FUJI ELECTRIC

MICREX-SX *series*

SPH

USER'S MANUAL

P-LINK MODULE

PE-LINK MODULE

FEH203

Preface

This User's Manual explains the specifications of P-link and PE-link moduls of SPH. Read this manual carefully to ensure correct operation.

When using modules or peripheral devices, be sure to read the corresponding user's manuals listed below.

Title	Manual No.	Contents
User's Manual Instruction, MICREX-SX series SPH/SPS	FEH200	Explains the memory, language and system definitions of the MICREX-SX series.
User's Manual Hardware, MICREX-SX series SPH	FEH201	Explains the system configuration, the specifications and operations of modules in the MICREX-SX series.
User's Manual T-link master module / T-link interface module, MICREX-SX series SPH	FEH204	Explains the communication specifications of the T-link, the specifications and operations of the T-link master module / the T-link interface module.
User's Manual D300win <Introduction>, MICREX-SX series	FEH250	Explains the basic operations of D300win, the programming and monitoring for MICREX-SX series.
User's Manual D300win <Reference>, MICREX-SX series	FEH251	Explains the menu and icon of D300win and all of the operations of D300win.

Notes

1. This manual may not be reproduced in whole or part in any form without prior written approval by the manufacturer.
2. The contents of this manual (including specifications) are subject to change without prior notice.
3. If you find any ambiguous or incorrect descriptions in this manual, please write them down (along with the manual No. shown on the cover) and contact FUJI.

Safety Precautions

Be sure to read the “Safety Precautions” thoroughly before using the module.

Here, the safety precaution items are classified into “Warning” and “Caution.”

Warning : Incorrect handling of the device may result in death or serious injury.

Caution : Incorrect handling of the device may result in minor injury or physical damage.

Even some items indicated by “Caution” may also result in a serious accident.

Both safety instruction categories provide important information. Be sure to strictly observe these instructions.

Warning

- ◊ Never touch any part of charged circuits as terminals and exposed metal portion while the power is turned ON. It may result in an electric shock to theoperator.
- ◊ Turn OFF the power before mounting, dismounting, wiring, maintaining or checking, otherwise, electric shock, erratic operation or troubles might occur.
- ◊ Place the emergency stop circuit, interlock circuit or the like for safety outside the PC. A failure of PC might break or cause problems to the machine.
- ◊ Do not connect in reverse polarity, charge (except rechargeable ones), disassemble, heat, throw in fire or short-circuit the batteries, otherwise, they might burst or take fire.
- ◊ If batteries have any deformation, spilled fluids, or other abnormality, do not use them. The use of such batteries might cause explosion or firing.
- ◊ Do not open the FG terminal with the LG-FG short circuited. (It must be grounded, otherwise it might cause electric shock.)

Safety Precautions

⚠ Caution

◊ Do not use one found damaged or deformed when unpacked, otherwise, failure or erratic operation might be caused.
◊ Do not shock the product by dropping or tipping it over, otherwise, it might be damaged or troubled.
◊ Follow the directions of the operating instructions when mounting the product. If mounting is improper, the product might drop or develop problems or erratic operations.
◊ Use the rated voltage and current mentioned in the operating instructions and manual. Use beyond the rated values might cause fire, erratic operation or failure.
◊ Operate (keep) in the environment specified in the operating instructions and manual. High temperature, high humidity, condensation, dust, corrosive gases, oil, organic solvents, excessive vibration or shock might cause electric shock, fire, erratic operation or failure.
◊ Select a wire size to suit the applied voltage and carrying current. Tighten the wire terminals to the specified torque. Inappropriate wiring or tightening might cause fire, malfunction, failure, or might cause the product to drop from its mounting.
◊ Contaminants, wiring chips, iron powder or other foreign matter must not enter the device when installing it, otherwise, erratic operation or failure might occur.
◊ Connect the ground terminal to the ground, otherwise, an erratic operation might occur.
◊ Periodically make sure the terminal screws and mounting screws are securely tightened. Operation at a loosened status might cause fire or erratic operation.
◊ Put the furnished connector covers on unused connectors, otherwise, failure or erratic operation might occur.
◊ Install the furnished terminal cover on the terminal block, otherwise, electric shock or fire might occur.
◊ Sufficiently make sure of safety before program change, forced output, starting, stopping or anything else during a run. The wrong operation might break or cause machine problems.
◊ Engage the loader connector in a correct orientation, otherwise, an erratic operation might occur.
◊ Before touching the PC, discharge any static electricity that may have been collected on your body. To discharge it, touch a grounded metallic object. Static electricity might cause erratic operation or failure of the module.
◊ Be sure to install the electrical wiring correctly and securely, observing the operating instructions and manual. Wrong or loose wiring might cause fire, accidents, or failure.
◊ When disengaging the plug from the outlet, do not pull the cord, otherwiase, break of cable might cause fire or failure.
◊ Do not attempt to change system configurations (such as installing or removing I/O modules) while the power is ON, otherwise, failure or erratic operation might occur.
◊ Do not attemp to repair the module by yourself -- contact your Fuji Electric agent. When replacing the batteries, correctly and securely connect the battery connectors, otherwise, fire, accidents or failure might occure.
◊ To clean the module, turn power off and wipe the module with a cloth moistened with warm water. Do not use thinner or other organic solvents, as the module surface might become deformed or discolored.
◊ Do not remodel or disassemble the product, otherwise, a failure might occur.
◊ Follow the regulations of industrial wastes when the device is to be discarded.
◊ The modules covered in these operating instructions have not been designed or manufactured for use in equipment or systems which, in the event of failure, can lead to loss of human life.
◊ If you intend to use the modules covered in these operating instructions for special applications, such as for nuclear energy control, aerospace, medical, or transportation, please consult your Fuji Electric agent.
◊ Be sure to provide protective measures when using the module covered in these operating instructions in equipment which, in the event of failure, may lead to loss of human life or other grave results.

Revision

***Manual No. is shown on the cover.**

Printed on	*Manual No.	Revision contents
Sep.1998	FEH203	First edition

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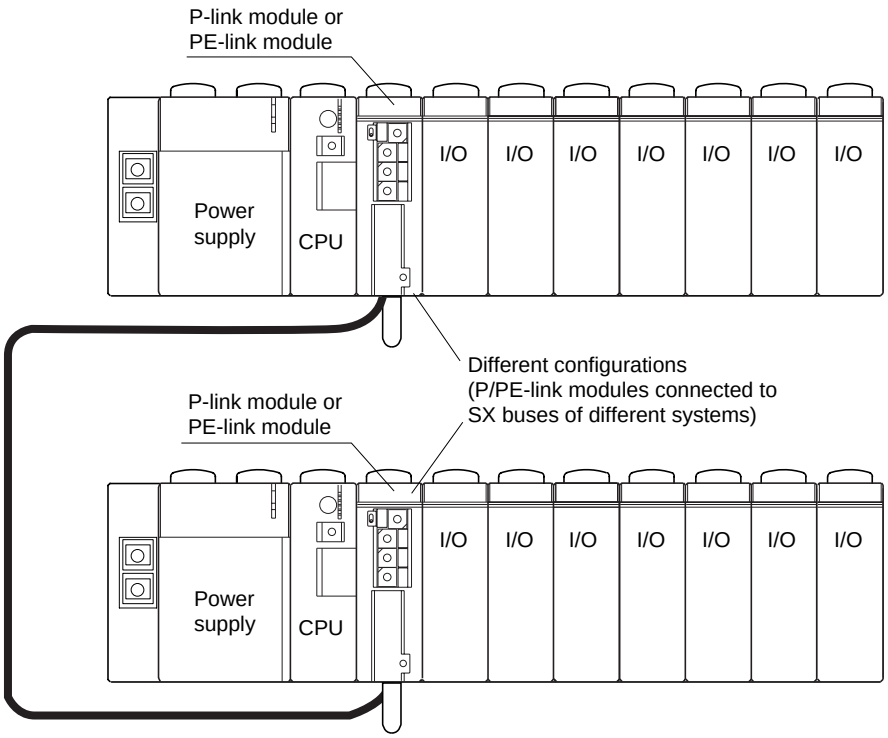
Section 1 General

Section 1 General
1-1 General of P/PE-link System

The NP1L-PL1 P-link module and NP1L-PE1 PE-link module are communication modules that handle data communication between CPU modules on the differently configurations. These modules are mounted on the base board of the MICREX-SX series (connected to the SX bus) and linked to the Fuji Electric original “P-link” or “PE-link” high-speed communication network. P-link and PE-link will be collectively denoted as “P/PE-link” below.



Note: P-link and PE-link cannot be mounted together on the same link.

Section 2 Specifications

Page

Section 2 Specifications

2-1 General Specifications

Item		Specification
Physical environment conditions	Operating ambient temperature	0 to 55° C
	Storage temperature	-25 to +70° C
	Relative humidity	20 to 95%RH no condensation (Transport condition: 5 to 95%RH no condensation)
	Pollution degree	2
	Corrosion immunity	Free from corrosive gases. No stained with organic solvent
	Operating altitude	2000m or less above sea level (Transport condition: 70kPa or more)
Mechanical service conditions	Vibration	Half amplitude: 0.15mm, Constant acceleration: 19.6m/s^2, Two hours for each of three mutually perpendicular axes.
	Shock	Acceleration peak: 147m/s^2, Three times for each of three mutually perpendicular axes.
Electrical service conditions	Nose immunity	1.5kV rise time 1ns, pulse width 1μs (noise simulator)
	Electrostatic discharge	Contact discharge: ± 6kV Aerial discharge: ± 8kV
	Radioelectromagnetic field	10V/m (80MHz to 1000MHz)
Construction		Panel-mounted
Cooling		Air cooling
Isolation method		Photocoupler
Dielectric strength		455V AC/minute (between I/O connector pins and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Internal current consumption		NP1L-PL1: 24V DC, 160mA or less NP1L-PE1: 24V DC, 160mA or less
Mass		NP1L-PL1: Approx. 235g, P-link connector : Approx. 40g NP1L-PE1: Approx. 235g, PE-link connector : Approx. 40g
Dimensions		Described in section 2-5

2-2 Performance and Communication Specifications

2-2-1 List of performance and communication specifications

Item	Specification	
	P-link	PE-link
Type	NP1L-PL1	NP1L-PE1
No. of channels	1 channel/module	
No. of SX bus connectable modules	Max. 2/configuration	
No. of P/PE-link connectable modules	Max. 16/system	Max. 64/system
Transmission line format	Bus configuration (multi-drop)	
Transmission line	Electrical transmission line: Coaxial cable Optical transmission line: SI/GI quartz optical cable Distance between optical converters: Max. 1km (SI)/3km (GI)	
Transmission distance	Electrical transmission line: Total length 250m Optical transmission line (Distance between optical converters): Max. 1km (SI)/3km (GI)	Electrical transmission line: Total length 500m Optical transmission line (distance between optical converters): Max. 1km (SI)/3km (GI)
Transmission method	Half-duplex, serial transmission	
Data exchange method	N : N (Token-passing method) Memory refresh method	
Transmission speed	5Mbps	
Modulation method	PDM (Pulse Duration Modulation)	
Error check	FCS (Frame Check Sequence), Number of data words check, Collision detection	
Data transfer	Broadcast communication, Message transmission	
Memory capacity for broadcast data	7.6KW	24.5KW
Other functions	Self diagnosis/RAS functions	
Occupied slot	1 slot	
Occupied words	None (No input /output areas are occupied)	

[Reference]

- Token passing method: System in which the right of control access is passed from one terminal to another by moving a token (the right of access) via the network.
- Broadcast communication: Simultaneous communication from one station to multiple stations with an image similar to that of a broadcasting station.

Note: Connection between P-link and PE-link is impossible.

2-2-2 Broadcast communication specifications

(1) Type and capacity of memory for broadcast communication

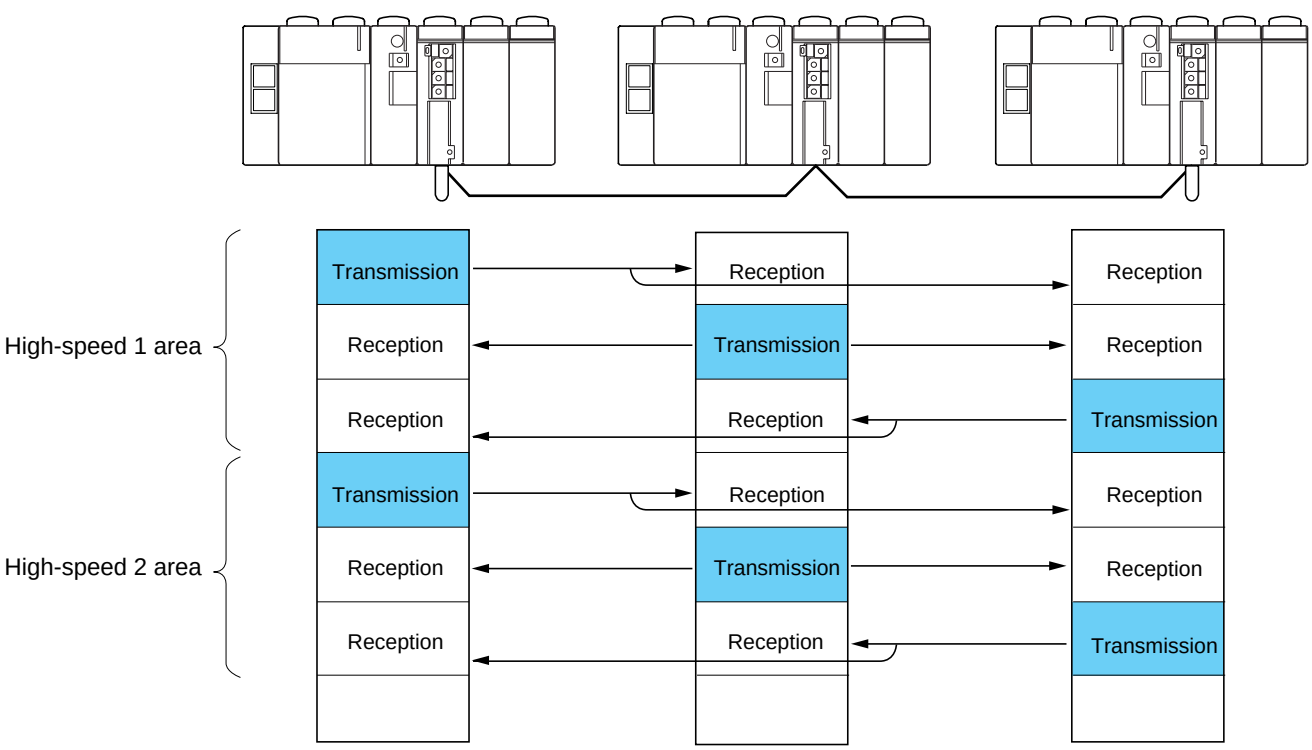
Type of memory	P-link		PE-link	
	Memory capacity	Max. transmission area	Memory capacity	Max. transmission capacity
High-speed 1 area	512 words	64 words	512 words	1K words
High-speed 2 area	1152 words	256 words	8K words	combining high-speed 1 and 2 areas
Low-speed 1 area	3072 words	512 words	4K words	1K words
Low-speed 2 area	3072 words	512 words	12K words	1K words

(2) Setting range for transmission area

Type of memory	P-link		PE-link	
	Head block No.	Number of transmission blocks	Head block No.	Number of transmission blocks
High-speed 1 area	0 to 15	0 to 2	0 to 63	0 to 64
High-speed 2 area	0 to 35	0 to 8	0 to 1023	0 to 128
Low-speed 1 area	0 to 95	0 to 16	0 to 511	0 to 128
Low-speed 2 area	0 to 95	0 to 16	0 to 1535	0 to 128

* 1 block P-link = 32 words
PE-link = 8 words

< Image of broadcast communication >



* Data is transferred similarly in low-speed 1 and 2 areas.

(3) Address assignment for broadcast communication

The memory for broadcast communication is provided in each P/PE-link module and the address is assigned as follows. In this table, addresses are listed in word format, but bit access is possible for all the areas.

Memory section	P-link	PE-link
High-speed 1 area	%MW .1.0 to %MW .1.511	%MW .1.0 to %MW .1.511
High-speed 2 area	%MW .1.512 to %MW .1.1663	%MW .1.512 to %MW .1.8703
Low-speed 1 area	%MW .1.2048 to %MW .1.5119	%MW .1.8704 to %MW .1.12799
Low-speed 2 area	%MW .1.5120 to %MW .1.8191	%MW .1.12800 to %MW .1.25087

* The CPU number (8 or 9) of P/PE-link module is entered in .

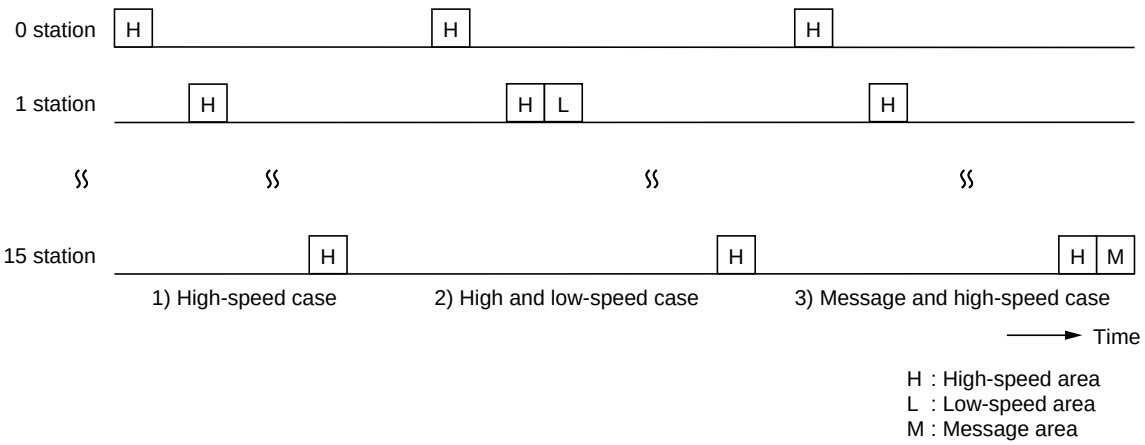
Note: The CPU number of a P/PE-link module is determined from the CPU number that is set from D300win, or from the “CPU No. selection switch” on the front panel of the module.

2-2-3 Transfer timing of P/PE-link

P/PE-link module transmits data of high-speed and low-speed areas and/or transmites messages to other stations by moving the right of transmission (token) in a sequence.

Area	Transmission
High-speed area	Data is transmitted whenever each module obtains the right of transmission. (1st block and 2nd block)
Low-speed area	Only one station transmits while the right of transmission is transferred around all the modules. When the right of transmission is set to both the 3rd and 4th blocks, at first, only one block is transmitted. The other block is transmitted at the next turn.
Message transmission	One message is transmitted whenever each module obtains the right of transmission. There is no transmission when there are no messages to transmit.

< Image of transfer timing >



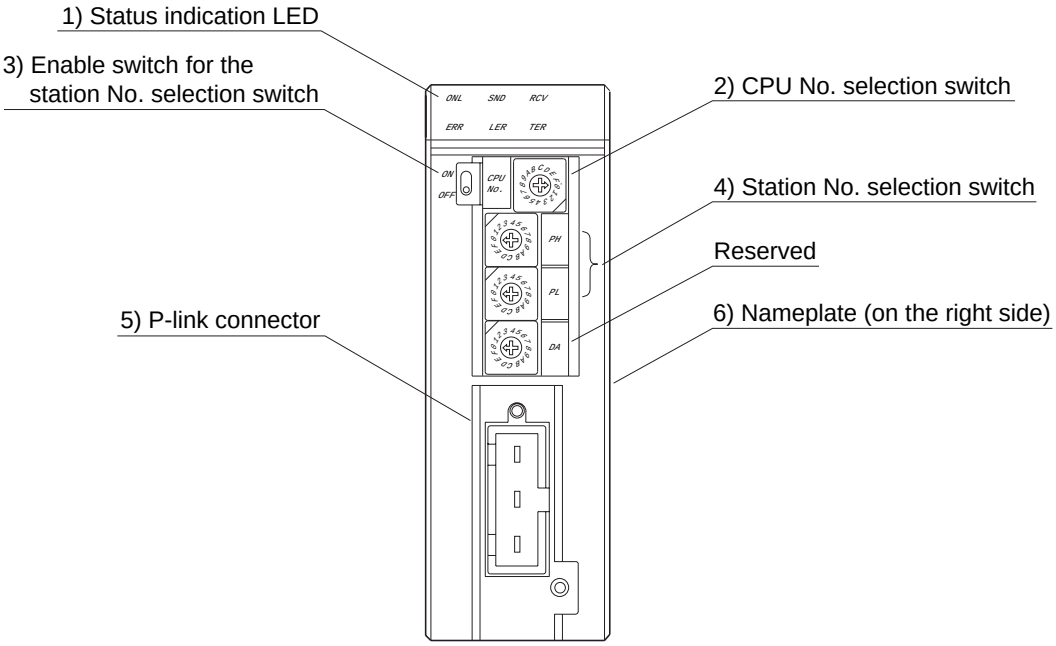
2-3 Cable Specifications

Use P/PE-link cable that has the following specifications. If a cable different from the specified cable (for example a twisted-pair cable, etc.) is used, the system may stop due to faulty operation of the transmission line.

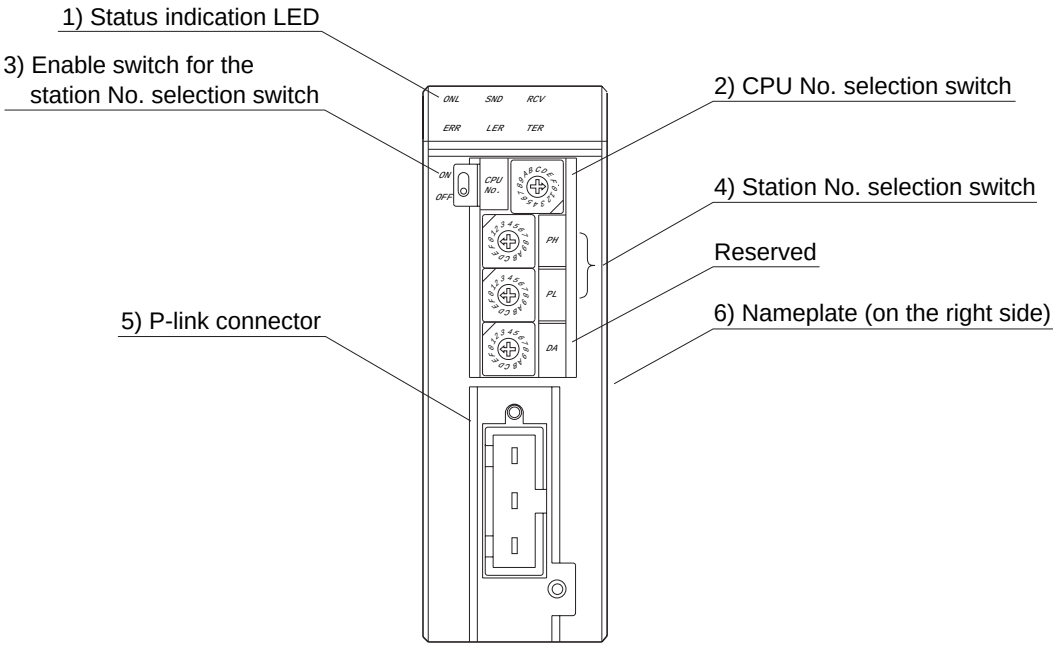
Item	Type	Coaxial cable 5C-2V (JIS C 3501 standard)
Conductor	Material	JIS C 3102 annealed copper wire for electrical use
	Outer diameter (mm)	0.8
Insulation	Material	Polyethylene
	Outer diameter (mm)	4.9
Shielding		Knitted annealed copper wire
Sheath	Material	Non-conversion PVC (black)
	Finished outside diameter (mm)	7.4
Mass (kg/km)		Approx. 74
Electrical characteristics	Conductor resistance (Ω/km)	35.9
	Insulation resistance (MΩ-km)	1000
	Dielectric strength (V AC/min.)	1000

2-4-1 Names

(1) NP1L-PL1 (P-link module)



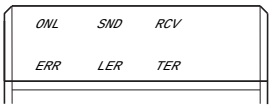
(2) NP1L-PE1 (PE-link module)



2-4-2 Functions

1) Status indication LED

This LED indicates operation status of NP1L-PL1/PE-1.



Symbol	Color	Description
ONL	Green	Turns on when the module is operating normally. (After power supply is turned on, blinks until the SX bus is setup.)
ERR	Red	Turns on when there is an error in module itself or on the SX bus.
SND	Green	Turns on during transmission of P/PE-link data.
RCV	Green	Turns on during reception of P/PE-link data.
LER	Red	Turns on when registered a P/PE-link station is not connected or a connected P/PE-link station is disconnected.
TER	Red	Turns on when a transmission error occurs.

< Example of status indication with LED >

Common indication		Individual indication				Status of module
ONL	ERR	SND	RCV	LER	TER	
Blink	—	—	—	—	—	Waiting for the SX bus initialization (common to all modules connected to the SX bus).
*	—	Blink	Blink	—	—	Waiting for key code input to the communication part of the P/PE-link side (blinking at long intervals).
ON	—	Blink	Blink	—	—	In normal transmission (blinking at short intervals).
ON	—	Blink	Blink	—	Blink	Continuous operation is possible even though transmission error indicator (TER) occasionally turns on.
ON	—	Blink	Blink	ON	—	P/PE-link configuration fault.
ON	—	—	—	Blink	Blink	Operation definition setting error. (slow and simultaneous blinking)
—	ON	—	—	—	—	Hardware fault in module.

Note: The (—) mark indicates “OFF” and the (*) mark indicates “Blink”, “ON” or “OFF.”

2) CPU No. selection switch

With the P/PE-link module, similar to the CPU module, it is necessary to assign a CPU station number. Never change settings during system operation.

CPU No.

← “8” or “9” are set in the case of a P/PE-link module.

3) Enable switch for the station No. selection switch

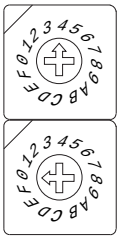
This switch enables or disables the setting of CPU No. selection switch on the front panel of the module. Never change settings during system operation.

ON ′Enabled

OFF ′Disabled

4) Station No. selection switch

This switch sets the station number of the P/PE-link within a range of “0” to “F” for the P-link module, and within “00” to “3F” for the PE-link module.



PH ◄— Upper digit

Note: In the case of the P-link module, set with the lower digit switch after fixing the upper digit to “4.” If a value other than “4” is set, proper operation cannot be guaranteed.

PL ◄— Lower digit

5) P/PE-link connector

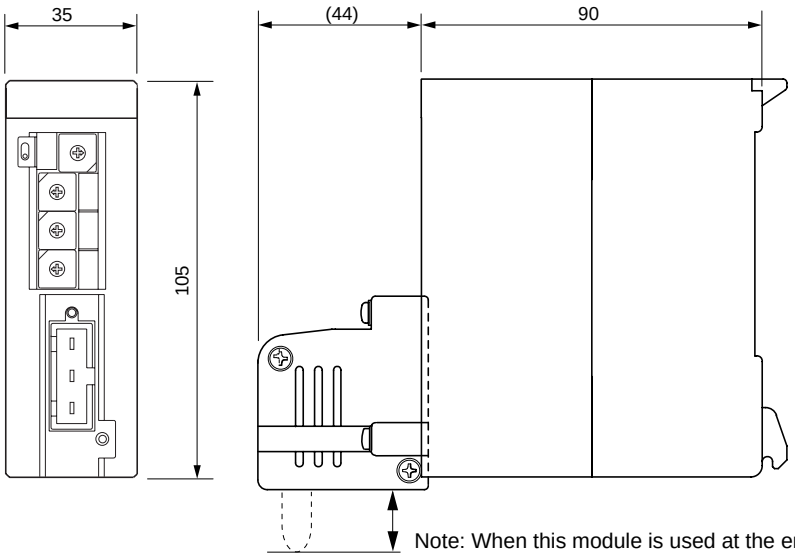
The P/PE-link connector is connected here. The tightening torque of the screw for fixing the connector is 0.9 to 1.0N·m. For a description of the method of assembling the P/PE-link connector, refer to “Section 5-2 Cable terminal processing of P/PE-link.”

6) Nameplate

The type, date of manufacture and serial number are printed on the side of the module.

2-5 Dimensions

Dimensions of NP1L-PL1 are same as those of NP1L-PE1.



Note: When this module is used at the end of the P/PE-link,
P/PE-link terminating resistance is needed.
The height of P/PE-link terminating resistance is 22 to 24mm.

Section 3 System Configuration

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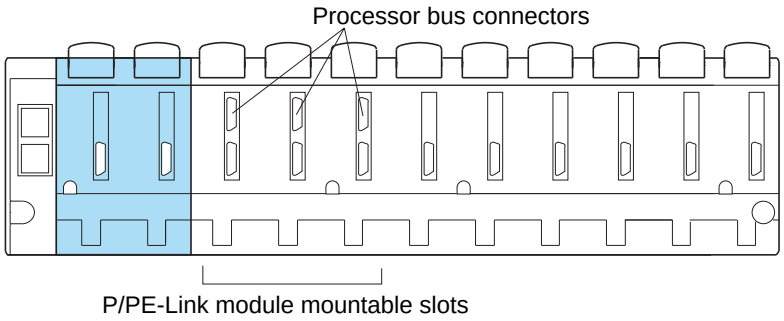
Section 3 System Configuration
3-1 Mounting the Module

3-1-1 Mounting position

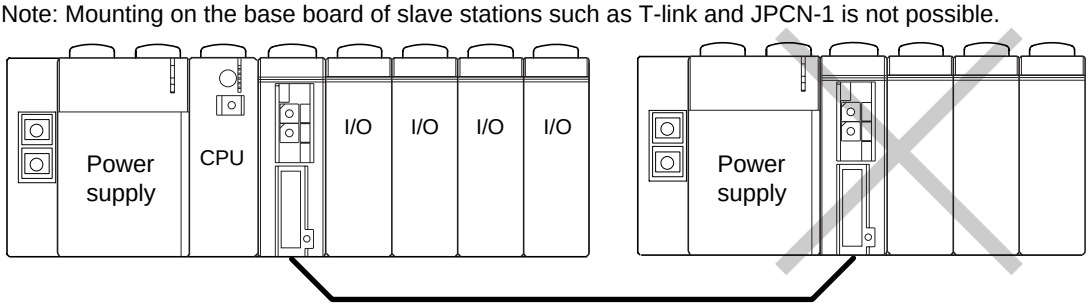
NP1L-PL1 and NP1L-PE1 are communication modules connected to the SX-bus. Mounting positions on the base board are restricted as follows.

The modules are mounted in slots where there are processor bus connectors.



* NP1BP-13 provides processor bus connectors for 10 slots.

Note: Mounting on the base board of slave stations such as T-link and JPCN-1 is not possible.



Note: The module can also be mounted in slots without processor bus connectors. However, since they are not connected to the processor bus, several dedicated commands must be used for data exchange with that CPU module.

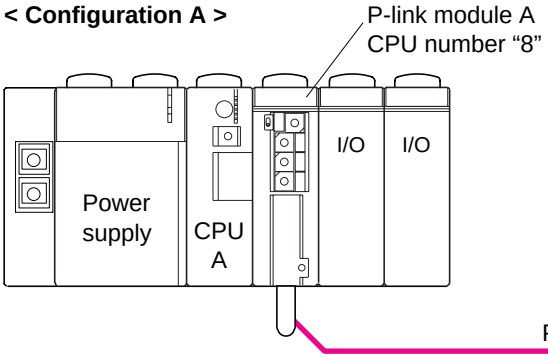
3-1-2 Number of mountable modules

In one configuration, up to 2 modules can be mounted together with P-link and PE-link modules.

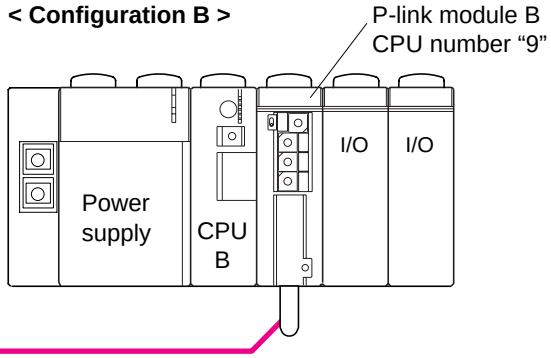
3-2 Example of Basic System Configuration

By using broadcast communication, data communication is carried out between two configurations. An example utilizing a P-link module will be explained below.
As shown in the following figures, by setting the CPU number of P-link module A to “8” and that of P-link module B to “9,” 1 block (32 words) for “high-speed 1 area” is used for each transmission area.

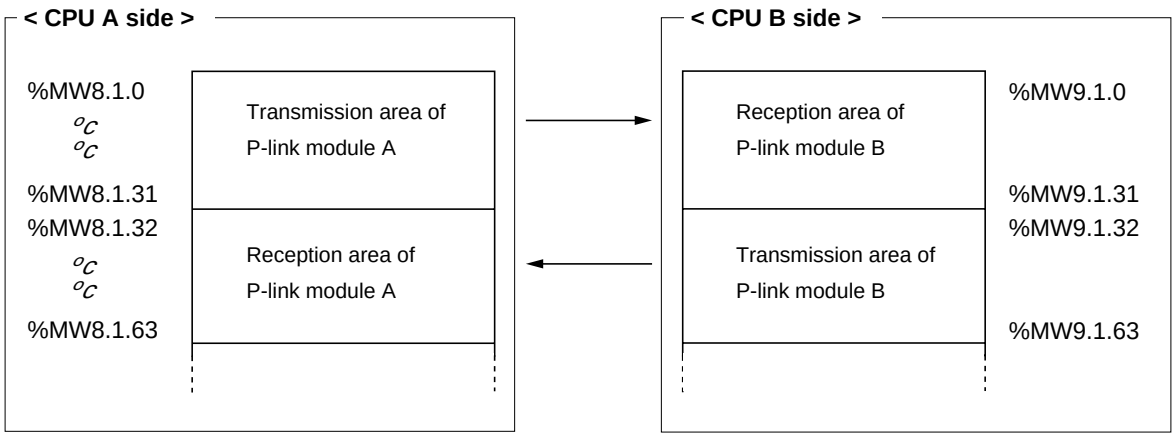
< Configuration A >



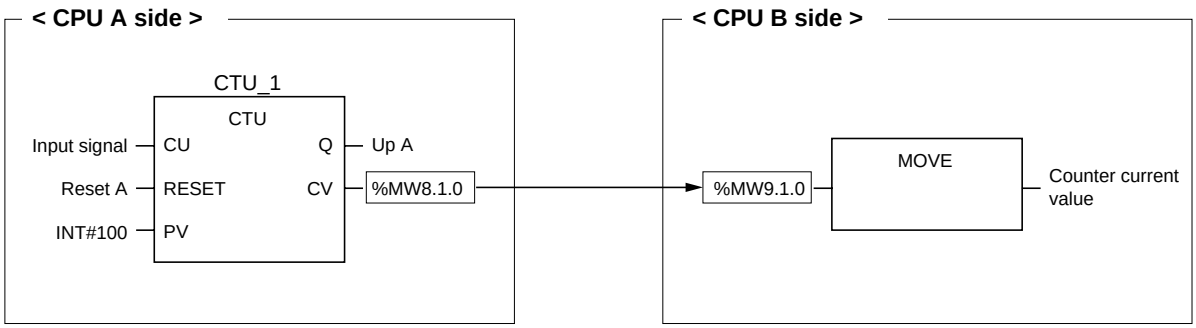
< Configuration B >



< P-link memory >



< Example of data transfer program >
The current value of CPU-A counter CTU_1 is transmitted to the CPU-B variable “counter current value A.”



3-3 P/PE-link System with Optical Converter

By constructing the transmission line of the P/PE-link with optical cables, the transmission distance of the P/PE-link can be extended. Further, since an optical transmission line is less influenced by noise, it is also effective if any device generating noise exists in the middle of the transmission line.

3-3-1 Summary of P/PE-link optical converters

The following optical converters are available for the P/PE-link.

Optical converter	General specifications
FNC300A-C10	Quartz fiber SI type, Distance between converters: max. 1km, Main power supply: 100V AC/DC
FNC300A-A20	Quartz fiber SI type, Distance between converters: max. 1km, Main power supply: 200V AC
FNC320A-C10	Quartz fiber GI type, Distance between converters: max. 3km, Main power supply: 100V AC/DC
FNC320A-A20	Quartz fiber GI type, Distance between converters: max. 3km, Main power supply: 200V AC

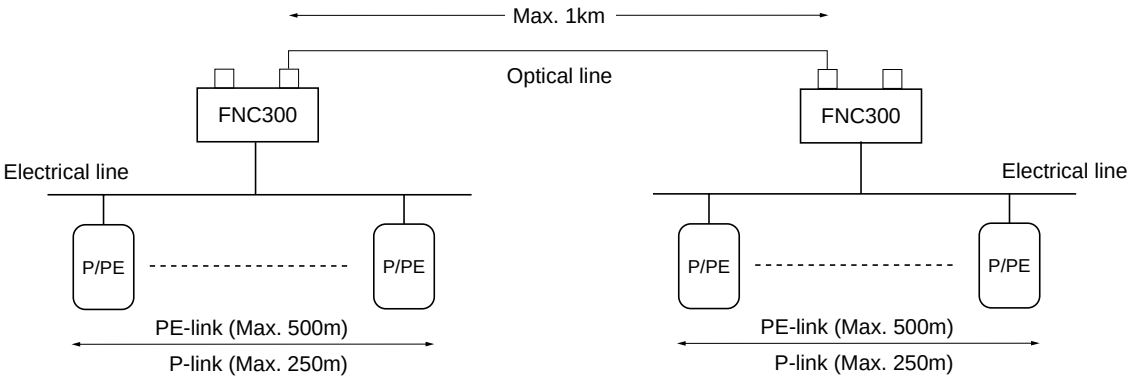
3-3-2 System configuration with optical converter (FCN300)

(1) Basic configuration

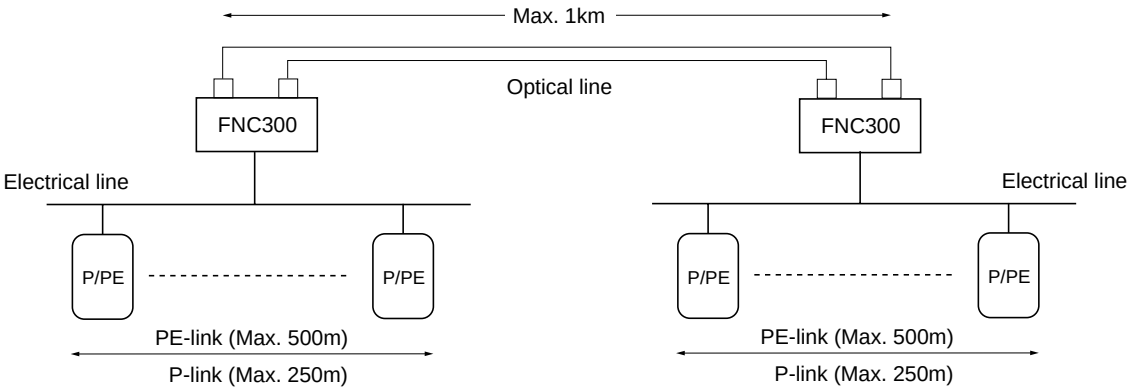
1) The transmission line is changed to an optical line by use of two optical converters.

< Maximum length of total distance >
P-link: 1.5km (Electrical line 250m x 2, Optical line 1km)
PE-link: 2km (Electrical line 500m x 2, Optical line 1km)

< P/PE-link module >
P-link: Max. 16
PE-link: Max. 64



2) By linking two optical converters through two optical cables, the optical transmission line can be duplicated. In this case, if any part of the optical cable becomes broken, transmission can be continued without interruption and a highly reliable system can be configured.



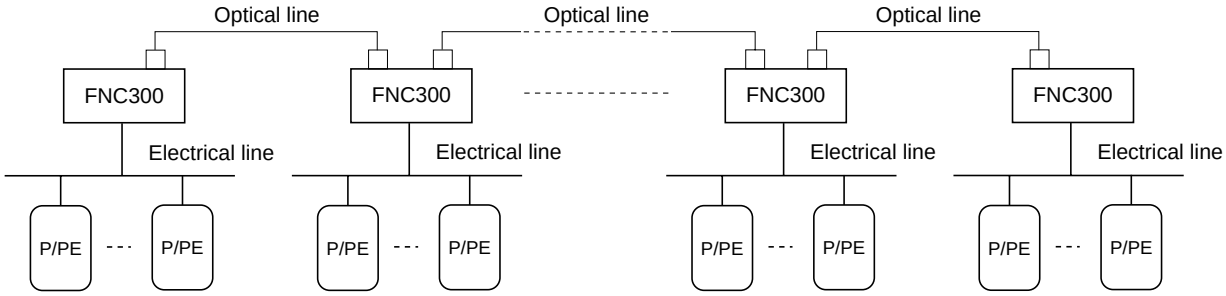
3-3 P/PE-link System with Optical Converter

(2) Cascade connection (Number of optical converters that can be connected: max.17)

1) Cascade connection 1

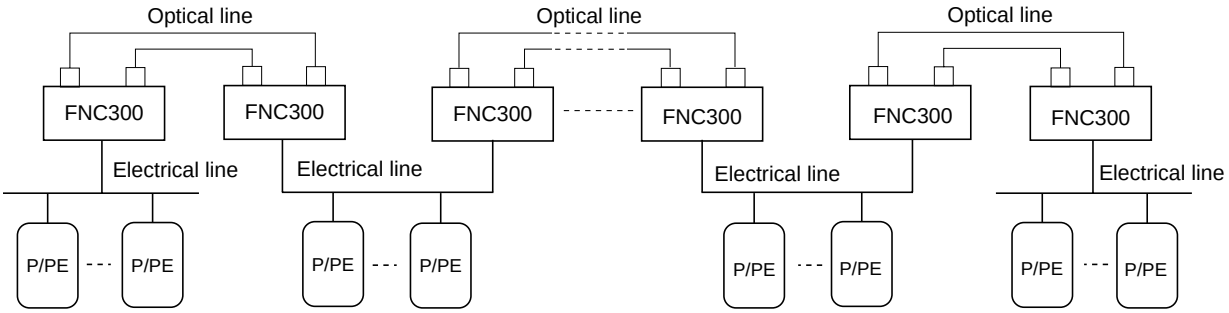
By cascading optical converters, P-link modules distributed by large distances from each other can be connected effectively.

* Total length of optical transmission line: max. 16km



2) Cascade connection 2

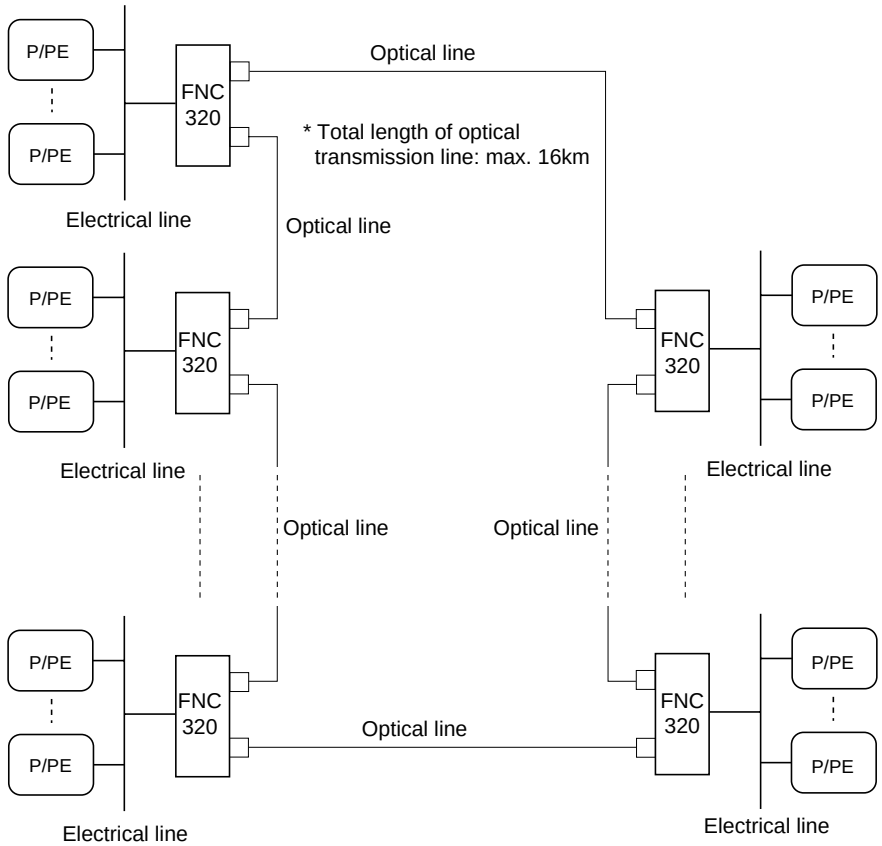
The optical transmission line can be duplicated for improved reliability.



3-3 P/PE-link System with Optical Converter

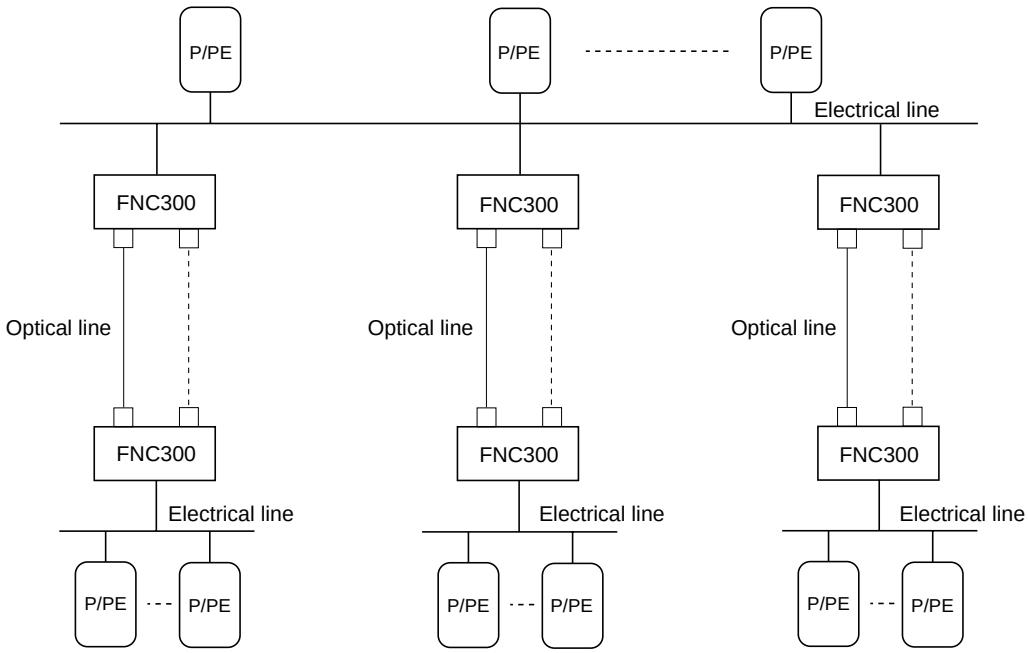
(3) Loop connection (Number of optical converters that can be connected: max. 17)

The optical transmission line can be connected in a loop for effective duplication of the configuration. Even if any part of the optical cables is broken, transmission can continue without interruption.



(4) Star connection (8 pairs maximum)

With a star connection, capsule groups dispersed in a wide area can be effectively connected. Since the effect of an optical converter error is limited to within the region where the error occurred, a highly reliable system can be configured. As shown in the following figure, transmission lines can be duplicated (by connecting the lines shown as dotted lines).



3-3 P/PE-link System with Optical Converter

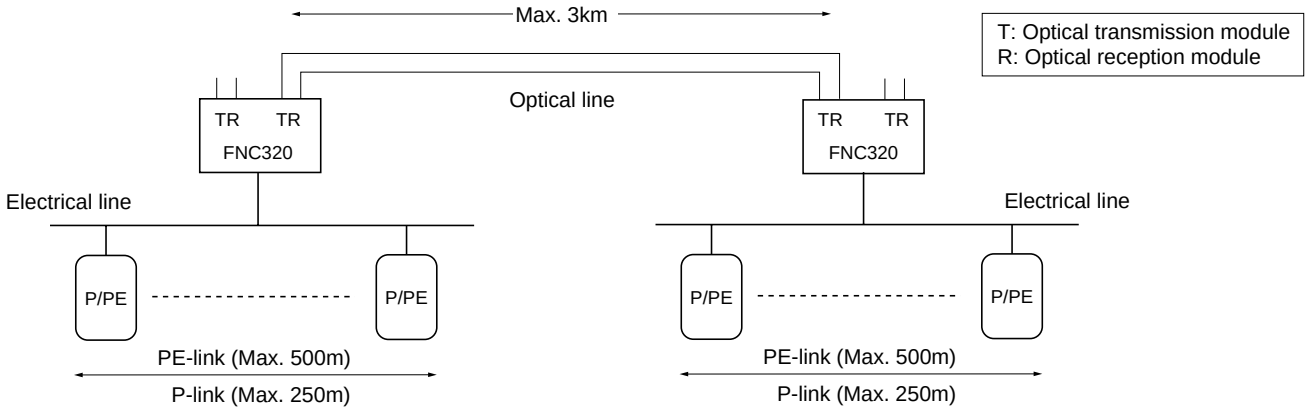
3-3-3 System configuration with long distance optical converter (FNC320)

(1) Basic configuration

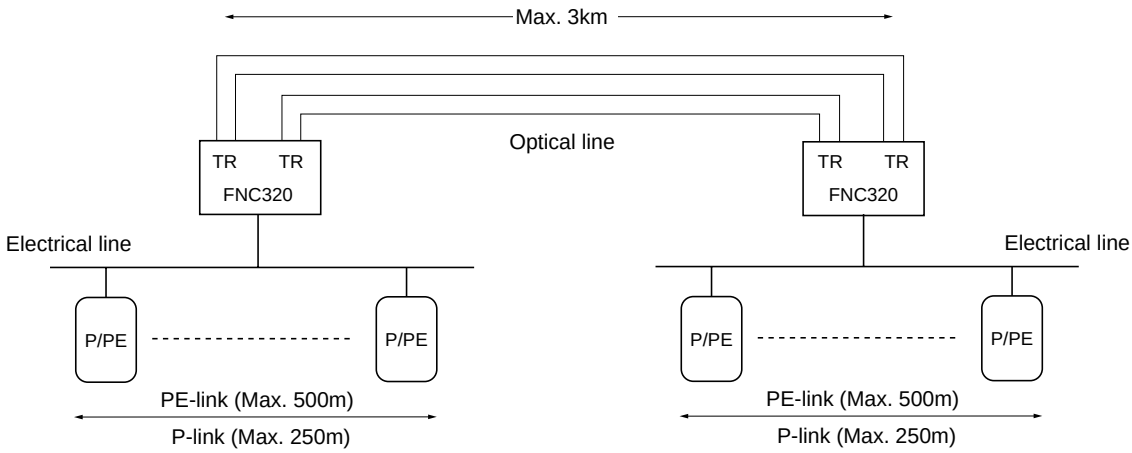
1) The transmission line is changed to optical line by use of two converters.

< Maximum length of total distance >
P-link: 3.5km (Electrical line 250m x 2, Optical line 3km)
PE-link: 4km (Electrical line 500m x 2, Optical line 3km)

< Number of connectable P/PE-link modules >
P-link: Max. 16
PE-link: Max. 64



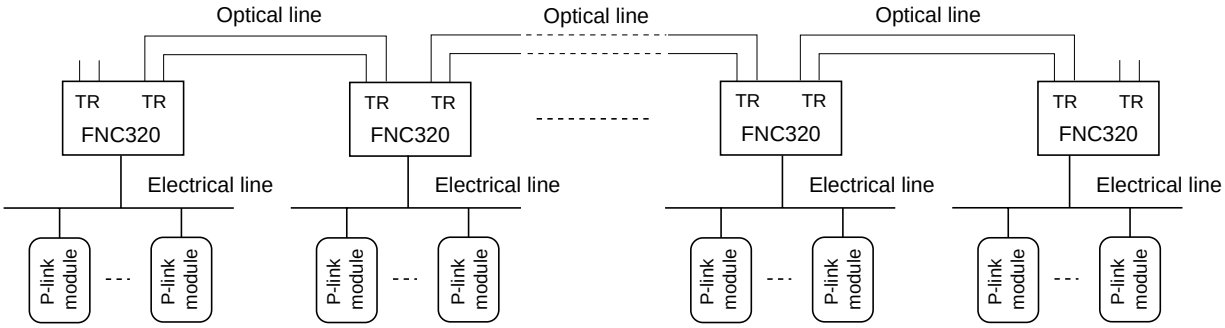
2) By connecting two optical converters through two optical cables, the optical transmission line can be duplicated. In this case, if any part of the optical cable becomes broken, transmission can be continued without interruption and a highly reliable system can be configured.



(2) Cascade connection (Number of optical converters that can be connected: max. 17)

By cascading optical converters, P-link modules separated by large distances from each other can be connected effectively.

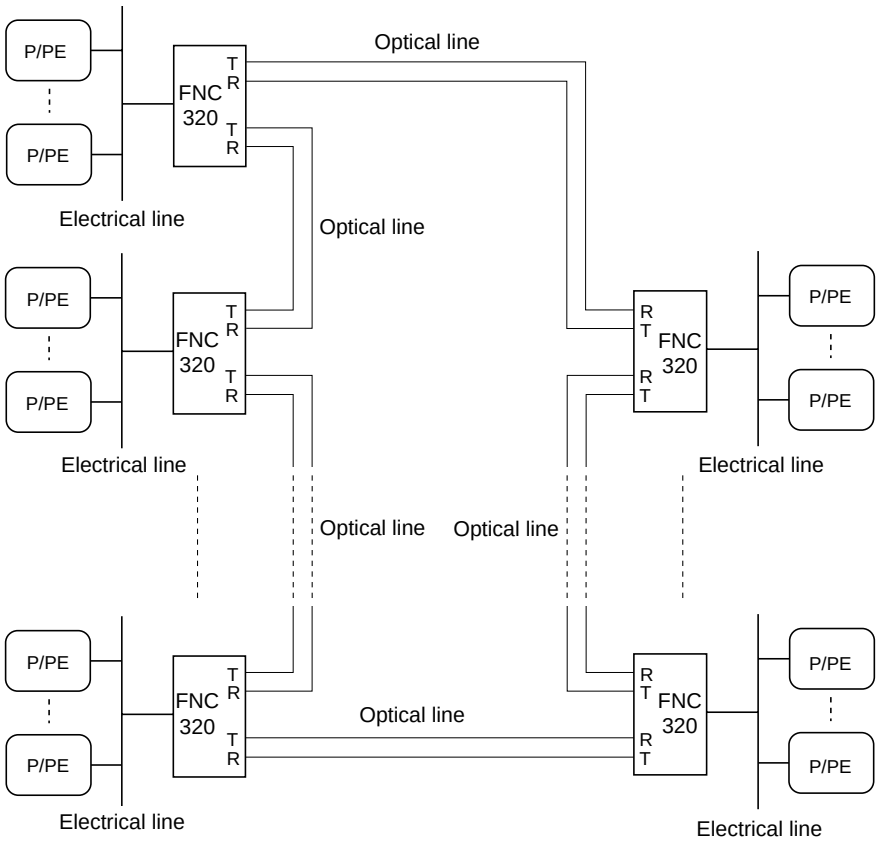
* Total length of optical transmission line: max. 48km



(3) Loop connection (Number of optical converters that can be connected: max. 17)

The optical transmission line can be connected in a loop for effective duplication of the configuration. Even if any part of the optical cables is broken, transmission can continue without interruption.

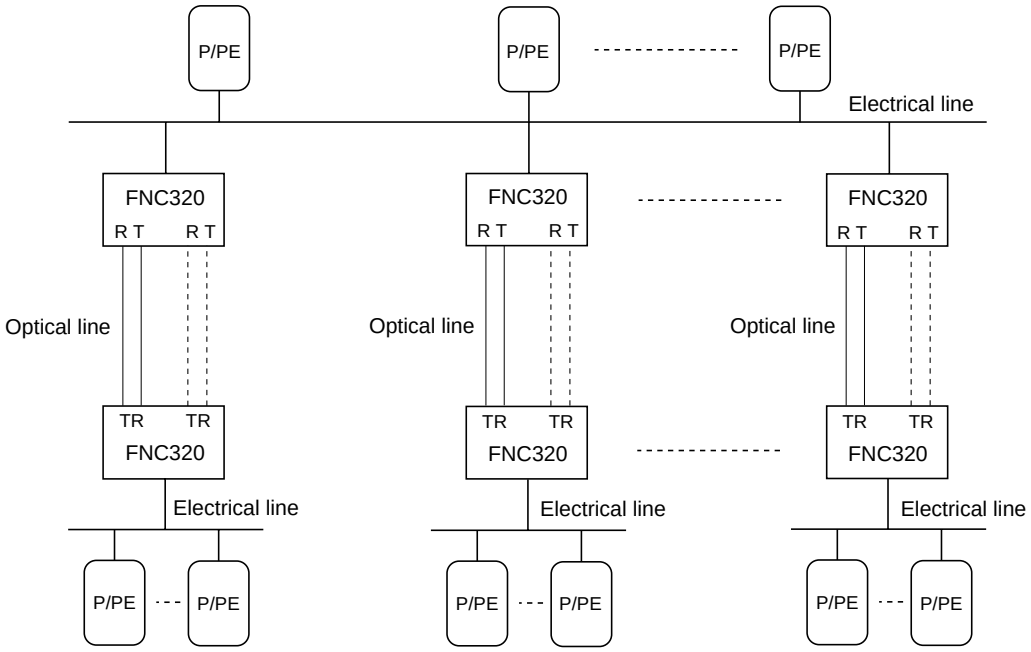
* Total distance length of optical transmission line: max. 48km



3-3 P/PE-Link System with Optical Converter

(4) Star connection (8 pairs maximum)

With a star connection, capsule groups dispersed in a wide area can be effectively connected. Since the effect of an optical converter error is limited to within the region where the error occurred, a highly reliable system can be configured. As shown in the following figure, transmission lines can be duplicated (by connecting the paths shown as dotted lines).



Section 4 System Definition

Page

Section 4 System Definition
4-1 System Configuration Definition

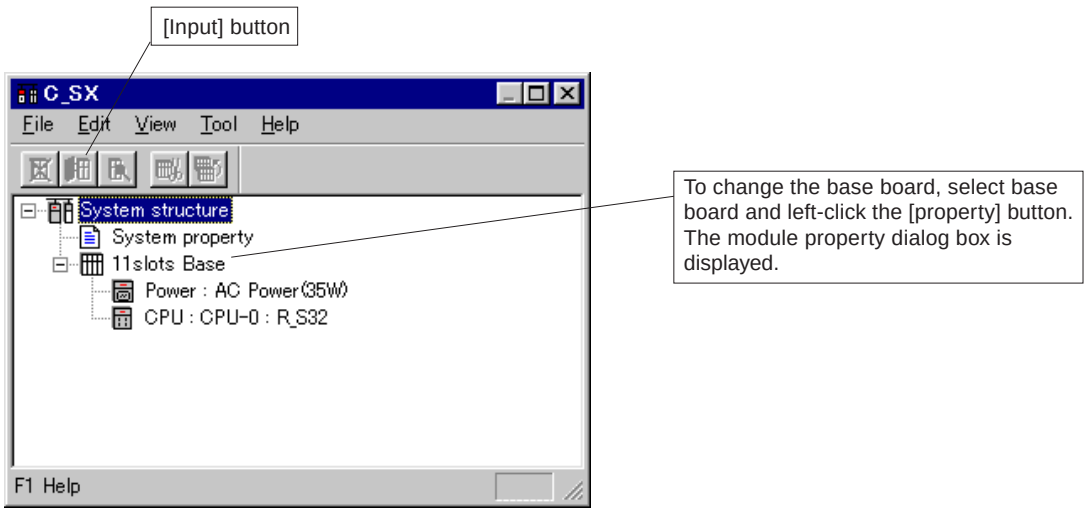
To construct a P-link system or a PE-link system with using a P-link module or a PE-link module of MICREX-SX series, the system definitions listed below are required for each configuration.

- System configuration definition
- Operation definition
- Configuration registration definition
  (Registration of P/PE-link configured stations)
- Area selection (Automatic sending area selection)
- Change bank CPU definition

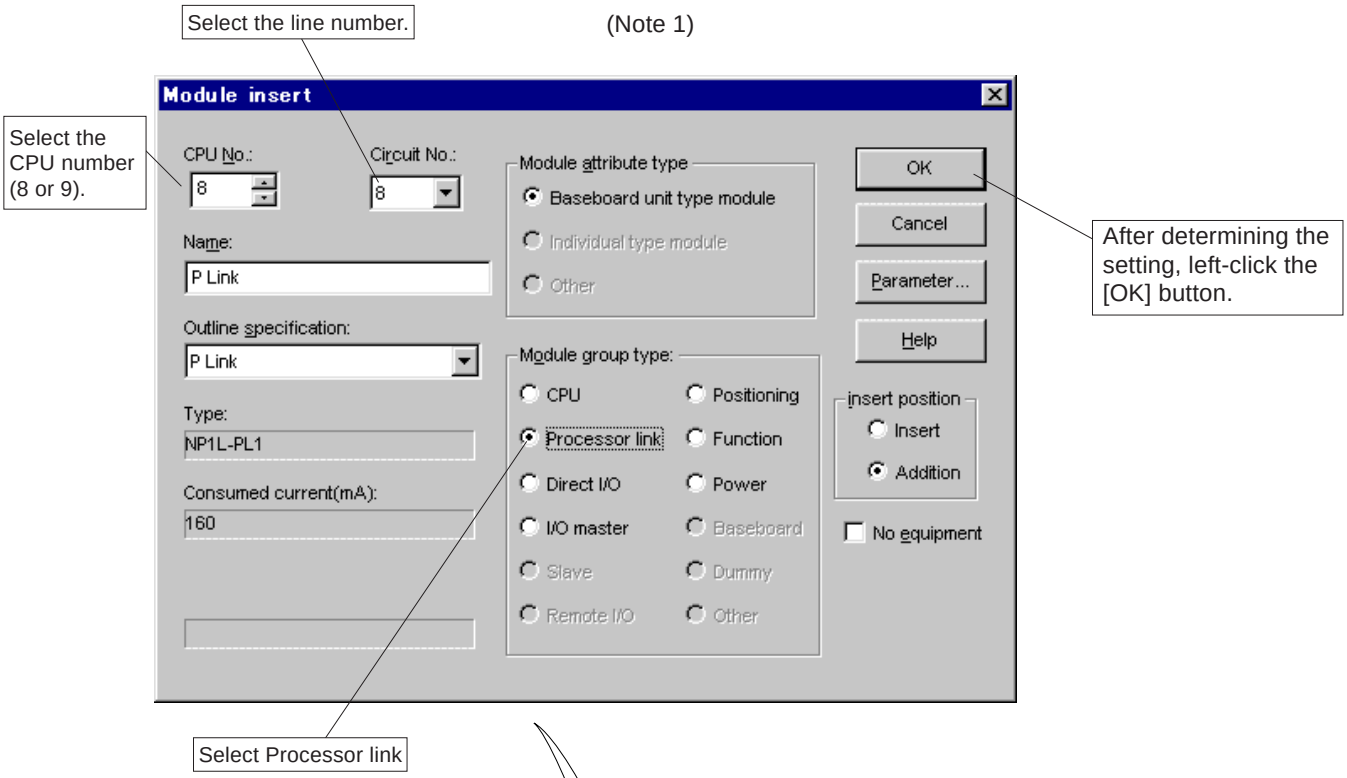
P-link modules or PE-link modules are registered with “System Definition” in the project tree.

<Setting procedure>

1) Double click the [System Definition] icon in the project tree with the left button. The system configuration window is displayed. As shown in the figure below, the window initially displays the 11-slot base board with the registered power supply module and CPU module.

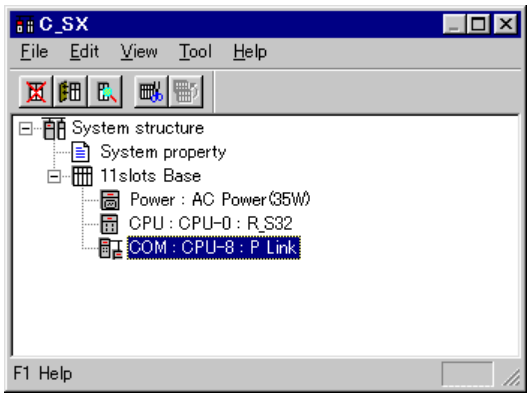


2) Register the P-link module. When the cursor on the screen is selecting the CPU module, left-click [Insert] button on the system configuration registration window. The “Module insertion” dialog box is displayed.



The P-link module is registered as shown below.

(Note 2)



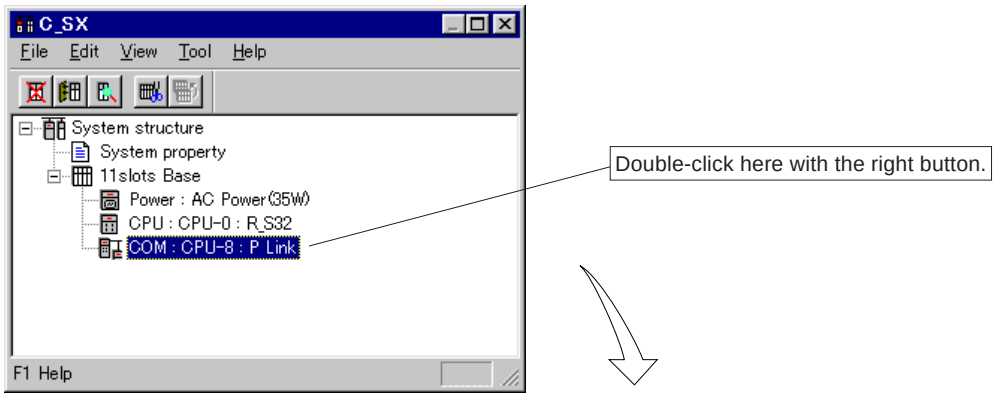
Note: 1) In P/PE-link system, the line number selects the P/PE-link channel on the configuration. Available range of the line number are “8” selects “channel 0,” and “9” selects “channel 1.”
2) Registration of the P/PE-link module should be with slot which is on the processor bus.

4-2 Operation Definition (Local Station Number Selection)

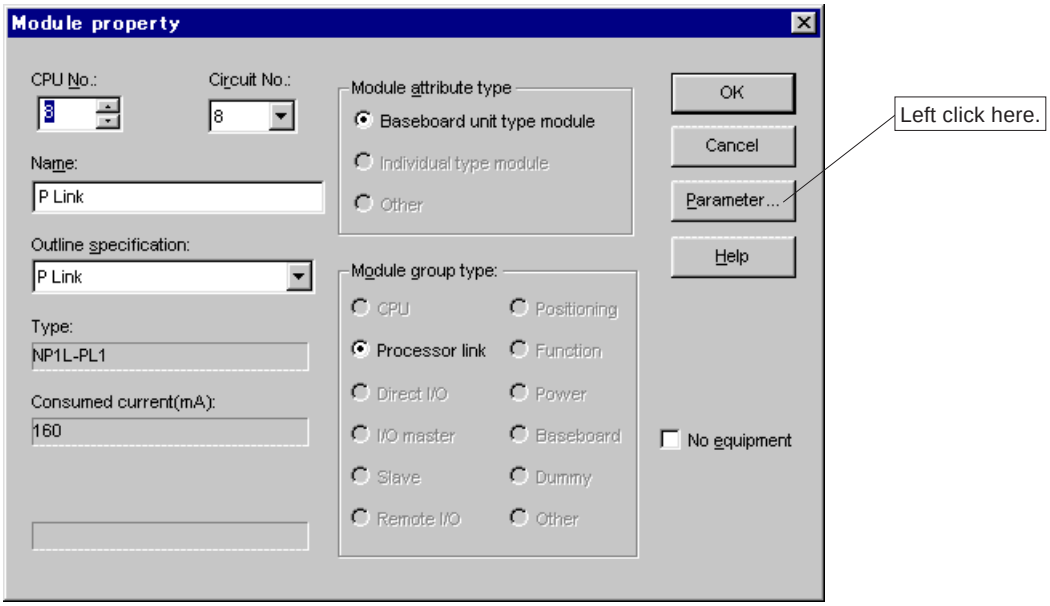
This definition is used to select the local station number of P/PE-link.

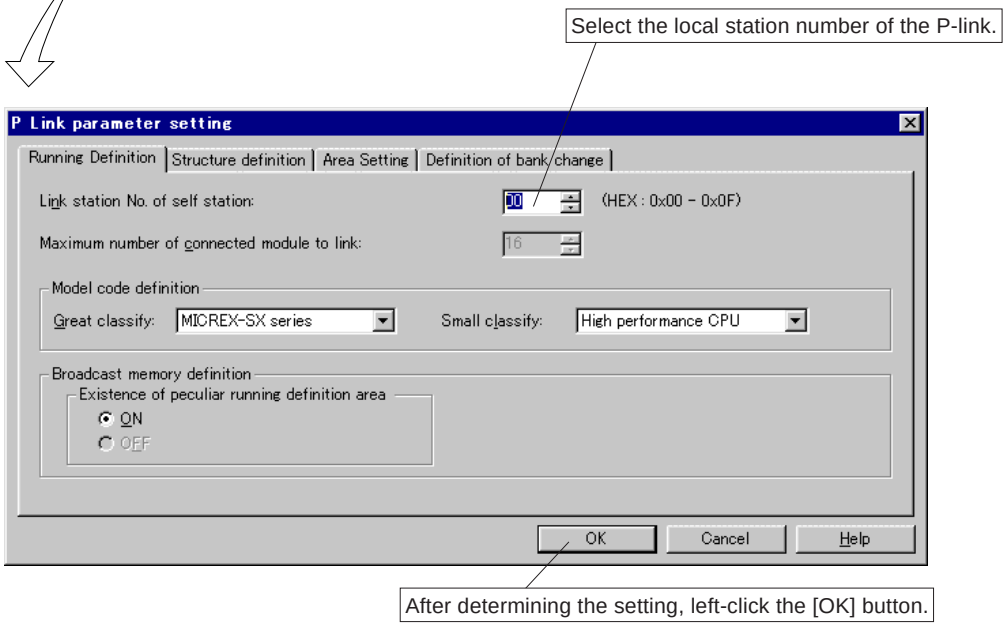
<Setting procedure>

1) Select the P-link module. The “P-link parameters setup” dialog box is displayed.



The “Module property” dialog box is displayed.



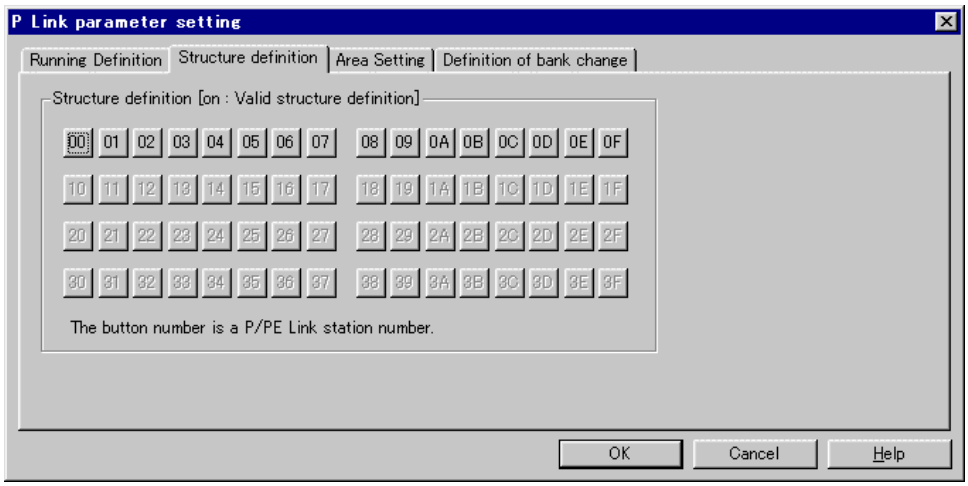


4-3 Configuration Registration Definition

This definition is used to register all station numbers of P/PE-link modules which are connected to the P/PE link.

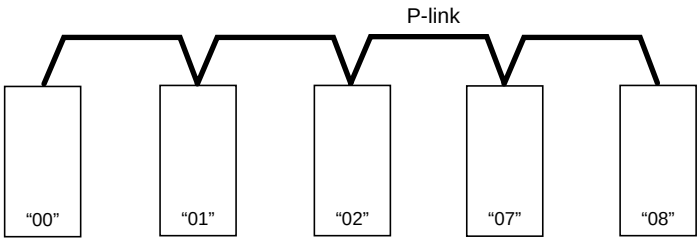
<Setting procedure>

1) Left-click the [Structure definition] tab in the "P-link parameters setup" dialog box. The following screen is displayed.

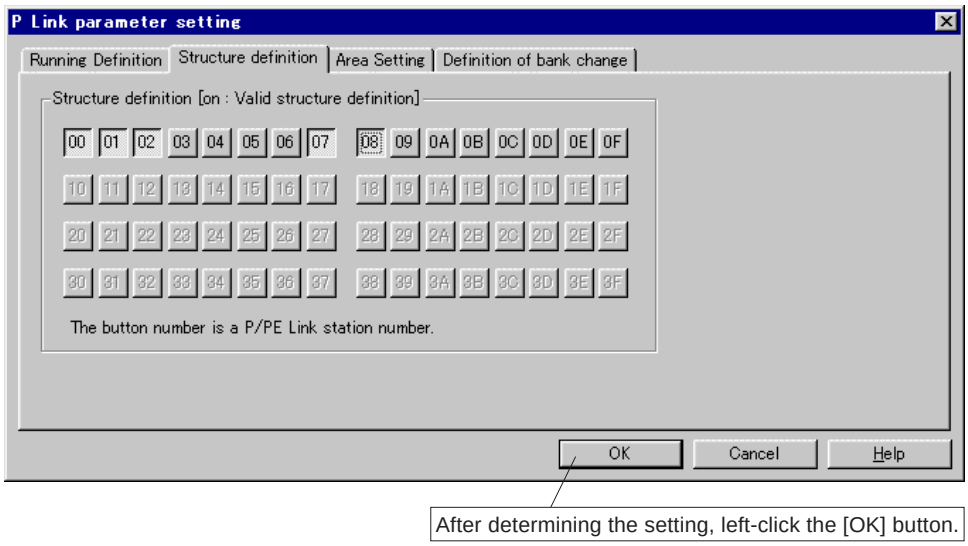


2) Left-click the station number of the P-link module which is connected to the P-link.

<Example of P-link configuration>



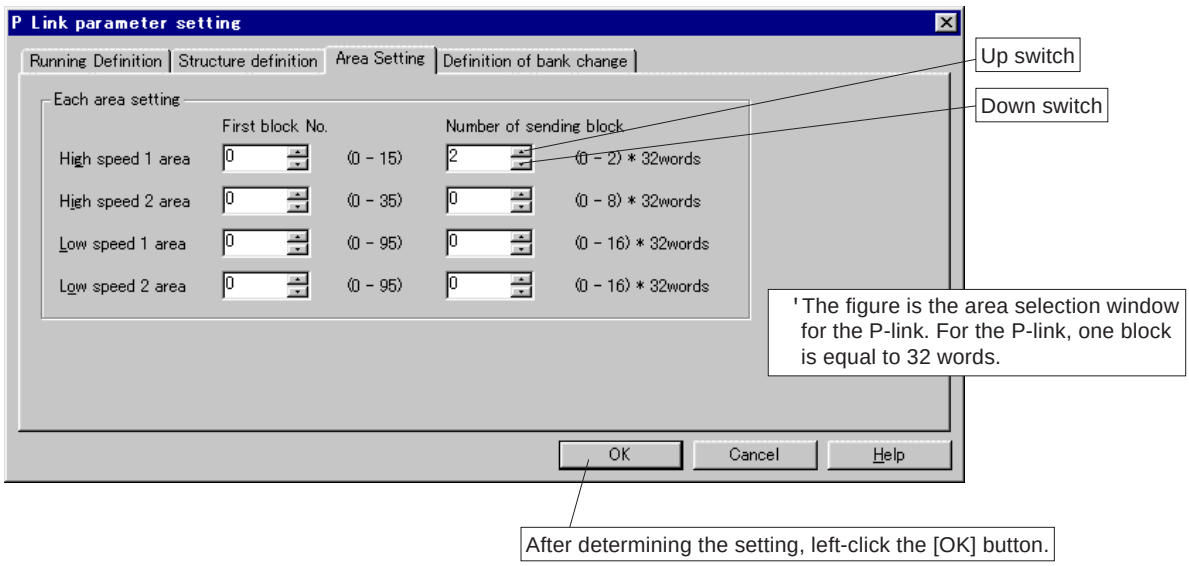
For the above configuration, the setting is as shown below.



The sending area of P/PE-link module is selected.

<Setting procedure>

Left-click the [Area setting] tab in the “P-link” dialog box.
The following screen is displayed.



4-5 Changing Bank

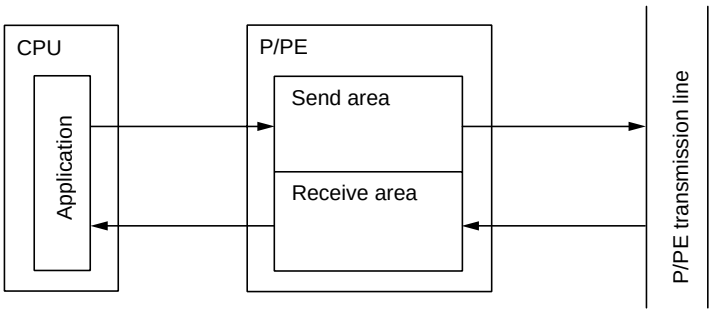
When the data are exchanged between the broadcast area and the application program, it occurs that the uniqueness of the data is important. The uniqueness of the data is maintained by changing the memory (bank) of the broadcast area for P/PE-link modules.

4-5-1 Data exchanging mode in broadcast communication

In MICREX-SX series, there are two modes of exchanging the data between the broadcast area and the application program.

1) Asynchronous mode

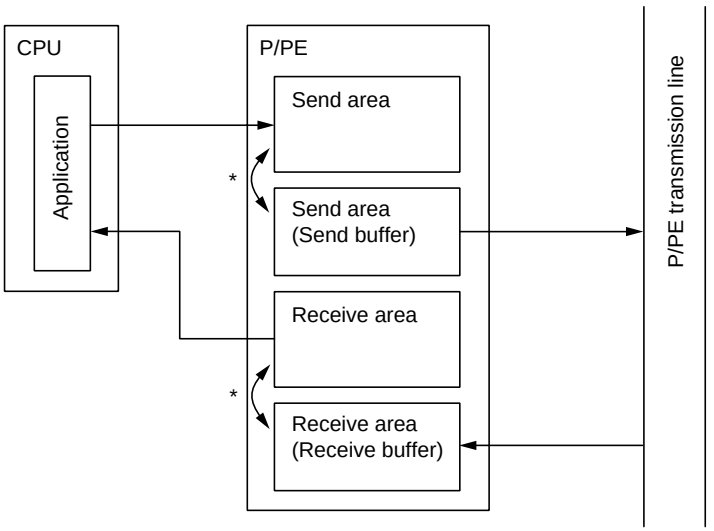
The same memory (broadcast area) is accessed by the P/PE-link transmission and the application program at the same time.



Note: Since the same area is accessed at the same time, the uniqueness of the data in the whole is not maintained. However, the uniqueness of the one word is maintained.

2) Change bank mode (Synchronous mode)

There are two send memories which are the same size, and two receive memories which are the same size as all. The P/PE-link transmission accesses different memory from the memory accessed by the application program. Since the same memory is not accessed at the same time, the uniqueness of the data can be maintained.



Note: The uniqueness of each bank (high-speed 2 area, low-speed 1 area, low-speed 2 area, receivearea) is maintained.

* The application program (change bank FB) changes the send / receive area accessed by the application program of the send / receive area accessed by the P/PE-link.

4-5-2 Change bank CPU definition

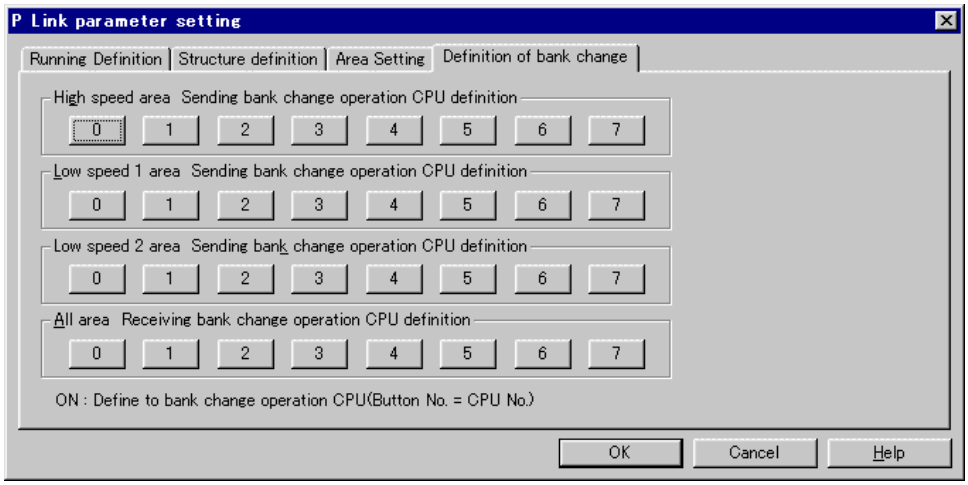
This definition is used to register the CPU which issues a change bank command. Two or more CPUs can be specified.

When even one CPU is registered, the change bank mode is performed. When no CPU is registered, the asynchronous mode is performed.

<Setting procedure>

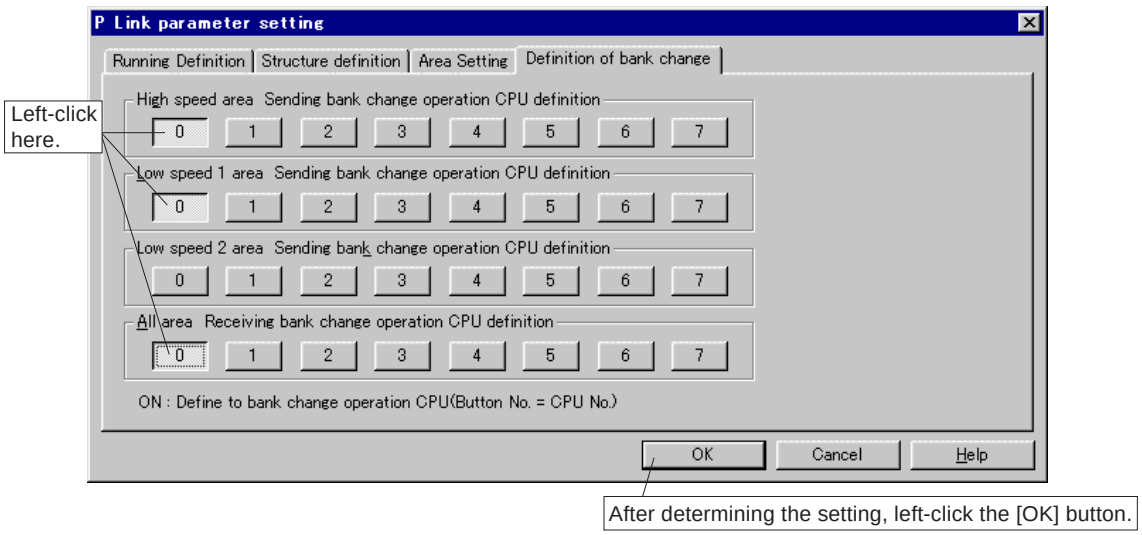
1) Left-click the [Definition of bank change] tab in the "P-link parameter setup" dialog box.

The following screen is displayed.



2) Setting example

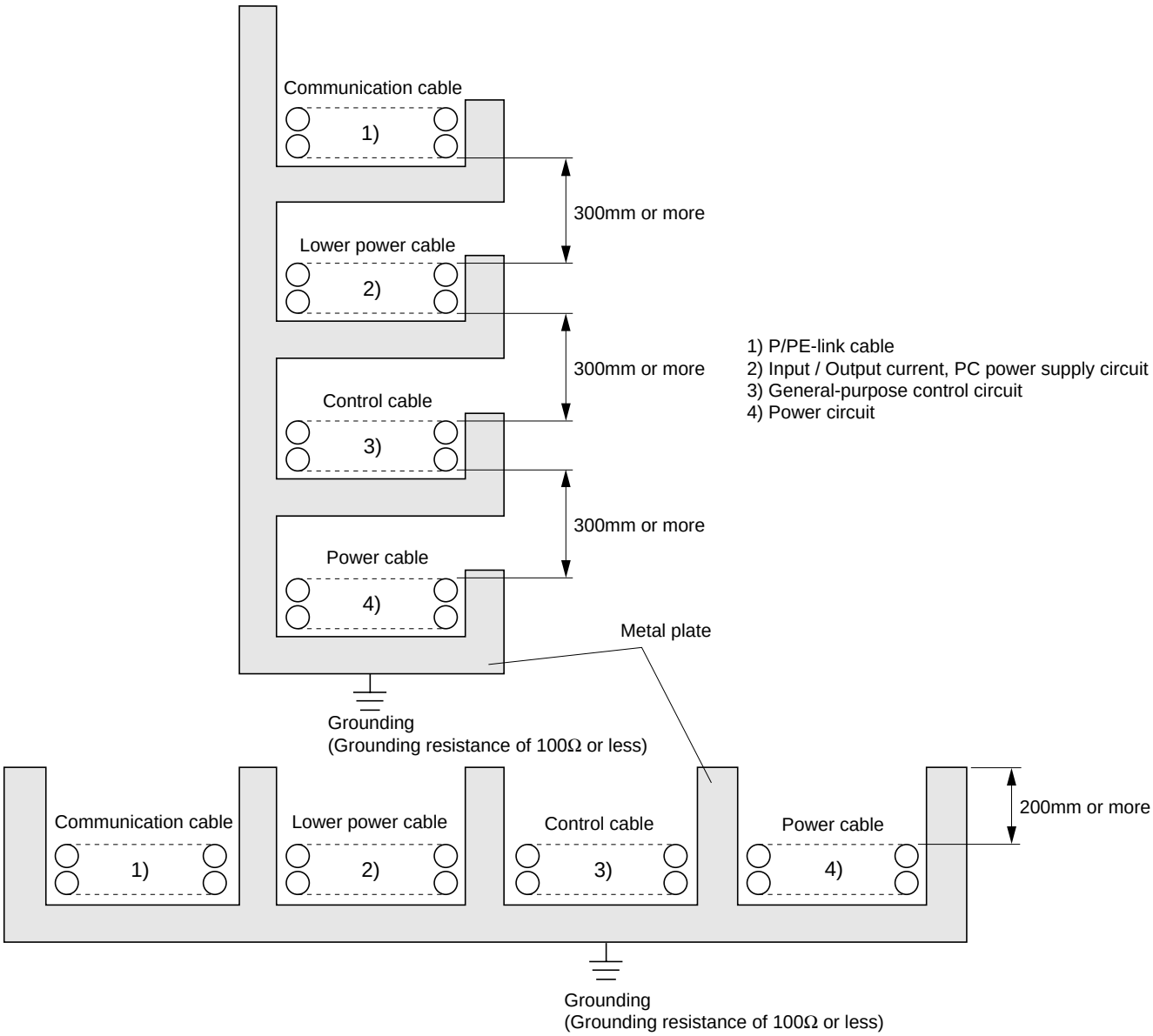
The application program is displayed. The application program of CPU0 changes the bank of the high-speed area (send) , the low-speed 1 area (receive) and the receive area as shown below.



Note: The application program (change bank FB) performs the change bank. Refer to Appendix 1-2.

Section 5 Wiring

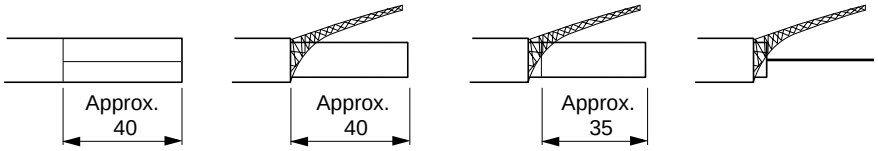
(1) Before removing the connector, remove the fixing screws.
(2) Communications cables must be isolated from high-voltage cables and power cables as far as possible. Communication cables must not be run parallel with those cables.
(3) These cables should be installed as shown in the following figure. Shielding cables should be used.



5-2 P/PE-link Wiring

Process the ends of P/PE-link cables.

(1) Remove a part of the sheath and internal insulation

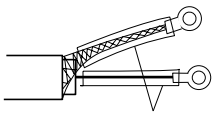


Cut the sheath

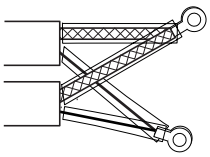
Remove the cut part of sheath to expose the shield wire (external conductor).

Cut the internal insulation and expose the internal conductor.

(2) Attach crimp terminals



For the shield wire, apply the insulation tube before caulking the terminal.



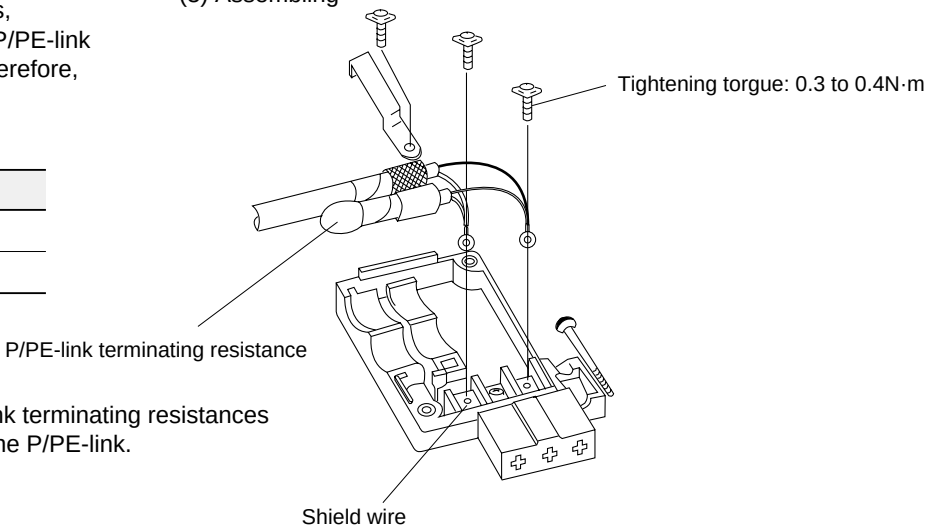
When two P/PE-link cables are to be connected to one terminal block, each pair of wires can be connected to one crimp terminal for convenience.

Note: If wires are connected directly to the terminal block without using crimp terminals, connection failure may result and P/PE-link transmission errors may occur. Therefore, crimp terminals must be used.

The followings are recommended.

Maker	Type
JST(Nichiatsu)	2-M3
Toei	2-3.5, 2-4S

(3) Assembling

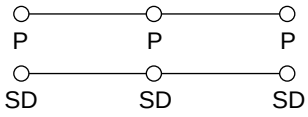


Note: Connect P/PE-link terminating resistances to both ends of the P/PE-link.

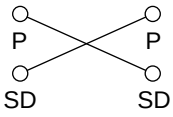
- P (inner wire) must be connected P, SD (shield wire) must be connected SD.

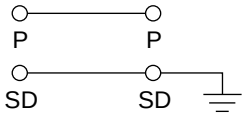
P and SD must not be grounding.

Correct



Incorrect

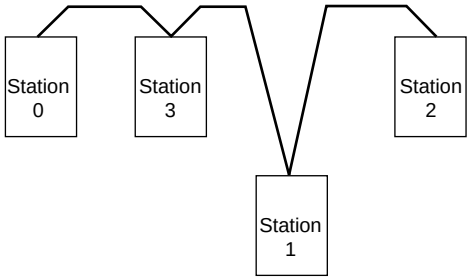




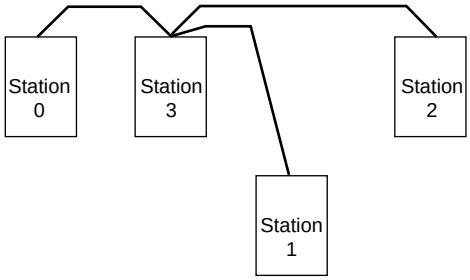
- P-link cable must be connected as a single line. Branching is not permitted.

The station numbers are not necessary to be in order.

Correct



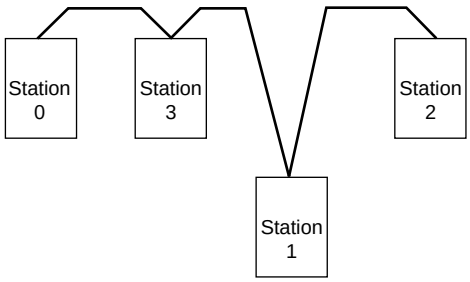
Incorrect



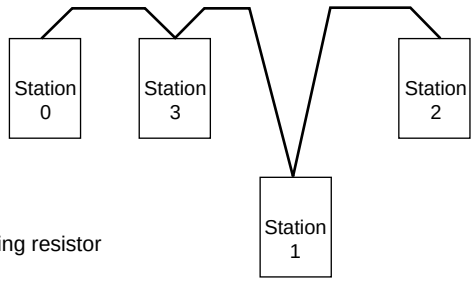
- Terminating resistors must be connected at the both ends of the P/PE-link.

There are connected between P and SD.
In other cases, the transmission may be fault.

Correct



Incorrect



: Terminating resistor

Section 6 RAS 6-1

Page

The P/PE-link initialization error flags are assigned at the system memory area in the CPU module.

Address	Name	Description
%MX10.26.0	P/PE-link 0 channel initialization error	Set to "1" when an error has occurred during P-link or PE-link initialization for the module of 0 channel (line number "8").
%MX10.26.1	P/PE-link 1 channel initialization error	Set to "1" when an error has occurred during P-link or PE-link initialization for the module of 1 channel (line number "9").

Note: When the above flags have been turned “ON,” the system stops in fatal fault state.

6-2 P/PE-link Configuration / Fault Flag

This flag is used to indicate the status of each P/PE-link station.

(1) P-link configuration / fault flag (%MW □.1.7808, %MW □.1.7809)

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
%MW□ .1.7808	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	' Configuration flag
%MW□ .1.7809	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	' Fault flag

(2) PE-link configuration / fault flag (%MW □.1.25088, %MW □.1.25095)

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
%MW□ .1.25088	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	Configuration flag
%MW□ .1.25089	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	
%MW□ .1.25090	2F	2E	2D	2C	2B	2A	29	28	27	26	25	24	23	22	21	20	
%MW□ .1.25091	3F	3E	3D	3C	3B	3A	39	38	37	36	35	34	33	32	31	30	
%MW□ .1.25092	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	Fault flag
%MW□ .1.25093	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	
%MW□ .1.25094	2F	2E	2D	2C	2B	2A	29	28	27	26	25	24	23	22	21	20	
%MW□ .1.25095	3F	3E	3D	3C	3B	3A	39	38	37	36	35	34	33	32	31	30	

Note: □ indicates the CPU number of the module.

Appendix 1 Example Programs

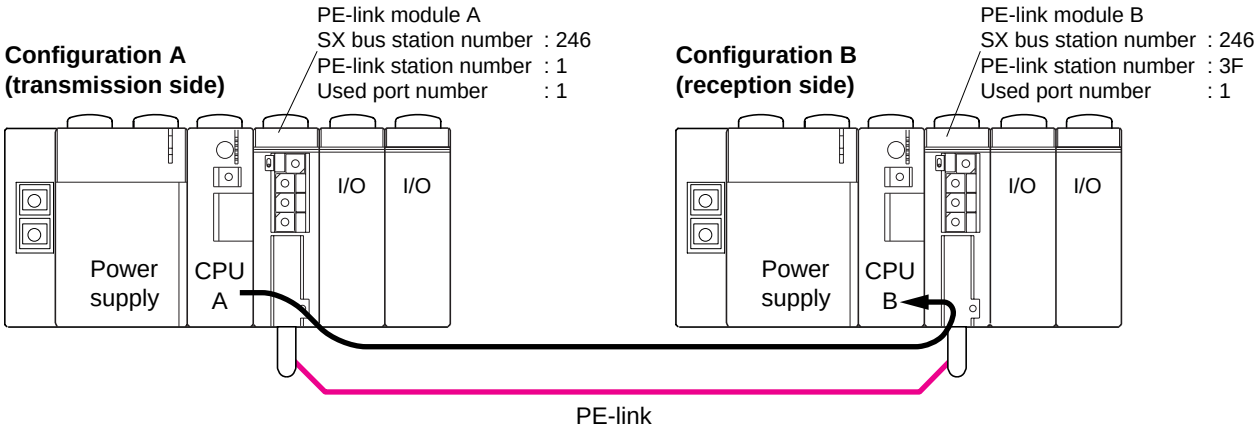
Page

Appendix 1 Example Programs

Appendix 1-1 Example of Message Communication Program

With two configurations connected through a PE-link as shown in the following figure, an example program for message communication between the CPUs via a PE-link module will be explained for the case of data transfer from CPU-A to CPU-B.

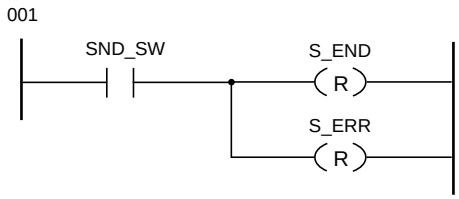
< Configuration diagram >

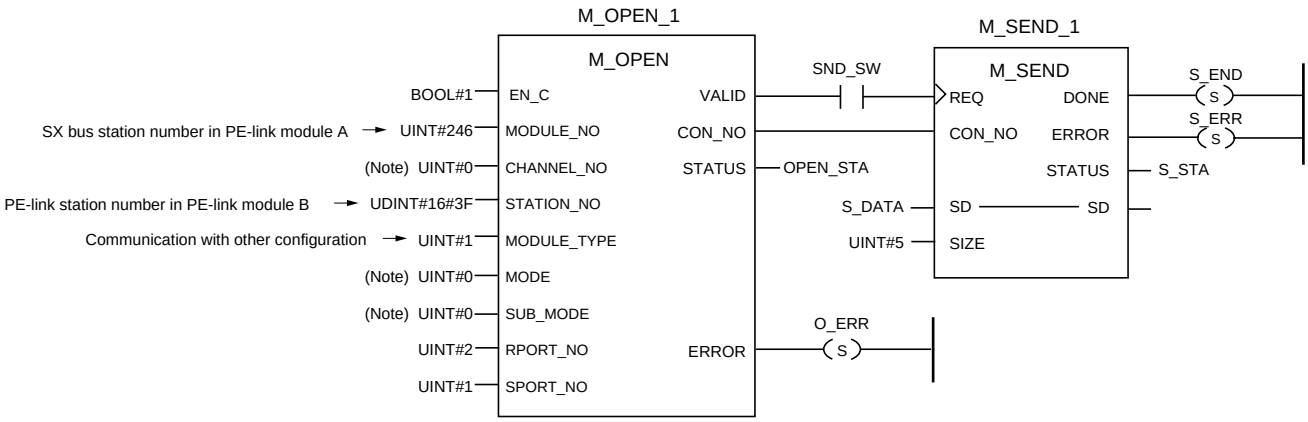


< Example of transmission program >

When SND_SW is turned ON, the send data (S_DATA) message is transmitted.

Send data →
- 1234–S_DATA [1]
- 2345–S_DATA [2]
- 3456–S_DATA [3]
- 4567–S_DATA [4]
- 5678–S_DATA [5]



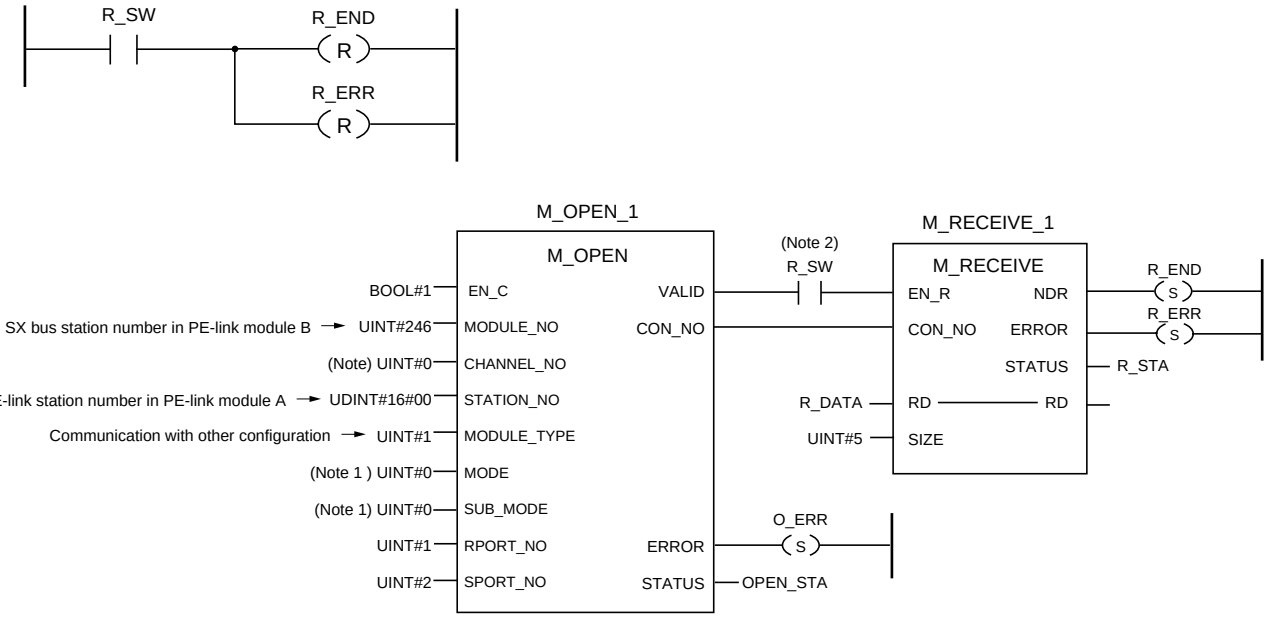


Note: Fixed to “0” in the case of a P/PE-link module.

Appendix 1-1 Example of Message Communication Program

< Example of reception program >

When R_SW is turned ON, the state changes to waiting for message reception. When data is transmitted, send data from CPU-A is received and R_END turns ON. Received data is stored in R_DATA.



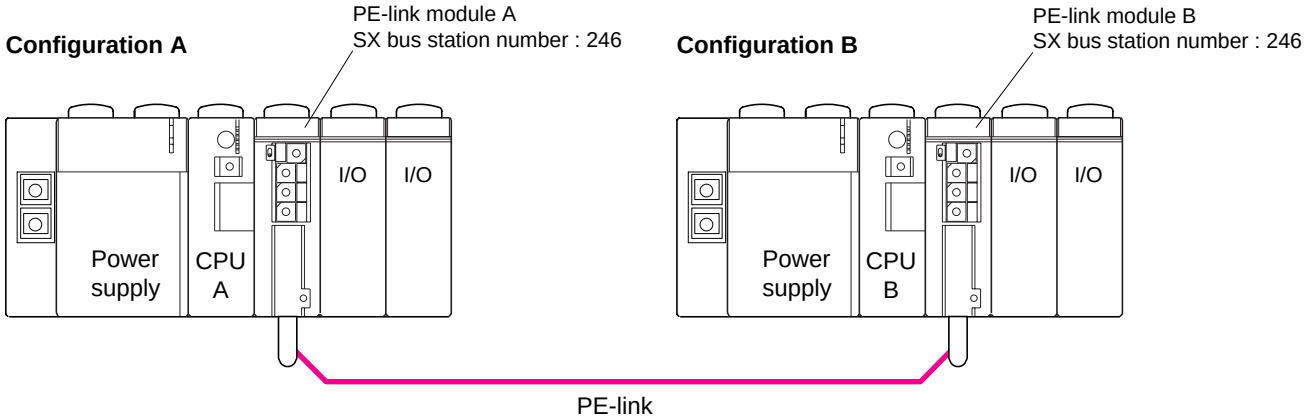
Note 1: Fixed to “0” in the case of a P/PE-link module.

Note 2: During message reception processing (from the rising edge of “EN_R” until “NDR” or “ERROR” turns ON), maintain the “EN_R” reception enable input as ON.

Appendix 1-2 Example of Bank-Change Program

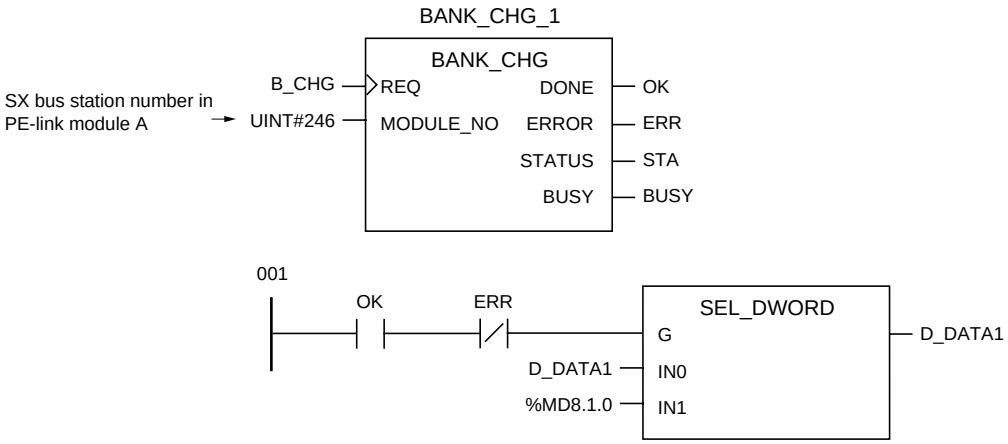
With two configurations linked through the PE-link as shown in the following figure, a program used to change the bank of data transmission in broadcast communication will be explained.

< Configuration diagram >



< Example of data read-out program (CPU-A) >

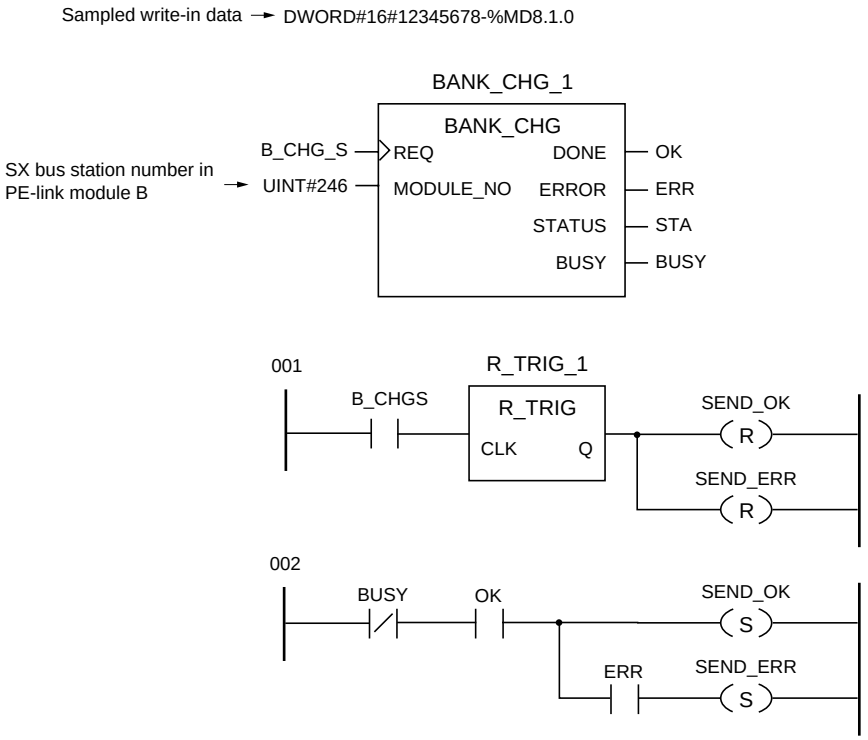
When B_CHG is turned ON, the bank is changed. After the bank-change is completed, broadcast data of the PE-link is read-out. In this example, if the bank-change is completed correctly, data of %MD8.1.0 is stored in D_DATA. 0 is stored if there was an error in the bank-change.



Appendix 1-2 Example of Bank-Change Program

< Example of data write-in program (CPU-B) >

After the write-in data is set, the bank is changed. #12345678 in the DWORD format is written-in.
In this example program, the bank is changed after data



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