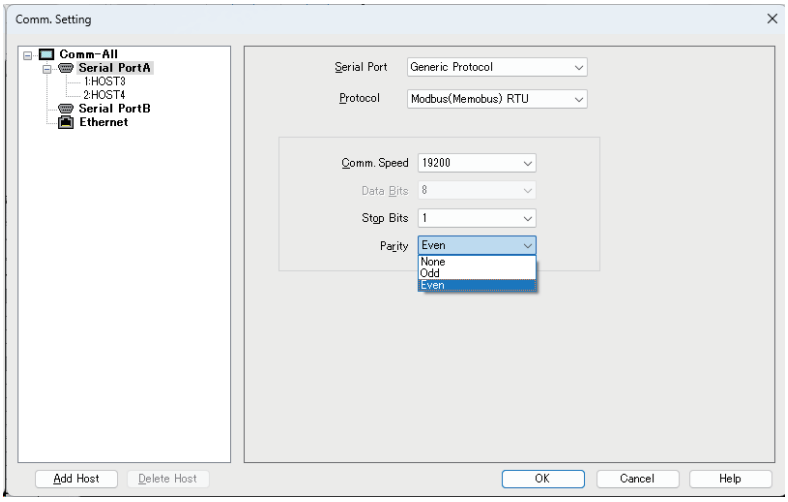
8 When connecting multiple devices to one serial port, right-click **Serial Port A** or **Serial Port B** in the left pane. Then click **Add**.



9 A host is added as shown below. Click the host name in the left pane. Then change the settings of the selected host in the right pane.



10 To set the communication speed, parity and stop bits, click **Serial Port A** in the left pane.

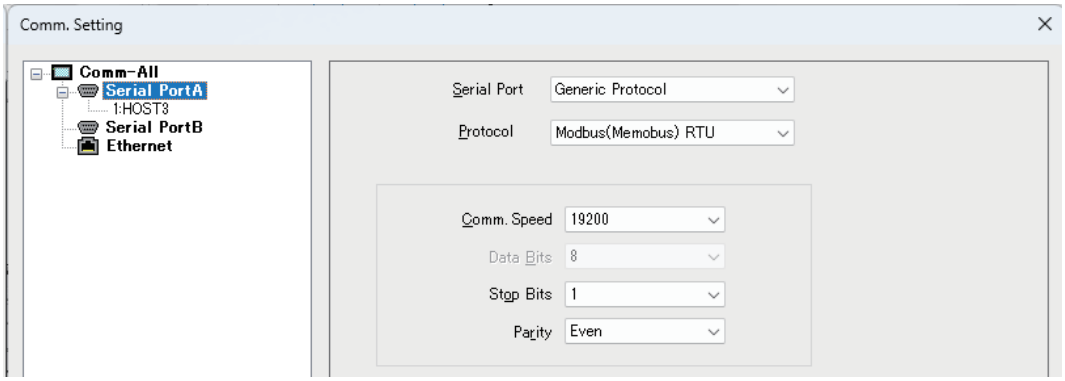


The settings are now finished.

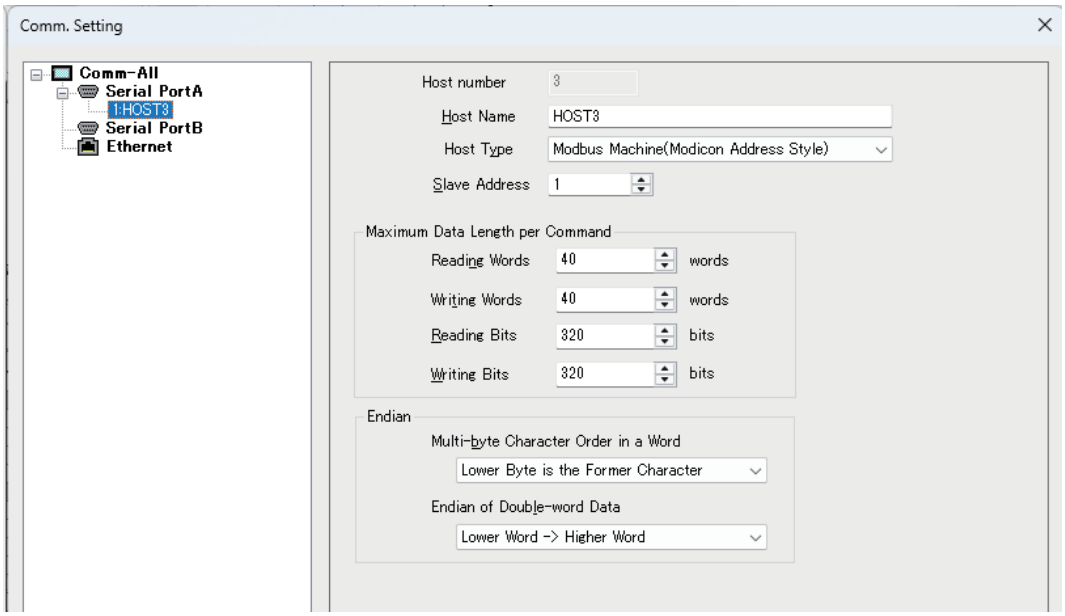
6-2-2 Communication Settings

It is recommended that the PT Unit and devices use the following default settings of CX-Designer. These settings meet the default communication conditions of the most Modbus devices.

When the communication settings of the device are changed, change these settings accordingly.



To change the settings of each host, click on the host name in the left pane. For details on how to make settings, refer to *6-2-1 Communication Setting for Project* on page 6-3.



You must change these settings according to the device you connect.

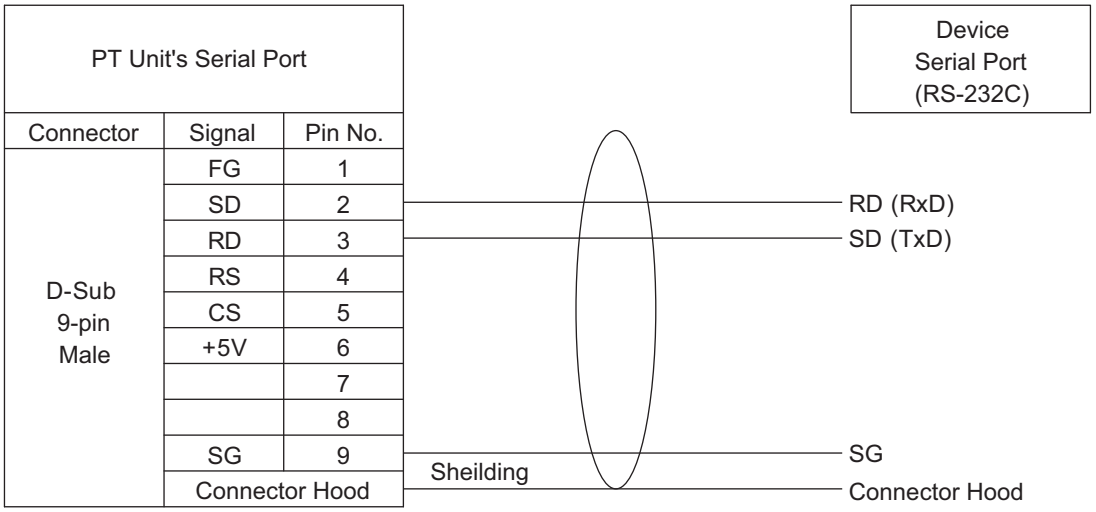
For example, to connect to measuring equipment not expecting to exchange a large amount of data, you must set a smaller value in **Maximum Data Length per Command**. Otherwise a communications error may occur. Also, to connect the PT Unit to a PLC, you must make settings correctly in the **Endian**. Otherwise double word numeral or multi-byte strings may not be displayed correctly.

Make settings appropriately by referring to manuals or other documents for the devices.

6-3 Communication Cables

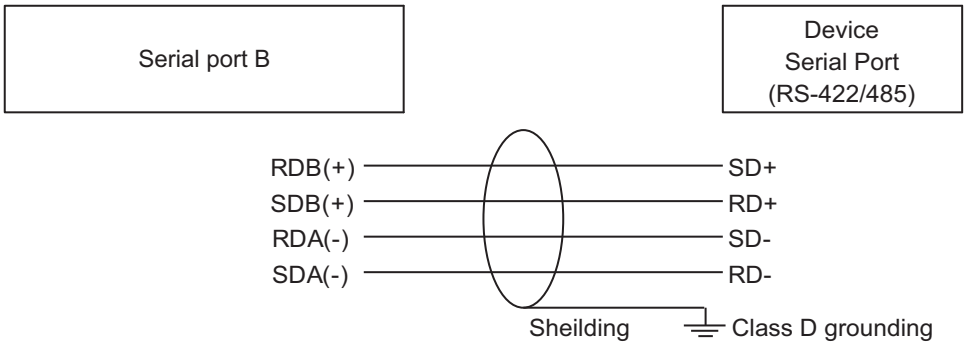
● Connection Diagram 1 (NS-B-series PTs with RS-232C connection)

Connect at least three signal wires and a shield wire as shown below. If the device requires control lines including RS (RTS), CS (CTS), DSR, DTR and CD, bend back the control lines at the device.



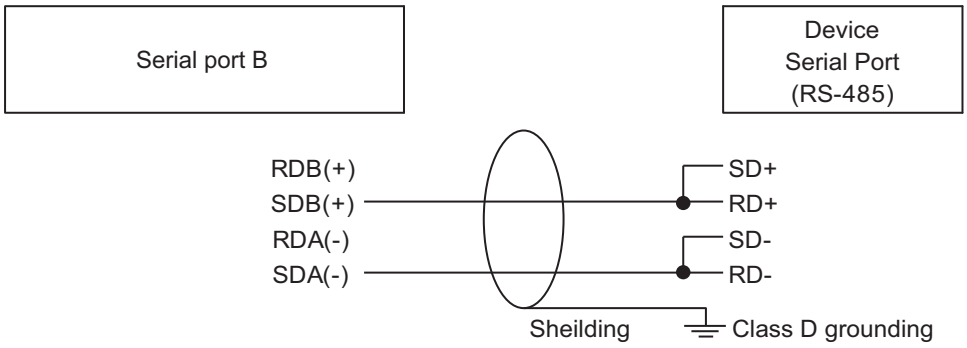
● Connection Diagram 2 (NS-B-series PTs with RS-422/485 connection)

Only serial port B of the PT Unit is supported. Wire the PT Unit and the device as shown below and install the converter into the serial port of the PT Unit.



● Connection Diagram 3 (NS-B-series PTs with RS-485 (two-wire method) connection)

Only serial port B of the PT Unit is supported. Wire the PT Unit and the device as shown below and install the converter into the serial port of the PT Unit. (Wiring must be completed before converter is installed into the PT Unit.)



6-4 Accessible Address Range

The following addresses can be accessed. Read carefully the Note below the table.

Symbol		Area	Word Access		Bit Access		Notes
Modicon Address	IEC61131 Address		Read	Write	Read	Write	
0	M	Coil	YES	YES	YES	YES	a) b) c) d) e)
1	I	Discrete Input	YES	NO	YES	NO	a) b) c) d) e) i)
3	IW	Input Register	YES	NO	YES	NO	a) b) c) d) f) h) i)
4	MW	Holding Register	YES	YES	YES	YES	a) b) c) d) f) g) h) j)

● Notes

a) When specifying IEC61131 addresses, do not input a “%” symbol. The “%” symbol indicates an absolute address.

b) To specify Modicon addresses, use six digits consisting of a one-digit value that represents the area type and a five-digit value that represents the position in the area. 00001 to 65536 can be specified for each area.

c) For IEC61131 addresses, 00000 to 65535 can be specified for each area.

d) In the table, “Yes” letters in “Read” and “Write” cells indicate that you can input these addresses with CX-Designer. It does not mean that all devices can access these addresses. Please check whether devices can access these addresses or not by referring to the manual or other documents for each device.

e) To treat consecutive 16 bits as one numerical value, suffix “W” to the address. When Modicon address is used, the address must be the one that leaves a remainder of 1 when divided by 16. When IEC61131 address is used, address must be divisible by 16. (e.g.: M00016W, I00032W, 000017W and 100033W.etc.)

f) To specify a certain bit within 16 bits of a register, add a period “.” to the end of the register number and a bit position next to the period. To specify a bit position when using Modicon address, you can use a number between 1 and 16. The bit position 1 is the most significant bit, and the bit position 16 is the least significant bit. To specify a bit position when using IEC61131 address, use a number between 0 and 15. The bit position 0 is the least significant bit, and the bit position 15 is the most significant bit. (e.g. IW00010.9 and 400034.16)

g) The PT Unit and device must not write to the same register. If doing so may result in data incoherency.

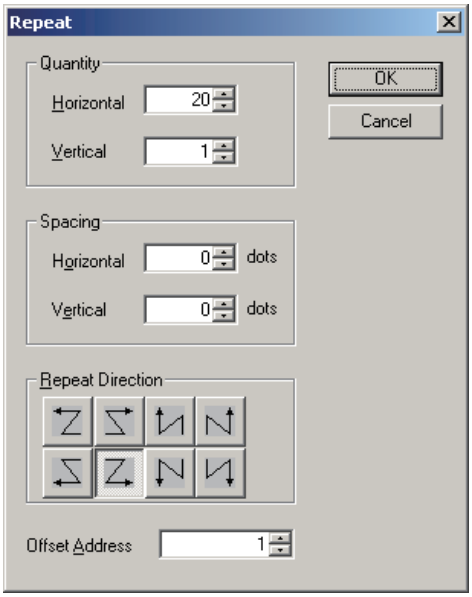
h) When using IEC61131 address, do not use MD and ID but use MW and IW even when the address is accessed by double word width.

i) The input register cannot be allocated to System Memory ($SB and $SW).

j) Do not allocate to System Memory ($SB) when using System Memory $SB control bit. If doing so could result in failing to control.

k) When you copy the specified object changing the address with **Repeat** Function if the Modicon Address Style is used and a bit address is specified for the object, the addresses will be allocated to each copied object based on the value set in Offset Address in order from 16 to 1.

For example, if you copy a Bit Lamp with an address 400002.16 using the settings as shown below (Offset Address is 1), the addresses allocated to the copied Bit Lamps will be 400002.15, 400002.14,…. 400002.02, 400002.01, 400003.16, 400003.15, 400003.14, 400003.13.



6-5 Changing Host Types

6-5-1 Changing Host Types between SYSMAC PLCs

The host type can be changed only when one host is registered with one serial port. In this case, the addresses will be replaced according to the table below.

It is, however, impossible to replace a word number if the word number became 32768 or above after changing the host type from Modbus to SYSMAC. When the host type is changed from SYSMAC to Modbus, words 4096 and above in CIO and WR cannot be replaced by addresses for Modbus. Addresses that were not replaced will become “Invalid Addresses”. For information on how to fix these addresses, refer to *A-3 Restrictions and Notes on Connecting Non-OMRON PLCs* on page A-17.

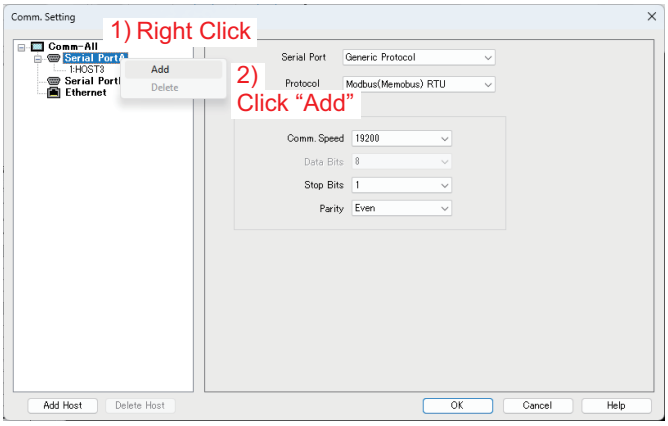
Modbus Device		SYSMAC
0	M	CIO
1	I	WR
3	IW	HR
4	MW	DM

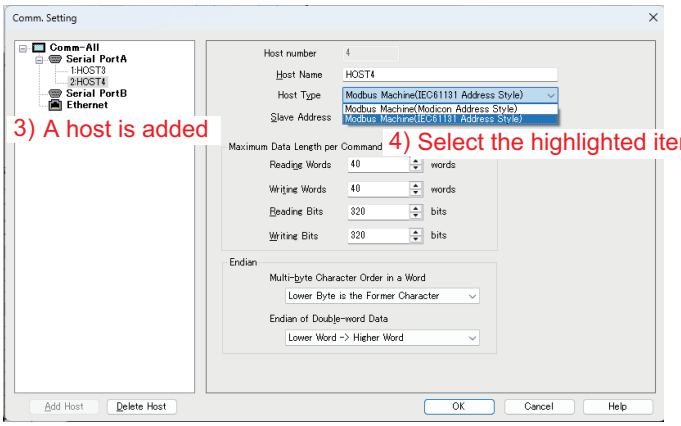
6-5-2 Changing Host Types to Change an Address Input Method

The host types cannot be directly changed between **Modbus Machine (Modicon Address Style)** and **Modbus Machine (IEC61131 Address Style)**. To change an address input method after creating a project, follow the procedure below.

In the following procedure, Modicon Address is changed to IEC61131 Address as an example. To change to Modicon Address, you can also use this procedure.

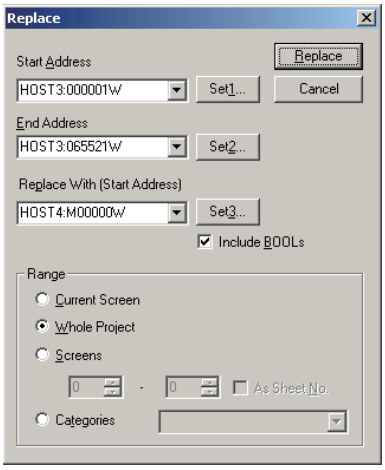
1 Click **PT** Menu - **Communication Setting**. Add a host to a serial port connecting to Modbus. Select **Modbus Machine (IEC61131 Address Style)** from the host type (See figure below).





Assume that the host added now is “HOST4” and the host already registered is “HOST3”.

2 Select **Find** Menu - **Replace**. Make settings as described in the “1st” column. Click **Replace**.

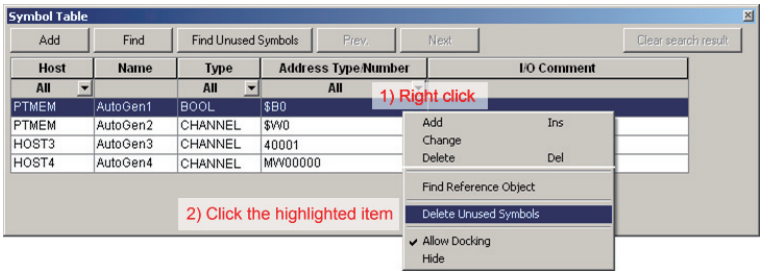


It may take several minutes or more to complete replacing depending on the size of the screen data. (Do not use the host name “HOST3” and “HOST4”, but use your own host names.)

	1st	2nd	3rd	4th
Start Address	HOST3:000001W	HOST3:100001W	HOST3:300001	HOST3:400001
End Address	HOST3:065521W	HOST3:165521W	HOST3:365535	HOST3:465535
Replace With (Start Address)	HOST4:M00000W	HOST4:I00000W	HOST4:IW00000	HOST4:MW00000
Include BOOLs	☑	☑	☑	☑
Range	Whole project	Whole project	Whole project	Whole project

3 Repeat the procedure No.2 three times. Do not use address in the “1st” column. Use addresses in the “2nd” to “4th” column accordingly.

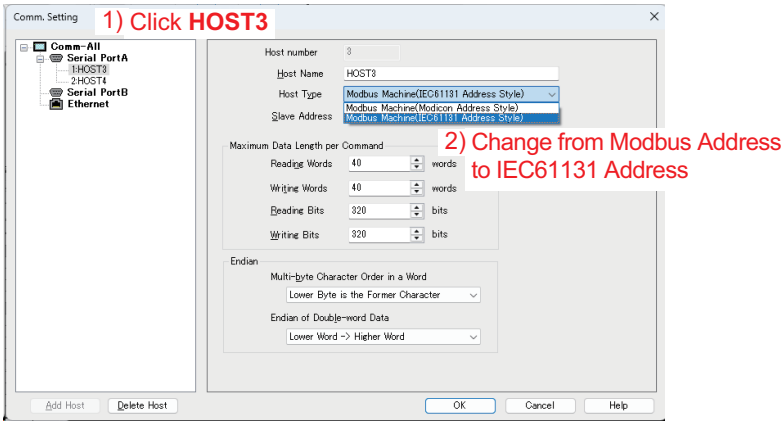
4 If **Symbol Table** Dialog Box is not shown, display the **Symbol Table** Dialog Box by pressing Alt + 2. Right-click on the dialog box. Select **Delete Unused Symbols**.



A confirmation dialog will be shown. Press Yes.

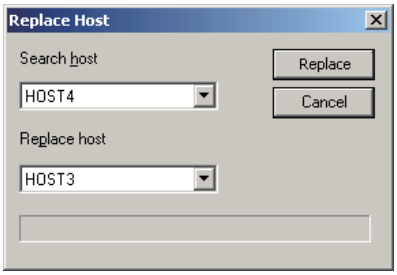
5 Click **PT** Menu - **Communication Setting**.

Change the host type of HOST3 to **Modbus Machine (IEC61131 Address Style)** as shown below. Press **OK**.



If an error message stating “Cannot change the host used in the project.” is displayed, repeat the procedure from No.2.

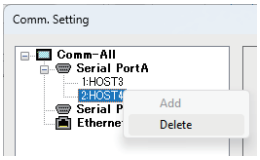
6 Click **Find** Menu- **Replace Host**. Enter the host names as shown below. Press **Replace**. Click **Replace**.



It may take several minutes or more to complete replacement depending on the size of the screen data.

7 Click **PT** Menu - **Communication Setting**.

Right-click HOST4. Then select **Delete** as shown below.



8 Press **OK** to close **Comm**. **Setting** Dialog Box.

The HOST3 was now changed from **Modbus Machine (Modicon Address style)** to **Modbus Machine (IEC61131 Address style)**.

6-6 Macro Function READCMEM and WRITECMEM Operations

READCMEM and WRITECMEM will write and read the internal expression of the controller as they are. In some cases, endian needs to be converted using SWAP/SWAPL function in order for the PT Unit to read values correctly. For details on how to use these functions, refer to *NS-B-series Programmable Terminal Macro Reference Manual (Cat. No. V132)*.

7

Connecting to Bar Code Readers

This section describes the methods for connecting to a Bar Code Reader by using a serial port on the NS-B-series.

7-1 Connecting to Bar Code Readers 7-2

7-1-1 Connection Methods 7-2

7-1-2 Setting Bar Code Readers 7-3

7-1-3 Data Format 7-4

7-1-4 Bar Code Input 7-4

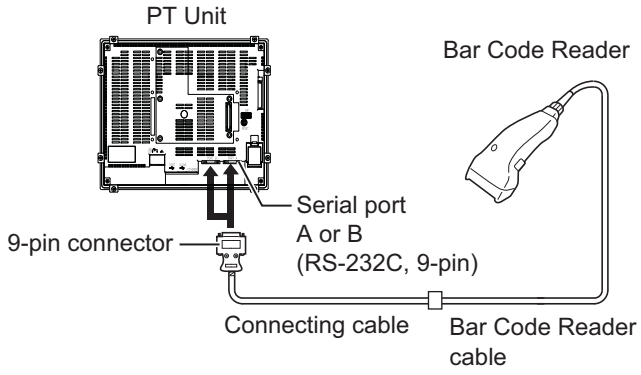
7-1 Connecting to Bar Code Readers

Connecting a Bar Code Reader to the PT Unit 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 *NS-B-series Programmable Terminal Software User's Manual (Cat. No. V130)*.

7-1-1 Connection Methods

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



Precautions for Safe Use

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

Prepare the connecting cables, referring to *A-4 Preparing Connecting Cables for Bar Code Readers* on page A-19.

Additional Information

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

7-1-2 Setting Bar Code Readers

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

Setting from the CX-Designer

Use the CX-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 *NS-B-series Programmable Terminal Hardware User's Manual (Cat. No. V129)*.

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 Unit. 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

7-1-3 Data Format

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

STX	Data	Data		Data	ETX
(02_H)					(03_H)

The supported data characters are 20_H to $7F_H$ hexadecimal and the maximum data length is 254 bytes.

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

7-1-4 Bar Code Input

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

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 *NS-B-series Programmable Terminal Software User's Manual (Cat. No. V130)*.

Additional Information

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.

A

Appendices

This section provides reference materials for connecting to the host.

A-1 Connection Device List A-2

A-2 PLC Memory Areas A-12

A-2-1 OMRON C-series PLC Memory Areas A-12

A-2-2 OMRON CVM1 and CV-series PLC Memory Areas A-12

A-2-3 OMRON CS-series CS1G, CS1H, CS1G-H, and CS1H-H PLC Memory Areas A-13

A-2-4 OMRON CJ-series CJ1G, CJ1G/H-H, CJ1M, CJ2H, CJ2M and CJ3M PLC Memory Areas A-14

A-2-5 PLC Areas That Can Be Used for Communications A-15

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A-3 Restrictions and Notes on Connecting Non-OMRON PLCs A-17

A-3-1 Notes and Restrictions When Changing Host Types A-17

A-3-2 Restrictions on Macro Functions A-18

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A-3-4 Restriction on Using Functions Monitoring a Large Number of Addresses . . .A-18

A-3-5 System Memory Compatibility with the NT Series A-18

A-3-6 Restriction on Using Functions Connecting Except for a Serial Port Where a Communication Error Occurs A-18

A-4 Preparing Connecting Cables for Bar Code Readers A-19

A-1 Connection Device List

Serial Communications Units

Model	Specifications	Applicable PLC
CS1W-SCU21	• RS-232C (2 ports) • Base-mounting type	CS-series CS1G/H and CS1G/H-H
CS1W-SCU41	• RS-232C (1 port) • RS-422A (1 port) • Base-mounting type	CS-series CS1G/H and CS1G/H-H
CJ1W-SCU21/22	• RS-232C (2 ports) • Building block type	CJ-series NJ-series
CJ1W-SCU31/32	• RS-422A (2 ports) • Building block type	CJ-series NJ-series
CJ1W-SCU41/42	• RS-232C (1 port) • RS-422A (1 port) • Building block type	CJ-series NJ-series

CPU Units That Connect to PT Units in 1:1 NT Links

PLC Series	Specifications
C200HE/HG/HX Series	With RS-232C connector (switching/9-pin type)
CQM1(H) Series	With RS-232C connector (9-pin type)
CPM1A Series	Connects to RS-232C cable using RS-232C Adapter CPM1-CIF01.
CPM2A Series	With RS-232C connector (9-pin type)
CPM2C Series	Connects to RS-232C connector branched using CPM2C-CN111 with converting cable.
CVM1/CV Series	With RS-232C connector (switching/9-pin type)

● CPU Units That Connect in 1:1 NT Links via RS-232C to PT Unit's Serial Ports

PLC Series	CPU Units with built-in 1:1 NT Link functionality	CPU Units that connect via optional Communications Boards
C Series	C200HS-CPU21/23/31/33	---
	C200HE-CPU42(-Z)	C200HE-CPU32/42(-Z)*1
	C200HG-CPU43/63(-Z)	C200HG-CPU33/43/53/63(-Z)*1
	C200HX-CPU44/64(-Z) C200HX-CPU65/85-Z	C200HX-CPU34/44/54/64(-Z)*1 C200HX-CPU65/85-Z
	CQM1-CPU41/42/43/44-V1 CQM1-CPU45-EV1	---
	CPM1A-10/20/30/40CD□-□(-V1)	---
	CPM2A-30/40/60CD□□-□	---
	CPM2C-10/20□□□□□□-□*2	---
	CQM1H-CPU21/51/61	CQM1H-CPU51/61
CV Series*3	CV500-CPU01-V1 CV1000-CPU01-V1 CV2000-CPU01-V1	---
CVM1 Series*3	CVM1-CPU01/11/21-V2	---

*1. A C200HW-COM02/COM04/COM05/COM06-V1 Communications Board is required.

*2. A CS1W-CN118 Conversion Cable or XW2Z-200T-2 Cable with connector must be used for the connection.

*3. Connection is not possible to CVM1/CV-series PLC CPU Units without “-V1” in the model number.



Additional Information

CS-series CPU Units cannot connect to 1:1 NT Links, but a 1:1 connection can be made using 1:N NT Links (normal or high-speed). Refer to *1-2 1:N Host Connection* on page 1-8 and *1-3 High-speed 1:N NT Link* on page 1-19 for details.

● CPU Units That Connect in 1:1 NT Links via RS-422A to PT Unit's Serial Ports

PLC Series	CPU Units with built-in 1:1 NT Link functionality
C Series	C200HE-CPU32/42(-Z)*1
	C200HG-CPU33/43/53/63(-Z)*1
	C200HX-CPU34/44/54/64(-Z)*1
	C200HX-CPU65/85-Z*1
	CQM1H-CPU51/61*2
CV Series*3	CV500-CPU01-V1
	CV1000-CPU01-V1
	CV2000-CPU01-V1
CVM1 Series*3	CVM1-CPU01/11/21-V2

*1. A C200HW-COM03-V1 or C200HW-COM06-V1 Communications Board is required.

*2. A CQM1H-SCB41 Serial Communications Board is required.

*3. Connection is not possible to CVM1/CV-series PLC CPU Units without “-V1” in the model number.



Additional Information

Do not use RS-485 to connect to a PLC. Connect using RS-422A (4-wire).

CPU Units That Connect to PT Units in Standard 1:N NT Links

PLC Series	Specifications
C200HE/HG/HX Series	With RS-232C connector (switching/9-pin type)
CQM1H Series	With RS-232C connector (9-pin type)
CS Series	With RS-232C connector (9-pin type)
CJ Series	With RS-232C connector (9-pin type)
NJ Series	With Serial Communications Unit (CJ1W-SCU22/32/42)
CP Series	With RS-232C connector (9-pin type/Terminal block) With Serial Option Board (CP1W-CIF01, CP1W-CIF11/12(-V1), CP2W-CIFD1, CP2W-CIFD2)

● CPU Units That Connect in 1:N NT Links via RS-232C to PT Unit's Serial Ports

PLC Series	Connecting with built-in ports	Connecting via optional Communications Boards or Units
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 CS1D-CPU65H/67H	Same as at left.*1
CJ Series	CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ1G-CPU42H/43H/44H/45H*2 CJ1M-CPU11/12/13/21/22/23 CJ2H-CPU64/65/66/67/68(-EIP) CJ2M-CPU11/12/13/14/15 CJ2M-CPU31/32/33/34/35*3 CJ3M-CPU11/12/13/14/15/31/32/33/34/35	CJ1H-CPU65H/66H/67H*2 CJ1H-CPU65H/66H/67H-R*2 CJ1G-CPU42H/43H/44H/45H*2 CJ1M-CPU11/12/13/21/22/23*2 CJ2H-CPU64/65/66/67/68(-EIP)*2 CJ2M-CPU11/12/13/14/15*2 CJ2M-CPU31/32/33/34/35*3 CJ3M-CPU11/12/13/14/15/31/32/33/34/35*2
NJ Series	---	NJ501-1500*4 NJ501-1400*4 NJ501-1300*4 NJ301-1200*4 NJ301-1100*4 NJ101-1000*4 NJ101-9000*4
CP Series	CP1E-N□□□□-□ CP2E-E□□D□-□ CP2E-S□□D□-□	CP1L-□□□□□-□*3 CP1H-□□□□□-□*3 CP2E-N□□D□-□*5

PLC Series	Connecting with built-in ports	Connecting via optional Communications Boards or Units
C Series	C200HE-CPU42(-Z)	C200HE-CPU32/42(-Z)*6
	C200HG-CPU43(-Z) C200HG-CPU63(-Z)	C200HG-CPU33/43/53/63(-Z)*6
	C200HX-CPU44(-Z) C200HX-CPU64(-Z) C200HX-CPU65-Z C200HX-CPU85-Z	C200HX-CPU34/44/54/64(-Z)*6 C200HX-CPU65/85-Z*6
	---	CQM1H-CPU21/51/61*7

*1. A CS1W-SCB21/SCB41 Serial Communications Board or a CS1W-SCU21 Serial Communications Unit is required.

*2. A CJ1W-SCU21/22/41/42 Serial Communications Unit is required.

*3. An RS-232C Option Board (CP1W-CIF01) is required.

*4. A CJ1W-SCU22/42 Serial Communications Unit is required.

*5. An RS-232C Option Board (CP1W-CIF01, CP2W-CIFD1, or CP2W-CIFD2) is required.

*6. A C200HW-COM02/COM04/COM05/COM06(-V1) Communications Board is required.

*7. A CQM1H-SCB41 Serial Communications Board is required.

Additional Information

Do not use RS-485 to connect to a PLC. Connect using RS-422A (4-wire).

● CPU Units That Connect in 1:N NT Links via RS-422A to PT Unit's Serial Ports

PLC Series	Unit	Serial Communications Board or Unit required for connection
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 CS1D-CPU65H/67H	CS1W-SCB41 Serial Communications Board
CJ Series	CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ1G-CPU42H/43H/44H/45H CJ1M-CPU11/12/13/21/22/23 CJ2H-CPU64/65/66/67/68(-EIP) CJ2M-CPU11/12/13/14/15 CJ2M-CPU31/32/33/34/35*1 CJ3M-CPU11/12/13/14/15/31/32/33/34/35	CJ1W-SCU31/32/41/42 Serial Communications Unit RS-422A Option Board: CP1W-CIF11 or CP1W-CIF12(-V1)*1
NJ Series	NJ501-1500 NJ501-1400 NJ501-1300 NJ301-1200 NJ301-1100 NJ101-1000 NJ101-9000	CJ1W-SCU32/42 Serial Communications Unit
CP Series	CP1E-N□□□□-□ CP1L-□□□□□-□ CP1H-□□□□□-□ CP2E-N□□D□-□*2	RS-422A Option Board: CP1W-CIF11 or CP1W-CIF12(-V1)
C Series	C200HE-CPU32/42(-Z) C200HG-CPU33/43/53/63(-Z)	C200HW-COM03/COM06(-V1) Communications Board
	C200HX-CPU34/44/54/64(-Z) C200HX-CPU65/85-Z	
	CQM1H-CPU21/51/61	CQM1H-SCB41 Serial Communications Board

*1. A CP1W-CIF11 or CP1W-CIF12(-V1) RS-422A Board is required to connect a CJ2M-CPU31/32/33/34/35 CPU Unit to the serial port on an NS-B-series PT.

*2. CP2E series units (CP2E-S30/S40/S60) with the Built-in RS-485 Port (2-wire) cannot be connected with the PT Unit via 2-wire RS-485.

Additional Information

Both the normal 1:N NT Links and high-speed NT Links are supported for CS-series PLC CPU Units with "-V1" in the model number. If the most recent Serial Communications Unit or Board is used, these connections are also supported by CPU Units without "-V1." Refer to *1-3 High-speed 1:N NT Link* on page 1-19 for details.

CPU Units That Connect to PT Units in High-speed 1:N NT Links

PLC Series	Specifications
CS Series*1	With RS-232C connector (9-pin type)
CJ Series	With RS-232C connector (9-pin type)
NJ Series	With Serial Communication Unit (CJ1W-SCU22/32/42)
CP Series	With RS-232C connector (9-pin type/Terminal block) With Serial Option Board (CP1W-CIF01, CP1W-CIF11/12(-V1), CP2W-CIFD1, CP2W-CIFD2)

*1. Connection is not possible for CPU Units without "-V1" in the model number.

● CPU Units That Connect in 1:N NT Links via RS-232C to PT Unit's Serial Ports

PLC Series	Connecting with built-in ports	Serial Communications Board or Unit required for connection
CS Series	CS1G-CPU42/43/44/45(-V1)*1 CS1H-CPU63/64/65/66/67(-V1)*1 CS1G-CPU42H/43H/44H/45H CS1H-CPU63H/64H/65H/66H/67H CS1D-CPU65H/67H	Same as at left.*2
CJ Series	CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ1G-CPU42H/43H/44H/45H CJ1M-CPU11/12/13/21/22/23 CJ2H-CPU64/65/66/67/68(-EIP) CJ2M-CPU11/12/13/14/15 CJ2M-CPU31/32/33/34/35*3 CJ3M-CPU11/12/13/14/15/31/32/33/34/35	Same as at left.*4
NJ Series	---	NJ501-1500*5 NJ501-1400*5 NJ501-1300*5 NJ301-1200*5 NJ301-1100*5 NJ101-1000*5 NJ101-9000*5
CP Series	CP1E-N□□□□-□ CP2E-E□□D□-□ CP2E-S□□D□-□	CP1L-□□□□-□*3 CP1H-□□□□-□*3 CP2E-N□□D□-□*6

*1. CS-series PLC CPU Units without "-V1" in the model number do not support high-speed NT Links.

*2. A CS1W-SCB21/SCB41 Serial Communications Board or a CS1W-SCU21 Serial Communications Unit is required.

*3. An RS-232C Option Board (CP1W-CIF01) is required.

*4. A CJ1W-SCU41 Serial Communications Board is required.

*5. A CJ1W-SCU22/42 Serial Communications Unit is required.

*6. An RS-232C Option Board (CP1W-CIF01, CP2W-CIFD1, or CP2W-CIFD2) is required.

● CPU Units That Connect in 1:N NT Links via RS-422A to PT Unit's Serial Ports

PLC Series	Unit	Serial Communications Board or Unit required for connection
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 CS1D-CPU65H/67H	CS1W-SCB41 Serial Communications Board
CJ Series	CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ1G-CPU42H/43H/44H/45H CJ1M-CPU11/12/13/21/22/23 CJ2H-CPU64/65/66/67/68(-EIP) CJ2M-CPU11/12/13/14/15 CJ2M-CPU31/32/33/34/35*1 CJ3M-CPU11/12/13/14/15/31/32/33/34/35	CJ1W-SCU31/41 Serial Communications Unit RS-422A Option Board: CP1WCIF11 or CP1W-CIF12(-V1)*1
NJ Series	NJ501-1500 NJ501-1400 NJ501-1300 NJ301-1200 NJ301-1100 NJ101-1000 NJ101-9000	CJ1W-SCU32/42 Serial Communication Unit
CP Series	CP1E-N□□□□-□ CP1L-□□□□□-□ CP1H-□□□□□-□ CP2E-N□□D□-□*2	RS-422A Option Board: CP1WCIF11 or CP1W-CIF12(-V1)

*1. A CP1W-CIF11 or CP1W-CIF12(-V1) RS-422A Board is required to connect a CJ2M-CPU31/32/33/34/35 CPU Unit to the serial port on an NS-B-series PT.

*2. CP2E series units (CP2E-S30/S40/S60) with the Built-in RS-485 Port (2-wire) cannot be connected with the PT Unit via 2-wire RS-485.

CPU Units That Connect to PT Units via Ethernet

PLC Series	CPU Unit	Specifications
CV Series	CV500-CPU01-V1 CV1000-CPU01-V1 CV2000-CPU01-V1	Mount a CV500-ENT01 Ethernet Unit (10Base-5). Mount a 10Base-T Adapter to the Ethernet Unit and a 10Base-T cable can also be used.
CVM1 Series	CVM1-CPU01/11/21-V2	
CS Series	CS1G-CPU42/43/44/45(-V1) CS1G-CPU42H/43H/44H/45H CS1H-CPU63/64/65/66/67(-V1) CS1H-CPU63H/64H/65H/66H/67H CS1D-CPU65H/67H	Mount a CS1W-ENT01 Ethernet Unit (10Base-5). Mount a 10Base-T Adapter to the Ethernet Unit and a 10Base-T cable can also be used. Mount a CS1W-ENT11 Ethernet Unit (10Base-T). Mount a CS1W-ETN21 Ethernet Unit (10Base-T/100Base-TX). Mount a CS1D-ETN21D Ethernet Unit (100Base-TX)
CJ Series	CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ1G-CPU42H/43H/44H/45H CJ1M-CPU11/12/13/21/22/23 CJ2H-CPU64/65/66/67/68(-EIP)*1 CJ2M-CPU11/12/13/14/15 CJ2M-CPU31/32/33/34/35*1 CJ3M-CPU11/12/13/14/15/31/32/33/34/35	Mount a CJ1W-ENT11 Ethernet Unit (10Base-T). Mount a CJ1W-ENT21 Ethernet Unit (10Base-T/100Base-TX). Mount a CJ1W-EIP21 EtherNet/IP Unit (10Base-T/100Base-TX).
CP Series	CP1L-□□□□□-□ CP1H-□□□□□-□ CP2E-N□□D□-□*2	Mount a CP1W-CIF41 Ethernet Option Board (10Base-T/100Base-TX).

*1. The CJ2H-CPU□□-EIP and CJ2M-CPU3□ CPU Units have a built-in Ethernet connector.

*2. CP2E-N□□D□-□ CPU Unit uses a Built-in Ethernet port. CP1W-CIF41 is not supported.

EtherNet/IP-connectable NS-B-series PT Units and Controllers

Series name	Using the built-in board	Using an EtherNet/IP Unit	EtherNet/IP Unit required for connection
CS Series	---	CS1G-CPU42/43/44/45(-V1) CS1G-CPU42H/43H/44H/45H CS1H-CPU63/64/65/66/67(-V1) CS1H-CPU63H/64H/65H/66H/67H CS1D-CPU65H/67H	CS1W-EIP21 (10Base-T/100Base-TX)
CJ Series	CJ2H-CPU64/65/66/67/68-EIP CJ2M-CPU31/32/33/34/35 CJ3M-CPU31/32/33/34/35	CJ1H-CPU65H/66H/67H CJ1H-CPU65H/66H/67H-R CJ1G-CPU42H/43H/44H/45H CJ1M-CPU11/12/13/21/22/23 CJ2H-CPU64/65/66/67/68 CJ2M-CPU11/12/13/14/15 CJ3M-CPU11/12/13/14/15	CJ1W-EIP21 (10Base-T/100Base-TX)
NJ Series	NJ101-□□□□ NJ301-□□□□ NJ501-□□□□	NJ101-□□□□ NJ301-□□□□ NJ501-□□□□	CJ1W-EIP21*1
NX Series	NX701-□□□□ NX102-□□□□ NX1P2-□□□□	---	---

*1. The NJ-series Troubleshooter cannot be used. The following unit versions are required.
NJ-series CPU Unit: Unit version 1.01 or later
EtherNet/IP Unit: Unit version 2.1 or later

A-2 PLC Memory Areas

A-2-1 OMRON C-series PLC Memory Areas

● NT Link 1:1 and NT Link 1:N

PLC model	C200HS	C200HE-E/-ZE C200HG-E/-ZE C200HX-E/-ZE	CQM1[*1]	CQM1H	CPM1A	CPM2A	CPM2C[*1]
Data area (CIO)	00000 to 00511		00000 to 00255		00000 to 00019 00200 to 00255	00000 to 00049 00200 to 00255	
Holding area (HR)	00000 to 00099		00000 to 00099		00000 to 00019		
AR area (AR)	00000 to 00027		00000 to 00027		00000 to 00015	00000 to 00023	
Link area (LR)	00000 to 00063		00000 to 00063		00000 to 00015		
Timer/counter present value (TIM/CNT)	00000 to 00511		00000 to 00511		00000 to 00127	00000 to 00255	
Data memory area (DM)	00000 to 06655 07000 to 09999		00000 to 06655[*2]	00000 to 06655[*2]	00000 to 01023	00000 to 02047 06144 to 06655	
EM Area (Current bank) (EM)	---	00000 to 06143[*2]	---	00000 to 06143[*2]	---		

*1. CQM1, CPM2A, and CPM2C PLCs only support 1:1 NT Link communications.

*2. The memory areas that can be used depend on the model of the CPU Unit

A-2-2 OMRON CVM1 and CV-series PLC Memory Areas

● NT Link 1:1

CVM1 and CV-series PLCs only support NT Link 1:1 communications.

PLC model	CV500 CVM1-CPU01-V□	CVM1-CPU11-V□	CV1000 CV2000 CVM1-CPU21-V□
Data area (CIO)	00000 to 02555	00000 to 02555	00000 to 02555
Holding area (HR)	---	---	---
AR area (AR)	00000 to 00511	00000 to 00511	00000 to 00511
Link area (LR)	---	---	---
Timer/counter present value (TIM/CNT)	00000 to 00511	00000 to 01023	00000 to 01023
Data memory area (DM)	00000 to 08191	00000 to 24575	00000 to 24575
EM Area (Current bank) (EM)	---	---	00000 to 32765

A-2-3 OMRON CS-series CS1G, CS1H, CS1G-H, and CS1H-H PLC Memory Areas

● NT Link 1:N

CS1G, CS1H, CS1G-H, and CS1H-H PLCs only support NT Link 1:N communications.

PLC model	CS1G CS1H CS1G-H CS1H-H CS1D
Data area (CIO)	00000 to 06143
Holding area (HR)	00000 to 00511
Auxiliary area (AR)*1	00000 to 00959
Link area (LR)*2	00000 to 00199
Timer/counter present value (TIM/CNT)	00000 to 04095
Data memory area (DM)	00000 to 32767
EM area (EM, EM0 to EMC)*3	00000 to 32767
Work area (WR)	00000 to 00511
Task flags (TK)*4	---
Timer completion flags (TU)*5	00000 to 04095
Counter completion flags (CU)*5	00000 to 04095

*1. For CS1G, CS1H, CS1G-H, and CS1H-H PLCs, AR00000 to AR00447 is a read-only area.

*2. CS1G, CS1H, CS1G-H, and CS1H-H PLCs do not have an LR area, but if the screen data uses the LR area, this will be automatically converted internally to CIO01000 to CIO01199 in the CIO area.

*3. Specify a bank for the data area when setting a bit address in the EM. If the data area is specified using the current bank, the ON/OFF function may not be able to be used correctly, depending on the status of other bits in the EM area for the same word number.

*4. Task flags cannot be used with PT Units.

*5. These areas cannot be set as the allocated addresses for system memory $SB or $SW.

Communications cannot be performed simultaneously for 63 or more points. If 64 or more points are set, a communications (settings) error will occur during operation. These areas cannot be used by READCMEM or WRITECMEM macros.

These areas cannot be set to ON/OFF Buttons or other objects that write bit data. These areas can be set only to bit lamps and other objects that read bit data.

A-2-4 OMRON CJ-series CJ1G, CJ1G/H-H, CJ1M, CJ2H, CJ2M and CJ3M PLC Memory Areas

● NT Link 1:N

CJ1G, CJ1G/H-H, and CJ1M PLCs support only 1:N NT Link communications.

PLC model	CJ1G CJ1G-H CJ1H-H CJ1M CJ2H CJ2M CJ3M
Data area (CIO)	00000 to 06143
Holding area (HR)	00000 to 00511
Auxiliary area (AR)*1	00000 to 00959 00960 to 01471 10000 to 11535
Link area (LR)*2	00000 to 00199
Timer/counter present value (TIM/CNT)	00000 to 04095
DM area (DM)	00000 to 32767
EM area (EM, EM0 to EM18)*3	00000 to 32767*4
Work area (WR)	00000 to 00511
Task flags (TK)*5	---
Timer completion flags (TU)*6	00000 to 04095
Counter completion flags (CU)*6	00000 to 04095

*1. AR00000 to AR01471 and AR10000 to AR11535 can be read or written in CJ2 PLCs. For other PLCs, AR00000 to AR00959 can be read or written and AR00000 to AR00447 and AR10000 to AR11535 are read only.

*2. CJ1G, CJ1G-H, CJ1H, CJ1H-H, and CJ1M PLCs do not have an LR area, but if the screen data uses the LR area, this will be automatically converted internally to CIO 01000 to CIO 01199 in the CIO area.

*3. Specify a bank for the data area when setting a bit address in the EM. If the data area is specified using the current bank, the ON/OFF function may not be able to be used correctly, depending on the status of other bits in the EM area for the same word number.

*4. CJ1M PLCs do not have an EM area.

*5. Task flags cannot be used with PT Units.

*6. These areas cannot be set as the allocated addresses for system memory $SB or $SW.

Communications cannot be performed simultaneously for 63 or more points. If 64 or more points are set, a communications (settings) error will occur during operation. These areas cannot be used by READCMEM or WRITECMEM macros.

These areas cannot be set to ON/OFF Buttons or other objects that write bit data. These areas can be set only to bit lamps and other objects that read bit data.

A-2-5 PLC Areas That Can Be Used for Communications

● OMRON C-series PLCs

PLC model	Ladder type PLCs							
	C200HS	C200HE/ HG/ HX(-Z)	C500	C1000H	C2000H CQM1	CQM1H	CPM1/C PM1A	CPM2A/ CPM2C
Common I/O Area (CIO)	00000 to 00511		00000 to 00063	00000 to 00255			00000 to 00019 00200 to 00255	00000 to 00049 00200 to 00255
Holding Relay (HR)	00000 to 00099		00000 to 00031	00000 to 00099			00000 to 00019	
Auxiliary Relay (AR)	00000 to 00027		---	00000 to 00027			00000 to 00015	00000 to 00023
Link Relay (LR)	00000 to 00063		00000 to 00031	00000 to 00063			00000 to 00015	
Timer/ Counter Area (TIM/CNT)	00000 to 00511		00000 to 00127	00000 to 00511			00000 to 00127	00000 to 00255
Data Memory Area (DM)	00000 to 06655 07000 to 09999		00000 to 00511	00000 to 04095	00000 to 06655	00000 to 06655	00000 to 01023 06144 to 06655	00000 to 02047 06144 to 06655
EM Area (Current bank) (EM)	---	00000 to 06143	---	---	---	00000 to 06143	---	---

● CVM1/CV-series PLCs

PLC model	CV500 CVM1-CPU01-V□	CVM1-CPU11-V□	CV1000 CV2000 CVM1-CPU11-V□ CVM1-CPU21-V□
Common I/O Area (CIO)	00000 to 02555	00000 to 02555	00000 to 02555
Holding Relay (HR)*1	---	---	---
Auxiliary Relay (AR)	00000 to 00511	00000 to 00511	00000 to 00511
Link Relay (LR)	---	---	---
Timer/Counter Area (TIM/CNT)	00000 to 00511	00000 to 01023	00000 to 01023
Data Memory Area (DM)	00000 to 08191	00000 to 09999	00000 to 09999
EM Area (Current bank) (EM)*2	---	---	---

*1. The HR Area is included in the CIO Area. To use the HR Area, specify the CIO Area.

*2. Do not use this area for creating screens. It cannot be used with Host Link communications.

● OMRON CS/CJ-series PLCs

PLC model	CS1G/H(-H) CJ1G/H(-H) CJ1M CP1L CP1H CJ2H CJ2M CJ3M
Common I/O Area (CIO)	00000 to 06143
Holding Relay (HR)	00000 to 00511
Auxiliary Relay (AR)	00000 to 00959
Link Relay (LR)	---
Timer/Counter Area (TIM/CNT)	00000 to 02047
Data Memory Area (DM)	00000 to 09999
EM Area (Current bank)*1	00000 to 09999
Work Area (WR)*2	---

*1. The EM Area cannot be specified for the CJ1M.

*2. Do not use this area for creating screens. It cannot be used with Host Link communications.

A-2-6 List of Areas with Bit Access

Symbol	Area Name	Allocation			
		C-series PLCs	CVM1/CV-series PLCs	CS/CJ-series PLCs	NJ-series Controllers
None	I/O area (IR)	OK	OK	OK	OK
H	Holding Area	OK	---	OK	OK
A	Auxiliary Area	OK	No	OK	---
L	LR Area	OK	---	OK*1	OK*1
T	Timer present values	No	No	No	---
TU	Timer Completion Flags	---	---	No	---
C	Counter present values	No	No	No	---
CU	Counter Completion Flags	---	---	No	---
W	Work Area	---	---	OK	OK
TK	Task Flags	---	---	No	No
D	DM Area	OK	OK	OK	OK
E	EM Area (Current bank)	OK*2	OK	OK	---
E0_ to E18_	EM Area Bank 0 to 18	---	---	OK	OK

*1. LR 00000 to LR 00199 are converted to and used as I/O area words CIO 01000 to CIO 01199.

*2. The EM area (EM) is supported only for C200HX/HG/HE-E/-ZE PLCs in the C Series.

A-3 Restrictions and Notes on Connecting Non-OMRON PLCs

Please read the following restrictions and notes carefully and make sure them when you connect the host (except SYSMAC PLC) to NS-B-series PT. Here, only general restrictions and notes are provided. For instructions of each host type, refer to the chapter that describes each host type.

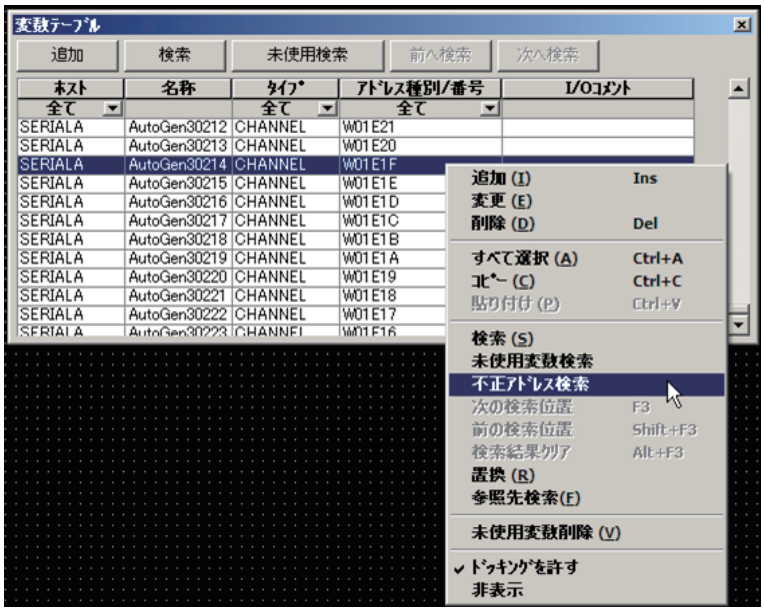
A-3-1 Notes and Restrictions When Changing Host Types

When converting host type using Comm. Setting Dialog Box, please pay attention to the following.

- When any addresses of the host before converting are already used, host types can be converted only between SYSMAC PLC and other host types. Conversion between host types (except SYSMAC PLC) is not allowed.
- When host type being converted, addresses are automatically converted by predetermined rule. Details of the rule are described in the chapter of each host type.
- When addresses being converted automatically, addresses which cannot be mapped to new host type are not converted. This may cause invalid addresses, so please search and modify such addresses after host conversion by the following procedure.

How to search and modify the invalid addresses

1. If **Symbol Table** window is not shown, press [Alt] + [2] to show it.
2. Right-click the symbols displayed area, and click **Find Invalid Addresses**.



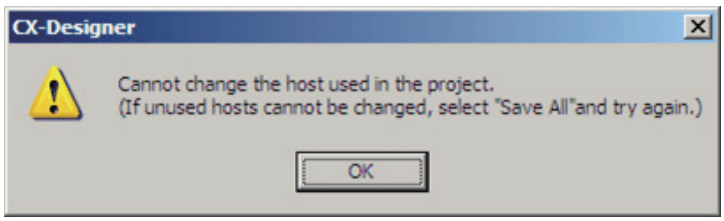
3. Invalid addresses will be highlighted by light cream color. Modify all of them.

   Even if you have modified invalid addresses, highlighting is not reset until the next step is done.
4. Do the step 2 again.

   If all highlightings are reset, it means modification is completed.

Additional Information

Conversion of host type is allowed with no restrictions if you do not use any addresses of converting host. But, the dialog as shown below may be displayed if you have once used some addresses of the converting host and removed them after that.



In such case, execute Find Unused Symbols function on Symbol Table Window, then, try again. To know for which objects the host addresses are used, select **Find** Menu - **Address Cross Reference**.

A-3-2 Restrictions on Macro Functions

The following macro functions are NOT supported for any host types except SYSMAC PLC.

- READHOSTB
- READHOSTW
- WRITEHOSTB
- WRITEHOSTW

A-3-3 Differences of Data Format in PLCs, and Restrictions Caused by Them

Data format depends on host type. For such reason, be careful when using macro functions that read/write data from/to non-SYSMAC.

For details on each host type, refer to Data format and Notes sections in the corresponding chapters of each.

A-3-4 Restriction on Using Functions Monitoring a Large Number of Addresses

When connecting to a host except SYSMAC PLC, functions which monitor large number of addresses —Data Log, Alarm/Event, and so on— may slow responses. Moreover, monitoring inconsecutive addresses may make it worse. This is caused by a performance limitation of communicating with the host. Therefore, when using these functions, please minimize the number of monitoring addresses, and design the system to be able to monitor consecutive addresses as possible as you can.

A-3-5 System Memory Compatibility with the NT Series

This function will not work when connected to a PLC that is not manufactured by OMRON.

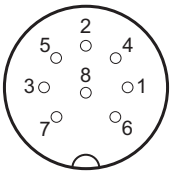
A-3-6 Restriction on Using Functions Connecting Except for a Serial Port Where a Communication Error Occurs

This function will not work when connected to a PLC that is not manufactured by OMRON. Please select No in the Comm. Setting Dialog Box.

A-4 Preparing Connecting Cables for Bar Code Readers

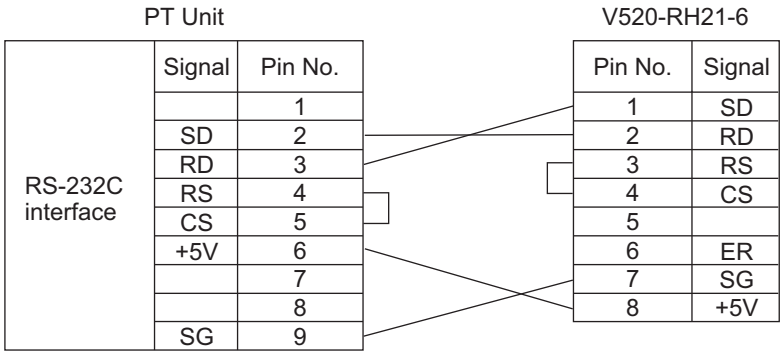
Refer to the following information when preparing the connecting cables for connecting the V520-RH21-6 Bar Code Reader.

● Connector Pin Arrangement



Pin number	Signal name	Abbreviation	Signal direction
1	Send data	SD (TXD)	V520-RH21-6 → PT Unit
2	Receive data	RD (RXD)	V520-RH21-6 ← PT Unit
3	Request to send	RS (RTS)	V520-RH21-6 → PT Unit
4	Clear to send	CS (CTS)	V520-RH21-6 ← PT Unit
5	Not connected.		
6	Data terminal ready	ER (DTR)	V520-RH21-6 → PT Unit
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	XM3A-0921 or equivalent	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 or equivalent	9-pin type Manufactured by OMRON.
Cable	AWG28 × 5P IFVV-SB	Multiconductor shielded cable Manufactured by Fujikura.
	CO-MA-VV-SB 5P × 28AWG	Multiconductor shielded cable Manufactured by Proterial.

Use the following cables if the V400-H111 or V400-H211 is used.

Model	Cable length
V400-W20-2M	2 m
V400-W20-5M	5 m

Use the following products with the V410-HDS4608XD and V410-HDS4608SR.

Name	Model	Details
AC power kit	V410-AC0-1	
Cable	V410-WR-2M	RS-232 cable, DB9 socket, 2 m
	V430-WPLC-2M	OMRON programmable controller (CS/CJ/NJ) connection RS-232C cable, 2 m

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