NS-Series

NS12-TS0☐(B)-V1/V2,   **NS10-TV0☐(B)-V1/V2**
NS8-TV☐☐(B)-V1/V2,   **NS5-TQ0☐(B)-V2**
NS5-SQ0☐(B)-V1/V2,   **NS5-MQ0☐(B)-V2**
NSJ12-SQ0☐(B)-G5D,   **NSJ10-TV0☐(B)-G5D**
NSJ8-TV0☐(B)-G5D,   **NSJ5-TQ0☐(B)-G5D**
NSJ5-SQ0☐(B)-G5D
NSH5-SQR00B-V2

Programmable Terminals

HOST CONNECTION MANUAL

Multivendor Connection

OMRON

Introduction

Thank you for purchasing NS-Series Programmable Terminal.

NS-Series PTs are designed to transfer data and information in FA production sites. Please be sure that you understand the functions and performance of the PT before attempting to use it.

When using an NS-Series PT, please also refer to the NS-Series Setup Manual the NS-Series Programming Manual and CX-Designer User's Manual.

Intended Audience

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

・ Personnel in charge of introducing FA systems into production facilities.

・ Personnel in charge of designing FA systems.

・ Personnel in charge of installing and connecting FA systems.

・ Personnel in charge of managing FA systems and facilities.

General Precautions

・ The user must operate the product according to the general specifications described in the Setup Manuals.

・ Do not use the PT touch switch input functions for applications where danger to human life or serious property damage is possible, or for emergency switch applications.

・ Before using the product under the following conditions, make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines and equipment, and be sure to provide them with a fail safe circuit, and then consult your OMRON representative.

 1) Use of the product under conditions and environments that are not described in the manual.

 2) Application of the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems.

 3) Use that may have a serious influence on lives and property if used improperly and requires the extra safety.

・ This manual provides information for connecting and setting up an NS-Series PT. Be sure to read this manual before attempting to use the PT and keep this manual close at hand for reference.

Safety Precaution

⚠ WARNING

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

Precautions and Suitability for use

Installation precautions

- When unpacking the Units, check carefully for any external scratches or other damage. Also, shake the Units gently and check for any abnormal sound.
- Do not touch the surface of the circuit board or the components mounted on it with your bare hands. Discharge any static electricity from your body before handling the board.
- Do not install the PT in any of the following locations:
  - Locations subject to extreme temperature changes.
  - Locations subject to temperatures or humidity outside the ranges in the specifications.
  - Locations subject to high humidity that may result in condensation.
  - Locations that would subject the PT to chemicals.
  - Locations that would subject the PT to oil.
  - Locations subject to corrosive or flammable gases.
  - Locations that would subject the PT to direct shock or vibration.
  - Locations that would directly expose the PT to wind or rain.
  - Locations subject to strong ultraviolet light.
- Provide proper shielding measures when installing in the following locations:
  - Locations subject to static electricity or other sources of noise.
  - Locations subject to strong electromagnetic fields.
  - Locations near to power supply lines.
  - Locations subject to possible exposure to radiation.
- Ground the Unit correctly to prevent operational errors caused by noise.
- Confirm that the current capacity of the connected device is 250 mA or less before using the +5V power supply from pin 6 of the serial port A, B connectors. The +5V output of the PT is 250 mA max. at 5 V±5%.
- The mounting panel must be between 1.6 and 4.8 mm thick. Tighten the Mounting Brackets evenly to a torque of between 0.5 and 0.6 N·m to maintain water and dust resistance. The front sheet may become distorted if the tightening torque is more than the specified limit or not uniform. Make sure the panel is not dirty or warped and that it is strong enough to hold the Units.
- Do not let metal particles enter the Units when preparing the panel.
- The connector's pull load is 30 N. Do not subject the connectors to a greater load than that specified.

- Turn OFF the power supply before connecting or disconnecting cables.
- Always tighten the connector screws after connecting communications cables.

Power precautions

- If conformance to EC Directives (Low Voltage Directive) is required, use reinforced insulation for the power supplies.
- Do not connect an AC power supply to the power terminals.
- Use a DC power supply with minimal fluctuation voltage.
- Do not perform a dielectric voltage test.
- Check the power supply voltage and supply at the recommended voltage. For power consumptions of NS-series PT, refer to the NS-Series Setup Manual and the NSJ Series Setup Manual and NSH-Series-Series Setup Manual.
- Use a twisted-pair cable with a cross-sectional area of at least 2 mm² to connect to the power terminals and always use M3.5 crimp terminals. Tighten the terminal screws to a torque of 0.8 N·m. Make sure the screws are properly tightened.

Precautions for power on, off and reset

- Confirm the safety of the system before turning ON, OFF or reset the power supply or before pressing the reset button.
- The whole system may stop depending on how the power supply is turned ON or OFF. Turn ON or OFF the power supply according to the specified procedure.
- After changing the settings of the DIP switch, always turn the power supply OFF and ON or reset the PT.
- Do not perform the following operations while the Memory Card is being accessed:
    - ➢ Turning OFF the power supply to the PT
    - ➢ Pressing the PT's reset switch
    - ➢ Removing the Memory Card

Precautions for creating screen data and programming

- Start actual system application only after sufficiently checking screen data. macros, and the operation of the program in the PC (host).
- For the safety of the system, before operating, create a program so that a host can periodically read signals to confirm that the PT is normally operating.

Operating precautions

- Do not press the touch switch with a force greater than 30 N.
- Confirm the safety of the system before pressing touch switches.
- Do not accidentally press touch switches when the backlight is not lit or when the display does not appear.

- Signals from the touch switches may not be input if the switches are pressed consecutively at high speed. Confirm each input before proceeding to the next one.
- Before initializing screen data, confirm that existing data is backed up at the other sites such as a computer.
- When changing the password with the system menu, do not reset or turn OFF the power supply until writing is finished (i.e., until the Write Button returns to its original condition). It may become impossible to manipulate screens if the password is not set correctly.

Terminology

The following terminologies are used in this manual.

PT	In this manual, indicates an NS-series Programmable Terminal.
NS-series	Indicates products in the OMRON NS[][] Series of Programmable Terminals.
CX-Designer	Indicates the OMRON CX-Designer (NS-CXDC1-V[]). In this manual, indicates CX-Designer V2.00 when its version is not clearly specified.
Host	Indicates the PLC, FA computer, or personal computer functioning as the control device and interfaced with the NS-series PT.
NS-V1	Indicates NS-Series PT whose model name ends with "-V1."
NS-V2	Indicates NS-Series PT whose model name ends with "-V2."
NSJ	Indicates PLC integrated NS-series PT whose model name starts with "NSJ[]-."
NSH-Series	Indicates handy type of NS-series PT whose model name starts with "NSH-Series[]-."
Host	Indicates the PLC, FA computer, or personal computer functioning as the control device and interfaced with the NS-series PT.

All brand names and product names are trademarks or registered trademarks of their respective companies.

Related Manuals

For CX-Designer Programmable Terminal Operating Procedures

CX-Designer User's Manual ....V074-E1[]

　　Refer to this manual to confirm operation procedures and setting items of CX-Designer while you are creating screens. The online help is also available from CX-Designer. When you do not know an operating procedure, press the F1 key in a screen to view the specific online help information.

Confirming PT Functions, Operations, and Restrictions

　　These manuals describe hardware including PT installation, connections and general specifications.

NS-V1/V2 series Programmable Terminals Setup Manual ....V083-E1[]

　　Provides information of the NS[]-[][]V1 and NS[]-[][]V2 series.

NSH-Series-Series Hand-held Programmable Terminal Operation ManualV090-E1[]

　　Provides information of the handy type NSH-Series-Series.

Contents

Chapter 1. Preparation and Screen data creation

1-1 Preparation

The followings items are required in order to use functions explained in this manual. Please prepare them before you use.

・ CX-Designer Version 2.00 or later
・ NS-V1, NS-V2, NSJ or NSH-Series type of PT
・ PT system program Version 6.60 or later

> Later version of CX-Designer and system may be required depending on the devices connected. Each applicable CX-Designer and system version is described in the beginning of chapters where connecting methods are explained.

Applicable CX-Designer Version	V2.10 or later
Applicable NS System Version	V6.70 or later

If the PT system program is old, it needs to be updated. For information on how to update, refer to the manual "How to recover or update the PT system program Ver6.6". (Start Menu – All Programs – OMRON – CX-One – CX-Designer)

The PT system program is bundled to CX-Designer V2.00, and is installed to "RecoverUpdate_[]_[]" folder ([] indicates version number) in CX-Designer's folder. If not installed, please re-execute CX-Designer's or CX-One's setup program, and install it.

Version number of CX-Designer and PT system program can be confirmed in the following procedures.

How to check the version of CX-Designer

1) Start up CX-Designer.
2) From the menu, select [Help] — [About CX-Designer].
3) The following dialog box will be displayed. The version is shown in the circle.

12
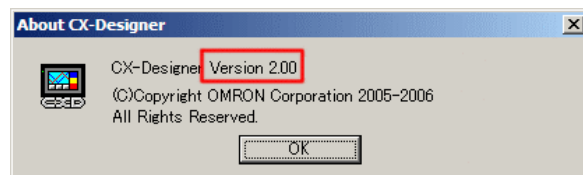
How to check the version of PT system program

1) Power on the PT.

2) Press any 2 corners of the PT screen at the same time to proceed to the system menu.

3) Touch the [Special screen] tab.

4) Touch the [System Version] button.

5) The screen as shown right will be displayed. Check the circled number. This example shows the system version 6.60.

(Note: DO NOT be confused with "Project Data Version". It is NOT the version of the PT system program.)

System Version

NS8 -TV11-V1 System Version 6.60

Project Data Version 5.10

Back
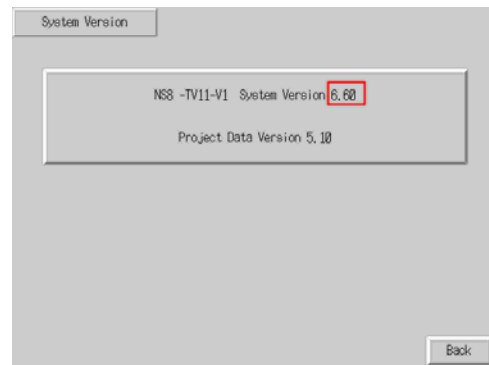
1-2 Creating screen data

This section provides general procedures of how to create screen data, providing an example of connecting to Mitsubishi FX Series sequencer to PORTA on a PT. Even when connecting other PLC to PT, you can create screen data in the same way.

1) Start up CX-Designer and select [File] — [New Project].
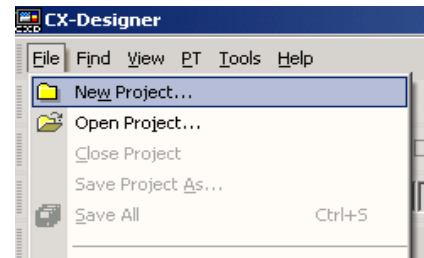
2) New Project Dialog Box will be displayed. Set the System Version to a version that supports the PLC to be connected. Any names can be given to the Project Title and File Name.
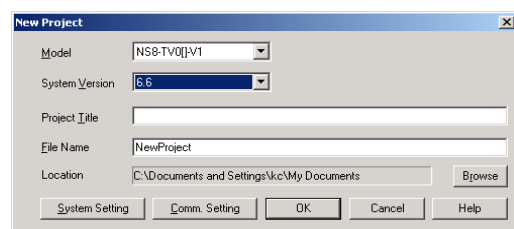
3) Press the [Comm. Setting] Button. Some confirmation dialog boxes may be displayed. Check the messages and press appropriate buttons.

4) Comm. Setting Dialog Box will be displayed. Click [SERIALA] on the tree in the left-side pane.
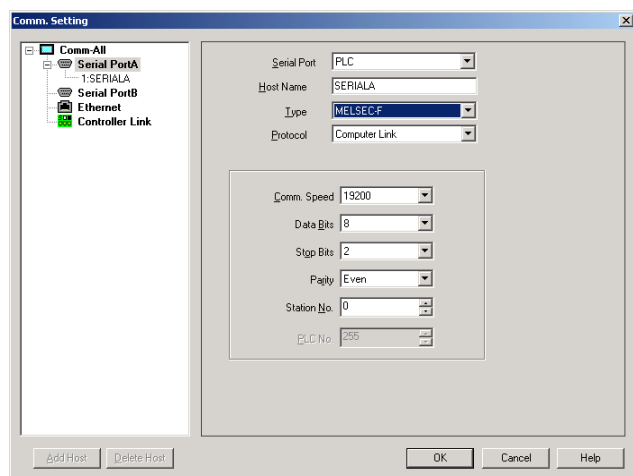
5) Set the [Type] to [MELSEC-F] on the right screen.

6) Check that [Protocol] is set to [Computer Link], and set Comm. Speed, Data Bits, Stop Bits, Parity and Station No. Set those settings to the same values as the communication setting of the FX Series sequencer to be connected to the PT.

When you use a PLC other than Mitsubishi FX Series, necessary setting items will be displayed in accordance with the PLC type. For details on settings, refer to each PLC chapter.

7) Press [OK] Button. Some confirmation dialog boxes may be displayed. Check the messages and press [OK] or [Yes] Button.

14

With the procedures above, the preparations for creating screens are completed. Now you can create screens using extensive ranges of functional objects including lamps, buttons.

For the general usages of CX-Designer and the method of transferring screen data to a PT, refer to CX-Designer User's Manual, CX-Designer Introduction Guide and CX-Designer Online Help.
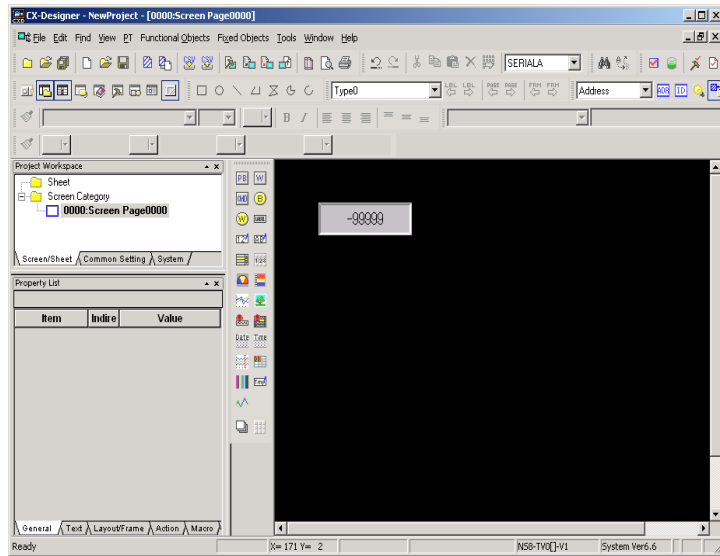
1-3 Restrictions and notes on connecting non-OMRON PLCs

Please read the following restrictions and notes carefully and make sure them when you connect non-OMRON PLC to NS-series PT.   Here, only general restrictions and notes are provided.   For instructions of each PLC, refer to the chapter that describes each vendor's PLC.

1-3-1 Notes and Restrictions When Changing Host Types

When converting host type using "Comm. Setting" Dialog Box, please pay attention to the following.

1) When any addresses of the host before converting are already used, host types can be converted only between OMRON PLCs and non-OMRON PLCs.   Conversion between non-OMRON PLCs is not allowed.

2) When host type being converted, addresses are automatically converted by predetermined rule. Details of the rule are described in the chapter of each PLC.

3) When addresses being converted automatically, addresses which cannot be mapped to new PLC 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 Address".

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.

Note: Conversion of host type is allowed with no restrictions if you do not use any addresses of converting host. But, the dialog like right may be displayed if you have once used some addresses of the converting host and removed them after that.
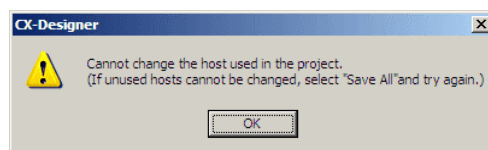
In such case, execute "Find Unused Symbols" function on "Symbol Table" window, then, try again.

To know for which objects the host addresses are used, select Find Menu – Address Cross Reference.

1-3-2 Restrictions on macro functions

The following macro functions cannot be executed with non-OMRON PLCs.

・ READHOSTB
・ READHOSTW
・ WRITEHOSTB
・ WRITEHOSTW

1-3-3 Differences of data format in each PLC, and restrictions caused by them

Data format depends on the PLC type. For such reason, be careful when using macro functions that read/write data from/to non-OMRON PLCs.

For details on each PLC, refer to "Data format" and "Notes" sections in the corresponding chapters of each PLC.

1-3-4 Restriction on using functions monitoring a large number of addresses

When connecting to non-OMRON 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 PLC.

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.

1-3-5 Notes for using RS-232C of NSH-Series PTs

Use the cable NSH 5-232UL-[]M for connecting NSH-Series PT and non-OMRON PLC. If NSH 5-232CW-[]M is used, an NSH-Series PT cannot communicate with the host which uses RS/CS signals.

1-3-6 Notes for using RS-232C of NSH-Series PTs

With NSH-Series PT Function Switches that notify ON/OFF of contact by communicating, addresses for non-OMRON devices cannot be allocated to Key Status Monitor Address.

Chapter 2.   Connecting to Mitsubishi A sequencers

Applicable CX-Designer Version	V2.00 or later

Applicable NS System Version	V6.60 or later

2-1 Compatible sequencers

2-1-1 Supported sequencer models

The following sets of sequencer and computer link unit are supported.

A1SHCPU   +   A1SJ71UC24-R□   or   A1SJ71UC24-PRF

A2USCPU   +   A1SJ71UC24-R□   or   A1SJ71UC24-PRF

A2USHCPU-S1 +   A1SJ71UC24-R□   or   A1SJ71UC24-PRF

A2ACPU   +   AJ71UC24

2-1-2 Protocol

Computer Link is supported.

2-1-3 Topology

1 to 1 connection is supported.

2-2 Connection configuration

2-2-1 Overview of connection method

Connect NS-Series PT to Mitsubishi A Series as illustrated below. Make cable according to the connection diagram. For detailed information of cables, please refer to "2-3 Communication Cable"
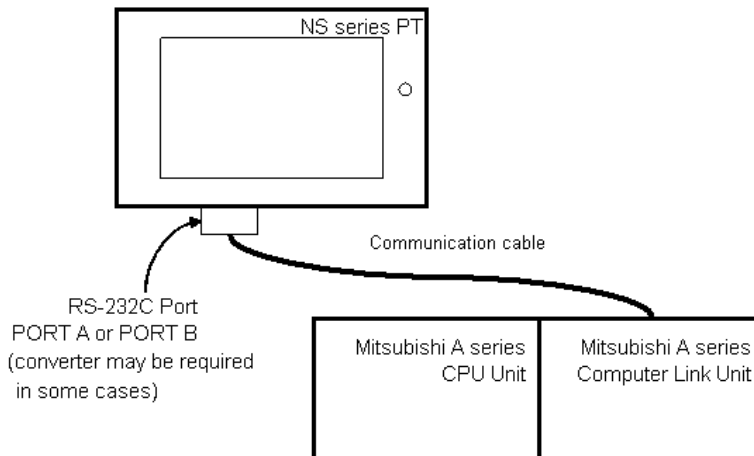
2-2-2 Communication setting for sequencers

Make the following communication settings with a sequencer. For the setting methods, refer to your programming tool's or your sequencer's manual.

Protocol:	Dedicated protocol (Form 1)
Data bit:	Set the same value as set for the communication setting's Data Bits of the PT.
Parity:	Set the same value as set for the communication setting's Parity of the PT.
Stop bit:	Set the same value as set for the communication setting's Stop Bits of the PT.
Transmission speed:	Set the same value as set for the communication setting's Comm. Speed of the PT.
Sum check:	YES (ON)
Station number setting:	Set the same value as set for the communication setting's Station No. of the PT.

2-2-3 Communication setting for NS project (screen data)

1) Click [PT] Menu ― [Communication Setting...].
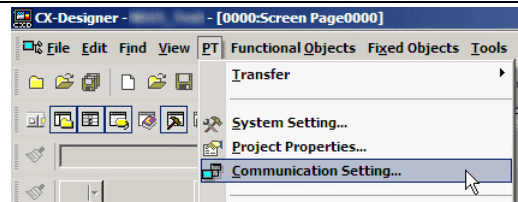
2) "Comm. Setting" dialog will be displayed. Click "Serial Port A" or "Serial Port B" which you want to connect A series sequencer, and configure it on right-side pane.
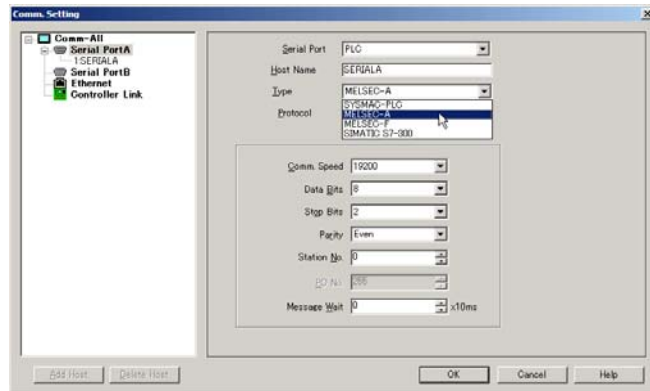
Set [Serial Port] to [PLC], [Type] to [MELSEC-A], and [Protocol] to [Computer Link].

The smaller the [Message Wait], the faster the communications. However, the allowable minimum value depends on the connection configuration. For details, refer to manuals for the sequencer computer link. For details on other setting items, refer to "2-2-2 Communication setting for sequencers" and make settings depending on sequencer settings.

3) Click [OK] to apply configuration.

20

2-3 Communication Cable

2-3-1 For NS-series PTs excluding NSH-series PTs

In case 9 pin RS-232C interface on the computer link unit is used

Make cable according to the connection diagram below. Bold line with an asterisk mark ('*') can be omitted when the computer link unit is configured not to check CD signal.

PT Serial Port (excluding NSH)					Mitsubishi A series Computer Link Unit (RS-232C, 9pin)		
Connector	Signal	Pin No.			Pin No.	Signal	Connector
D-Sub 9 pin Male	FG	1		*	1	CD	D-Sub 9 pin Male
	SD	2			2	RD	
	RD	3			3	SD	
	RS	4			4	DTR	
	CS	5			5	SG	
	+5V	6			6	DSR	
		7			7	RS	
		8			8	CS	
	SG	9			9		
	Hood		Shield			Hood	
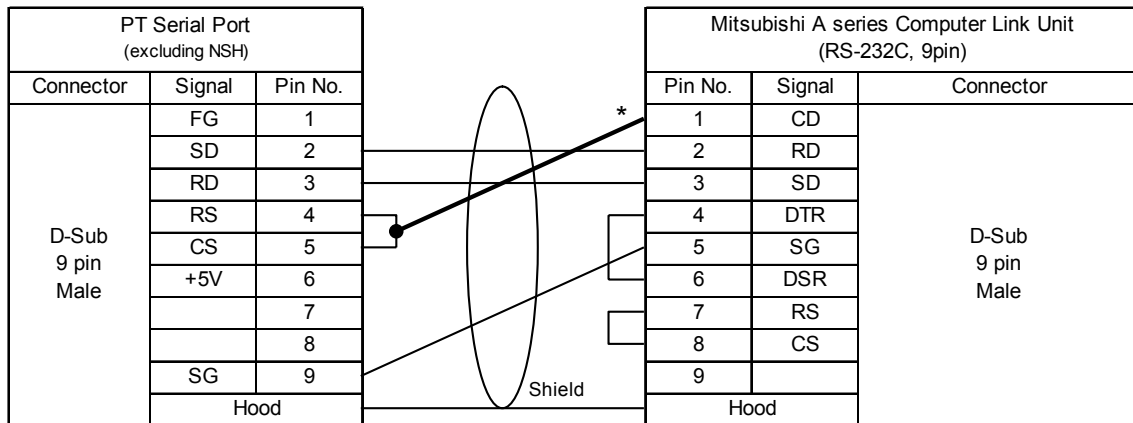
In case RS-422/485 interface on the computer link unit is used

To communicate using RS-422/485 type of Computer Link unit, the PT requires an RS-232C/RS-422A Converter (OMRON NS-AL002, NT-AL001 or CJ1W-CIF11). Applicable cable is as illustrated below.

Connect cable to the Converter, then mount it on a serial port of the NS (Be sure to complete the connection before mounting the Converter on the PT).

Set the dip switch of NS-AL002 to 4-wire and enable terminator if necessary (see also NS-AL002's instruction sheet).

RS-232C/RS-422A Converter model NS-AL002					Mitsubishi A Series Computer Link Unit (RS-422)	
Connector	Signal	No.			Signal	Connector
RS-422A Terminal block	FG	1				
	RDB(+)	2			RDA(+)	Terminal block
	SDB(+)	3			RDB(-)	
	RSB(+)	4			SDA(+)	
		5			SDB(-)	
	RDA(-)	6			SG	
	SDA(-)	7			FG	
	RSA(-)	8	Shield			

* Connect to FG which is class D grounded.
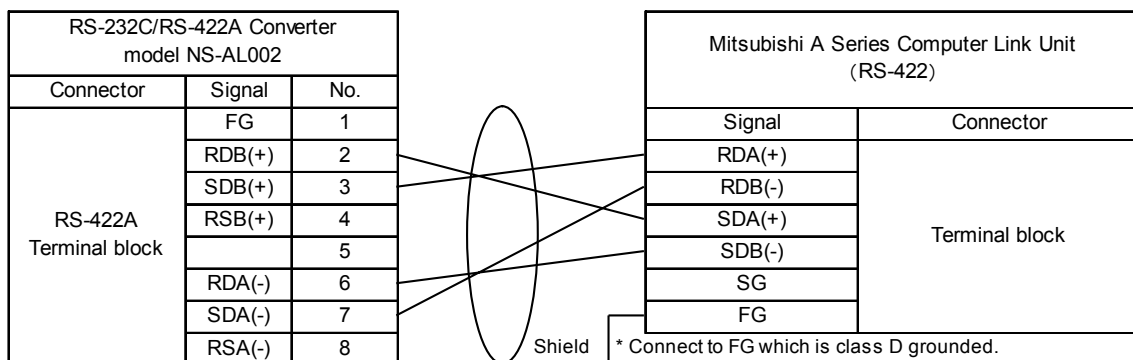
If NS cannot be grounded for some reason, shield wire also needs to be connected to FG of NS-AL002.

2-3-2 For NSH-Series PTs

In case 9 pin RS-232C interface on the computer link unit is used

Use the NSH 5-232UL-[]M cable for NSH-Series, and connect its D-Sub connector to the computer link unit using the cable below.

Loopback connecters are mounted on the CN7 and CN8 connecters of the NSH cable. Remove the connecters and connect the CN7 and CN8.

NSH special cable (NSH5-232UL-[]M)				Mitsubishi A series Computer Link Unit (RS-232C, 9pin)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
D-Sub 9 pin Female (Screw mm, Female)	FG	1		1	CD	D-Sub 9 pin Male
	RD	2		2	RD	
	SD	3		3	SD	
	CS	4		4	DTR	
	RS	5		5	SG	
	+5V	6		6	DSR	
		7		7	RS	
		8		8	CS	
	SG	9		9		
Hood				Hood		
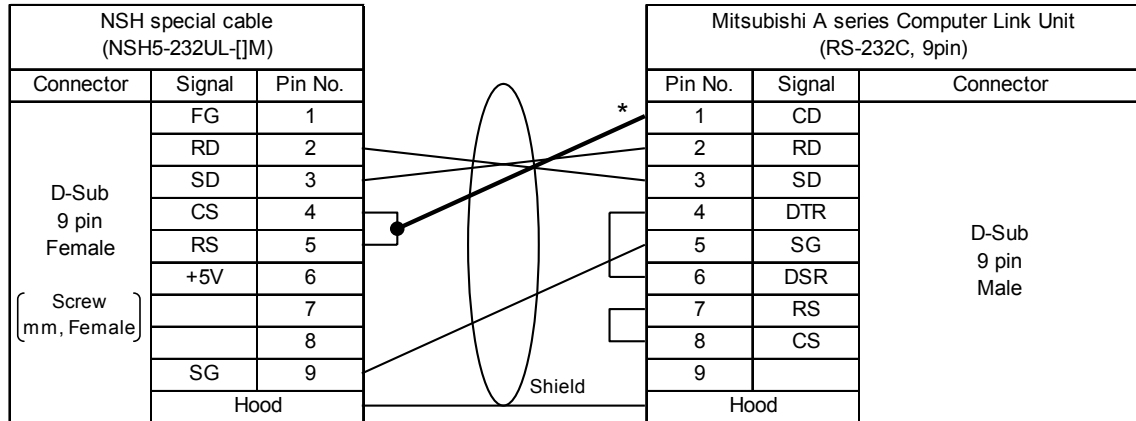
In case RS-422/485 interface on the computer link unit is used

Use the NSH 5-422UL-10M cable for NSH-Series, and wire as follows. Enable NSH-Series and computer link unit's terminating resistor if necessary.

NSH Special Cable (NSH5-422UL-10M)		Mitsubishi A Series Computer Link Unit (RS-422)	
Forked loose wires		Signal	Connector
SDB(+)		RDA(+)	Terminal block
SDA(-)		RDB(-)	
RDB(+)		SDA(+)	
RDA(-)		SDB(-)	
		SG	
FG		FG*	

* Connect to FG which is class D grounded.
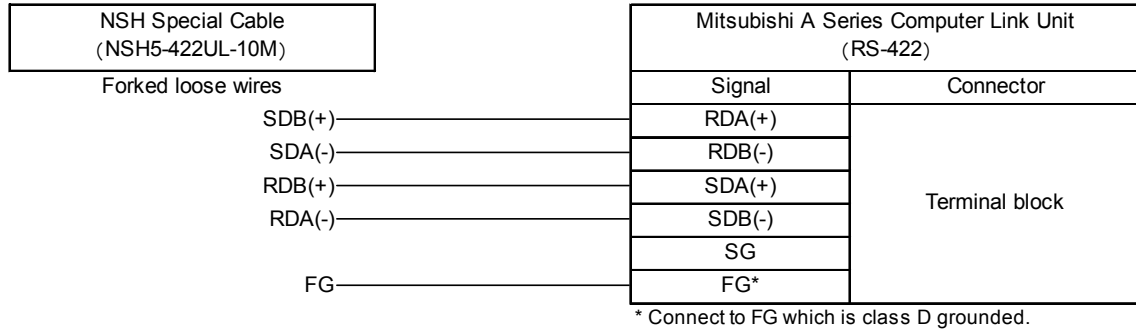
2-4 Accessible address range

Screen data can access the following addresses of A series sequencer. The devices with YES in the table can be accessed with all range of devices' numbers that your sequencer supports. Read carefully the restrictions and notes below the table.

Device		Word Access		Bit Access		Restrictions and Notes
		Read	Write	Read	Write	
X	Input	YES	YES	YES	YES	1) 2) 3) 5)
Y	Output	YES	YES	YES	YES	1) 2) 3) 5)
M	Auxiliary Relay	YES	YES	YES	YES	1) 2) 3) 4) 5) 7)
L	Latch relay	YES	YES	YES	YES	1) 2) 3) 4) 5)
S	Step relay	YES	YES	YES	YES	1) 2) 3) 4) 5)
B	Link relay	YES	YES	YES	YES	1) 2) 3) 5)
F	Annunciator	YES	YES	YES	YES	1) 2) 3) 5)
TU	Timer contact	No	No	YES	YES	1) 2) 3) 9)
TC	Timer coil	No	No	YES	YES	1) 2) 3)
CU	Counter contact	No	No	YES	YES	1) 2) 3) 9)
CC	Counter coil	No	No	YES	YES	1) 2) 3)
D	Data register	YES	YES	YES	YES	1) 2) 3) 6)
W	Link register	YES	YES	YES	YES	1) 2) 3) 6)
R	File register	YES	YES	YES	YES	1) 2) 3) 6)
xxR	Extension file register	YES	YES	YES	YES	1) 2) 3) 6) 10)
T	Timer	YES	YES	No	No	1) 2) 3) 8)
C	Counter	YES	YES	No	No	1) 2) 3) 8)

Restrictions and Notes

1) If "writing operation during run" is disabled, any writing operations are rejected regardless of the table above during the sequencer running.

2) Do not use the device numbers that your sequencer does not support. If screen data that contains unsupported device numbers are operated, an error dialog box like

right will be displayed (error code may be different). When you use objects that occupy large size of memory (such as string display & input objects), please pay an extra attention not to use unsupported device numbers.

3) Avoid that both PT and sequencer write data to the same address. Otherwise, the
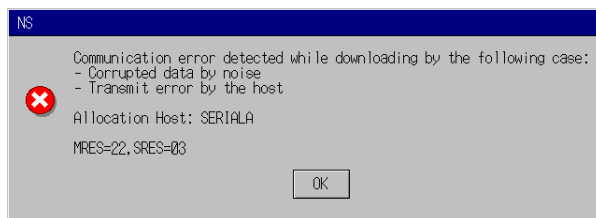
value changes that are made by a sequencer may be lost when a sequencer rewrites word that contains bits which PT is also going to rewrite.

This is because bit writing for word devices is implemented by reading 1 word that contains those bits and then writing it back to the sequencer.

4) M, L, and S share same area and any device number of M, L and S can be accessed with any device name of M, L and S. However, please avoid accessing same address with different notation, because it makes communication slower.

5) Bit device can be specified where word device is usually specified (except for Timer contact and Counter contact). In this case, only addresses that are divisible by 16 can be specified, and address number must be suffixed by 'W', which means word access. For example, addresses such as X0W, Y10W, S16W and M224W can be specified for Numeral Display & Inputs object.

Make sure that device numbers of X, Y, and B are noted by hexadecimal. Therefore, addresses such as X0, X10, X20, X30 and X100 etc. are divisible by 16. Please note that X16 and X32 are not divisible by 16.

6) Word devices can be specified into address input columns where bit device is usually specified. To do so, suffix a period to the device number and specify the bit position (0 to 15) after that. For example, D123.12 can be specified for a display address of a bit lamp.

7) Even M8992~8999 and M9256~9263 do not exist, word access from M8992 and M9248 are exceptionally accepted. When reading, not existing addresses are always 0.   When writing, they are ignored.

8) Do not allocate devices T and C to the String Display & Input object.

9) When specifying "Timer contact" or "Counter contact" on CX-Designer, use "TU" or "CU" as a device name.

10) Expansion file register (00R~64R) can be used.   To specify device numbers of them, write "R<block #>_<device #>" (e.g. "R04_00012").

2-5 Data format

2-5-1 Numerics

NS treats the numeric data stored in A sequencer as little-endianed.

For example, when 16bit integer value 0x1234 is written into D0 from NS, sequencer's memory becomes like right.

Address	D0															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x1234															

Another example, 32bit integer value 0x12345678 is written, sequencer's memory becomes like below.

Address	D0																D1															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	0	1	1	1	1	0	0	1	1	0	1	0	1	0	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x5678																0x1234															

Even when NS accesses bit devices as a word device, the rule is as same as above.   For example, when the status of M device is like right, M0W becomes 0x1234.

Device	M															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x1234															

2-5-2 Strings

ASCII String

For example, when an ASCII string "ABCDEF" is written from NS, sequencer's memory becomes like right.

Address	D0	D1	D2	D3
Value(char)	"AB"	"CD"	"EF"	NULL NULL
Value(hex)	0x4241	0x4443	0x4645	0x0000

Please make sure that NS handles string data by 1 word. So when the length of the string is even, two byte of null characters will be appended.

Unicode String

For example, when a Unicode string "ABCDEF" is written from NS, sequencer's memory becomes like below.

Address	D0	D1	D2	D3	D4	D5	D6
Value(char)	A	B	C	D	E	F	NULL
Value(hex)	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0000

2-6 Address conversion when converting host type

In case host type is converted between OMRON PLC

When host type is converted between SYSMAC PLC and A series PLC, address types (areas / devices) are automatically converted according to the table shown right (see the figure below).

SYSMAC PLC CS, CJ, etc…	MELSEC-A A Series sequencer
CIO	M
HR	L
AR	—
LR	B
TIM	T
CNT	C
DM	D
WR	W
EM	—
EM0~EMC	—
TU	TU
CU	CU
—	X
—	Y
—	F
—	S
—	R
—	xxR
—	TC
—	CC
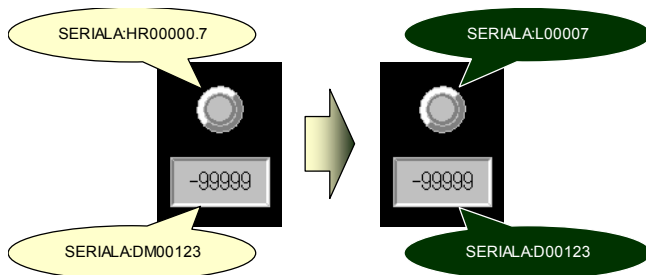
"—" in the right table means those addresses cannot be mapped to new PLC's address, so they will not be converted. This may cause invalid addresses (see the figure below), so you have to modify such invalid addresses by yourself. See "1-3-1 Notes and Restrictions When Changing Host Type" for how to find and modify them.

Note: Address numbers will be converted to make their bit offsets equal. For example, HR00003.12 is the 60th bit (60=16×3+12), so will be converted to L00060.
The opposite is same. L00080W of MELSEC-A will be converted to HR00005 of SYSMAC, and L00084 to HR00005.4.

2-7 Precautions

See also instructions shown in "2-3 Communication Cable".

2-7-1 Macro functions

Precaution of Macro function (READCMEM/WRITECMEM)

Data length that can be read/written at once with READCMEM/WRITECMEM depends on your sequencer and computer link unit. Please see Mitsubishi's manuals that describe details of computer link. The limitation will be written as "Number of points processed in one-time update" in those manuals.

If too large data length is specified, a macro error will occur.

Precaution when handling ASCII string with macro function

Because of the difference of ASCII string format between NS and A series sequencer, byte-order must be changed after reading ASCII string by READCMEM and before writing by WRITECMEM. Otherwise, strange strings will be seen on NS or A.

When reading 64 bytes length of ASCII string from sequencer's D0 to NS's $W1000, program as follows (adapt `mitsubishi_a_hostname` to your environment).

```
READCMEM($W1000,[mitsubishi_a_hostname:D00000],32);
SWAP($W1000,32);
```

Note : Some models of sequencer rejects 32 words reading command. In such a case, please divide 32 words into some pieces, and execute READCMEM some times.

When writing 64 bytes length of ASCII string from NS's $W1000 to FX's D0, program as follows (adapt `mitsubishi_a_hostname` to your environment). The program below first changes the byte-order to sequencer's format, then writes it to sequencer, and finally re-changes to NS-format.

```
SWAP($W1000,32);
WRITECMEM([mitsubishi_a_hostname:D00000],$W1000,32);
SWAP($W1000,32);
```

Note : Some models of sequencer rejects 32 words writing command. In such a case, please divide 32 words into some pieces, and execute WRITECMEM some times.

Chapter 3.　Connecting to Mitsubishi FX sequencers

Applicable CX-Designer Version	V2.00 or later

Applicable NS System Version	V6.60 or later

3-1　Compatible sequencers

3-1-1　Supported sequencer models

The following sequencers are supported.

・ FX0N

・ FX1S

・ FX1N

・ FX1NC

・ FX2N

・ FX3UC

3-1-2　Protocol

Computer Link is supported. Use a communication expansion board or communication expansion unit when necessary. For further information, refer to "3-2 Connection configuration."

3-1-3　Topology

1 to 1 connection is supported.

3-2 Connection configuration

3-2-1 Overview of connection method

Connect NS-series PT to Mitsubishi FX Series as illustrated below. Use a recommended model of cable or make cable according to the connection diagram. For detailed information of cables, please refer to "3-3 Communication cable"
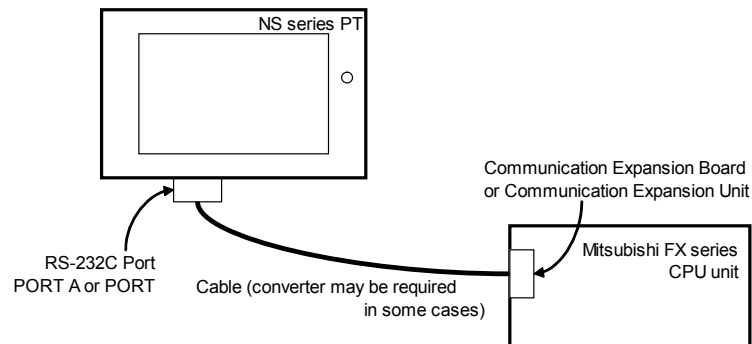
3-2-2 Communication setting for sequencers

Make the following communication settings with a sequencer. For the setting methods, refer to your programming tool's or your sequencer's manual.

Protocol: Dedicated protocol (Computer Link)

Data length: Set the same value as set for the communication setting's Data Bits of the PT.

Parity: Set the same value as set for the communication setting's Parity of the PT.

Stop bit: Set the same value as set for the communication setting's Stop Bits of the PT.

Transmission speed: Set the same value as set for the communication setting's Comm. Speed of the PT.

Sum check: ON (YES)

Transmission control procedure: Form1 (without CR,LF)

Station number setting: Set the same value as set for the communication setting's Station No. of the PT.

3-2-3 Communication setting for NS project (screen data)
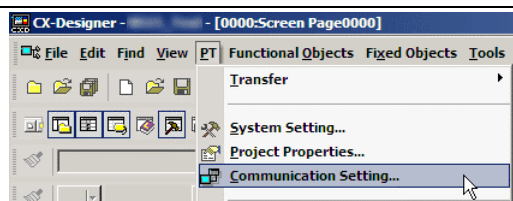
1) Click [PT] — [Communication Setting…].

2) "Comm. Setting" dialog will be displayed. Click "Serial Port A" or "Serial Port B" which you want to connect FX series sequencer, and configure it on right-side pane. Set [Serial Port] to [PLC], [Type] to [MELSEC-F], and [Protocol] to [Computer Link]. For other
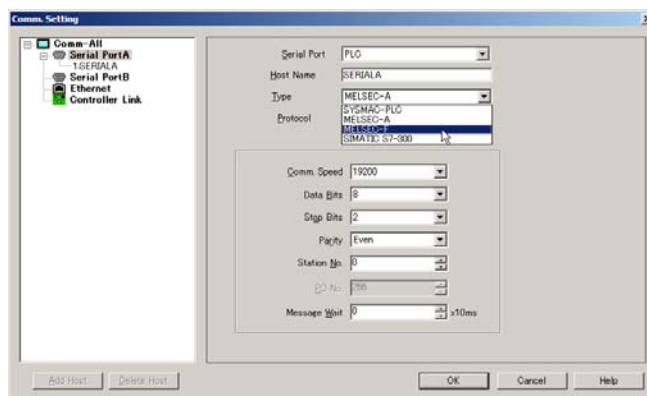
settings, refer to "3-2-2 Communication setting for sequencers" and make settings according to the settings for sequencer. The smaller the Message Wait is set, the faster communications is done. But the allowable minimum setting value depends on the connection configuration. For details, refer to manuals for your sequencer.

3) Click [OK] to apply configuration.

3-3 Communication cable

An applicable communication cable depends on the communication method of Serial communication expansion board and the adapter. Prepare a cable applicable to your configuration.

3-3-1 For NS-series PTs excluding NSH-series PTs

In case 9 pin RS-232C Communication expansion board (FX[][]-232-BD) or
9 pin RS-232C Communication special adapter (FX3U-232-ADP, FX2NC-232ADP) is used

Make cable according to the connection diagram below.

PT Serial Port (for excluding NSH)				FX series Communication expansion board or Communication special unit		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
D-Sub 9 pin Male	FG	1		1	CD	D-Sub 9 pin Female
	SD	2		2	RD	
	RD	3		3	SD	
	RS	4		4	ER	
	CS	5		5	SG	
	+5V	6		6	DR	
		7		7		
		8		8		
	SG	9		9		
Hood			Shield	Hood		
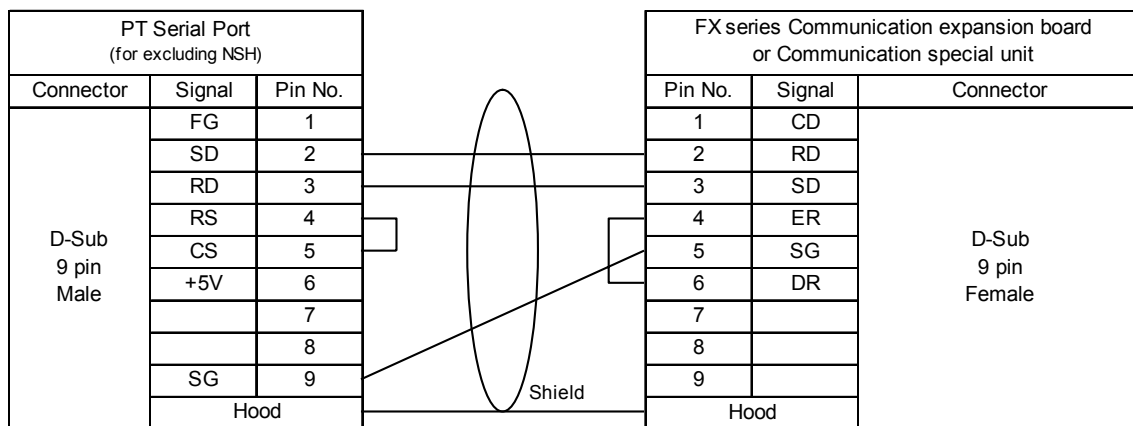
OMRON XW2Z-S002 (2m long) cable is also applicable.　Even cable connection of XW2Z-S002 is not same as the connection diagram above, it is applicable because both NS and FX do not check control signals.

In case 25 pin RS-232C Communication special adapter (FX0N-232-ADP) is used

Follow the connection diagram below.

PT Serial Port (for excluding NSH)				FX series Communication special adapter (25 pin type)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
D-Sub 9 pin Male	FG	1		1	FG	D-Sub 25 pin Male
	SD	2		2	SD	
	RD	3		3	RD	
	RS	4		4	RS	
	CS	5		5	CS	
	+5V	6		6	DR	
		7		7	SG	
		8				
	SG	9		20	ER	
Hood			Shield	Hood		
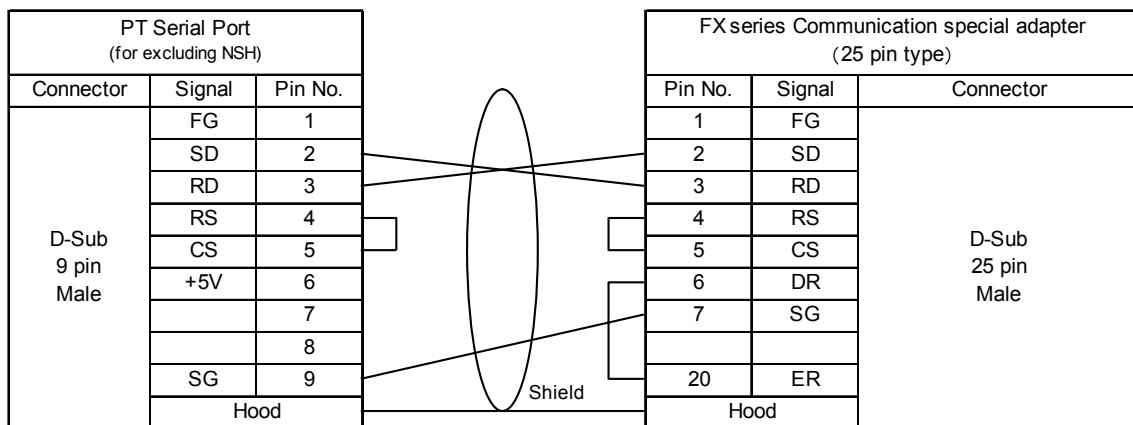
In case RS-485 Communication expansion board or Communication special unit is used

To communicate using RS-485 Communication expansion board or Communication special unit on a sequencer, the PT requires an RS-232C/RS-422A Converter (OMRON NS-AL002). Applicable cable is as illustrated below. Connect cable to NS-AL002, then mount it on a serial port of the NS (Be sure to complete the connection before mounting a NS-AL002 on a PT).

Set the dip switch of NS-AL002 to 4-wire and enable terminator if necessary (see also NS-AL002's instruction sheet). Enable the terminating resistance on the NS-AL002 when necessary. (To enable the terminating resistance, turn ON the DIP switch 4.)
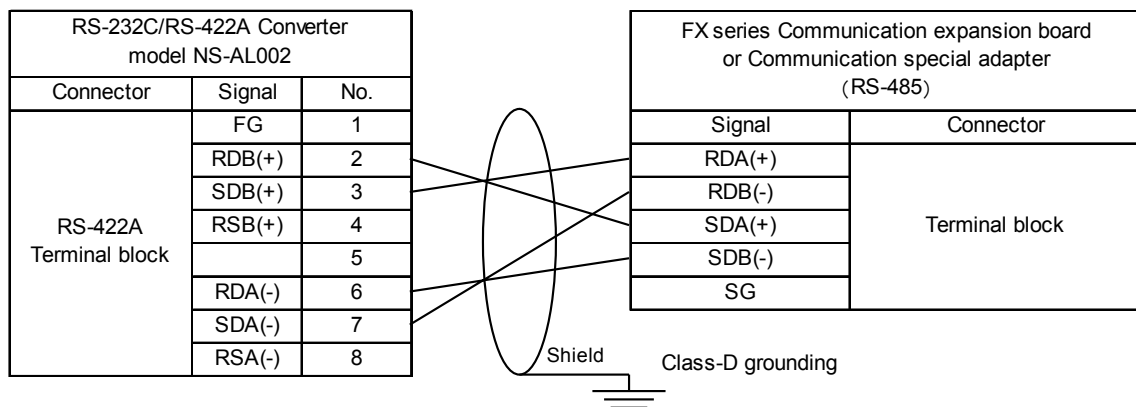
RS-232C/RS-422A Converter model NS-AL002				FX series Communication expansion board or Communication special adapter （RS-485）	
Connector	Signal	No.		Signal	Connector
RS-422A Terminal block	FG	1			
	RDB(+)	2		RDA(+)	Terminal block
	SDB(+)	3		RDB(-)	
	RSB(+)	4		SDA(+)	
		5		SDB(-)	
	RDA(-)	6		SG	
	SDA(-)	7			
	RSA(-)	8			

Shield   Class-D grounding

If NS cannot be grounded for some reason, shield wire also needs to be connected to FG of NS-AL002.

3-3-2 For NSH-Series PTs

In case 9 pin RS-232C Communication expansion board (FX[][]-232-BD) or
9 pin RS-232C Communication special adapter (FX3U-232-ADP, FX2NC-232ADP) is used

Use the NSH 5-232UL-[]M cable for NSH-Series, and connect its D-Sub connector to the computer link unit using the cable below.

NSH special cable (NSH5-232UL-[]M)				FX series Communication expansion board or Communication special unit		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
	FG	1		1	CD	
	RD	2		2	RD	
D-Sub	SD	3		3	SD	
9 pin	CS	4		4	ER	
Female	RS	5		5	SG	D-Sub
	+5V	6		6	DR	9 pin
Screw		7		7		Female
(mm, Female)		8		8		
	SG	9		9		
	Hood		Shield		Hood	

In case 25 pin RS-232C Communication special adapter (FX0N-232-ADP) is used

Use the NSH 5-232UL-[]M cable for NSH-Series, and connect its D-Sub connector to the computer link unit using the cable below.

NSH special cable (NSH5-232UL-[]M)				FX series Communication special adapter (25 pin type)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
	FG	1		1	FG	
	RD	2		2	SD	
D-Sub	SD	3		3	RD	
9 pin	CS	4		4	RS	
Female	RS	5		5	CS	D-Sub
	+5V	6		6	DR	25 pin
Screw		7		7	SG	Male
(mm, Female)		8				
	SG	9		20	ER	
	Hood		Shield		Hood	
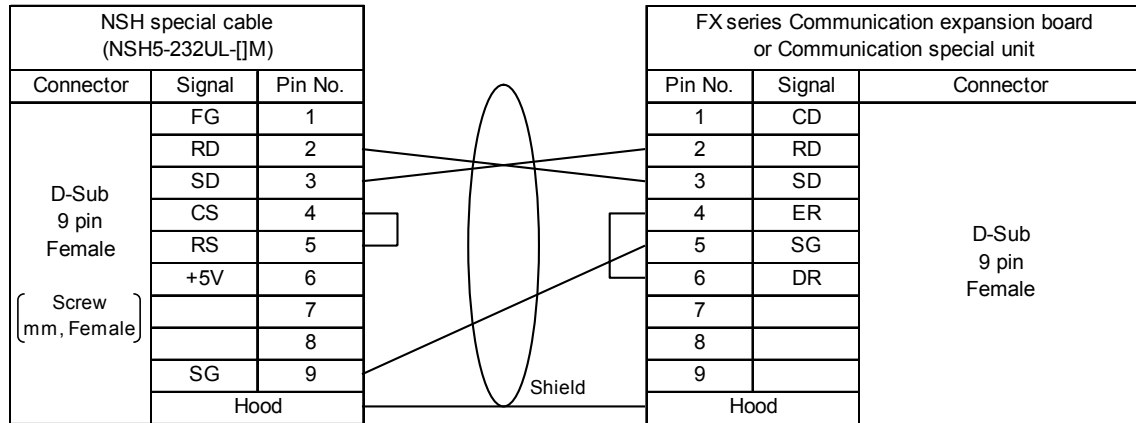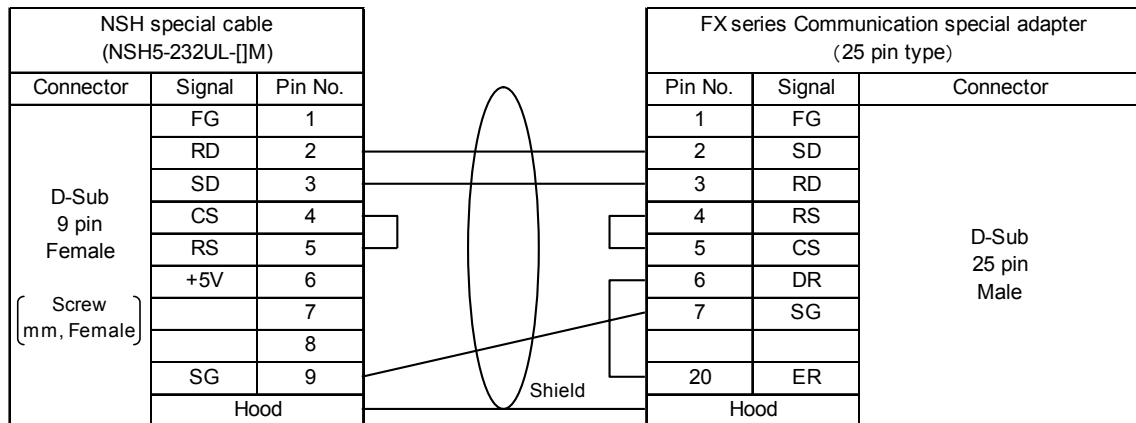
In case RS-485 Communication expansion board or Communication special unit is used

Use the NSH 422UL-10M cable for NSH-Series, and connect its loose wires with forked terminal to the communication expansion board. Enable NSH-Series and communication expansion board/adapter's terminating resistor if necessary.

Please cut fork terminals if you do not need them.

NSH Special Cable (NSH5-422UL-10M)	FX series Communication expansion board or Communication special adapter (RS-485)	
Forked loose wires	Signal	Connector
SDB(+)	RDA(+)	
SDA(-)	RDB(-)	
RDB(+)	SDA(+)	Terminal block
RDA(-)	SDB(-)	
	SG	
FG	FG*	

* Connect to FG which is class D grounded.
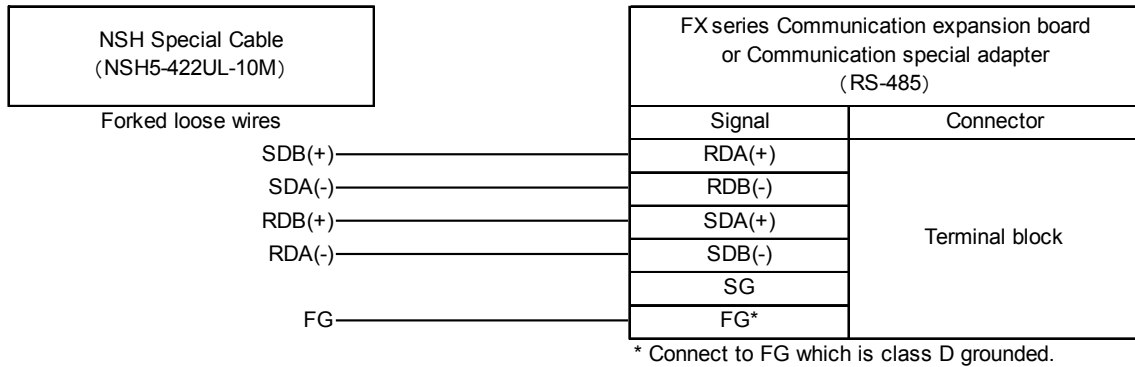
3-4 Accessible address range

When Mitsubishi FX Series is used as a host, screen data can access the following addresses. The devices with YES in the table can be accessed with all range of devices' numbers that your sequencer supports. Read carefully the Instructions below the table.

Device [1]	Word access		Bit access	
	Read	Write	Read	Write
D [6]	YES	YES	YES [3] [4]	YES [3] [4]
M [6]	YES [2]	YES [2]	YES	YES
T (Timer current value) [7]	YES	YES	No	No
T (Timer contact) [8]	No	No	YES	YES
C (Counter current value) [7] [9] [10]	YES	YES	No	No
C (Counter contact) [8]	No	No	YES	YES
X	YES [2]	YES [2]	YES	YES
Y	YES [2]	YES [2]	YES	YES
S	YES [2] [5]	YES [2] [5]	YES	YES
R	YES	YES	YES [3] [4]	YES [3] [4]

Instructions

1) Do not use the device numbers that your sequencer does not support. If screen data that contain those unsupported device numbers are operated, an error dialog box to the
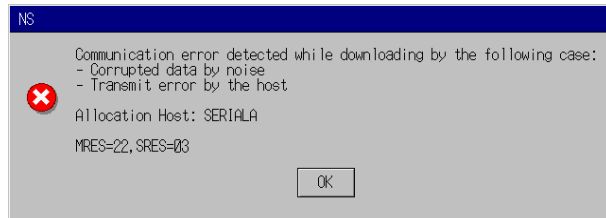
right will be displayed (error code may be different). When you use objects that occupy large size of memory (such as string display & input objects), please pay an extra attention not to use unsupported device numbers.

2) Bit device can be specified where word device is usually specified (Except for Timer contact and Counter contact). In this case, only addresses that are divisible by 16 can be specified, and address number must be suffixed by 'W', which means word access. For example, addresses such as X0W, Y20W, S16W and M224W can be specified for Numeral Display & Inputs object.

Note that device numbers of X and Y are octal notation. Therefore addresses such as X0, X20, X40, X60 and X100 etc. are divisible by 16. Please note that X16 and X32 are not divisible by 16.

3) Word devices can be specified into address input columns where bit device is usually specified. To do so, suffix a period to the device number and specify the bit position

after that (0 to 15). For example, D123.12 can be specified for a display address of a bit lamp.

4) Avoid that both PT and sequencer write data to the same address. Otherwise, the value changes that are made by a sequencer may be lost when a sequencer rewrites word that contains bits which PT is also going to rewrite.
This is because bit writing is implemented by reading 1 word that contains those bits and then writing it back to the sequencer.

5) Exceptionally, word access from S992 is accepted for sequencer whose device S is up to 999. When reading, the higher 8 bits are always set to 0. When writing, lower 8 bits will be written to S992 to 999 and higher 8 bits will be ignored.

6) Each D and M has two types of areas — normal area (0 to 7999) and special area (8000 and above). These areas are internally treated as different devices. Therefore, make sure not to place functional objects which access across these ranges. Otherwise, errors will occur.
For example, if [Storage Type] is set to [UDINT (unsigned, 2 words)] for the Numeral Display & Input object and D7999 is specified for [Address], error occurs. Because this object reads data across D7999 and D8000. Also ensure that for the String Display & Input setting, the ends of areas in which strings are stored are not across the ranges.

7) Do not allocate devices T and C to the String Display & Input object.

8) Device name TU and CU are used in CX-Designer for the timer contact and the counter contact respectively.

9) If functional objects which access across the C199-C200 range are placed, error will occur when operating the project on PT.
For example, if a storage type is set to DINT (signed, 2 words) for the Numeral Display & Input and C199 is specified for an address, an error occurs, because this object reads data across C199 and C200.

10) When using 32 bit counters (C200 and above) for screen data, it is recommended that the setting be made to access as 2 words.
It is also possible to make a setting as 1 word. But in this case, when writing, a PT writes lower 16 bits and changes the higher 16 bits to 0.
For example, if the Storage Type is set to DINT or UDINT for the Numeral Display & Input object (Recommendation setting for when using 32 bits counter) a PT accesses a sequencer as 2 words. Please note that if the Storage Type is set to INT or UINT, not only higher 16 bits are ignored but also they are set to 0 when written.

3-5 Data format

3-5-1 Numerics

NS treats the numeric data stored in FX sequencer as little-endianed.

For example, when 16bit integer value 0x1234 is written into D0 from NS, sequencer's memory becomes like right.

Address	D0															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x1234															

Another example, 32bit integer value 0x12345678 is written, sequencer's memory becomes like below.

Address	D0																D1															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	0	1	1	1	1	0	0	1	1	0	1	0	1	0	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x5678																0x1234															

Even when NS accesses bit devices as a word device, the rule is as same as above. For example, when the status of M device is like above, M0W becomes 0x1234.

Device	M															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x1234															

3-5-2 Strings

ASCII String

For example, when an ASCII string "ABCDEF" is written from NS, sequencer's memory becomes like right.

Address	D0	D1	D2	D3
Value(char)	"AB"	"CD"	"EF"	NULL NULL
Value(hex)	0x4241	0x4443	0x4645	0x0000

Please make sure that NS handles string data by 1 word. So when the length of the string is even, two byte of null characters will be appended.

Unicode String

For example, when a Unicode string "ABCDEF" is written from NS, sequencer's memory becomes like below.

Address	D0	D1	D2	D3	D4	D5	D6
Value(char)	A	B	C	D	E	F	NULL
Value(hex)	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0000

3-6 Address conversion when converting host type

In case host type is converted between OMRON PLC

When host type is converted between SYSMAC PLC and FX series PLC, address types (areas / devices) are automatically converted according to the table shown right (see the figure below).
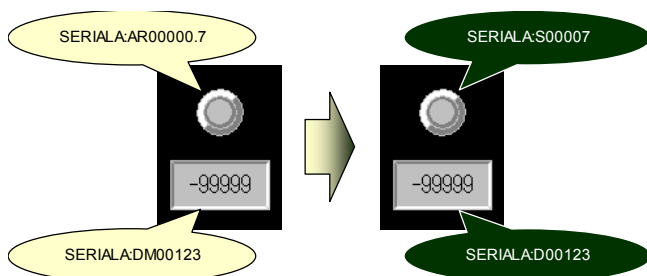
SYSMAC PLC CS, CJ, etc…	MELSEC-F FX Series sequencer
CIO	M
HR	—
AR	S
LR	—
TIM	T
CNT	C
DM	D
WR	—
EM	—
EM0~EMC	—
TU	TU
CU	CU
—	X
—	Y
—	R

"—" in the right table means those addresses cannot be mapped to new PLC's address, and they are not converted. This may cause invalid addresses (see the figure below), so please modify such invalid addresses by yourself. See "1-3-1 Notes and Restrictions When Changing Host Type" to know how to find and modify them.
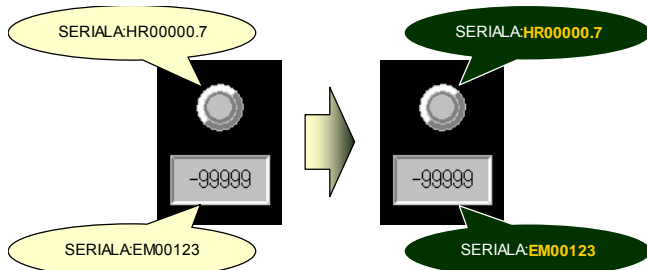
Note: Address numbers will be converted to make their bit offsets equal. For example, AR00003.12 is the 60th bit (60=16×3+12), so will be converted to S00060.
The opposite is same. S00080W of FX will be converted to AR00005 of SYSMAC, and S00084 to AR00005.4.

3-7 Precautions

See also instructions shown in "3-4 Accessible address range".

3-7-1 Macro Functions

Precaution of Macro function (READCMEM/WRITECMEM)

Data length that can be read/written at once with READCMEM/WRITECMEM is limited to the limitation of computer-link specification. It depends on model of sequencer, so please see Mitsubishi's manuals that describe details of computer-Link. The limitation will be written as "Number of points processed in one-time update" in those manual.

If too large data length is specified, a macro error will occur.

Precaution when handling ASCII string with macro function

Because of the difference of ASCII string format between NS and FX series sequencer, byte-order must be changed after reading ASCII string by READCMEM and before writing by WRITECMEM. Otherwise, strange strings will be seen on NS or FX.

When reading 64 bytes length of ASCII string from FX's D0 to NS's $W1000, program as follows (adapt `fx_hostname` to your environment).

```
READCMEM($W1000,[fx_hostname:D00000],32);
SWAP($W1000,32);
```

Note : Some models of sequencer rejects 32 words reading command. In such a case, please divide 32 words into some pieces, and execute READCMEM some times.

When writing 64 bytes length of ASCII string from NS's $W1000 to FX's D0, program as follows (adapt `fx_hostname` to your environment). The program below first changes the byte-order to FX-format, then writes it to FX, and finally re-changes to NS-format.

```
SWAP($W1000,32);
WRITECMEM([fx_hostname:D00000],$W1000,32);
SWAP($W1000,32);
```

Note : Some models of sequencer rejects 32 words writing command. In such a case, please divide 32 words into some pieces, and execute WRITECMEM some times.

Chapter 4.   Connecting to Siemens S7-300 PLCs

Applicable CX-Designer Version	V2.00 or later

Applicable NS System Version	V6.60 or later

4-1 Compatible PLCs

4-1-1 Supported PLC models

The following PLC models are supported.

- S7-300 CPU315-2 DP
- S7-300 CPU317-2 PN/DP

4-1-2 Protocol

The 3964(R) + Prodave HMI protocol is supported.   In order to connect, Siemens SIMATIC S7 HMI Adapter (order number: 6ES7 972-0CA11-0XA0) is required. For detailed information refer to "4-2 Connection configuration."

4-1-3 Topology

At the moment only a 1 to 1 connection is supported.

4-2 Connection configuration

4-2-1 Overview of connection method

Connect a PT to Siemens S7-300 series in the following methods. Make sure that Siemens SIMATIC S7 HMI Adapter (6ES7 972-0CA11-0XA0) or Renu Gateway MPI Adapter is required.

Use a recommended model of cable or make it yourself according to the connection diagram. For details on cables refer to "4-3 Applicable communication cable."
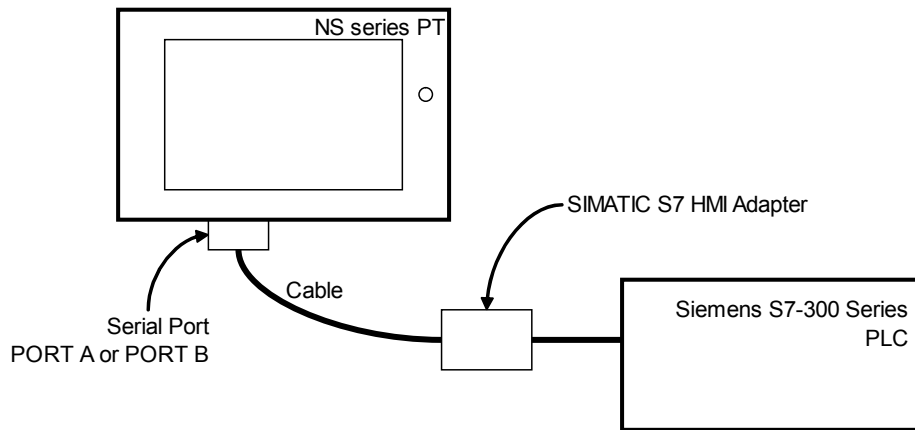
4-2-2　Communication setting for PLCs

　　Make the following communication settings to connect to the PLC. For more information on how to setup the communication of the S7 PLC, refer to your programming tool's or your PLC manual.

　　MPI Transmission speed:　　　Set to 187.5 kbps

4-2-3　Communication setting for NS project (screen data)
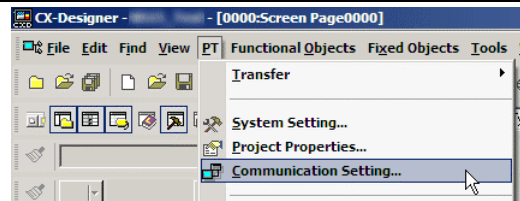
1) Click [PT] － [Communication Setting…].

2) "Comm. Setting" dialog will be displayed. Click "Serial Port A" or "Serial Port B" depending on the port you want to connect S7-300 series PLC, and configure it on right-side pane. Set [Serial Port] to [PLC], [Type] to [SIMATIC S7-300], and [Protocol] to [3964(R)]. Configure other settings according to your environment.
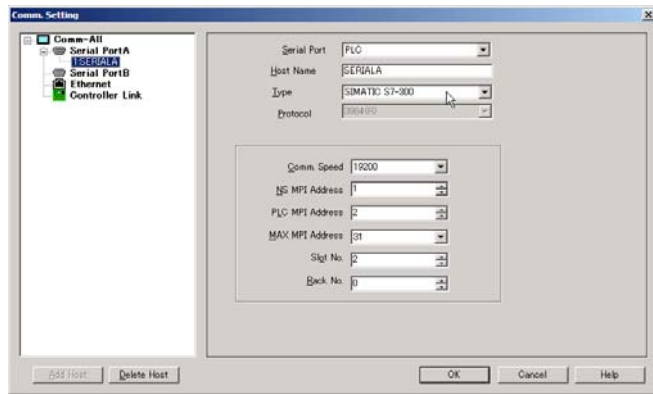
3) Click [OK] to apply configuration.

4-3 Applicable communication cable

Compatible cable depends on the combination of devices you use. Please use appropriate cable depending on the devices used.

4-3-1 For NS-series PTs excluding NSH-series PTs

OMRON XW2Z-S002 (2m long) cable is applicable.

When you make cables yourself, follow the connection diagram below.

PT Serial Port (for excluding NSH)				SIMATIC HMI Adapter		
Connector	Signal	Pin No.		Signal	Pin No.	Connector
	FG	1		CD	1	
	SD	2		RD	2	
	RD	3		SD	3	
	RS	4		ER	4	
D-Sub 9 pin Male	CS	5		SG	5	D-Sub 9 pin Female
	+5V	6		DR	6	
		7		RS	7	
		8		CS	8	
	SG	9		RI	9	
	Hood		Shield		Hood	
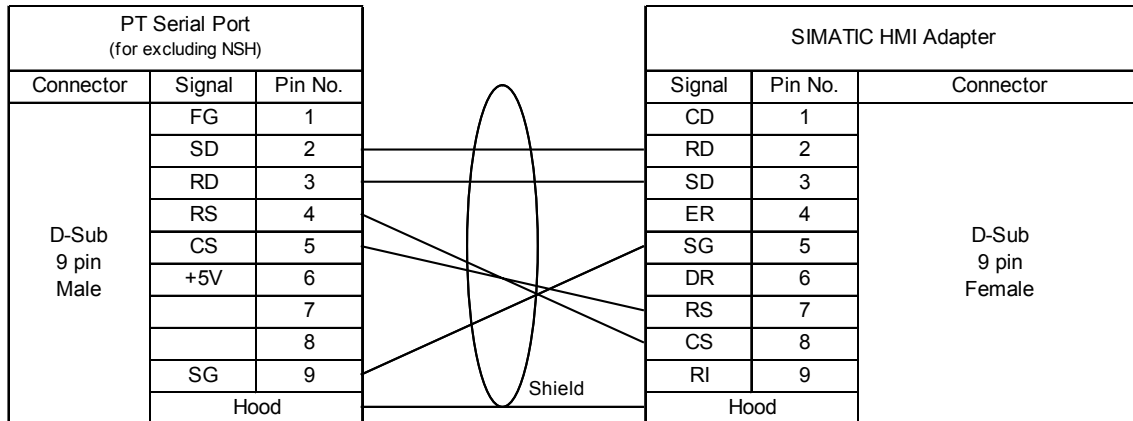
4-3-2 For NSH-Series series

Use NSH5-232UL-[]M and wire between D-Sub 9-pin connecter on the cable and the computer link unit.

Remove the loopback connecters are mounted on the CN7 and CN8. Then connect the CN7 and CN8.

NSH special cable (NSH5-232UL-[]M)				SIMATIC HMI Adapter		
Connector	Signal	Pin No.		Signal	Pin No.	Connector
	FG	1		CD	1	
	RD	2		RD	2	
D-Sub 9 pin Female	SD	3		SD	3	
	CS	4		ER	4	
	RS	5		SG	5	D-Sub 9 pin Female
	+5V	6		DR	6	
Screw (mm, Female)		7		RS	7	
		8		CS	8	
	SG	9		RI	9	
	Hood		Shield		Hood	
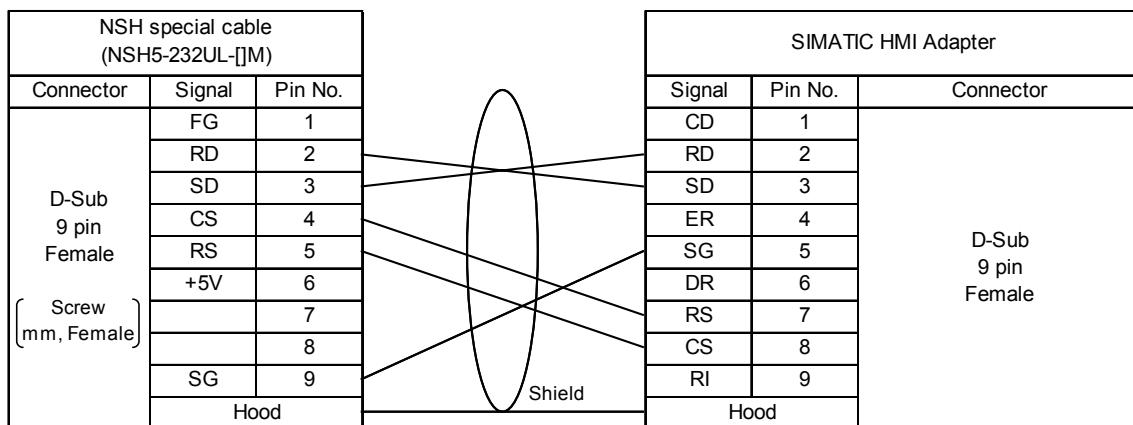
4-4 Accessible address range

When using Siemens S7-300 series as a host, accessible addresses in screen data are as follows. Devices with Yes in the following table can be used. Also read carefully the instructions below the table.

Address area name 1) (E, A, Z are German notation)	Double word access 3)		Word access		Bit access	
	Read	Write	Read	Write	Read	Write
I　(E)　2)	YES	No 5)	YES 3)	No 3)5)	YES	No 5)
Q　(A)　2)	YES	No 5)	YES 3)	No 3)5)	YES	No 5)
M	YES	YES	YES 3)	YES 3)	YES	YES
DB　　8)	YES	YES	YES 3)	YES 3)	YES	YES
T　　6)	No	No	YES	YES 6)	No	No
C　(Z)　2)7)	No	No	YES	YES 7)	No	No

Instructions

1) Do not use addresses that your PLC does not support. If you operate screen data that contains unsupported addresses, the error dialog box like right (error code

may be different) will be displayed, and it may also cause disturbances such as accessing unexpected memory area.
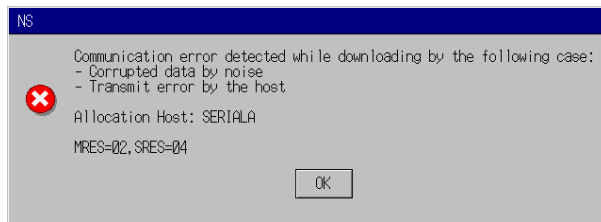
When using objects that occupy a large memory area such as the "string display & input" objects, make sure that the end address is within the range.

2) Only English notation is supported. Germany notation will be supported in future version.

3) Siemens PLC supports byte access, but PT does not.　But accessing 1 word from odd address is supported (address specification like "MW1" is accepted).

4) Even when accessing double word, specify W (word width) as an alphabet of access unit to add the end of the address range. For example, when accessing double word that starts with M0 in the Numeral Display & Input, specify 2 words width such as MW0 for the Address and UDINT and DINT for the Storage Type. Do not use D that stands for double word access.

5) I(E) and Q(A) are read-only. Do not place functional objects which write to these areas. When attempting to write to these areas, an error dialog box will be displayed.

6) When using T, make sure that invalid values as SIMATIC_TIME are not written.

44

When writing an invalid value, an error dialog box (error code may be different) will be displayed.

7) When using C, make sure that invalid values as COUNTER type cannot be written. When writing an invalid value, an error dialog like right (error code may be different) will be displayed.

```
NS                                                          ✕
    Addressing error exists in the screen, alarm, data log or macro.
     Correct address setting by the NS-Designer.
    Screen No.:3
 ❌ Allocation Host: SERIALA
    Allocation address:C00063
    MRES=21,SRES=03

              OK
```
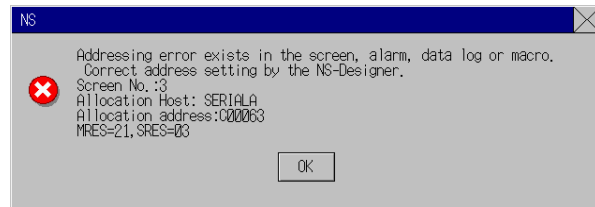
8) Do not use nonexistent datablock numbers.

4-5 Data format

4-5-1 Numerics

I, Q, M, DB area

NS treats the numeric data stored in S7-300 PLC as big-endianed.

For example, when 16bit integer value 0x1234 is written into MW0 from NS, PLC's memory becomes like right.

Address	M0								M1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Value	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0
Value(hex)	0x12								0x34							

Another example, 32bit integer value 0x12345678 is written, PLC's memory becomes like below.

Address	M0								M1								M2								M3							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Value	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0	0	1	0	1	0	1	1	0	0	1	1	1	1	0	0	0
Value(hex)	0x12								0x34								0x56								0x78							

T area

Data format of T is pursuant to SIMATIC_TIME type format.

C area

Data format of C is pursuant to COUNTER type format.

4-5-2 Strings

ASCII String

For example, when an ASCII string "ABCDEF" is written from NS into MW0, PLC's memory becomes like right.

Address	M0	M1	M2	M3	M4	M5	M6	M7
Value(char)	A	B	C	D	E	F	NULL	NULL
Value(hex)	0x41	0x42	0x43	0x44	0x45	0x46	0x00	0x00

Please make sure that NS handles string data by 1 word. So when the length of the string is even, two byte of null characters will be appended.

Unicode String

For example, when a Unicode string "ABCDEF" is written from NS into MW0, PLC's memory becomes like below. One Unicode character consists of 2 bytes. Higher byte will be stored into prior address, and lower into posterior.

Address	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
Value(char)	A		B		C		D		E		F		NULL	
Value(hex)	0x00	0x41	0x00	0x42	0x00	0x43	0x00	0x44	0x00	0x45	0x00	0x46	0x00	0x00

4-6 Address conversion when converting host type

In case host type is converted between OMRON PLC

When host type is converted between OMRON PLC and S7-300 series PLC, address types (areas / devices) are automatically converted according to the table shown right (see also the figure below).

SYSMAC PLC CS, CJ, etc…	SIMATIC S7-300
CIO	M
HR	—
AR	—
LR	—
TIM	T
CNT	C (Z)
DM	—
WR	—
EM	—
EM0~EMC	—
TU	—
CU	—
—	I (E)
—	Q (A)
—	DBxxxx

In case changing host type of SERIALA from SYSMAC PLC to MELSEC-A

SERIALA:HR00000.7

SERIALA:L00007

SERIALA:DM00123

SERIALA:D00123

"—" in the right table means those addresses cannot be mapped to new PLC's address, and they are not converted.   This may cause invalid addresses (see the figure below), so you have to modify such invalid addresses by yourself.   See "1-3-1 Notes and Restrictions When Changing Host Type" to know how to find and modify them.

SERIALA:HR00000.7

SERIALA:HR00000.7

SERIALA:EM00123

SERIALA:EM00123

Note: Address numbers will be converted to make their bit offsets equal.   For example, CIO00003.12 is the 60th bit $(60=16\times3+12)$ of CIO, so will be converted to M00007.4 $(60=7\times8+4)$.

It is same in reverse case.   MW00004 of S7-300 will be converted to CIO00002 of SYSMAC, and M00005.7 to CIO00002.15.

Note: When host type being converted from S7-300 to SYSMAC PLC, word access from odd address (MW1, MW303, etc.) will not be converted automatically.   This is because they cannot be mapped to addresses of new PLC.

4-7 Precautions

See also instructions shown in "4-4 Accessible address range".

4-7-1 Macro Functions

Precaution of Macro function (READCMEM/WRITECMEM)

Data length that can be read at once with READCMEM is limited to 110, and writable length at once with WRITECMEM is limited to 80.

If too large data length is specified, a macro error will occur.

Precaution when handling 32 bit length numeric data with macro function

Because of the difference of numeric format between NS and S7-300 series PLC, word-order must be changed after reading 32 bit length data with READCMEM, and also must be changed before writing with WRITECMEM. Otherwise, strange data will be seen on NS or S7-300 PLC.

When reading 32 bit integer value from S7-300's MW0 to NS's $W1000, program as follows (adapt `s7_300_hostname` to your environment).

```
READCMEM($W1000,[s7_300_hostname:MW00000],2);
SWAPL($W1000,1);
```

When writing 32 bit integer value from NS's $W1000 to S7-300's MW0, program as follows. The program below first changes the word-order to S7-300-format, then writes it to PLC, and finally re-changes to NS-format.

```
SWAPL($W1000,1);
WRITECMEM([s7_300_hostname:MW00000],$W1000,2);
SWAPL($W1000,1);
```

4-7-2 Limitation of communication restoration

When the communication cable is disconnected or the PLC is reset / shut down, it may take about 1 minute even if you restore them right soon.

4-7-3 Address replacement

When addresses are replaced between hosts for which SIMATIC S7-300 is set and hosts for which other host types are set, the address numbers will be replaced in principle considering bit absolute positions.

Addresses will not be replaced when there is no corresponding address in the destination.

For example, when SERIALA is set to SYSMAC PLC, SERIALB is SIMATIC S7-300, and when replacing SERAILA:DM0 to 99 with SERIALB:MW100, each DM0, DM1, DM2, … will be replaced with MW100, MW102, MW104, ….
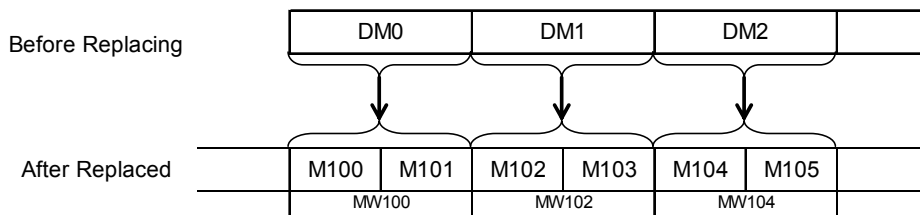
For another example, when SERIALB:MW0 to MW5 are replaced with SERIALA:D100, each MW0, MW2 and MW4 will be replaced with DM100, D101 and D102. However MW1, MW3 and MW5 will not be replaced since they do not have corresponding addresses.
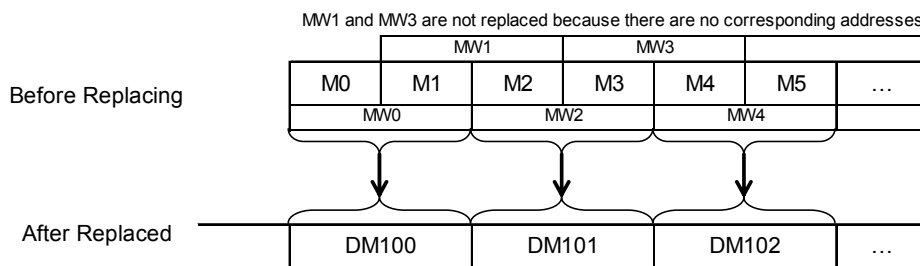
For another example, when SERIALB:MW5 to MW9 are replaced with SERIALA:D100, each MW5, MW7 and MW9 will be replaced with DM100, D101 and D102. However MW6 and MW8 will not be replaced.
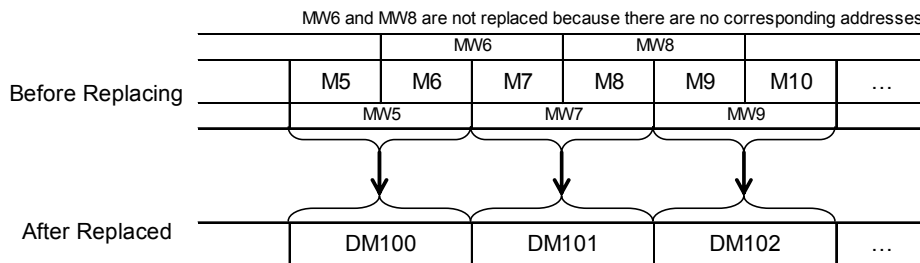
4-8 Tips on creating screen data

4-8-1 How to avoid inputting invalid values as COUNTER in the Numeral Display & Input functional object

For the S7-300 series, BCD values of 999 or less are valid as a counter. When writing invalid values from a PT, an error dialog box will be displayed. However, making some settings can avoid inputting invalid values.　The procedure is described below.

1) Place numeral display & input object and double-click it.

2) A dialog box as shown right will be displayed. Set the Display Type to Decimal and the Storage Type to BCD2 (unsigned 1 word).

3) Set [Integer] in [Format] group box to 3.
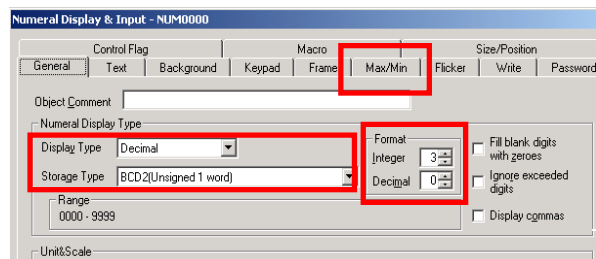
4) Click the Max/Min tab.

5) Check [Maximum Input Limit] checkbox and set the [Value] to 999.

6) Check [Minimum Input Limit] checkbox and set the Value to 0.

7) Press OK button to exit this dialog box.
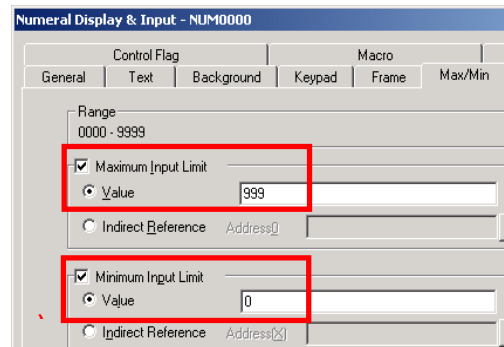
* This setting is required for each object that you want to limit input value.

* Registering this object to the library makes it easier to reuse this object.　For details of how to register objects to library, see CX-Designer's help or programming manual.

4-8-2 How to display a value of SIMATIC_TIME type by its original mean

A SIMATIC_TIME value consists of 16 bits.　A set of higher four bits represents timer unit (0000=10ms, 0001=100ms, 0010=1s, 0011=10s), and a set of lower 12 bits represents significand (BCD).　For example, SIMATIC_TIME value "0x3124" means 10 × 124 = 1240 seconds.

To display SIMATIC_TIME value by its original mean, do as followings.

The procedure consists of three parts — "Unit setting", "Screen macro programming", and "Numerical Display & Input functional objects setting".　Unit setting is required for each project only once on which you want to place "SIMATIC_TIME display & input objects".　Screen macro programming is required for each screen or sheet, and

Numerical Display & Input functional objects setting for each object you want to display SIMATIC_TIME value by its mean.

This example describes how to monitor a SIMATIC_TIME value of SERIALA:T23. Please make sure that following procedure requires a word temporary memory ($W1023 is used in this example), and four continuous unit/scale numbers (20 ~ 23 are used in this example).

Unit Setting

1) Click [PT] — [Unit/Scale] from menu, or double-click [Unit/Scale] on Common Setting tab of project workspace.
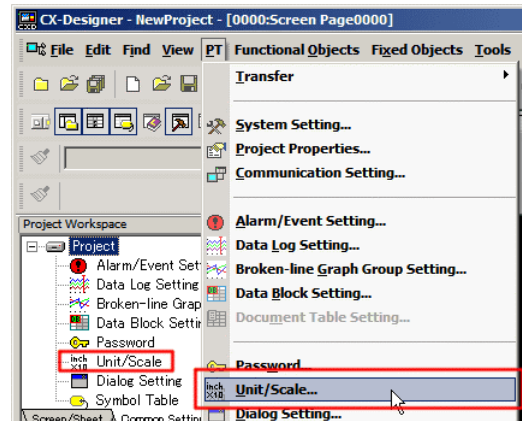
2) Specify unit setting like the right figure using continuous four numbers. In this example, No. 20~23 are used.

3) Click [OK] to close the window.

Screen macro programming

1) Open the screen or sheet on which you want to place the numerical display & input object that displays SIMATIC_TIME data by its original mean.

2) Right-click the blank area of the screen, then click [Screen/Sheet Property].
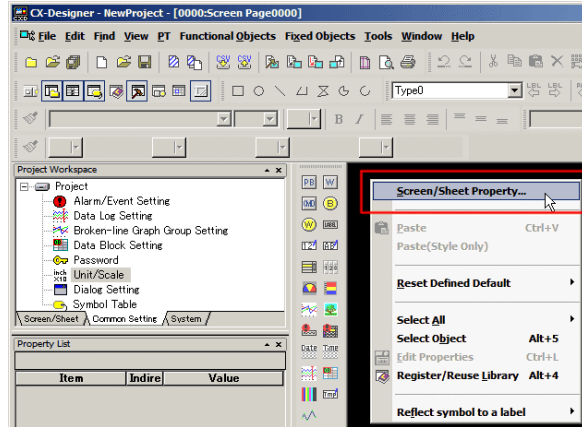
3) The dialog will open. Click [Macro] tab, [When loading a screen] checkbox, and [Edit Macro] button in this order.
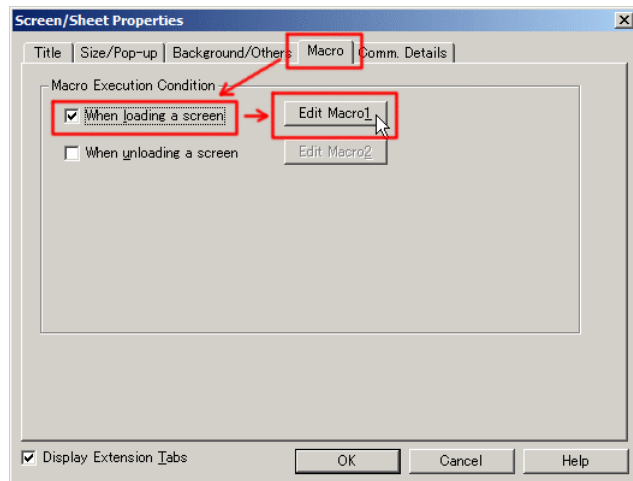
4) "Edit Macro" dialog will be displayed. Type the following program into the edit box. Please adapt bolded and underlined $W1023, SERIALA:T23, 20 to your environment (20 is the head number which we set the unit/scales for SIMATIC_TIME.

```
READCMEM($W1023,[SERIALA:T23],1);
$W1023=($W1023>>12)+20;
```

5) Click [OK] button to close "Edit Macro" dialog.

6) Click [OK] button to close "Screen/Sheet Properties" dialog.

Numerical Display & Input functional objects setting

1) Place a Numerical Display & Input object on the screen.

2) Set parameters as the right figure in property list. If property list window is hidden, it can be show by pressing [Alt]+[3].
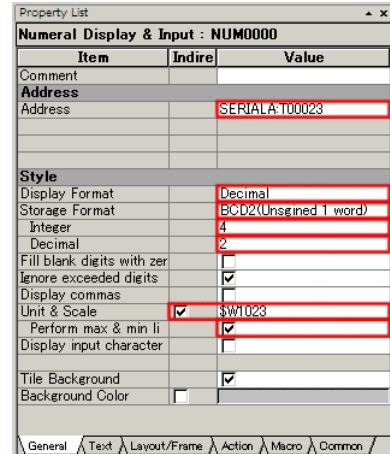
3) Click "Macro" tab in the property list, then check on [Before Writing] and click ⬇.
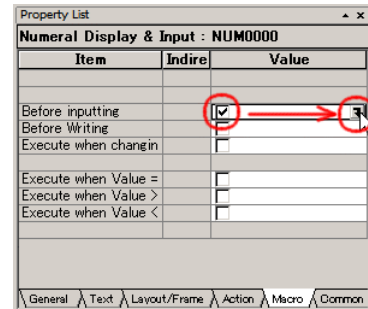
4) "Edit Macro" dialog will be displayed. Type the following program into the edit box. Please adapt bolded and underlined $W1023, SERIALA:T23, and 20 to your environment (20 is the head number which we set the unit/scales for SIMATIC_TIME.

```
$W1023=($W1023>>12)+20;
```

5) Click [OK] button to close "Edit Macro" dialog.

6) Check on [Before Writing] and click ⬇.

7) "Edit Macro" dialog will be displayed. Type the following program into the edit box. Please adapt bolded and underlined $W1023, SERIALA:T23, 20 to your environment (20 is the head number which we set the unit/scales for SIMATIC_TIME.

```
READCMEM($W1023,[SERIALA:T23],1);
$W1023=($W1023>>12)+20;
```

8) Click [OK] button to close "Edit Macro" dialog.

9) Click "Action" tab in the property list, check "Maximum Limit", and set "Maximum Value" to "3999".

10) Check "Minimum Limit", and set "Minimum Value" to "0".

That's all.　Following pictures show examples of objects which are applied vs. which are NOT applied this settings.
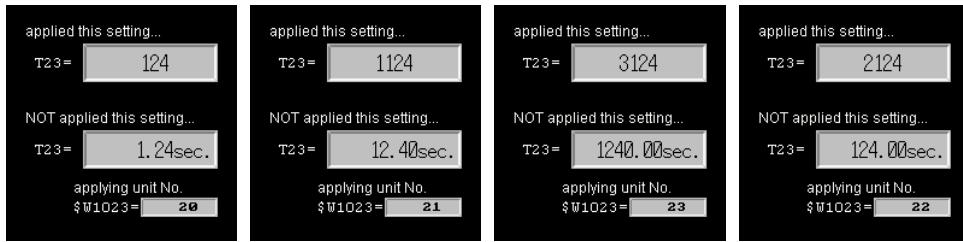
Chapter 5.   Connecting Yasukawa Electric Varispeed series inverters

Applicable CX-Designer Version	V2.10 or later

Applicable NS System Version	V6.70 or later

Connection Method	Serial (RS-485)

5-1 Compatible Inverters

5-1-1 Supported Inverters

The following invertors are supported.

- OMRON 3G3MV
- OMRON 3G3JV (RS-422/485 interface (3G3JV-PSI485J) is additionally required.)
- Varispeed F7 series
- VS mini V7 series
- VS mini J7 series (An optional product RS-422/485 interface (SI-485/J7) is required separately.)

5-1-2 Protocol

The Memobus RTU protocol can be used to connect.

5-1-3 Connection Structure

- When using RS-485, up to 32 invertors can be connected to a single serial port on the NS-series PT.
- Broadcast is possible.

5-2 Connection Configuration

Configure each device as follows to connect the NS-series PT with the Varispeed series inverter.

5-2-1 Overview of Connection Method and Wire Connection

Using RS-485(4-wire) / RS-422

The RS-232C/RS-422A conversion unit (NS-AL002 or NT-AL001, which also support RS-485) is required for the NS-series PT. Wire the conversion unit and communication terminal on the inverter as illustrated in the diagram below. Then install the conversion unit in a serial port on the NS-series PT. Also, set the DIP Switch on the conversion unit to the 4-wire type.

> The RS-232C and the RS-422A/485 of the NS-AL002 are not insulated. Therefore, if differences in ground potential or effects from noise are of concern, it is recommended that an insulated NT-AL001 converter be used.

Example: Connecting 3 inverters.

DIP SW Configuration for RS-232C/422A Converter Unit

NS-AL002		NT-AL001		CJ1W-CIF11	
SW1	ON	SW1-1	ON	SW1	*NOTE
SW2	OFF	SW1-2	*NOTE	SW2	OFF
SW3	OFF	SW1-3	OFF	SW3	OFF
SW4	*NOTE	SW1-4	OFF	SW4	OFF
		SW1-5	OFF	SW5	OFF
		SW1-6	OFF	SW6	OFF

※NOTE: Turn ON to enable the internal terminal resitance

>>NOTE<<
 Use shielded wire and ground shield line properly
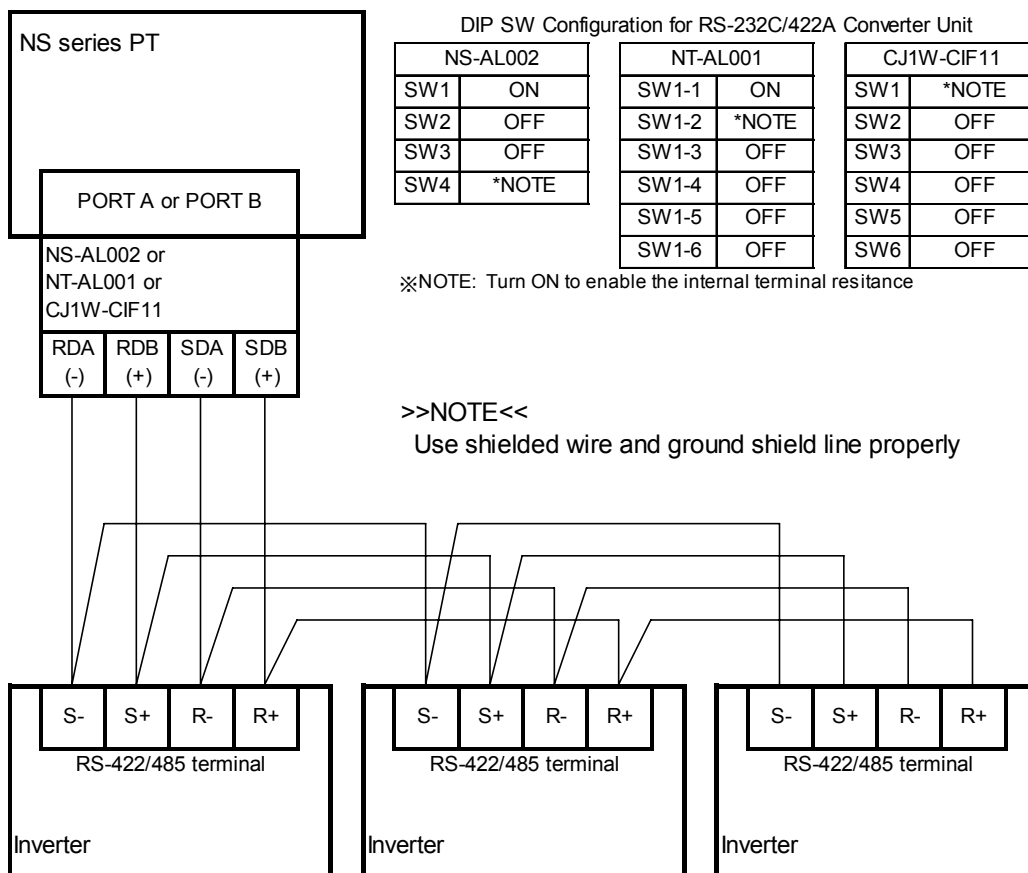
RS-485(2-wire)

The RS-232C/RS-422A conversion unit (NS-AL002, NT-AL001 or CJ1W-CIF11 which also support RS-485) is required for the NS-series PT. Wire the conversion unit and communication terminal as illustrated in the diagram below. Then install the conversion unit in a serial port on the NS-series PT.

Set the DIP Switch of the conversion unit as follows.

DIP SW Configuration for RS-232C/422A Converter Unit

NS-AL002		NT-AL001		CJ1W-CIF11	
SW1	ON	SW1-1	ON	SW1	*NOTE
SW2	ON	SW1-2	*NOTE	SW2	ON
SW3	ON	SW1-3	ON	SW3	ON
SW4	*NOTE	SW1-4	ON	SW4	ON
		SW1-5	OFF	SW5	ON
		SW1-6	ON	SW6	ON

※NOTE: Turn ON to enable the internal terminal resitance

>>NOTE<<
Use shielded wire and ground shield line properly
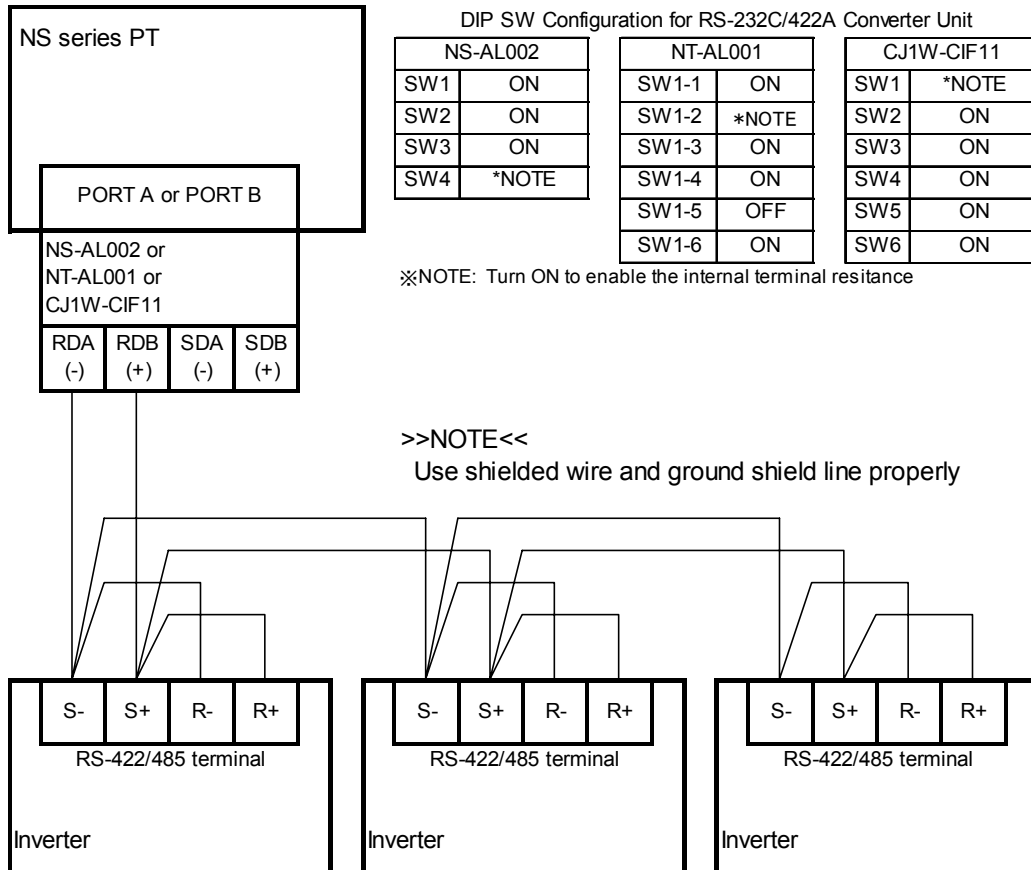
5-2-2 Communication Settings for the Inverter

Set and confirm the Comm.Speed, Parity and Stop Bits settings, using an operator provided with the inverter.

5-2-3 Communication setting for the project (NS screen data)
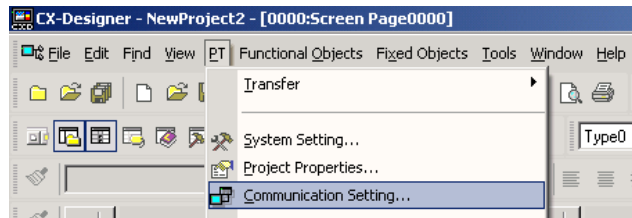
1) Use CX-Designer to click **PT Menu - Communication Setting.**

2) The Comm. Setting Dialog Box will be opened. In the left pane, click either Serial PortA or Serial PortB according to the port to which you want to connect the inverter.

3) Set the **Generic Protocol** for the Serial Port in the right pane.
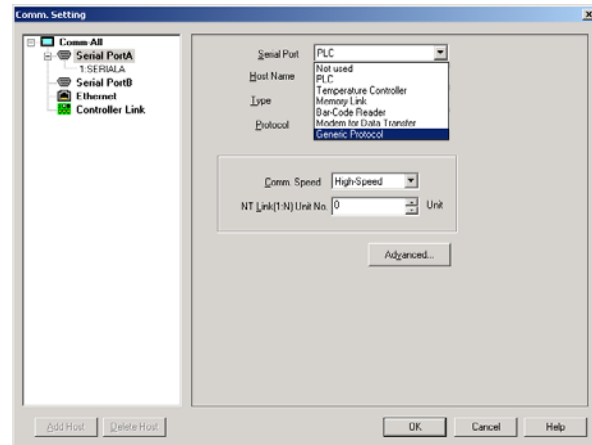
4) A confirmation will be displayed. Press the **Yes** Button.
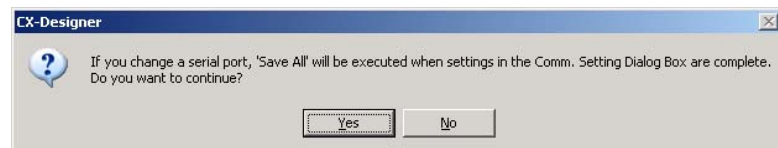
5) One host is registered under the serial port as shown in the dialog box. Set the **Varispeed / VS Mini** for the host type. Set the slave address properly. The host name will be used later when allocating an address to a functional object. Give an appropriate name.
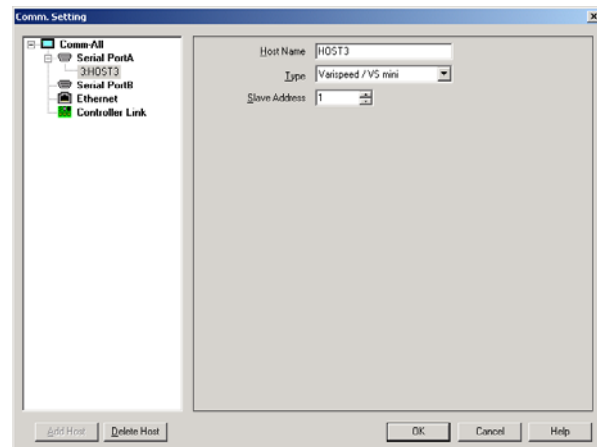
6) When connecting multiple inverters to a single serial port, click either the **Serial PortA** or **Serial PortB** in the left pane. Then click the **Add**.
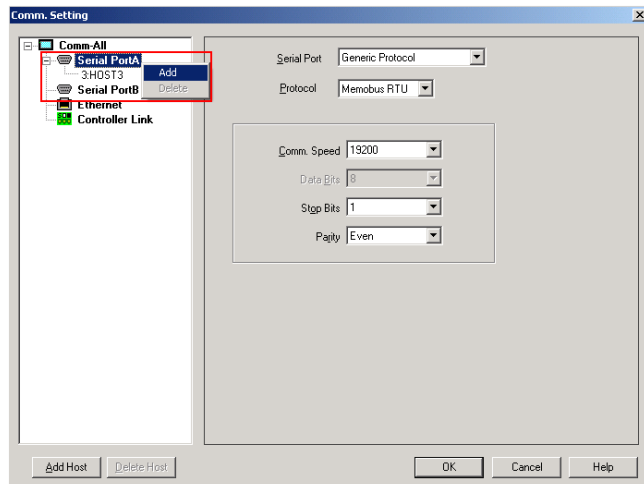
7) A host is added as shown in the dialog box. Click the displayed host in the left pane to change the settings in the right pane.
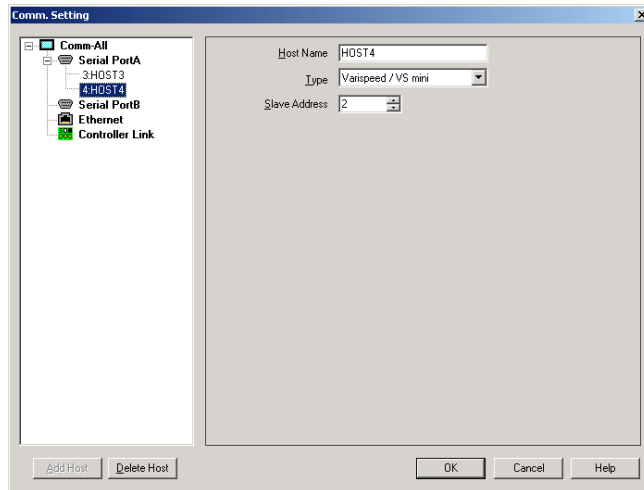
8) Click the **Serial PortA** in the left pane to set Comm.Speed, Stop Bits and Parity.
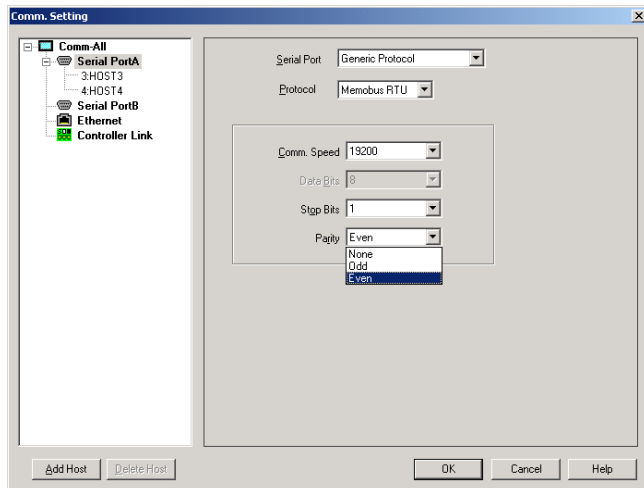
5-3 Communication Cable

Refer to "5-2-1 Overview of Connection Method and Wire Connection."

5-4 Accessible Address Range

All registers supported by your inverters can be used. Please read following instructions.

Instructions

1) Specify an address in the order of "<Host Name>:<Register No.>.<Bit Position>". When referring to a register as a 16-bit integer, omit <Bit Position>.

2) Specify the Register No. in hexadecimal, and specify the Bit Position in decimal.
   <Example>
   If an emergency stop occurs in the VS mini V7, bit E of register No. 002AH will turn ON. But in order to refer to this bit, specify "2A.14" for an address.

3) If the register No. starts with A to F, at least one 0 must be contained in the beginning address.
   <Example>
   To refer to a register 000AH, input "0A" or "0000A" in the address input field.

4) Do not create screen data using a register number reserved or unused by your inverter.

5-5 Restrictions

5-5-1 Restrictions on Host Type Changing

When the Varispeed / VS mini is registered with the host, the host type cannot be changed except for when any addresses of the host have never been used. Also the host cannot be replaced. The address, however, can be replaced to other host type.
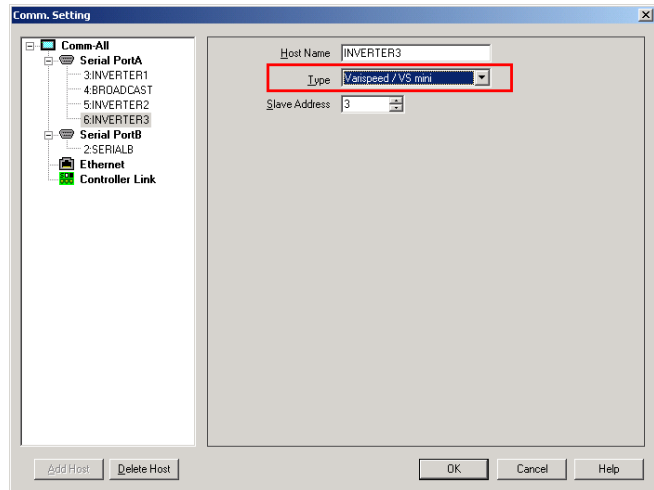
5-6 Tips on Screen Data Creation

5-6-1 Using Broadcast

To use the Memobus broadcast function, register a host whose slave address is set to 0, and write values to this host using a WRITECMEM macro.

Host with slave address 0 is write-only. Thus, do not use it with READCMEM macro or allocate it to general functional objects. If this is done, a communication error will occur (MRES=0x21, SRES=0x01: Cannot access because it is write-only.)

Chapter 6.　　Connecting Yaskawa Electric MP Series Motion Controllers

Applicable CX-Designer Version	V2.03A or later

Applicable NS System Version	V6.71 or later

Connection Method	Serial (RS-232C/485)

6-1-1　Compatible Controllers

・　Yaskawa Electric MP900 Series

・　Yaskawa Electric MP2000 Series

6-1-2　Protocol

The Memobus RTU protocol can be used to connect.

6-1-3　Connection Structure

Up to 32 controllers can be connected to a single serial port on the NS-series PT.

Please note that a project data which accesses many controllers simultaneously will make response slow. Therefore, please make sure to check if the response speed is appropriate by using ON/OFF button before operation.

6-2 Connection Configuration

6-2-1 Connection Method and Wire Connection

To connect the Yaskawa Electric MP Series controller with the NS-series PT, use RS-232C or RS485. Configure each device as follows. The dot lines or devices indicate that the connection depends on the configuration.
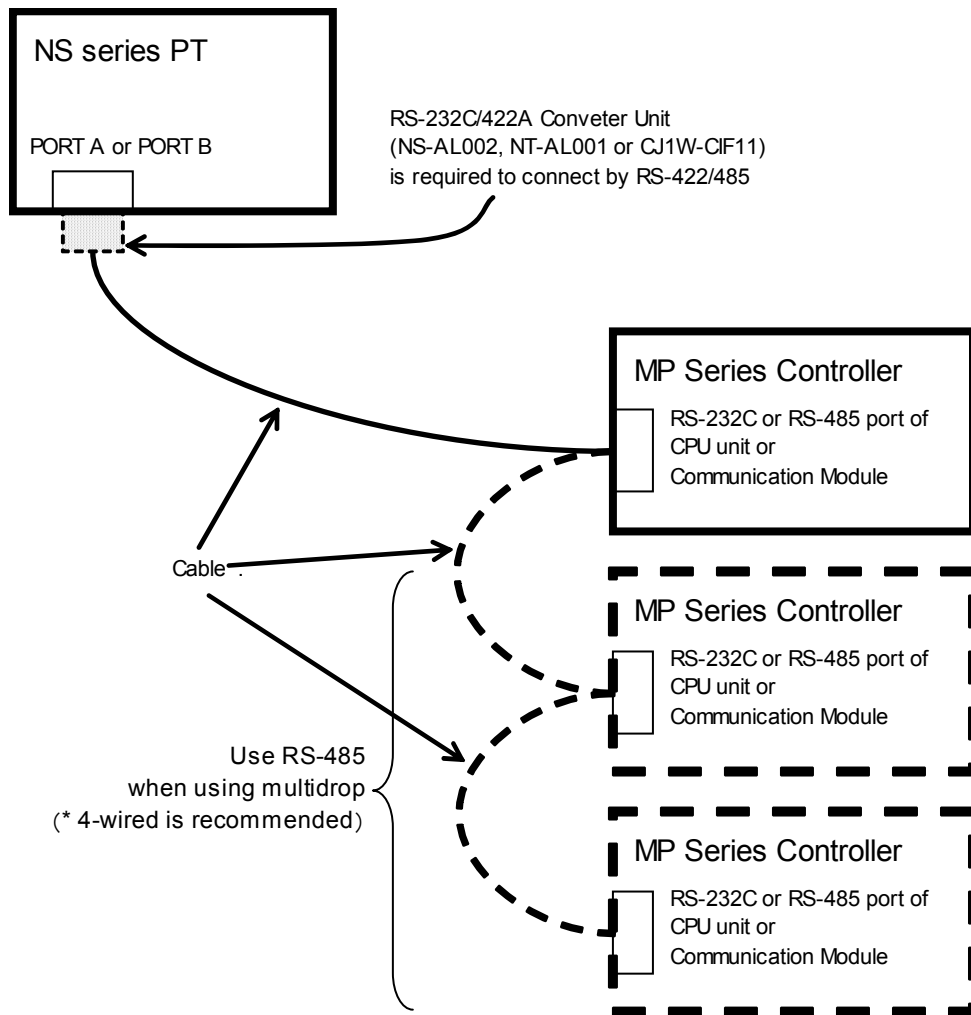
6-2-2 Communications Settings for MP Series Controller

Set the communication port on the MP Series controller to be connected to the NS-series PT as follows.

- Transmission protocol   MEMOBUS
- Master/Slave   Slave
- Transmission Mode   RTU
- Data Length   8 Bit

Please make settings other than above according to your environment.

"Device address" is referred to as "Slave address" with CX-Designer. Communication speed 76800 bps supported by some MP series is not supported by NS series. Please use 57600 bps instead of 76800 bps.

6-2-3 Communications Settings for Project (NS screen data)

1) Use CX-Designer to click **PT Menu** – **Communication Setting**.
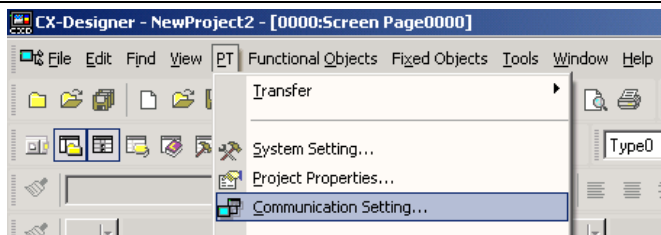
2) The Comm. Setting Dialog Box will be opened. In the left pane, click either **Serial PortA** or **Serial PortB** according to the port to which the inverter is connected.
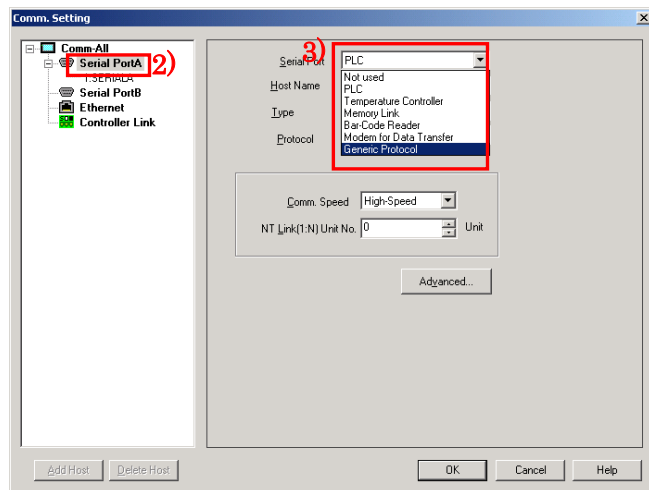
3) Set the **Generic Protocol** for the Serial Port in the right pane.

4) A confirmation will be displayed. Press the **Yes** Button.

5) One host is registered under the serial port as shown in the dialog box. Set the **YASKAWA MP** for the host type. Set the Slave Address the same as the Device Address of MP series. The Host Name will be used later when allocating an address to a functional object. Give an appropriate name.
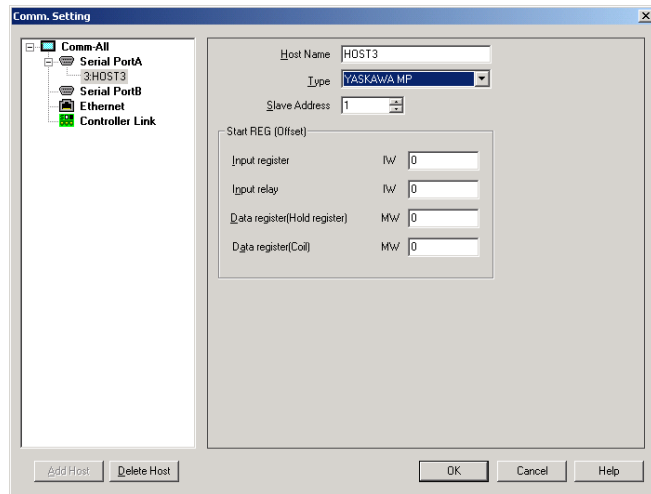
6) When connecting multiple inverters to a single serial port, click either the **Serial PortA** or **Serial PortB** in the left pane. Then click the **Add**.
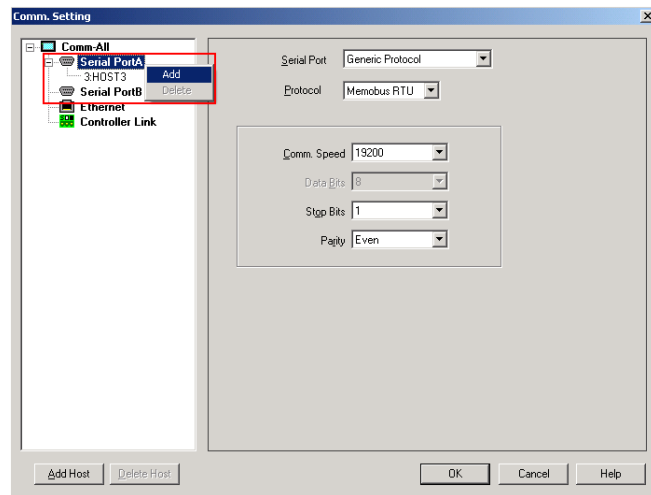
7) A host will be added as shown in the dialog box. Click a displayed host in the left pane to change settings of the host in the right pane.
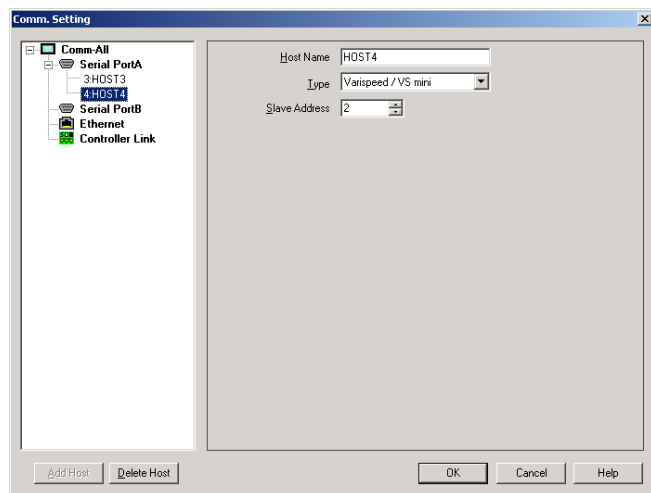
8) Click the **Serial PortA.** Then set Comm.Speed, Stop Bits and Parity in the left pane.

This completes the settings.
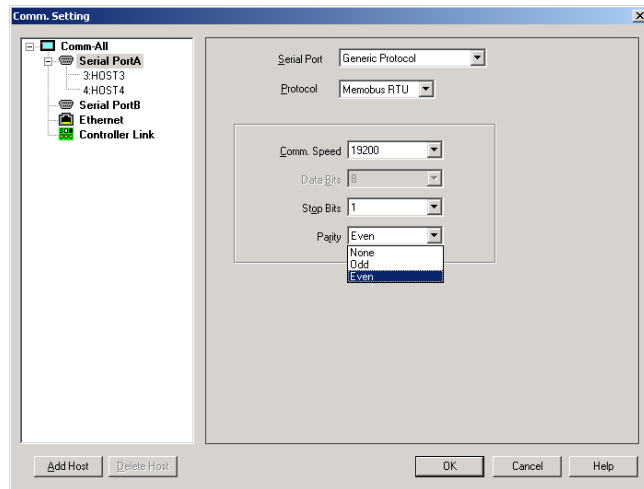
6-3 Communication cable

6-3-1 Using NS-series PTs other than NSH-Series PTs

Using RS-232C

Make cable according to the connection diagram below.

NS-series PT Serial Port (Except for NSH)					MP Series Controller Serial Port RS-232C (9pin)		
Connector	Signal	Pin No.			Pin No.	Signal	Connector
D-Sub 9pin male	FG	1			1	FG	D-Sub 9pin male
	SD	2			2	SD	
	RD	3			3	RD	
	RS	4			4	RS	
	CS	5			5	CS	
	+5V	6			6	DR	
		7			7	SG	
		8			8	CD	
	SG	9			9	ER	
Connector Hood			Shield Wire		Connector Hood		
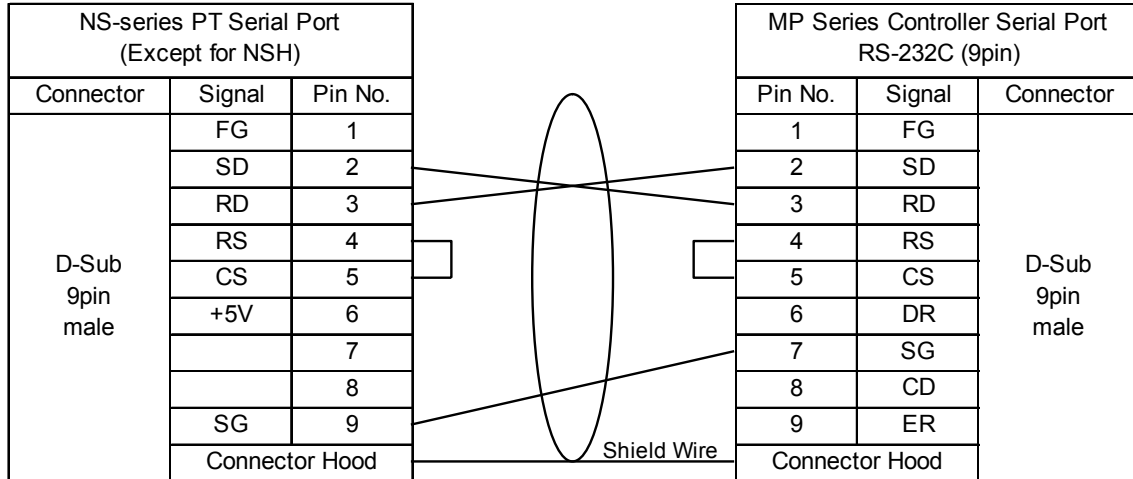
Using RS-422 / RS-485 (4-wire)

The RS-232C/RS-422A conversion unit (NS-AL002, NT-AL001 or CJ1W-CIF11) is required for the NS-series PT. Wire the conversion unit and MP Series Controller and set the DIP Switch on the conversion unit as illustrated in the figure below. Also install the conversion unit in the serial port on the NS-series PT.

The RS-232C and the RS-422A/485 of the NS-AL002 are not insulated. Therefore, if differences in ground potential or effects from noise are of concern, it is recommended that an insulated NT-AL001 converter be used.

When multiple MP Series Controllers are connected to a single serial port of NS-series PT, if MP Series Controller has an RS-422/485 switch, always set the switch to RS-485.
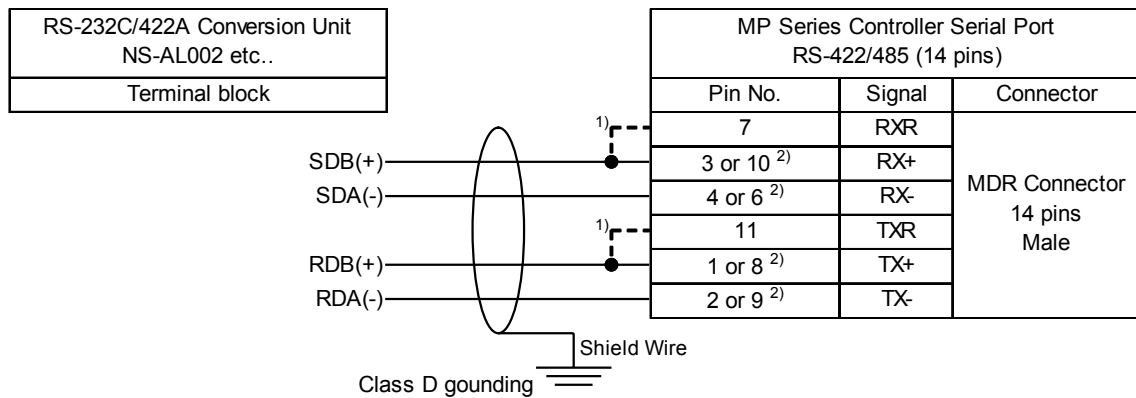
RS-232C/422A Conversion Unit NS-AL002 etc..		MP Series Controller Serial Port RS-422/485 (14 pins)		
Terminal block		Pin No.	Signal	Connector
	1)	7	RXR	MDR Connector 14 pins Male
SDB(+)		3 or 10 2)	RX+	
SDA(-)		4 or 6 2)	RX-	
	1)	11	TXR	
RDB(+)		1 or 8 2)	TX+	
RDA(-)		2 or 9 2)	TX-	

Shield Wire
Class D gounding

1) Connect them to enable the built-in teminal resistance of MP series.
2) Connect one of the pin. Use another pin to connect next controller for multi-drop connection.

6-3-2　Using NSH-series PTs

Using RS-232C

Use a cable for NSH-series PT (NSH-232UL-[]M). Connect D-Sub 9 pin connector of the cable to MP Series Controller using the cable below.

Cable for NSH (NSH5-232UL-[]M)				MP Series Controller Serial Port RS-232C (9 pins)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
	FG	1		1	FG	
	RD	2		2	SD	
	SD	3		3	RD	
	CS	4		4	RS	
D-Sub 9pin Female	RS	5		5	CS	D-Sub 9pin Male
	+5V	6		6	DR	
		7		7	SG	
		8		8	CD	
	SG	9		9	ER	
Connector Hood			Shield Wire	Connector Hood		
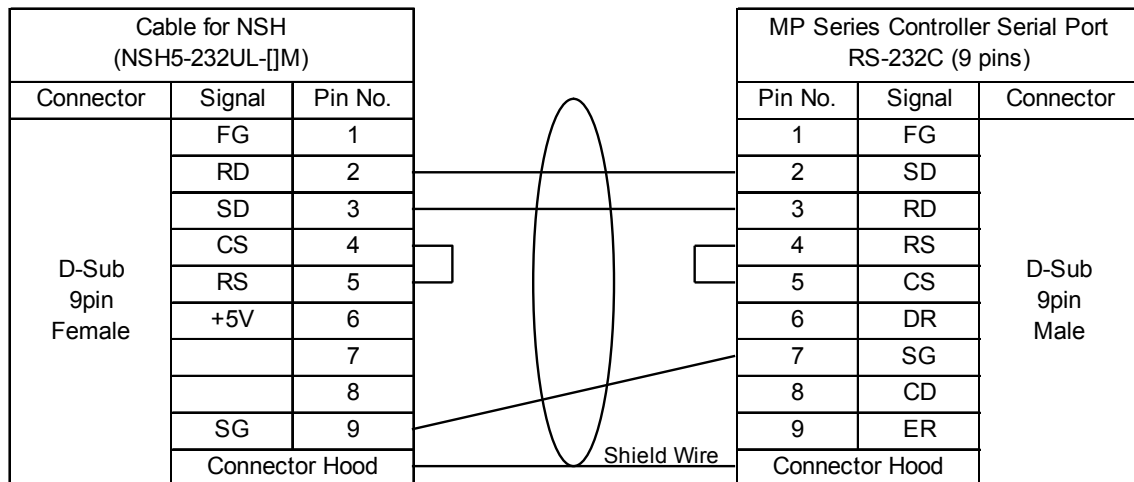
RS-422 / RS-485 (4-wire)

Use a cable for NSH-series PT (NSH5-422UL-10M) and wire it as illustrated below.

Please cut the spade terminal (Y type) of NSH5-422UL-10M when necessary.
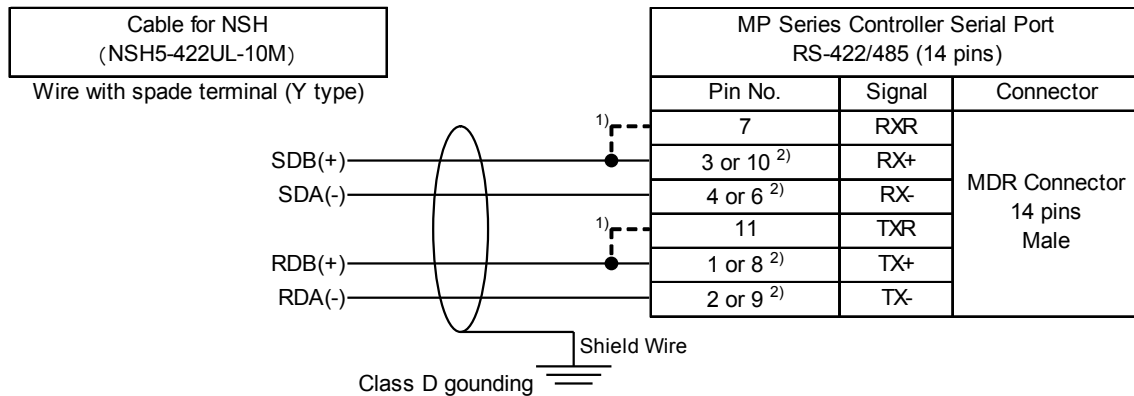
Cable for NSH (NSH5-422UL-10M)	MP Series Controller Serial Port RS-422/485 (14 pins)		
Wire with spade terminal (Y type)	Pin No.	Signal	Connector
	7	RXR	
SDB(+)	3 or 10 [2]	RX+	
SDA(-)	4 or 6 [2]	RX-	MDR Connector 14 pins Male
	11	TXR	
RDB(+)	1 or 8 [2]	TX+	
RDA(-)	2 or 9 [2]	TX-	

1) Connect them to enable the built-in teminal resistance of MP series.

2) Connect one of the pin. Use another pin to connect next controller for multi-drop connection.

6-4 Accessible Address Range

Addresses listed in the table below can be specified. Be sure to carefully read notes below the table and the Offset Specification and Absolute Specification.

Offset Specification and Absolute Specification

The NS-series PTs support 2 addressing methods (offset and absolute specification) for the MP Series registers. Use the offset specification unless necessary.

With the offset specification, an address to be accessed is specified using an offset from an address set for the Start REG of MP series. For example, when attempting to access GIW1000 in MP series whose input register start REG is set to IW00A0, IW10A0 (IW(00A0+1000)) will be accessed.

With the absolute specification, if IW1000 is specified, IW1000 is always accessed regardless of how the Start REG is set. Note that the start REG data set with the MP Series needs to be specified correctly in the Comm. Setting Dialog Box of CX-Designer in order to work the absolute specification properly.

Register Type		Word access		Bit access		Restrictions and Notes
		Read	Write	Read	Write	
GIB	Input register (Input relay) (Offset reference, Bit access)	No	No	Yes	No	See note 2)
GIW	Input register (Input register) (Offset reference, Word access)	Yes	No	No	No	
GMB	Data register (Coil) (Offset reference, Bit access)	No	No	Yes	Yes	See note 2)
GMW	Data register (Hold register) (Offset reference, Word access)	Yes	Yes	No	No	
IB	Input register (Absolute reference, Bit access)	No	No	Yes	No	See note 1) 3)
IW	Input register (Absolute reference, Word access)	Yes	No	No	No	See note 1)
MB	Data register (Absolute reference, Bit access)	No	No	Yes	Yes	See note 1) 3)
MW	Data register (Absolute reference, Word access)	Yes	Yes	No	No	See note 1)

Instructions

1) IB, IW, MB and MW cannot access address numbers smaller than respective numbers set with the Start REG.

2) Set GIB to between GIB000000 and GIB00FFFF and GMB to between GMB000000 and GMB04095F. Addresses beyond the ranges will cause a communication error.

3) Set IB and MB to between the addresses set with respective Start RGB to 4096 words. Any address other than them will cause a communication error.
   Example: If the Input Relay Start RGB is IW01000, IB010000 to IB01FFFF can be accessed. If the coil Start REG is MW00200, MB002000 to MB04295F can be accessed.

Chapter 7. Connecting Trajexia motion controllers

Use the Ethernet port to connect the Trajexia. The Trajexia can be used only when units have Ethernet ports.

Applicable CX-Designer Version	V2.03A or later

Applicable NS System Version	V6.71 or later

Connection Method	Ethernet

7-1 Compatible Controllers

7-1-1 Supported Controller Models

・　Trajexia TJ1-MC16 is supported.

　* Trajexia TJ1-MC04 is now being checked its operation with the PT.

7-1-2 Connection Structure

The Ethernet must be used to connect. Use an RJ45 Ethernet connector for the Ethernet cable of NS-series PT and the Trajexia.

7-1-3 Communication Settings for Project (NS screen data)

1) Use CX-Designer to click the **Communication Setting** from the PT Menu.
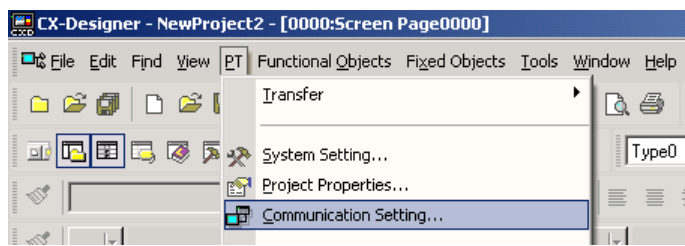
2) The Comm. Setting Dialog Box will be displayed. Click the **Ethernet** in the left pane and set the Ethernet port in the right pane.

   The Network Address and Node Address are for the OMRON FINS Network settings. Set them as shown right unless there is a special circumstance.
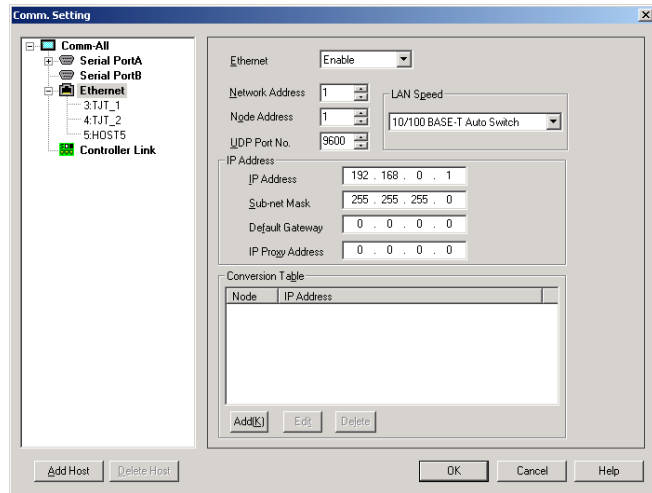
Set the IP address and Sub-net Mask according to the Ethernet environment used.

> ### Reference
>
> ◆ Set as follows in order to make remaining settings easier.
>
>   The first three segments of the IP Address (Underlined parts of "<u>192.168.0</u>.1")
>
>   --- > The Trajexia's IP Address
>
>   The forth segment of the IP Address (Underlined parts of "192.168.0.<u>1</u>")
>
>   --- > The Node Address

3) Right click the **Ethernet** in the left pane. Then click the **Add**.
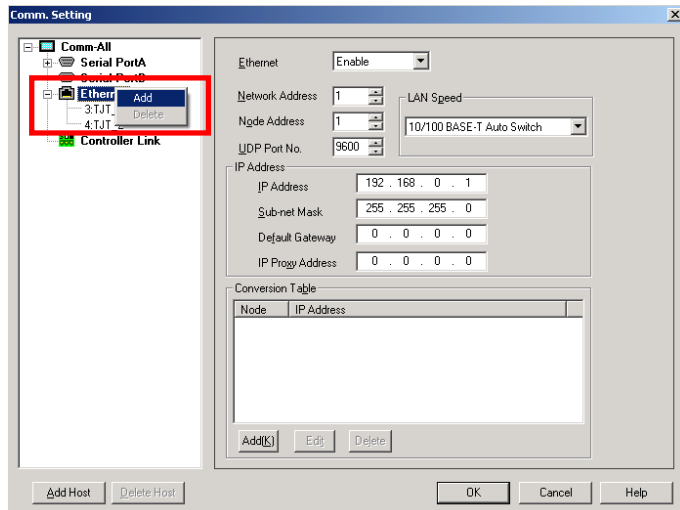
4) A host will be added. Confirm the added host is displayed in reverse. Then set Trajexia in the Type field. Change the host name if necessary.
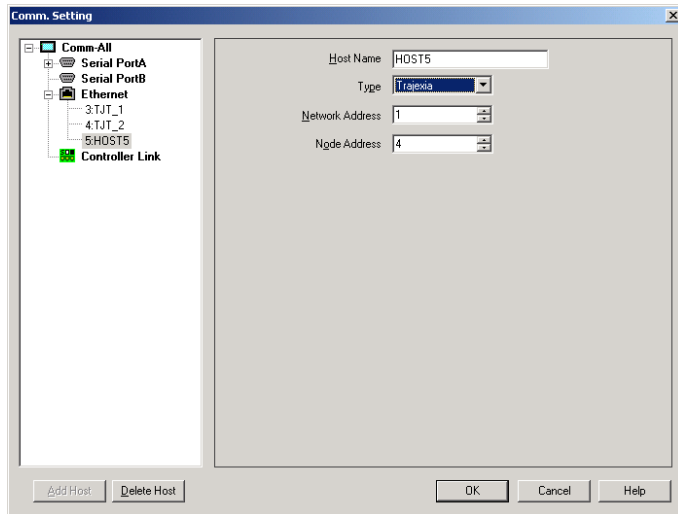
Reference

◆ Set as follows unless there is a special situation.

　　The Network Address --- > The NS Network Address set at step 2

　　The Node Address --- > The forth segment of the IP Address set with Trajexia

This completes the procedure if settings described in the *Reference* at the step 2 and 4 have been made. When not made, the following settings are additionally required.

5) Setting the address conversion table. Click the **Ethernet** in the left pane.

6) The Conversion Table will be shown in the right pane. Click the **Add** Button.

7) The **IP Address Setting** Dialog Box will be displayed. Input the Node Address set with Trajexia in the Node Address field and Trajexia IP Address in the IP Address field. Press the **OK** Button.
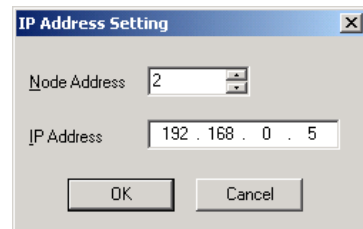
8) Settings will be made for the Conversion table as shown in the right. When connecting more than 2 Trajexia units, repeat the step 7 as many times as the number of Trajexia units used.

　This completes the setting.
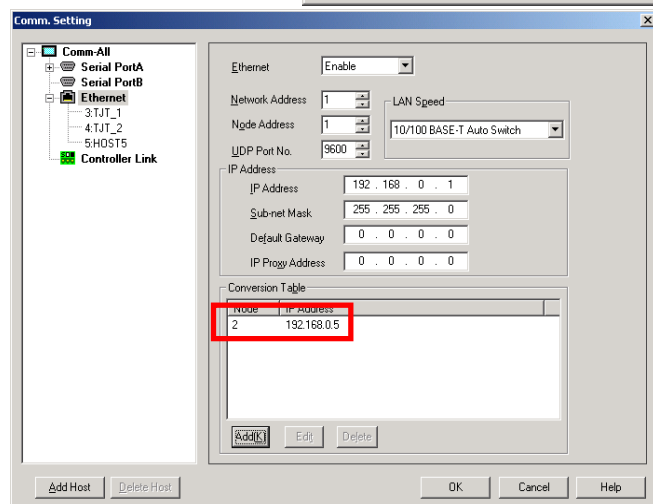
7-2 Accessible address range

Addresses listed in the table below can be used. Also confirm the restrictions and notes under the table.

	Area	Restrictions and Notes
TBR	Table Memory : REAL	2) 3)
TB	Table Memory	4) 5) 6) 7)
VRR	VR Memory: REAL	1) 2) 3)
VR	VR Memory	4) 5) 6) 7)

1) The VRR cannot be used due to Trajexia functional restriction. (As of July 2007). If the VRR is allocated to a functional object, a communications error will occur. The VRR will be supported in the future.

2) When allocating TBR and VRR, always set REAL (Real number) for the Storage Type. (See the right dialog.) Setting other than REAL (Real number) can cause malfunctions such as displaying an unintended value and a communication error.

3) Do not allocate TBR and VRR for fields including string display & input object where values are not treated as a floating-point format.

Always set REAL (Real number) in Storage Type field when allocating TBR.
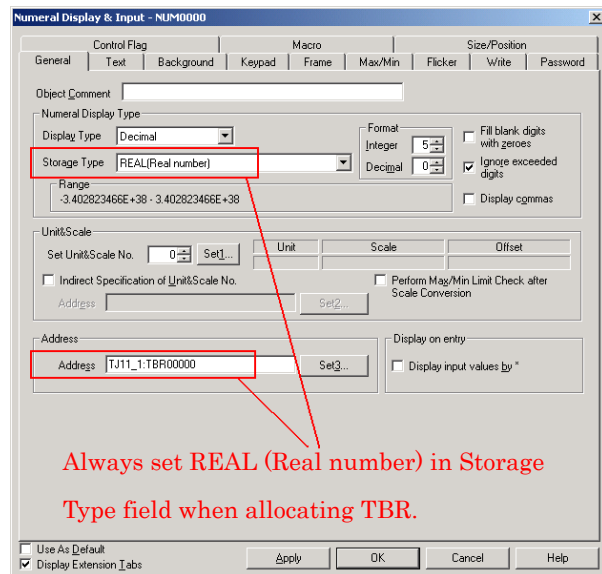
4) Specify the following combination in Display Type and Storage Type field when allocating TB and VR.

	Display Type	Storage Type
1	Decimal	INT (Signed 1 word)
2	Hexadecimal	INT (Unsigned 1 word)

Even when the No.2 is specified, Trajexia treats 0x8000 to 0xFFFF as negative numbers.

5) When writing a number to Trajexia from a functional object for which TB or VR is allocated, Trajexia may not recognize negative numbers properly if Trajexia firmware version is old. In this case use TBR or VRR, or include a program that turns a corresponding number to a negative number when bit 2^{15} is 1 so that Trajexia can recognize negative numbers properly.

74

6) When allocating TB or VR, do not set 2 words such as REAL, UDINT and DINT, for the storage type. Allocate TBR or VRR when accessing as 32-bit IEEE 754 floating point. (See below dialog)
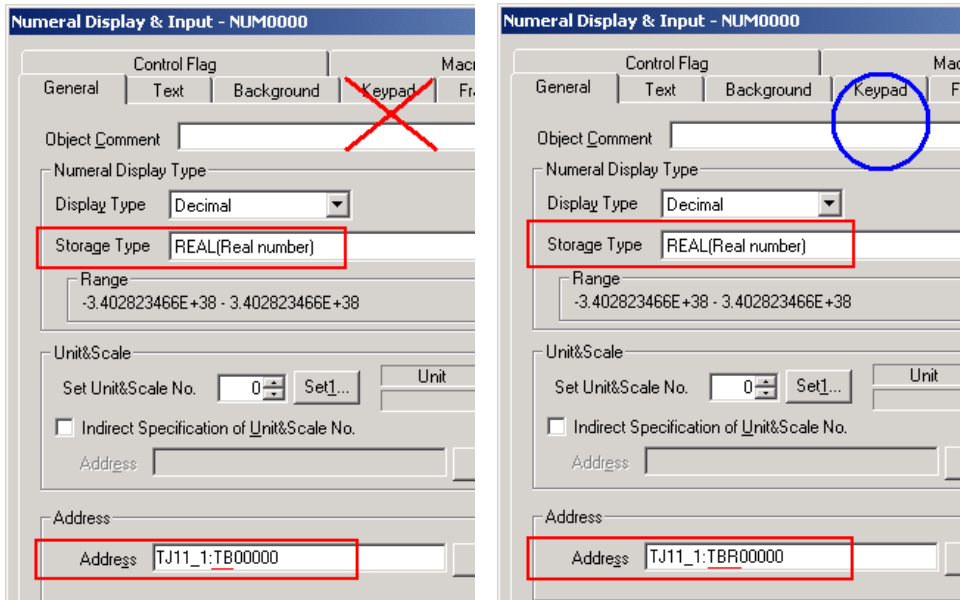
7) When allocating TB or VR for a String display & input object, set **Unicode** for the String Display Type. (See below dialog)

   With an NS, no terminating NULL will be added when writing if characters are entered up to the specified number of characters. Make sure there always is a terminating NULL for the Trajexia. Always make settings in the below dialog box so that TABLE(8) is equal to 0.
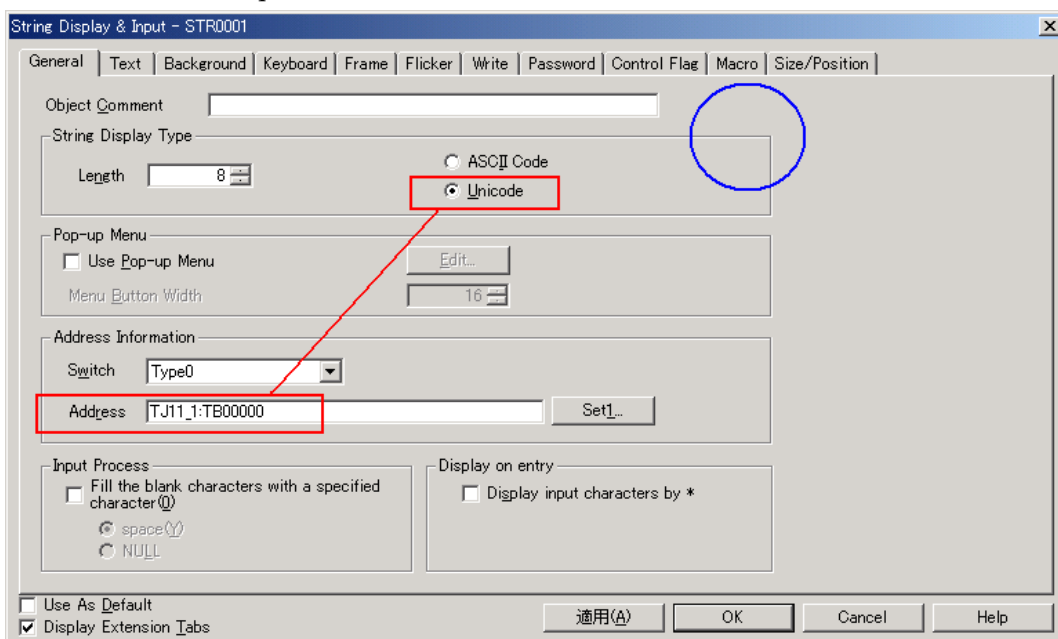
7-3 PLC Data Storage Type

7-3-1 Numerals

The Trajexia's table memory and VR memory are originally represented in 32-bit IEEE 754 floating-point format. Functional objects for which TBR or VRR are allocated refers to numerals as a floating-point format.

On the other hand, Trajexia can also treat table memory and VR memory as 24-bit signed integer. NS-series-PT can access the integer by specifying TB or VR. However, NS-series-PT treats TB and VR as 16-bit signed integer. Thus, NS-series-PT accesses the sign bit and rightmost 15 bits (a total of 16 bits). (See the diagram below)

> ### *Reference*
>
> ◆ Also refer to 7-2 Accessible address range.
>
> ◆ When the Trajexia firmware version is old, the rightmost 16 bits may simply be accessed which is different to the operations above.

Trajexia

TABLE(0) = 194168.8
(0x02F678 in 24-bit signed interger)

The sign bit is 0 because 0x02F678 is positive and the lower 15 bits is 0x7678, so 0x7678 = 30328 will be displayed.

NS

TB00000   30328

Trajexia

TABLE(1) = -50.257
(0xFFFFCE in 24-bit signed integer)

The sign bit is 1 because 0xFFFFCE is negative and lower 15bits is 0x7FCE, so 0xFFCE = -51 will be displayed

NS

TB00000   -51
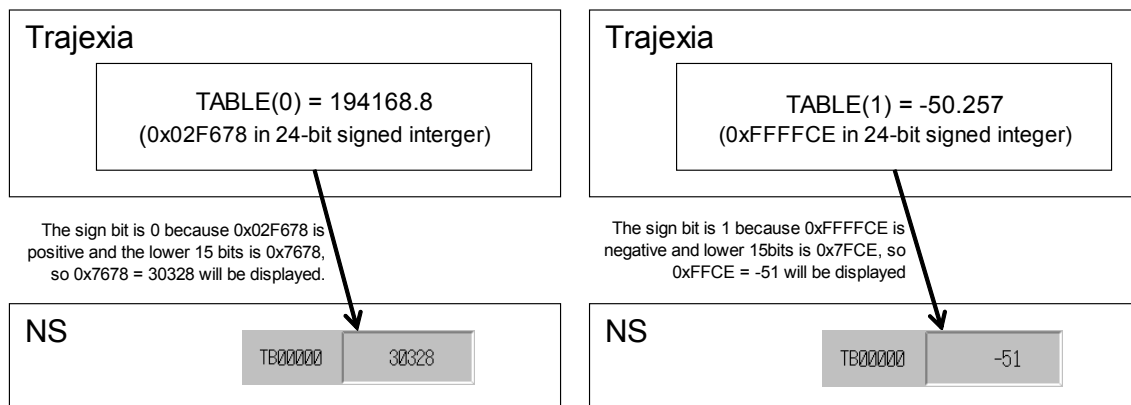
7-3-2 Character Strings

One character of Trajexia occupies one area of table memory or VR memory. In order to access a string of Trajexia from NS-series PT, make sure to allocate TB or VR and select Unicode for the string storage type.

< Example >

The below shows Trajexia memory when a string "ABCDEF" is recorded starting from TB0.

Address	TB0	TB1	TB2	TB3	TB4	TB5	TB6
Value (Character)	A	B	C	D	E	F	NULL
Value (Hexadecimal)	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0000

7-4 Converting Addresses When Changing a Host Type

Changing host types between OMRON PLCs (SYSMAC PLCs).

When host types are changed between OMRON PLCs, address types will be converted according to the relationship listed in the table below.

Trajexia		SYSMAC
TBR		EM
TB	⟷	DM
VRR		WR
VR		CIO

Please note the following points.

- When converting from TBR and VRR to EM and WR respectively, word parts will be doubled. (E.g. TBR00010 → EM00020)

- When converting from EM and WR to TBR and VRR respectively, word parts will be reduced by half. (E.g. WR00030 → VRR00015).

- If an odd word is allocated or a bit is specified, EM and WR will not be converted to TBR and VRR. Unchanged addresses will become Invalid Addresses. Please correct them. For method for correcting invalid addresses, refer to 1-3-1 Notes and Restrictions When Changing Host Types.

7-5 Notes and Restrictions

7-5-1 When Accessing TBR or VRR Using a Macro Function

When executing macro functions READCMEM and WRITECMEM for TBR and VRR, specify points to be written and read in words.

<Example>

When reading TBR00003 to TBR00007 to $W1000, 5 TBRs (2 words per 1) will be read. Therefore, specify 10 for the points as follows. (Change "*HOST_TRAJEXIA*" according to your host name.)

```
READCMEM($W1000,[HOST_TRAJEXIA:TBR00003],10);
```

Always read or write TBR and VRR in even word. A communication error will occur if reading or writing them in odd word.

7-5-2 Address Replacement

Addresses will be replaced according to the following rule when Trajexia addresses are converted to other addresses by replacing hosts or addresses.

Replacing Trajexia addresses

Each address number will be replaced with an address number even when addresses with different bit widths such as VR and TBR are replaced.

Example: Replacing VR0-VR3 with TBR10- and vise versa.
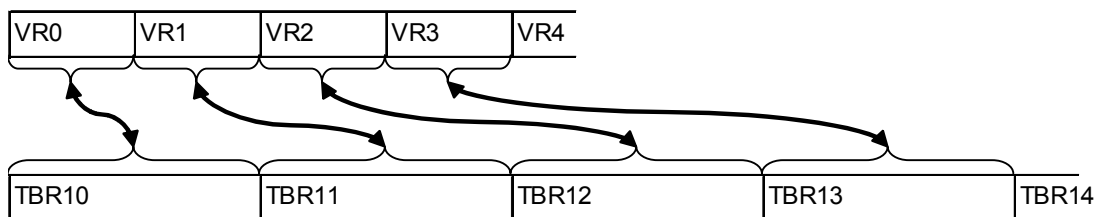
Replacing Trajexia addresses to these of other type of host

Addresses will be replaced so that the number of bits will be equal to that of destination. However, if there are no appropriate addresses in the destination, those addresses will remain unchanged.

When SYSMAC DM is replaced with Trajexia TBR in the example below, DM0,2,4 and 6 will be replaced with TBR10,11,12 and 13 respectively. DM1,3,5 and 7, however, will not be replaced.

Also, bits cannot be specified for TBR and VRR. Thus, bit-addresses (DM01234.5 etc.) will not be replaced with TBR or VRR.

Example: Replacing SYSMAC DM0-DM7 with Trajexia TBR10- and vise versa.

DM0	DM1	DM2	DM3	DM4	DM5	DM6	DM7	DM8

TBR10	TBR11	TBR12	TBR13	TBR14
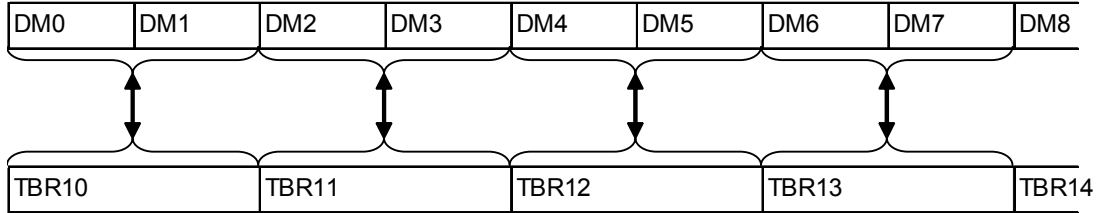
Example: Replacing Siemens M0-M15 with Trajexia TBR10- and vise versa.

M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16

TBR10	TBR11	TBR12	TBR13	TBR14
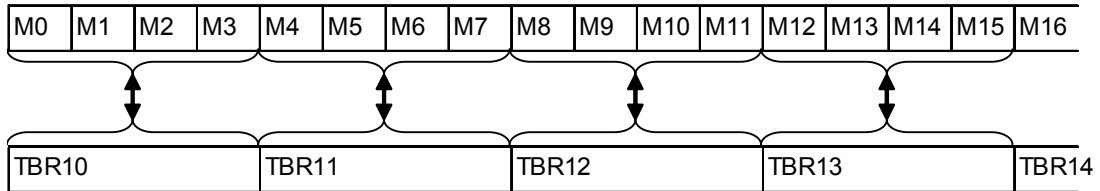
Chapter 8.　　Connecting to Mitsubishi Q/QnA Series Sequencers

Applicable CX-Designer Version	V2.102A or later

Applicable NS System Version	V7.00D or later

Connection Method	Serial (RS-232C/485)

8-1　Compatible Sequencers

8-1-1　Supported sequencer models

The following combinations of CPUs and serial communications modules can be used.

CPU	Serial Communication Module	Protocol	Connection Method
Q00CPU Q01CPU	None * Connect to a serial port on a CPU unit	MC Protocol (Format 5)	RS-232C
Q00JCPU Q00CPU Q01CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	QJ71C24N-R2 QJ71C24N-R4 QJ71C24N		RS-232C RS-485 (four-wire method)
Q2ASCPU Q2ASCPU-S1 Q2ASHCPU Q2ASHCPU-S1	A1SJ71QC24N		

8-1-2　Topology

When using RS-485, up to 32 sequencers can be connected to one serial port on the PT. Please note, however, that if the number of sequencers connected is increased, the PT may respond slowly.

When using RS-232C, only one sequencer can be connected to one serial port on the PT.

8-2 Connection Configuration

8-2-1 Overview of Connection Method

RS232C or RS485 is used to connect the Mitsubishi Q/QnA series sequencer to the NS-series PT using a Q/QnA series serial communications module.

Configure each device as illustrated on the right.

When connecting multiple sequencers to one serial port using RS-485, Q series and QnA series sequencers can be connected on one communication line.

Serial port A or B on the PT
* To connect using RS-485, an RS-232C/422A converter (e.g. NS-AL002) is required.

Up to 32 sequencers can be connected when using RS-485.
* Please not the PT may respond slowly.

Serial Communications Module

Q series/QnA series CPU
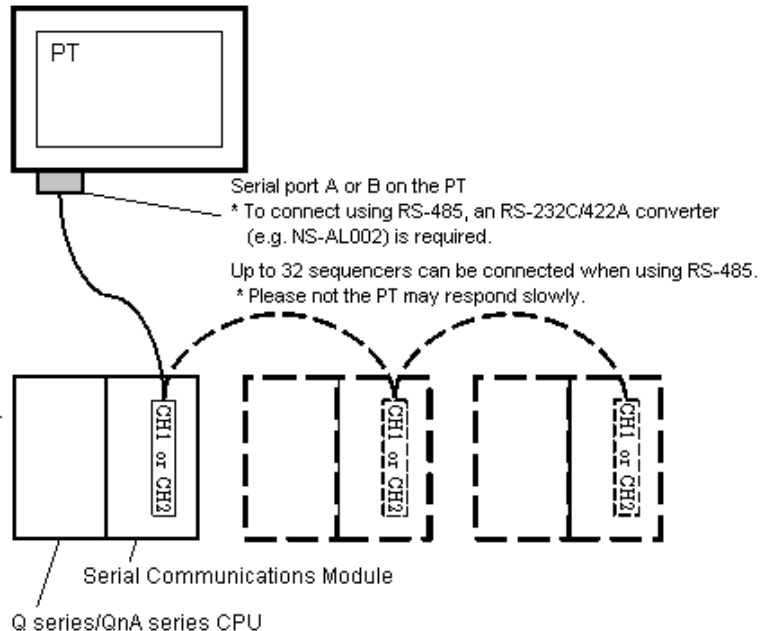
When using Q00CPU or Q01CPU, it is also possible to connect to the serial port on the CPU. In this case, use a Mitsubishi connection cable QC30R2 and conversion cable and wire them as illustrated on the right. For information on connection diagram, refer to *8-3 Communication Cable.*

Serial port A or B on PT

Conversion cable
(For details on cable diagram, refer to the connection diagram in 8-3)

Serial port on CPU (round 6-pin)

Mitsubishi connection cable
(QC30R2)

Q00CPU or Q01CPU
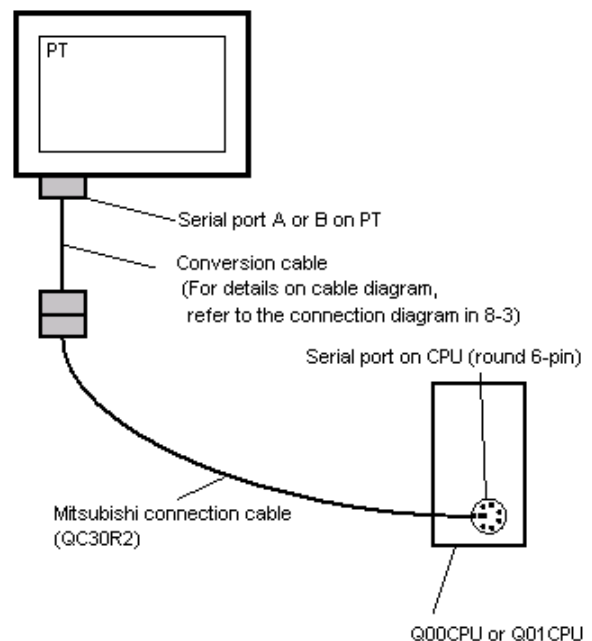
8-2-2 Communication Settings for NS Project (Screen Data)

1) Click **PT** Menu – **Communication Setting…** with CX-Designer.
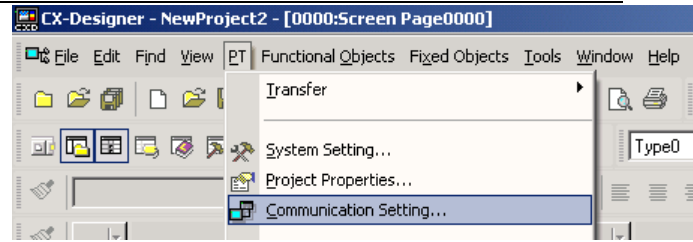
2) **Comm. Setting** Dialog Box will be displayed. Click **Serial Port A** or **Serial Port B** in the left pane, depending on the port you want to connect the sequencer.
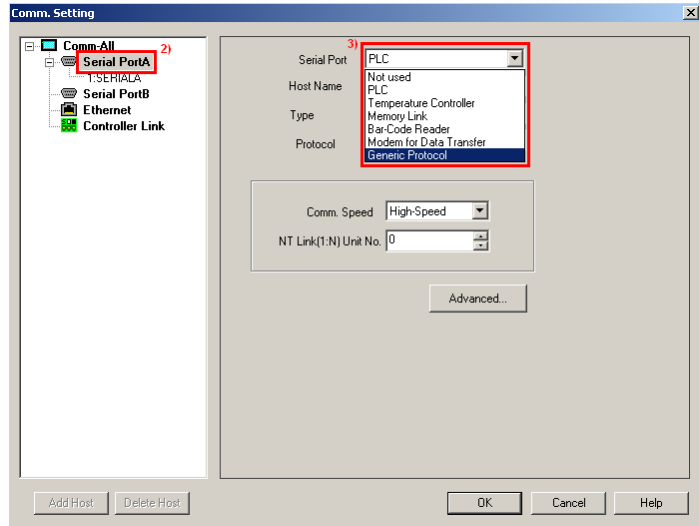
3) Select **Generic Protocol** from **Serial Port** option in the right pane.

4) A confirmation message will be displayed. Press **Yes** to continue to the next step.
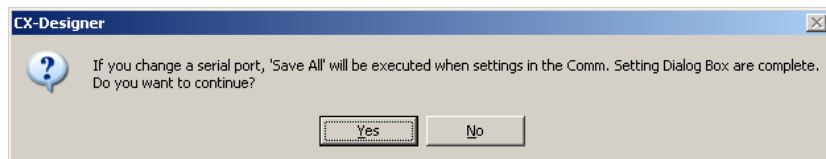
5) A host will be added under the serial port as shown on the right.

In the left pane, click **Serial Port A** or **Serial Port B**. In the right pane, select **MC Protocol** from **Protocol** option.
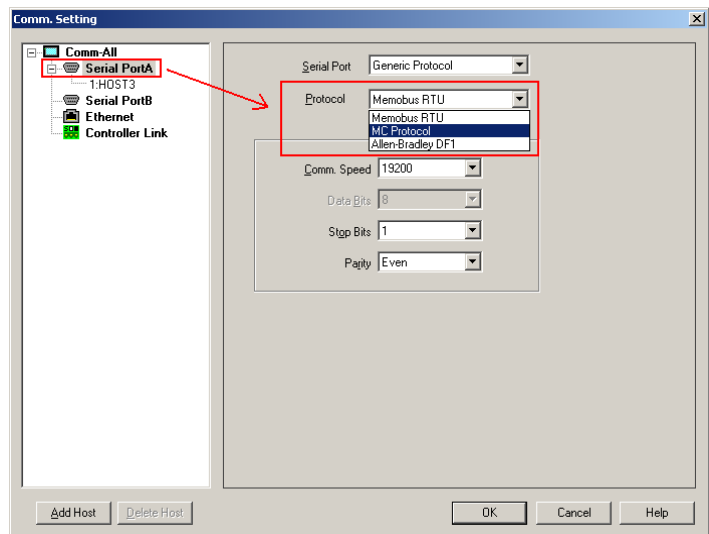
6) Confirm the **Type** of the host is **MELSEC-Q/QnA**. Set the **Station No.** according to the sequencer used.

Note: When connecting to the serial port on Q00CPU and Q01CPU, set the **Station No.** to 0.
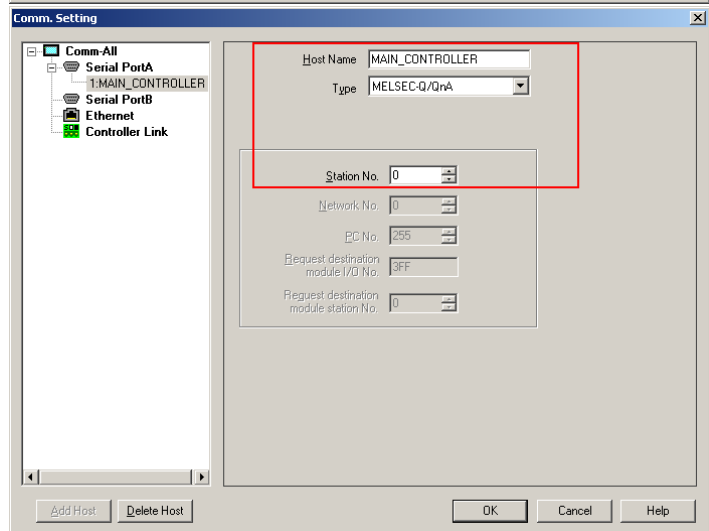
7) To change the serial port settings such as communication speed, click **Serial Port A** or **Serial Port B** in the left pane. Then change the settings in the right pane.

This completes settings required for when connecting only one sequencer. Press **OK** Button to close **Comm. Setting** Dialog Box.
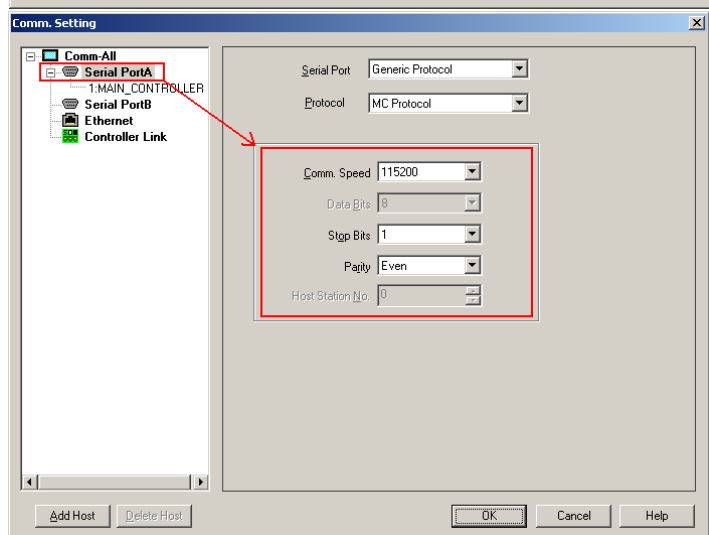
When connecting multiple sequencers to one serial port on the PT using RS-485, please follow the procedure below.

8) To connect multiple sequencers with one serial port, right-click **Serial Port A** or **Serial Port B** in the left pane. Then click **Add**.
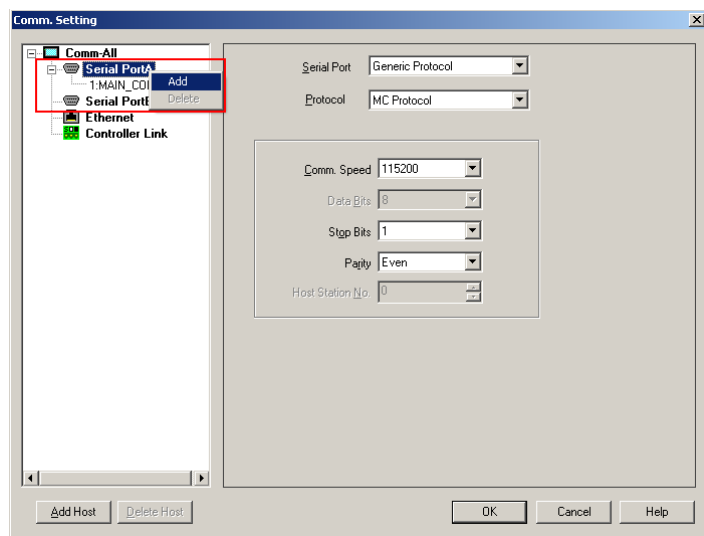
9) A host will be added as shown on the right. To change host settings in the right pane, click the displayed host name.
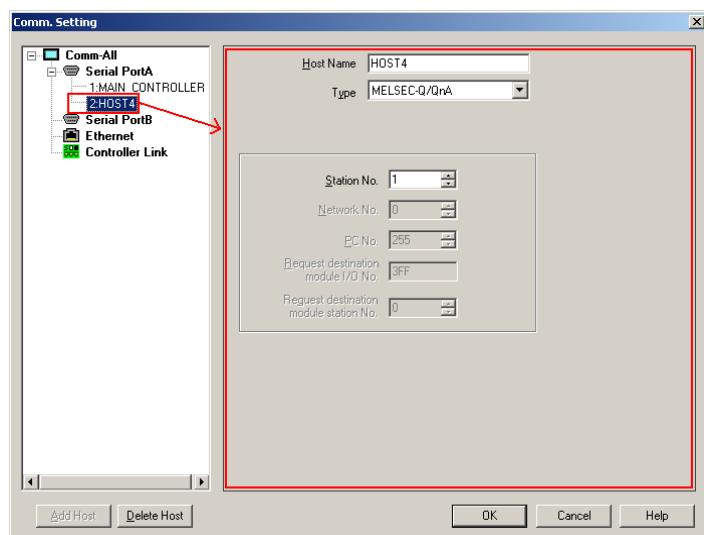
8-2-3 Communication Settings for Sequencers (Serial Communications Modules)

Serial Port on Q series Q00CPU and Q01CPU

Set the serial communication setting to the same as the communication settings of the PT, using GX Developer or other programming software.

For setting example, refer to 8-2-4.

Q Series QJ71C24N, QJ71C24N-R2 and QJ71C24N-R4

Set the switch on the serial communications module according to the communication settings of the PT, using GX Developer or other programming software.

For information on setting example, refer to 8-2-4.

QnA Series A1SJ71QC24N

Set the DIP switch and rotary switch on the serial communications module according to the communication settings of the PT.

For information on setting example, refer to 8-2-4.

8-2-4 Setting Example

When using the serial port on the PT with the CX-Designer default settings, set the CPU on the port or the serial communications module to be connected to the PT as follows.

Note: Settings may change depending on the specification changes of the sequencer and serial communications module. Please check the manuals for devices used as well.

Setting Serial Port on CPU (Q Series Q00CPU, Q01CPU)

Use GX Developer or other software to set the serial communications settings as follows.

Setting Item	Setting Value
Use serial communication	☑
Transmission speed	115.2 Kbps
Sum check	☑
RUN write setting - Permit	☑

Setting Serial Communications Module
(Q Series QJ71C24N, QJ71C24N-R2 and QJ71C24N-R4)

Use GX Developer or other software to set switch on the serial communications module as described in the table below.

The setting example for when connecting to CH1 of the serial communications module is given below.

When connecting to CH2, set the switch 3 to the value of the switch 1 and the switch 4 to the value of the switch 2.

Setting Item	Setting Value	Remarks
Switch 1	0B66	The following settings are made. 115.2 Kbps, 1 stop bit, 8 data bits, Odd parity, Independent mode, Write during RUN, Sum check: Yes, and Setting modification prohibited
Switch 2	0005	MC Protocol (Format 5) is set. Always set to 0005.
Switch 3	0000	
Switch 4	0000	
Switch 5	0000	The station number is set to 0.

Setting Serial Communications Modules (QnA Series A1SJ71QC24N)

Set the switch of the port connected to the PT as follows.

Switch	Switch No.	Setting Value	Remarks
Mode Switch		5	MC Protocol (Format 5)
Transmission specifications switch	SW01	Off	Independent mode
	SW02	ON	8 data bits
	SW03	ON	Parity: Yes
	SW04	Off	Odd parity
	SW05	Off	1 stop bit
	SW06	ON	Sum check: Yes
	SW07	ON	Write during RUN allowed
	SW08	Off	Setting change disabled
	SW09	ON	Transmission speed 115.2 Kbps
	SW10	ON	
	SW11	Off	
	SW12	ON	

CX-Designer Default Settings

When MC Protocol is selected, the default values of the CX-Designer for the serial port are as follows.

Setting Items	Default
Comm. Speed	115200
Data Bits	8
Stop Bits	1
Parity	Even

8-3 Communication Cable

8-3-1 For NS-series PTs excluding NSH-series PTs

Connecting to the 9-pin RS-232C interface on the serial communications module

Make cable according to the connection diagram below.

NS-series PT Serial Port (Except for NSH)				Serial Communications Module (RS-232C, 9-pin type)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
D-Sub 9-pin male	FG	1		1	CD	D-Sub 9-pin male
	SD	2		2	RD	
	RD	3		3	SD	
	RS	4		4	DTR	
	CS	5		5	SG	
	+V5	6		6	DSR	
		7		7	RS	
		8		8	CS	
	SG	9		9		
	Connector Hood		Sheiding	Connector Hood		
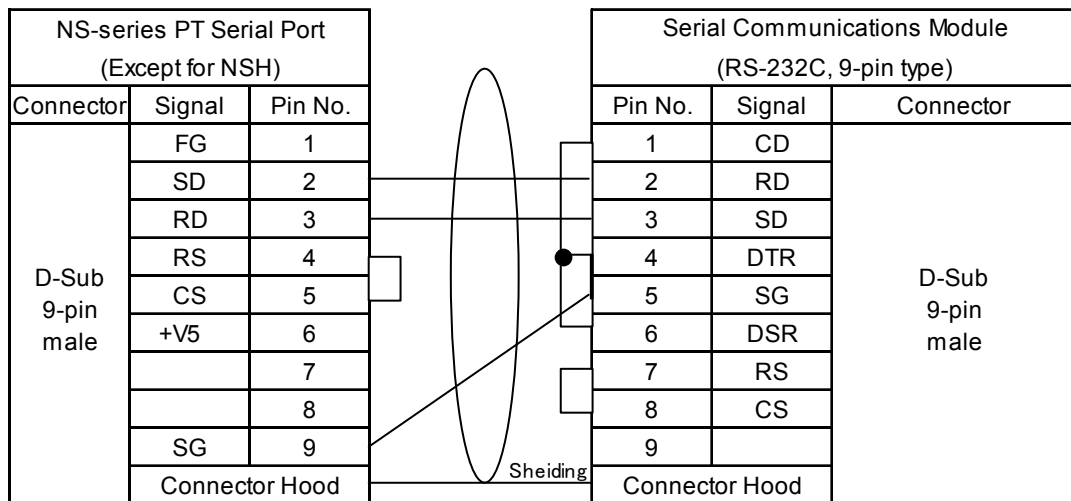
Connecting to the RS422/485 terminal block on the serial communications module

To communicate using RS-422/485 type of serial communications module, the PT requires an RS-232C/RS-422A Converter (OMRON NS-AL002, NT-AL001 or CJ1W-CIF11). Connect the converter and serial communications module using cable as shown below. Then mount the converter on the serial port of the PT. (Be sure to complete to connect the converter and module before mounting the converter on the PT.) Set the DIP switch on the converter to 4-wire type. Enable the terminator of the converter if necessary. (To enable the terminator on NS-AL002, set the 4 pin of DIP switch to ON.)

RS232C/422A Converter NS-AL002				Q/QnA series Serial Communications Module (RS-422/485)	
Connector	Signal	No.		Signal	Connector
RS-422A Terminal block	FG	1		RDA(+)	Terminal block
	RDB(+)	2		RDB(-)	
	SDB(+)	3		SDA(+)	
	RSB(+)	4		SDB(-)	
		5		SG	
	RDA(-)	6		FG	
	SDA(-)	7			
	RSA(-)	8	Sheiding		

* Connect to FG which is class D grounded.

88
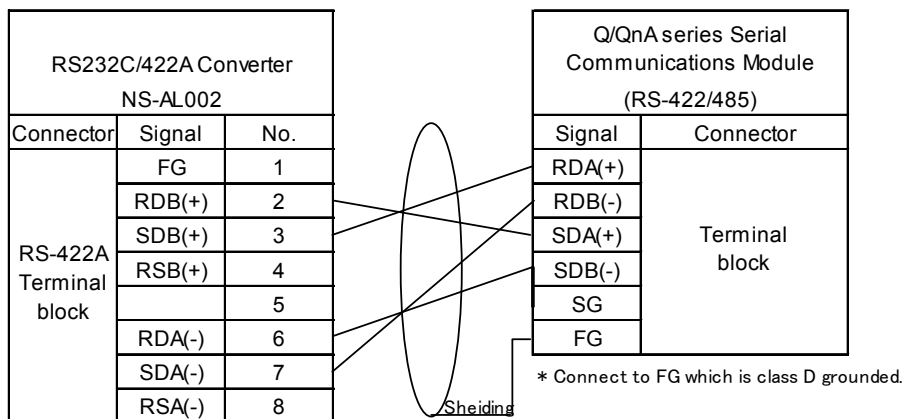
If the functional ground (FG) of the PT cannot be grounded for some reason, the shielding wire needs to be connected to the FG of NS-AL002.

Connecting to the serial port of Q00CPU or Q01CPU

Use a Mitsubishi connection cable QC30R2 to connect the conversion cable between the 9-pin on the Mitsubishi connection cable and the serial port on the PT as illustrated below.

NS-series PT Serial Port (Except for NSH)				Connection cable QC30R2 (RS-232C, 9-pin type)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
D-Sub 9-pin male	FG	1		1		D-Sub 9-pin male
	SD	2		2	SD	
	RD	3		3	RD	
	RS	4		4	DSR	
	CS	5		5	SG	
	+V5	6		6	DTR	
		7		7		
		8		8		
	SG	9		9		
Connector Hood			Sheiding	Connector Hood		
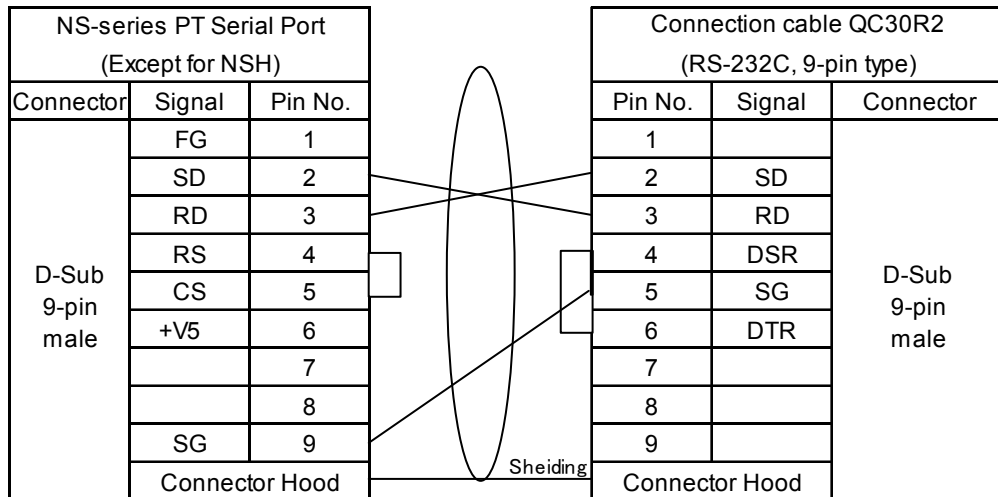
8-3-2 For NSH-Series PTs

Connecting to the 9-pin RS-232C interface on the serial communications module

Use the NSH 5-232UL-[]M cable for NSH-Series, and connect its 9 pin D-Sub connector to the serial communications modules using the cable as shown below.

Loopback connecters are mounted on the CN7 and CN8 connecters of the NSH cable. Leave the connecters mounted and do NOT connect the CN7 and CN8.

NSH Special Cable (NSH5-232UL-[]M)				Q/QnA series Serial Communications Module (RS-232C, 9-pin type)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
D-Sub 9-pin male (mm Screw, Female)	FG	1		1	CD	D-Sub 9-pin male
	RD	2		2	RD	
	SD	3		3	SD	
	CS	4		4	DTR	
	RS	5		5	SG	
	+V5	6		6	DSR	
		7		7	RS	
		8		8	CS	
	SG	9		9		
	Connector Hood		Sheiding	Connector Hood		
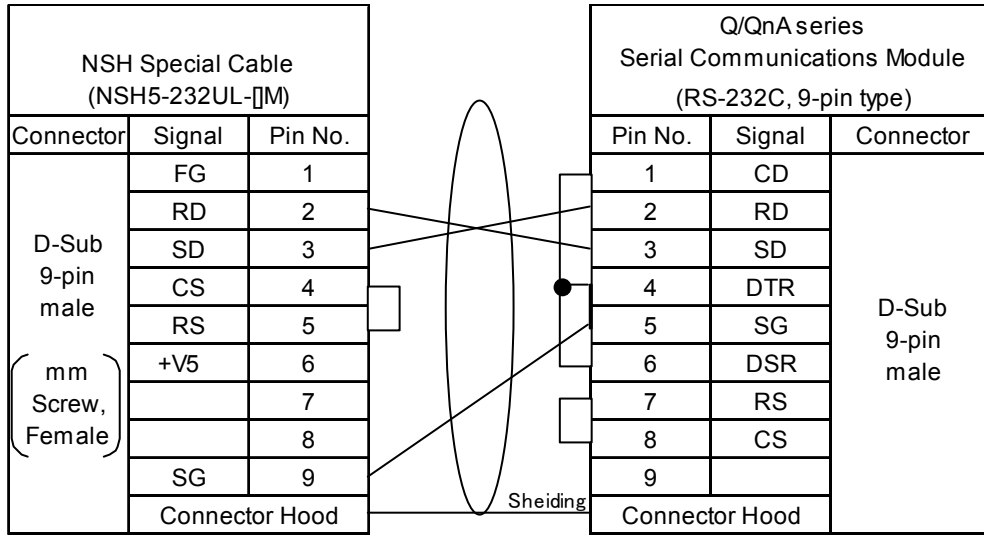
Connecting to the RS-422/485 terminal block on the serial communications module

Use an NSH5-422UL-10M cable and wire it as shown below.

When necessary, enable the terminating resistance on the NSH and connect this terminating resistance to the serial communications module.

NSH Cable NSH5-422UL-10M		Q/QnA series Serial communications module (RS-422/485)	
Forked loose wires		Signal	Connector
SDB(+)		RDA(+)	Terminal Block
SDA(-)		RDB(-)	
RDB(+)		SDA(+)	
RDA(-)		SDB(-)	
		SG	
FG		FG (See note)	

Note:Connect to FG which is class D grounded.
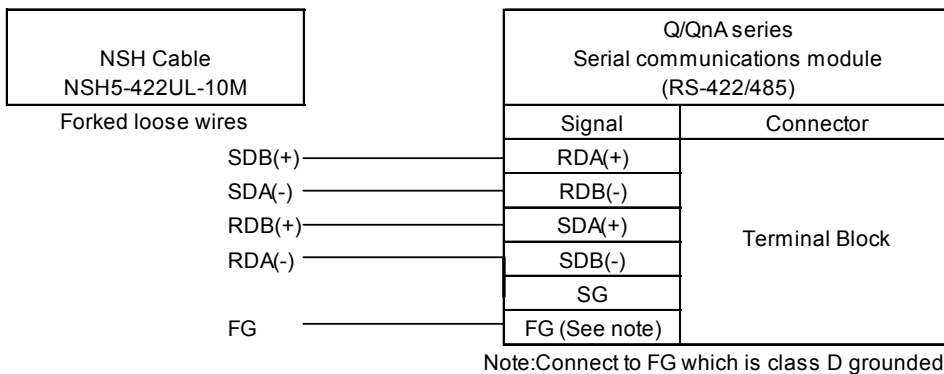
Connecting to the serial port on Q00CPU or Q01CPU

Connect a conversion cable between the 9-pin of the Mitsubishi connection cable QC30R2 and the serial port on the PT as shown below.

Loopback connecters are mounted on the CN7 and CN8 connecters of the NSH cable. Leave the connecters mounted and do NOT connect the CN7 and CN8.

NSH Cable (NSH5-232UL-□M)			Connection cable QC30R2 (RS-232C, 9-pin)		
Connector	Signal	Pin No.	Pin No.	Signal	Connector
D-Sub 9-pin male (mm Screw, Female)	FG	1	1		D-Sub 9-pin male
	RD	2	2	SD	
	SD	3	3	RD	
	CS	4	4	DSR	
	RS	5	5	SG	
	+V5	6	6	DTR	
		7	7		
		8	8		
	SG	9	9		
	Connector Hood		Connector Hood		

Sheiding
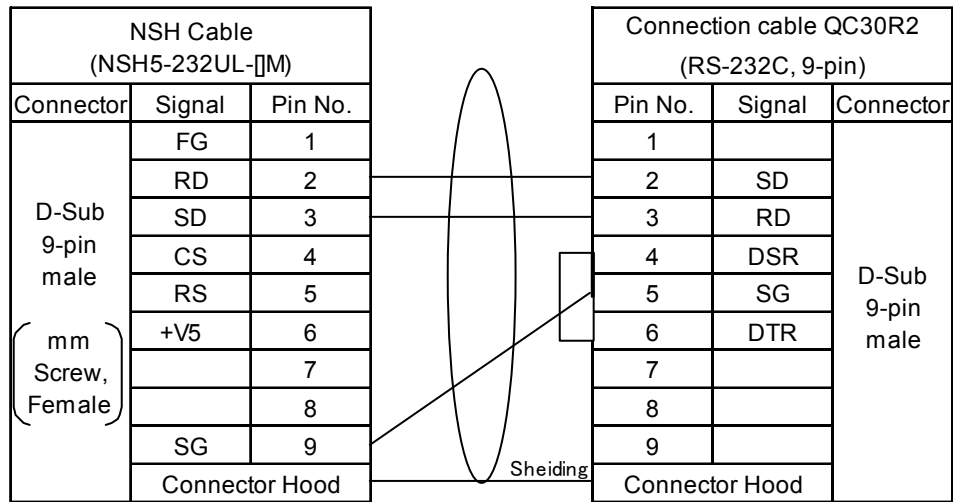
8-4 Accessible Address Range

Addresses listed in the table below can be used. Be sure to carefully read the restrictions and notes below the table.

Device		Word Access		Bit Access		Restrictions and Notes
		Read	Write	Read	Write	
X	Input	YES	YES	YES	YES	1), 2), 4), 9)
Y	Output	YES	YES	YES	YES	1), 2), 4), 9)
M	Auxiliary Relay	YES	YES	YES	YES	1), 2), 4)
SM	Special Relay	YES	YES	YES	YES	1), 2), 4)
L	Latch relay	YES	YES	YES	YES	1), 2), 4)
S	Step relay	YES	YES	YES	YES	1), 2), 4)
V	Edge Relay	YES	YES	YES	YES	1), 2), 4)
B	Link relay	YES	YES	YES	YES	1), 2), 4), 9)
SB	Special Link Relay	YES	YES	YES	YES	1), 2), 4), 9)
F	Annunciator	YES	YES	YES	YES	1), 2)
TS	Timer Contact	No	No	YES	No	1), 2), 7)
TC	Timer coil	No	No	YES	YES	1), 2)
CU	Counter Contact	No	No	YES	No	1), 2), 7)
CC	Counter Coil	No	No	YES	YES	1), 2)
SS	Retentive Timer Contact	No	No	YES	No	1), 2), 7)
SC	Retentive Timer Coil	No	No	YES	YES	1), 2)
D	Data register	YES	YES	YES	YES	1), 2), 3), 5)
SD	Special Register	YES	YES	YES	YES	1), 2), 3), 5)
W	Link register	YES	YES	YES	YES	1), 2), 3), 5), 9)
SW	Special Link Register	YES	YES	YES	YES	1), 2), 3), 5), 9)
R	File register	YES	YES	YES	YES	1), 2), 3), 5)
xxR	Extension file register	YES	YES	YES	YES	1), 2), 3), 5), 8)
T	Timer	YES	YES	No	No	1), 2), 3), 6)
C	Counter	YES	YES	No	No	1), 2), 3), 6)
SN	Retentive Timer	YES	YES	No	No	1), 2), 3), 6)

Restrictions and Notes

1) If "RUN write setting" is not permitted, any writing operations are rejected during running the sequencer even if the addresses in the table above are used. (A communication error will occur.)

2) Do not use the device numbers that your sequencer does not support.

3) Avoid that both PT and sequencer write data to the same address of the same device. All the values changed by a sequencer may be lost when a sequencer rewrites a word that contains bits to which the PT is also rewriting. This happens because bits are

written by reading one word containing bits and writing back these bits to a sequencer.

4) Most bit devices can be specified with address input fields that are used to specify word devices. In this case, addresses that are divisible by 16 can only be specified. The address numbers must be suffixed by "W". This "W" means word access. For example, addresses such as X0W, Y30W, S16W and M224W can be specified. The device numbers of X, Y, B and SB are hexadecimal. Therefore, addresses such as X0, X10, X20, X30 and X40 etc. are divisible by 16. Please note that X16 and X32 are not divisible by 16.

5) Most word devices can be specified in address input fields that are used to specify bit devices. To do so, suffix a period to the device number and then specify the bit position (0 to 15). For example, D123.12 can be specified for a display address of a bit lamp.

Reference: With the future version of CX-Designer, bit positions must be specified in one digit hexadecimal. (The same as the method used for specifying the bit position with GX Developer.) With the future version of CX-Designer, screen data created with CX-Designer V2.102A can be used without any modification. When the screens are open with the future version, the bit position will be automatically displayed in one digit hexadecimal.

6) Do not allocate devices T, C and SN to String Display & Input objects.

7) Input "TU" or "CU" with CX-Designer as the device name "Timer contact" or "Counter contract" respectively.

8) Expansion file register (00R to 31R) can be used. To specify these device numbers, write "R<block#>_<device#>" so the block number comes last.

9) Input at least one zero between the device name and the device number when inputting addressees whose most significant digits of the device numbers are A to F. (e.g. "W0FFF")

8-5 PLC Data Format

8-5-1 Numerics

The PT treats the numeric data stored in Q/QnA sequencer as little-endianed.

The example on the right shows the PLC memory of when the PT writes 0x1234 (word width) to D0.

Address	D0															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x1234															

The example below shows the PLC memory of when the PT writes 0x12345678 (double word) to D0.

Address	D0																D1															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	0	1	1	1	1	0	0	1	1	0	1	0	1	0	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x5678																0x1234															

When the PT accesses bit devices as word devices, the PT also treats the numeric data as little-endianed.

For example, when each bit of M device is in the status shown on the right, M0W becomes 0x1234.

Device	M															
Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0
Value(hex)	0x1234															

8-5-2 Strings

ASCII Strings

The example on the right shows the sequencer memory of when the PT writes an ASCII string "ABCDEF" to D0.

Address	D0	D1	D2	D3
Value(char)	"AB"	"CD"	"EF"	NULL NULL
Value(hex)	0x4241	0x4443	0x4645	0x0000

The PT always handles string data by word unit. So please note that when writing the number of strings containing NULL at the end is odd byte, an additional one byte NULL will be added.

Unicode Strings

The example below shows the sequencer memory of when the PT writes a Unicode string "ABCDEF" to D0.

Address	D0	D1	D2	D3	D4	D5	D6
Value(char)	A	B	C	D	E	F	NULL
Value(hex)	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0000

8-6 Address Conversion When Converting Host Type

Changing the host type to/from OMRON PLC

When the host type is converted between an OMRON PLC and MELSEC Q/QnA, address types (areas/devices) are automatically converted according to the table on the right. (See the figure below)

*Changing a host type of SERIALA from SYSMAC PLC to MELSEC-Q

MELSEC Q/QnA	SYSMAC
X	—
Y	—
M	CIO
SM	—
L	HR
S	—
V	—
B	LR
SB	—
F	—
TS	TU
TC	—
CS	CU
CC	—
SS	—
SC	—
D	DM
SD	—
W	WR
SW	—
R	—
xxR~	—
T	TIM
C	CNT
SN	—

SERIALA:HR00000.7 → SERIALA:L00007

-99999 → -99999

SERIALA:DM00123 → SERIALA:D00123
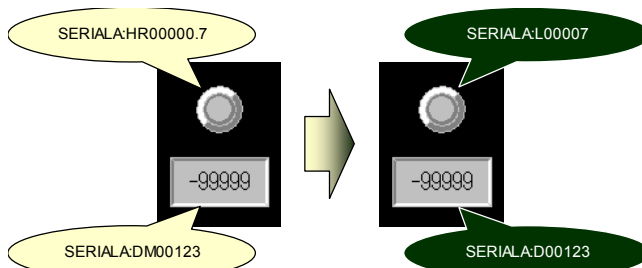
Address with "-" in the right table and addresses not in the table will not be mapped to new PLCs address and will not be converted.

*Changing a host type of SERIALA from SYSMAC PLC to MELSEC-Q

SERIALA:AR00000.7 → SERIALA:AR00000.7

-99999 → -99999

SERIALA:EM00123 → SERIALA:EM00123
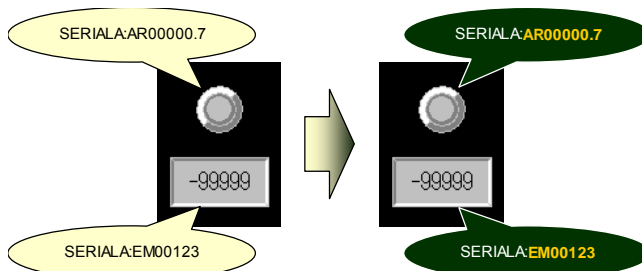
Please modify the addresses that have not been converted. For how to modify addresses, refer to "1-3-1 Notes and Restrictions When Changing Host Types".

Note: When SYSMAC PLC address are replaced with MELSEC-Q/QnA bit devices, address numbers will be converted to make their bit offsets equal. For example, HR00003.12 is the 60th bit (60=16×3+12), so will be converted to L00060.

The opposite is same. L00080W of MELSEC-A will be converted to HR00005 of SYSMAC, and L00084 to HR00005.4.

Chapter 9.   Connecting to Rockwell (Allen-Bradley) PLCs

Applicable CX-Designer Version	V2.103 or later

Applicable NS System Version	V7.01 or later

Connection Method	Serial (RS-232C/485)

9-1 Compatible PLCs

The following models and connection methods are supported.

Series	CPU	Connection Port	Connection Method (see note.)						
			Physical layer	1:1	N:1	1:N	Connection diagram	Setting Example	Remarks
SLC500	SLC5/03 SLC5/04 SLC5/05	CPU on serial port	RS-232C	OK	NG	NG	1	1	
MicroLogix	MicroLogix 1500	CPU on serial port	RS-232C	OK	NG	NG	2	1	See note 1.
ControlLogix	Logix5555	CPU on serial port	RS-232C	OK	NG	NG	1	2	
CompactLogix	1769-L31	CPU on serial port	RS-232C	OK	NG	NG	1	2	
PLC-5	PLC-5/20	CPU on serial port	RS-485 (4-wire method)	OK	NG	NG	3	3	
				OK	-	NG	4	3	See note 2.

Connection method: OK: Operation checked, -: Operation not checked, NG: Not supported.

                N:1: Multiple hosts can be connected to one port on PT

                1:N: Multiple PTs can be connected to one port on host

Note 1: A Rockwell (Allen-Bradley) cable (1761-CBL-PM02) is required.

     2: An OMRON RS-232C/422A Converter (NS-AL002, NT-AL001 or CJ1W-CIF11) is

        required. (Except for NSH-series PTs)

9-2 Connection Configuration

9-2-1 Communication Settings for NS Project (Screen Data)

1) Click **PT** Menu – **Communication Setting…** with CX-Designer.
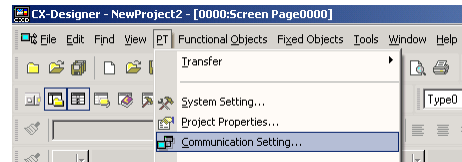
2) **Comm. Setting** Dialog Box will be displayed. Click **Serial Port A** or **Serial Port** B, depending on the port to which you want to connect the sequencer.
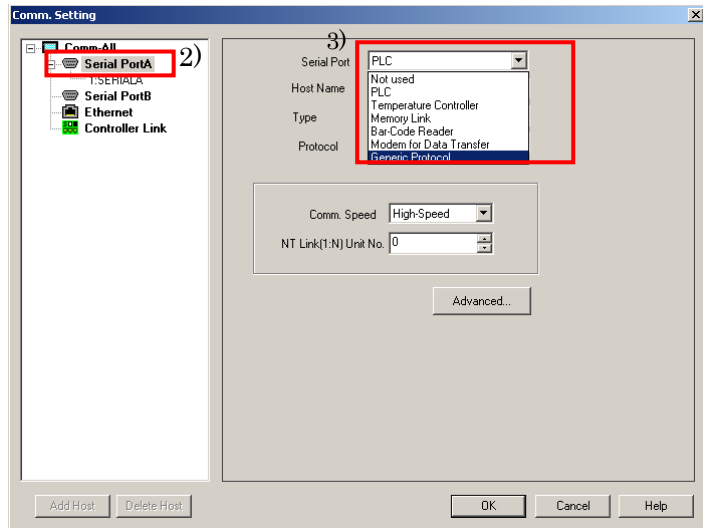
3) Select **Generic Protocol** from **Serial Port** option.

4) A confirmation message shown. Press **Yes** to continue to the next step.
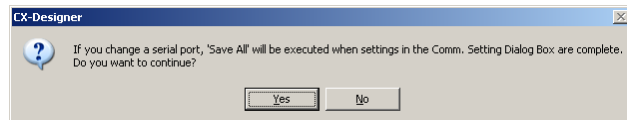
5) The dialog box shows the display shown on the right.
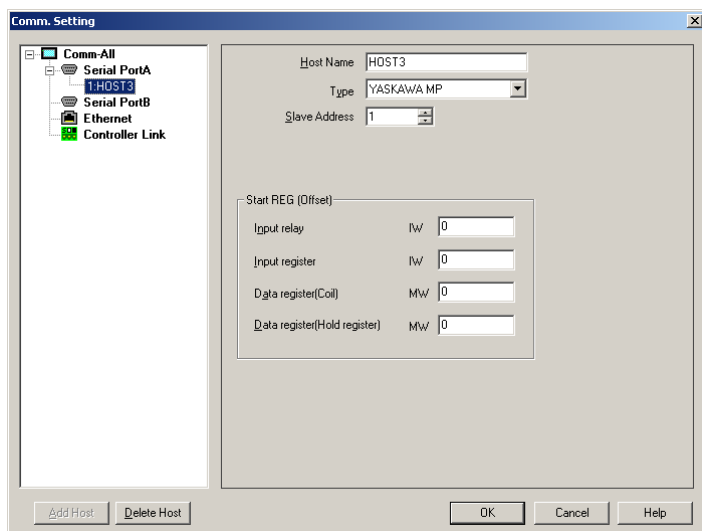
6) In the left pane, click **Serial Port A** or **Serial Port B**. In the left pane, select **Allen-Bradley DF1** from **Protocol** option.
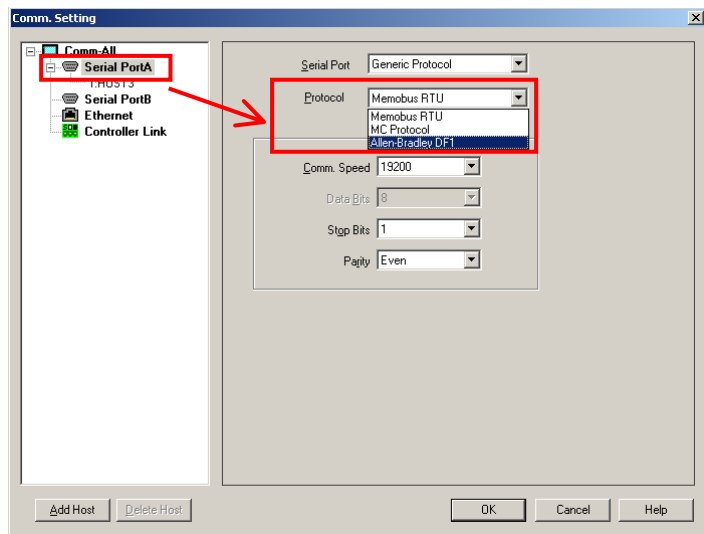
7) The dialog box shows the display shown on the right. Set the **Type** of the host to the PLC used. Also set the **Node Address** according to the PLC used.
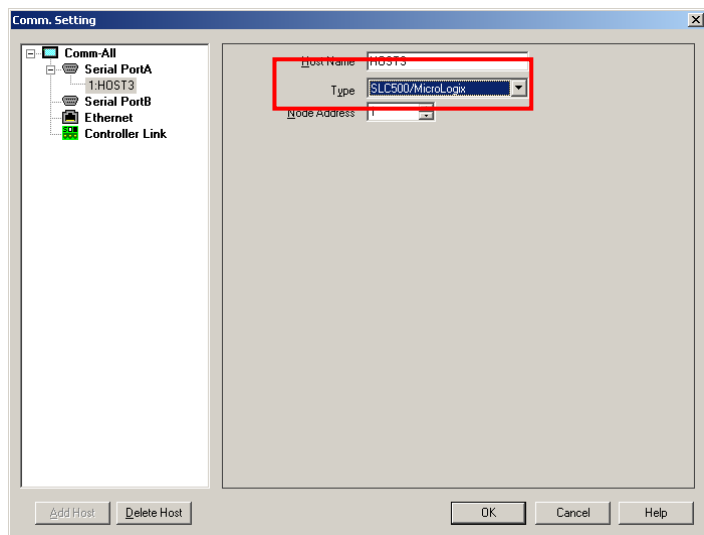
8) To change settings such as communication speed and parameter of DF1 protocol, click **Serial Port A** or **Serial Port B** in the left pane. Then change the settings in the right pane.
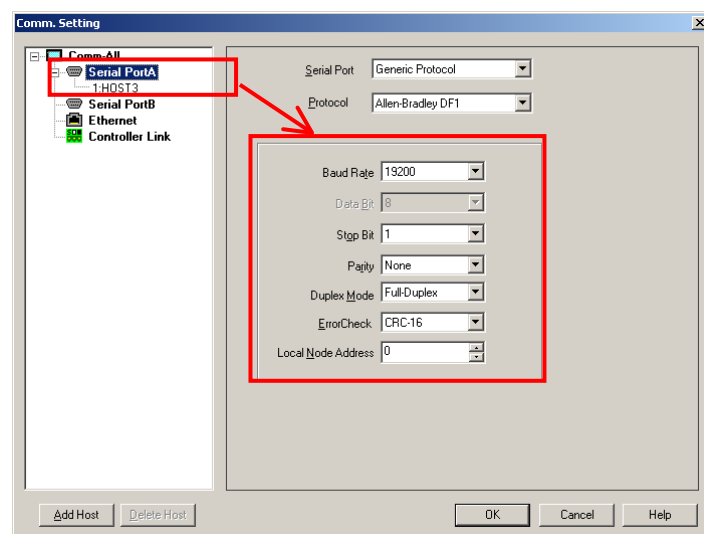
This completes settings required for when connecting only one PLC. Press **OK** Button to close **Comm. Setting** Dialog Box.

When connecting multiple PLCs to one serial port on the PT using RS-485, please follow the procedure below.

98

9) To connect multiple sequencers with one serial port, right-click **Serial Port A** or **Serial Port B** in the left pane. Then click **Add** option.
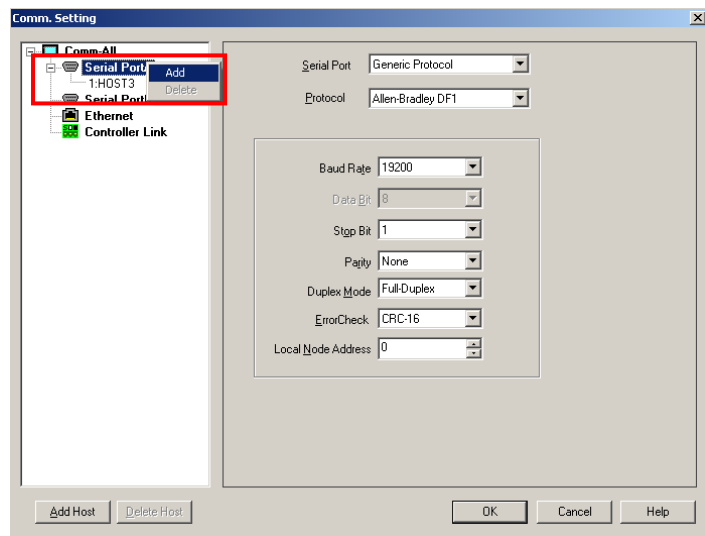
10) A host will be added as shown on the right. To change host settings in the right pane, click the displayed host name.
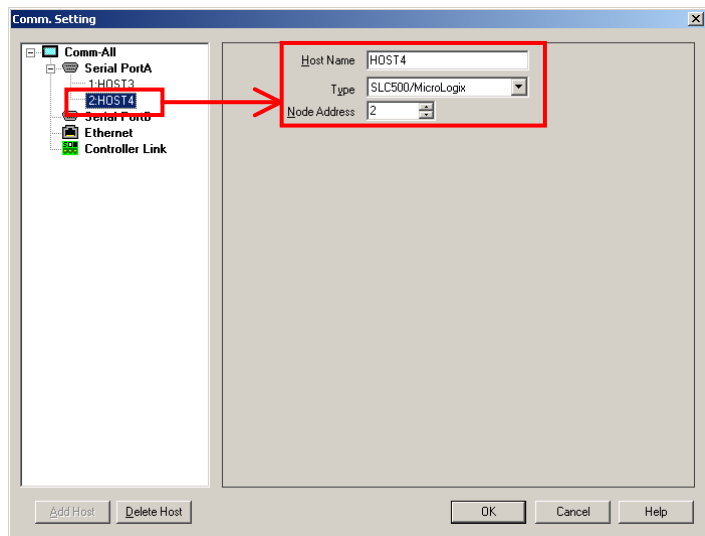
9-2-2 Example of PLC Communications Settings

Use Rockwell (Allen-Bradley) support software to make communications settings for the PLC.

The following are examples OMRON recommends.

Setting Example 1 - SLC500, MicroLogix Series

Start support software (RSLogix 500) and select **Project** – **Controller** from the project tree. Then double click **Channel Configuration**. Open a tab page of a port to which the PT is connected and make settings as follows.

Full-duplex

Configuration Item	Recommended Setting
Driver	DF1 Full Duplex
Baud	19200
Parity	NONE
Source ID	0
Control Line	No Handshaking
Error Detection	CRC
Embedded Responses	Enabled
Duplex Packet Detect	☑
ACK Timeout	50
NAK Retries	3
ENQ Retries	3

Half-duplex

Configuration Item	Recommended Setting
Driver	DF1 Half Duplex Slave
Baud	19200
Parity	NONE
Node Address	1 (1 is recommended. However any value is fine as long as the value is different from the Local Node Address set for the NS-series.
Control Line	No Handshaking
Error Detection	CRC
EOT Suppression	☐
Duplex Packet Detect	☑
Poll Timeout	50
Message Retries	3
Pre Transmit Delay	0

Setting Example 2 - CompactLogix, ControlLogix

Start support software (RSLogix 5000). In the Controller Organizer, right-click your controller and select **Properties**. The **Controller Properties** Dialog Box appears. Open the **Serial Port** and **System Protocol** Tab Page and set each item as follows.

Full-duplex

Configuration Item	Recommended Setting
Mode	System
Baud Rate	19200
Data Bits	8
Parity	None
Stop Bits	1
Control Line	No Handshaking
RTS Send Delay	0
RTS Off Delay	0
Protocol	DF1 Point To Point
Station Address	0
NAK Receive Limit	3
ENQ Transmit Limit	3
ACK Timeout	50
Embedded Responses	Autodetect
Error Detection	BCC
Enable Duplicate Detection	☑

Half-duplex

Configuration Item	Recommended Setting
Mode	System
Baud Rate	19200
Data Bits	8
Parity	None
Stop Bits	1
Control Line	No Handshaking
RTS Send Delay	0
RTS Off Delay	0
Protocol	DF1 Slave
Station Address	1 (1 is recommended. However any value is fine as long as the value is different from the Local Node Address set for the NS-series.
Transmit Retries	3
Slave Poll Timeout	3000
EOT Suppression	☐
Error Detection	BCC
Enable Duplicate Detection	☑

Setting Example 3 - PLC-5 Series

Start support software (RSLogix 5) and select **Project** – **Controller** from the project tree. Double click **Channel Configuration**. Then open a tab page of a port to which the PT is connected and make the settings as follows.

Full-duplex

Configuration Item	Recommended Setting
Protocol	System (Point to Point)
Baud Rate	19200
Bits Per Char	8
Stop Bits	1
Parity	None
Error Detect	BCC
Control Line	No Handshaking
NAK Receive	3
DF1 ENQs	3
ACK Timeout	50

Half-duplex

Configuration Item	Recommended Setting
Protocol	System (Slave)
Baud Rate	19.2K
Bits Per Char	8
Stop Bits	1
Parity	None
Error Detect	BCC
Control Line	No Handshaking
Station Addr	1
DF1 Retries	3
Detect Duplicate Messages	☑
RTS Send Delay	0
RTS OFF Delay	0
ACK Timeout	50
Message Application Timeout	30 seconds
Remote Mode Change	☐ (Deselect the "Enable" checkbox)

9-2-3 Recommended CX-Designer Communication Settings

Setting Example 1 – SLC500, MicroLogix Series

Make settings using CX-Designer as follows.

Full-duplex

Configuration Item	Recommended Setting
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Duplex Mode	Full-Duplex
ErrorCheck	CRC-16
Local Node Address	0

Full-duplex

Configuration Item	Recommended Setting
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Duplex Mode	Half-Duplex Master
ErrorCheck	CRC-16
Local Node Address	0

* When using half-duplex, the Node Address of the host must be the same as the Node Address of the controller.

Setting Example 2 – CompactLogix, ControlLogix sereis

Make settings using CX-Designer as follows.

Full-duplex

Configuration Item	Recommended Setting
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Duplex Mode	Full-Duplex
ErrorCheck	BCC
Local Node Address	0

Full-duplex

Configuration Item	Recommended Setting
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Duplex Mode	Half-Duplex Master
ErrorCheck	BCC
Local Node Address	0

* When using half-duplex, the Node Address of the host must be the same as the Node Address of the controller.

Setting Example 3 – PLC-5 sereis

Make settings using CX-Designer as follows.

Full-duplex

Configuration Item	Recommended Setting
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Duplex Mode	Full-Duplex
ErrorCheck	BCC
Local Node Address	0

Full-duplex

Configuration Item	Recommended Setting
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Duplex Mode	Half-Duplex Master
ErrorCheck	BCC
Local Node Address	0

* When using half-duplex, the Node Address of the host must be the same as the Node Address of the controller.

9-3 Connection Configuration

Connection Diagram 1 (NS-series PTs excluding NSH-series PTs)

Omron XW2Z-S002, XW2Z-200S-V and XW2Z-500S-V cables are compatible. To make a cable, make the following wiring connection.

* The following wiring connection differs in detail from that of OMRON cables.

SLC500, CompactLogix, ControlLogix

Connector	Signal	Pin No.		Pin No.	Signal	Connector
			PT Serial Port (for excluding NSH) → SLC500 / CompactLogix / ControlLogix Serial Port on the CPU (RS-232C)			
D-Sub 9 pins Male	FG	1		1	CD	D-Sub 9 pins Male
	SD	2		2	RD	
	RD	3		3	SD	
	RS	4		4	DTR	
	CS	5		5	SG	
	+5V	6		6	DSR	
		7		7	RS	
		8		8	CS	
	SG	9		9		
	Hood		Shield	Hood		
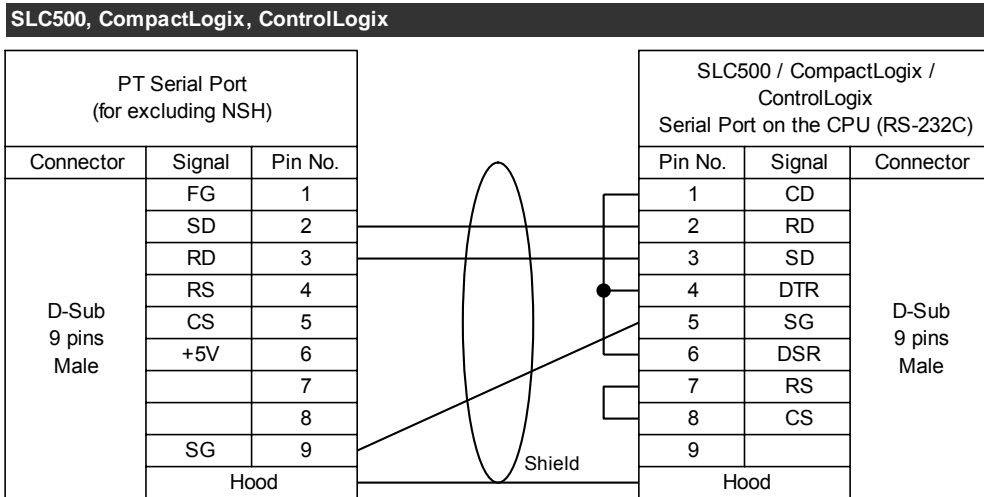
Connection Diagram 1 (NSH-series PTs)

Connect the 9-pin connecter of NSH cable to the serial port on the CPU using the cable as shown below.

SLC500, CompactLogix, ControlLogix

Connector	Signal	Pin No.		Pin No.	Signal	Connector
			NSH Cable (Model: NSH5-232UL-□M) → SLC500 / CompactLogix / ControlLogix Serial Port on the CPU (RS-232C)			
D-Sub 9 pins Female (mm screw)	FG	1		1	CD	D-Sub 9 pins Male
	RD	2		2	RD	
	SD	3		3	SD	
	CS	4		4	DTR	
	RS	5		5	SG	
	+5V	6		6	DSR	
		7		7	RS	
		8		8	CS	
	SG	9		9		
	Hood		Shield	Hood		

Connection Diagram 2 (NS-series PTs excluding NSH-series PTs)

A Rockwell (Allen-Bradley) 1761-CBL-PM02 cable is required. Connect the 1761-CBL-PM02 cable to the port on MicroLogix. Then connect the PT to D-Sub 9-pin connecter of the 1761-CBL-PM02 cable using the cable as shown below.

MicroLogix (RS-232C)

PT Serial Port (for excluding NSH)				Rockwell (Allen-Bradley) Cable 1761-CBL-PM02 Side of 9-pins connector		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
	FG	1		1	CD	
	SD	2		2	RD	
	RD	3		3	SD	
D-Sub 9 pins Male	RS	4		4		D-Sub 9 pins Female (mm screw)
	CS	5		5	SG	
	+5V	6		6		
		7		7	RS	
		8		8	CS	
	SG	9		9		
Hood			Shield	Hood		

Connection Diagram 2 (NSH-series PTs)

A Rockwell (Allen-Bradley) 1761-CBL-PM02 cable is additionally required. Connect the 1761-CBL-PM02 cable to the port on MicroLogix. Then connect the D-Sub 9-pin connecter of the 1761-CBL-PM02 cable to the 9-pin connecter of NSH cable shown as follows.

MicroLogix (RS-232C)

NSH Cable (Model: NSH5-232UL-□M)				Rockwell (Allen-Bradley) Cable 1761-CBL-PM02 Side of 9-pins connector		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
	FG	1		1	CD	
	RD	2		2	RD	
	SD	3		3	SD	
D-Sub 9 pins Female (mm screw)	CS	4		4		D-Sub 9 pins Female (mm screw)
	RS	5		5	SG	
	+5V	6		6		
		7		7	RS	
		8		8	CS	
	SG	9		9		
Hood			Shield	Hood		
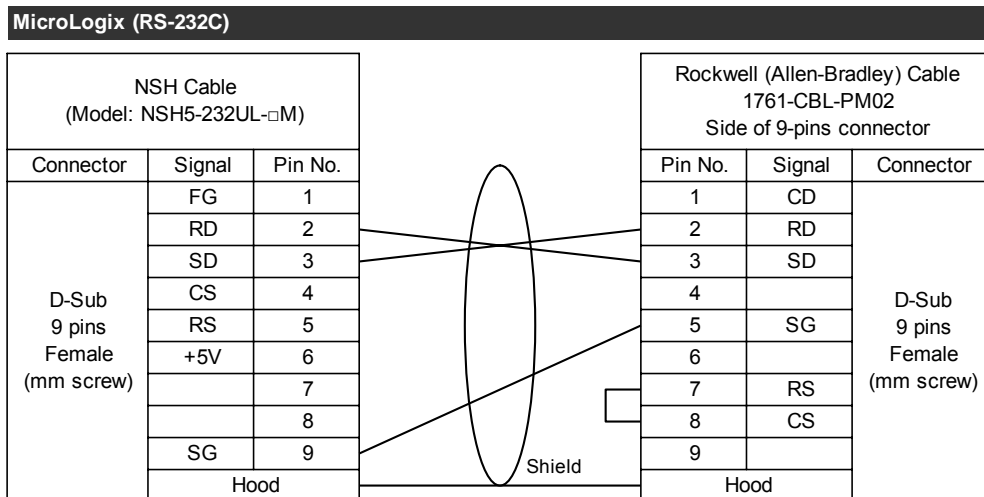
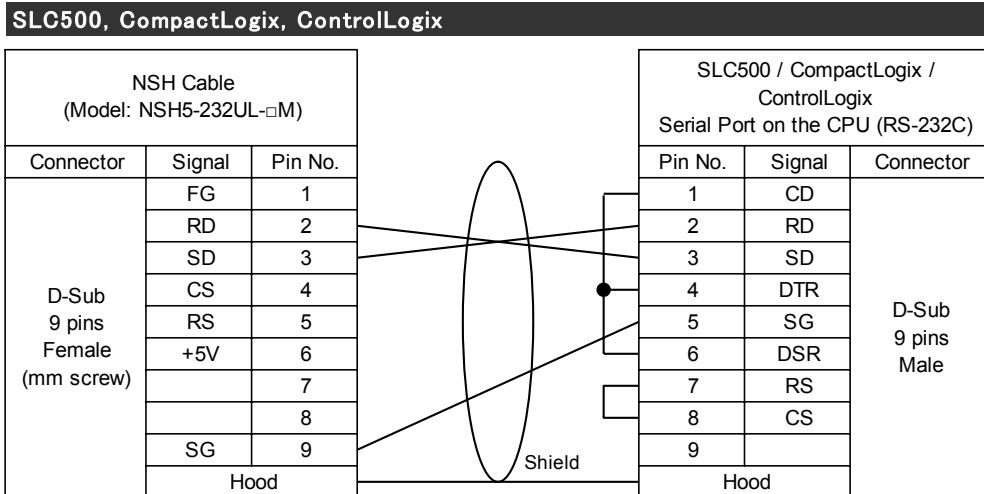Connection Diagram 3 (NS-series PTs excluding NSH-series PTs)

OMRON XW2Z-200S (2m length) and XW2Z-500S (5m length) are compatible. To make a cable, make the following wiring connection.

* The following wiring connection differs in detail from that of OMRON cables.
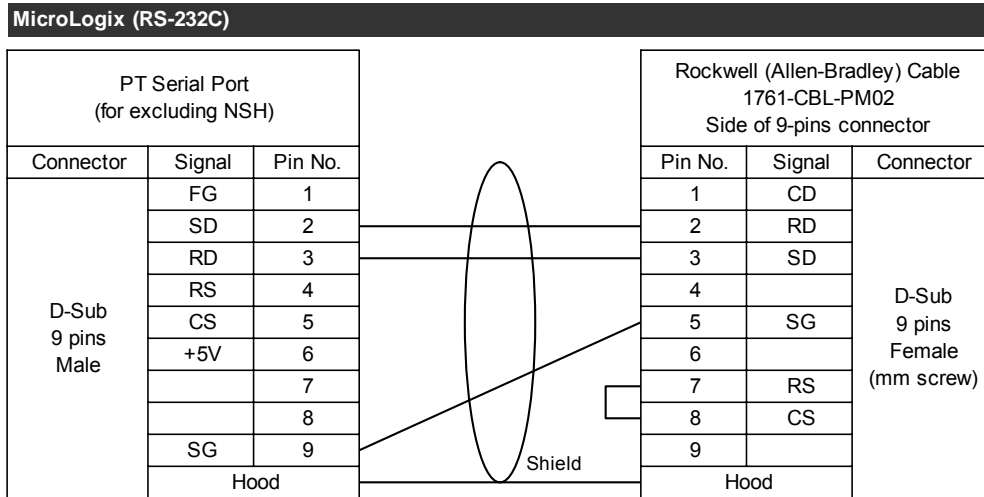
PLC-5

PT Serial Port (for excluding NSH)				PLC-5 Serial Port on the CPU (RS-232C)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
	FG	1				
	SD	2		2	SD	
	RD	3		3	RD	
	CS	4		4	RS	
D-Sub 9 pins Male	RS	5		5	CS	D-Sub 25 pins Male
	+5V	6		6	DSR	
		7		7	SG	
		8		8	CD	
	SG	9		20	DTR	
Hood			Shield	Hood		
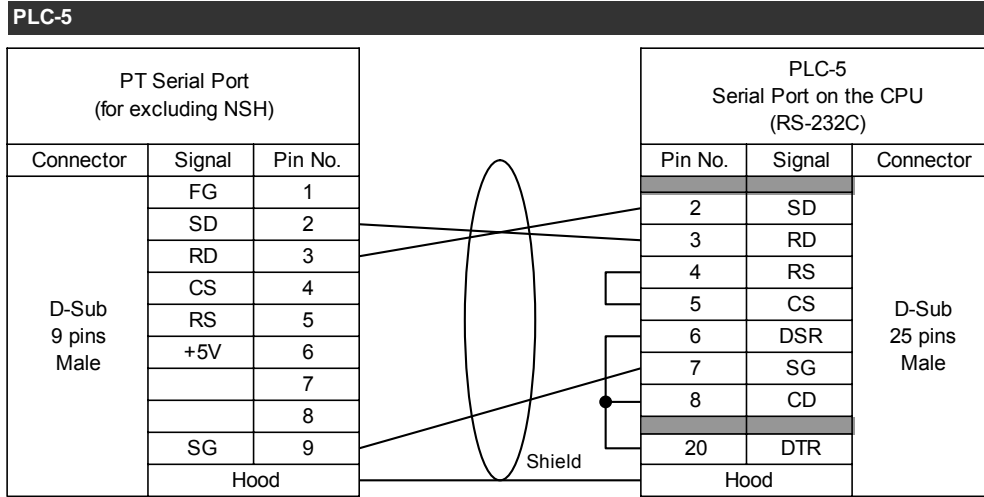
Connection Diagram 3 (NSH-series PTs)

Connect the serial port on PLC-5 to the 9-pin connecter of NSH cable shown as follows.

PLC-5

NSH Cable (Model: NSH5-232UL-☐M)				PLC-5 Serial Port on the CPU (RS-232C)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
	FG	1				
	RD	2		2	SD	
	SD	3		3	RD	
	CS	4		4	RS	
D-Sub 9 pins Female (mm screw)	RS	5		5	CS	D-Sub 25 pins Male
	+5V	6		6	DSR	
		7		7	SG	
		8		8	CD	
	SG	9		20	DTR	
Hood			Shield	Hood		
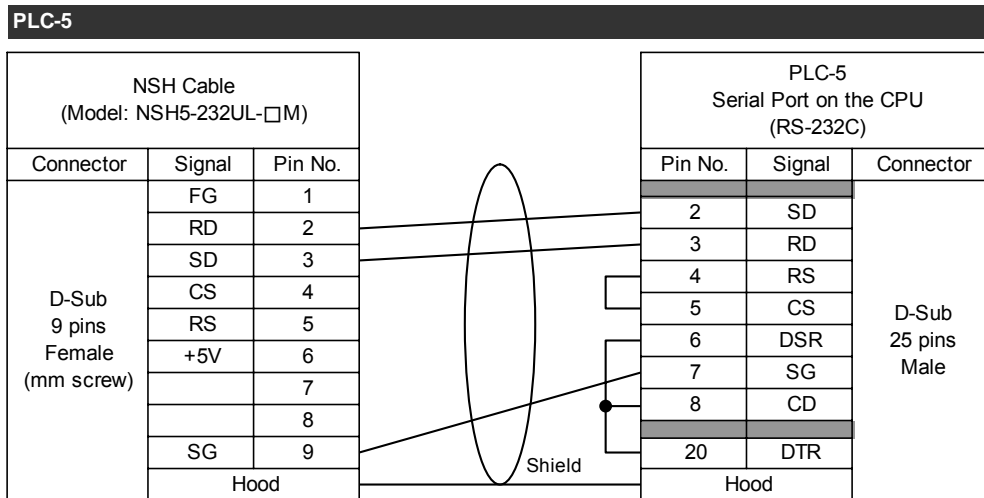
Connection Diagram 4 (NS-series PTs excluding NSH-series PTs)

Connect the serial port of the NS to RS-232C/RS422A converter (NS-AL002, NT-AL011 or CJ1W-CIF11). Then connect the converter to the serial port on PLC-5 as shown below.

> The RS-232C and the RS-422A/485 of the NS-AL002 are not insulated. Therefore, if differences in ground potential or effects from noise are of concern, it is recommended that an insulated NT-AL001 converter be used.

PLC-5 (RS-485)

RS-232C/RS-422A Converter NS-AL002, NT-AL001, or CJ1W-CIF11			Shielding	PLC-5 Serial Port on CPU (RS-232C)		
Connector	Signal	Pin No.		Pin No.	Signal	Connector
				1	FG	
Terminal Block	RDB(+)	2		2	SDA(-)	D-Sub 25-pin male
	SDB(+)	3		3	RDA(+)	
	RSB(+)	4				
				14	SDB(-)	
	RDA(-)	6		16	RDB(-)	
	SDA(-)	7				
	RSA(-)	8				
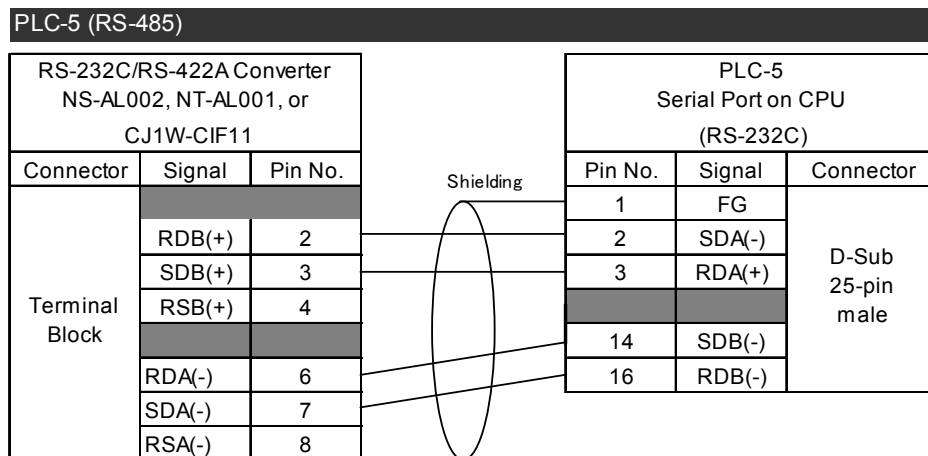
Settings of DIP Switches on RS232C/422A Converter

NS-AL002	
SW1	ON
SW2	OFF
SW3	OFF
SW4	See note

NT-AL001	
SW1-1	ON
SW1-2	See note
SW1-3	OFF
SW1-4	OFF
SW1-5	OFF
SW1-6	OFF

CJ1W-CIF11	
SW1	See note
SW2	OFF
SW3	OFF
SW4	OFF
SW5	OFF
SW6	OFF

Note: To enable the terminating resistance on the converter, turn it ON.

Connection Diagram 4 (NSH-series PTs)

Use an NSH5-422UL-10M cable and wire it as shown below. When necessary, enable the terminating resistance on the NSH.

PLC-5 (RS-485)

NSH Cable NSH5-422UL-10M Forked loose wires	Shielding	PLC-5 Serial port on CPU (RS-232C)		
		Pin No.	Signal	Connector
		1	FG	
RDB(+)		2	SDA(-)	D-Sub 25-pin male
SDB(+)		3	RDA(+)	
RDA(-)		14	SDB(-)	
SDA(-)		16	RDB(-)	
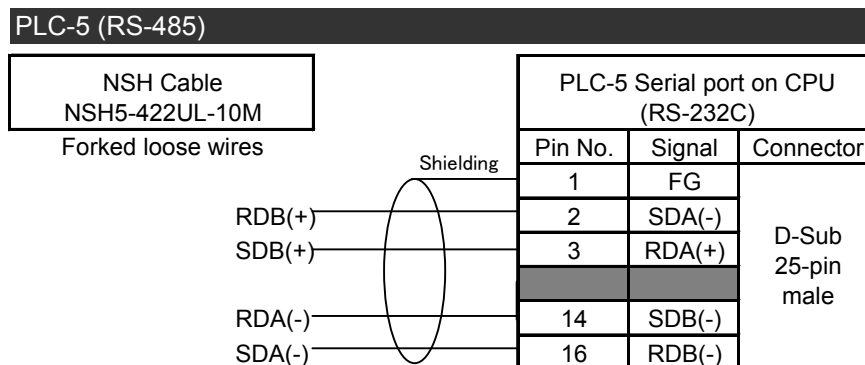
9-4 Accessible Address Range

Addresses listed in the table below can be used. Be sure to carefully read the notes.

For SLC500 / MicroLogix / PLC-5		Word Access		Bit Access		Notes
File Type		Read	Write	Read	Write	
O	Output	Yes	Yes	Yes	Yes	1) 2) 3) 4) 5)
I	Input	Yes	Yes	Yes	Yes	1) 2) 3) 4) 5)
S	Status	Yes	Yes	Yes	Yes	1) 2) 3) 4) 5)
B	Binary / Bit	Yes	Yes	Yes	Yes	1) 2) 3)
T	Timer	Yes	Yes	Yes	Yes	1) 2) 3) 4) 6) 9)
C	Counter	Yes	Yes	Yes	Yes	1) 2) 3) 4) 6) 9)
R	Control	Yes	Yes	Yes	Yes	1) 2) 3) 4) 7) 9)
N	Integer	Yes	Yes	Yes	Yes	1) 2) 3)
F	Float	Yes	Yes	No	No	1) 2) 3) 4) 10)
ST	String	Yes	Yes	No	No	1) 2) 3) 8)
A	ASCII	Yes	Yes	Yes	Yes	1) 2) 3)
L	Long Integer	Yes	Yes	Yes	Yes	1) 2) 3) 4)
D	BCD	Yes	Yes	Yes	Yes	1) 2) 3) 4)

For ControlLogix / CompactLogix		Word Access		Bit Access		Notes
File Type		Read	Write	Read	Write	
BL	BOOL	Yes	Yes	Yes	Yes	1) 2) 3) 4) 11) 13)
INT	INT	Yes	Yes	Yes	Yes	1) 2) 3) 11)
RE	REAL	Yes	Yes	No	No	1) 2) 3) 4) 10) 11)
DIN	DINT	Yes	Yes	Yes	Yes	1) 2) 3) 4) 11)
SIN	SINT	Yes	Yes	Yes	Yes	1) 2) 3) 4) 11) 12)

Notes

1) Bit data are written by reading one word (2 words for each file of I, BL and DIN) that contains this bit data, rewriting this bit data and writing back the one word or two word. After the PT reads data if the controller changes the word data before the PT writes back the data, the changes made by the controller may be lost when the PT writes back the data. Therefore, please do not allow the controller to write word or double words which the PT also writes.

2) The address replacement function is not supported.

3) A communication error will not occur even when a combination of file number and file type does not match a file of the controller.

4) It is not possible to use for storing strings. For example allocating to a String Display & Input object is not possible.

5) Please omit the file number for O, I, S when using CX-Designer. Omit the file number even when directly typing addresses in an address input field.

6) Symbols cannot be used to specify bits and sub-elements of Timer and Counter. Please reference these tables when specifying sub-element numbers and bit numbers.

Timer (T)		
Symbol	Usage	Adress Representation
/EN	Timer Enable Bit	T4:0.0/15
/TT	Timer Timing Bit	T4:0.0/14
/DN	Timer Done Bit	T4:0.0/13
.PRE	Preset Value	T4:0.1
.ACC	Accumulated Value	T4:0.2

Counter (C)		
Symbol	Usage	Adress Representation
/CU	Count Up Enable Bit	C5:0.0/15
/CD	Count Down Enable Bit	C5:0.0/14
/DN	Count Done Bit	C5:0.0/13
/OV	Count Overflow Bit	C5:0.0/12
/UN	Count Underflow Bit	C5:0.0/11
.PRE	Preset Value	C5:0.1
.ACC	Accumulated Value	C5:0.2

7) Symbols cannot be used to specify bits and sub-elements of Control. Please reference these tables when specifying sub-element numbers and bit numbers.

Control (R)					
Symbol	Usage	Adress Representation	Symbol	Usage	Adress Representation
/EN	Enable Bit	R6:0.0/15	/UR	Unload Bit	R6:0.0/10
/EU	Queue Bit	R6:0.0/14	/IN	Inhibit Bit	R6:0.0/9
/DN	Asynchronous Done Bit	R6:0.0/13	/RN	Running Bit	R6:0.0/9
/EM	Synchronous Done Bit	R6:0.0/12	/FD	Found Bit	R6:0.0/8
/ER	Error Bit	R6:0.0/11			
.LEN	Number of characters specified to be sent or received				R6:0.1
.POS	Number of characters actually sent or received				R6:0.2

8) For information on operations for when allocating ST file addresses to objects, refer to "9-6 ST File processed by the PT".

9) Even when a bit is specified, index specification will affect an element number. For example, when $SW27 is 5 (Offset of index 0 is 5), [T4:10.0/13i0] will become [T4:15.0/13].

10) Always use "REAL" as the "Storage Type" of numeric.

11) File numbers must be allocated to tags in advance using support software (RSLogix 5000).

12) The PT access data by one word. Thus, it will read and write by two elements.

13) Specify addresses considering the fact that BL treats 32 bits as 1 element. The quotient that is obtained by dividing the target bit index by 32 is the element number, and the remainder is the bit position.

9-5 Changing Host Types

A host type can be changed to/from a SYSMAC PLC only when a Rockwell PLC is connected to one serial port.

Addresses for a Rockwell PLC will become invalid when changing the host type to/from Rockwell PLC. After changing the addresses, fix the invalid addresses. For how to fix them, refer to "1-3-1 Notes and Restrictions When Changing Host Types".

A Rockwell PLC, which has been registered as a host type, cannot be directly changed to other Rockwell PLC.

To change the host type in this situation, change it to SYSMAC PLC first and then to other Rockwell PLC. Or add a new host and replace all old host addresses with new host addresses. Then delete the old host.

9-6　ST File Processed by the PT

The PT processes the ST file differently.

9-6-1　Differences Depending on the Place Allocated

When allocating ST file addresses to the following places, the PT treats the ST file data as string. In this case, make sure to set **ASCII code** as the character code.

- **Address** Field of String Display & Input object.
- **Store the string of the selected line in the specified address** option of List Selection object.
- **Address** Field when selecting **String** from **Data Format** in each field column with Data Block Table object.
- **Write Address** Field of **Write String** function of Malfunction object.
- **Transmit from** Field displayed when selecting **Indirect specification of string** from **Transmit Type** in **Key Button** function page of Multifunction object and Command Button.

When allocating addresses to other than above, the PT reads from/writes to the ST file string length (.LEN). In this case, always set **INT** as the storage type.

9-6-2　Reading Character Strings

When the PT reads character string from a ST file element (except for reading by READCMEM Macro Function), the PT recognizes only one of the following number of characters, whichever is smaller.

- The number of bytes of string length (.LEN) of the element, or
- The maximum number of characters set with object or other place.

9-6-3　Writing Character Strings

When the PT writes character string to a ST file element (except for writing by WRITECMEM Macro Function), the number of bytes of the string will be automatically written to the string length (.LEN) of the element.

9-7 Operation of Macro Function READCMEM and WRITECMEM

READCMEM and WRITECMEM will write and read the internal expression of the controller as they are. In some cases, endian needs to be converted by using SWAP function in order to read values correctly. See the following examples.

Example 1

The following Macro reads 10 words from N7:8 of "MICROLOGIX" to $W2000. As a result, the value of N7:8 is read to $W2000, the value of N7:9 is read to $W2001…, and the value of N7:17 is read to $W2009

```
READCMEM($W2000,[MICROLOGIX:N7:8],10);
```

Example 2

The following Macro reads 5 words from T4:0.0 of the host "SLC500" to $W1000. As a result, the flag word of T4:0 is read to $W1000, the set value of T4:0 is read to $W1001, the current value of T4:0 is read to $W1002, the flag word of T4:1 is read to $W1003 and the set value of T4:1 is read to $W1004.

```
READCMEM($W1000,[SLC500:T4:0.0],5);
```

Example 3

The following Macro reads the element 5 of the F file (file number 8) of the host "PLC5" and stores it to from $W1000 to 1001. However, the word endian is opposite, so SWAPL function is used.

When reading to/writing from "the F file of PLC-5" and "the REAL file of ControlLogix/CompactLogix", endian   must be converted by using SWAPL function.

```
READCMEM($W1000,[PLC5:F8:5],2);
SWAPL($W1000,1);
```

Example 4

This is a writing example, opposite from Example 3. The endian is converted before writing. After writing, the endian is converted again to adjust it to the PT's endian.

```
SWAPL($W1000,1);
WRITECMEM([PLC5:F8:5],W1000,2);
SWAPL($W1000,1);
```

Revision History

Revision code	Date	Revised content
01	July 2006	Original production
02	November 2006	Added descriptions on YASKAWA inverter connection. Added descriptions on RS and CS signal line to NSH-series PT wiring diagram.
03	August 2007	Added descriptions on Trajexia connection.
04	November 2007	Added descriptions on Mitsubishi Q/QnA series and Rockwell (Allen-Bradley) controllers connection

A manual revision code appears as a suffix to the Man. No. on the back cover of the manual.

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