Fe *e-Front runners*

MICREX-SX *series*
SPH
USER'S MANUAL

PROFIBUS-DP Master Module
< Type: NP1L-PD1>
PROFIBUS-DP Slave Module
< Type: NP1L-PS1>

Preface

Thank you for purchasing Fuji Electric Programmable Controller MICREX-SX Series.
This user's manual describes the specifications of the PROFIBUS-DP master module (type: NP1L-PD1) and slave module (NP1L-PS1) for MICREX-SX series.
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:

<SX-Programmer Expert (D300win)>

Title	Manual No.	Contents
User's Manual Instruction, MICREX-SX series	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 D300win <Reference>, MICREX-SX series	FEH254	Explains the installation procedure, functions and operations of D300winV2.
User's Manual D300win <Reference>, MICREX-SX series	FEH257	Explains the installation procedure, functions and operations of D300winV3.
User's Manual D300win <LD/FBD Editor>, MICREX-SX series	FEH257-1	Explains the operations of LD/FBD added to D300winV3.

<SX-Programmer Standard (Standard loader)>

Title	Manual No.	Contents
User's Manual Instruction, MICREX-SX series	FEH588	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 SX-Programmer Standard <Reference>, MICREX-SX series	FEH590	Explains the functions and operations of SX-Programmer Standard.

* This manual is available for both D300win and Standard loader.
* In addition to the above manuals, the following Fuji Electric FA Components & Systems Co., Ltd. site offers various manuals and technical documents associated with MICREX-SX.
    URL   http://www.fujielectric.co.jp/fcs/eng/

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Notes
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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 precautions 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 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 the operator.
- ❑ 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, deform, throw in a 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.

Safety Precautions

> ### ⚠ Caution
>
> - ❑ Do not use one found damaged or deformed when unpacked, otherwise, fire, 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, fire, accident, erratic operation or failure might occur.
> - ❑ Remove the dust-cover seals of modules after wiring, otherwise, fire, accident, erratic operation or failure might occur.
> - ❑ Connect the ground terminal to the ground, otherwise, electric shock or 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, erratic operation or failure might occur.
> - ❑ Put the furnished terminal covers on the terminal blocks, 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. Wrong operation might break or cause problems to the machine
> - ❑ 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.
> - ❑ Be sure to install the electrical wiring correctly and securely, observing the directions of the operating instructions and manual. Wrong or loose wiring might cause fire, accident or failure.
> - ❑ When disengaging the plug from the outlet, do not pull the cord, otherwise, 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, erratic operation or failure might occur.
> - ❑ Do not attempt to repair the module by yourself, but contact your Fuji Electric agent. When replacing the batteries, correctly and securely connect the battery connectors, otherwise, fire, accident or failure might occur.
> - ❑ Do not remodel or disassemble the product, otherwise, 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, can lead to loss of human life or other grade results.
> - ❑ External power supply (such as 24 V DC power supply) which is connected to DC I/O should be strongly isolated from AC power supply, otherwise, accident or failure might occur. (Use of EN60950 conforming power supply is recommended.)

Revision

Printed on	*Manual No.	Revision contents
Sep. 2002	FEH237	First edition
Nov. 2004	FEH237a	⋄ Specifications of slave module (type: NP1L-PS1) were added. ⋄ Specifications of response speed were altered. ⋄ Operations for using SX-Programmer Standard were added.
Aug. 2005	FEH237b	In I/O point specification, normal mode (I/O 128 words) and I/O extension mode (I/O 510 words) were added.
Feb. 2007	FEH237c	"I/O extension + redundant mode" was added to the extension mode setting switch.
Printed on	*Manual No.	Revision contents

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Section 1 General

PROFIBUS-DP master module "NP1L-PD1" is the communication module that has the master function for the "PROFIBUS-DP" system, or an open device level network. You can construct one PROFIBUS-DP system using only one unit of the NP1L-PD1 module.

PROFIBUS-DP slave module "NP1L-PS1" is the communication module that communicates at the I/O level with external devices that have the master function for the "PROFIBUS-DP" .

1-1 What is PROFIBUS-DP?

PROFIBUS is the IEC661158 international standards and the EN57170 European Fieldbus Standard open network. PROFIBUS-DP (Decentralized Periphery) makes it possible to transmit data at high speed between field devices such as controllers, remote I/O and drives.

1-2 Features

(1) Open system

PROFIBUS-DP slave devices can be connected. (There are 300 or more vendors of PROFIBUS-DP slave devices.) DP slave devices are approved by the PROFIBUS Association, and their compatibility is confirmed.

(2) Flexible system configuration

The basic configuration consists of one DP master station and multiple DP slave stations. Maximum 126 devices (including master stations) can be connected. However, repeater is necessary to connect 33 or more devices.

(3) Transmission rate

You can select any desired one of 9 transmission rates (9.6, 19.2, 93.75, 187.5, 500, 1500, 3000 and 12000 kbps). However, transmission rate depends on the specifications of slave devices or master devices.

1-3 Supported Versions

When you use the NP1L-PD1, be sure to use the following version of CPU module and loader.

NP1L-PD1	When software version is earlier than V33, or when PROFIBUS extension mode is used with V33 or later version	When normal mode, or when I/O extension mode is used with V33 or later version	When I/O extension + redundant mode is used with V34 or later version.
SPH300	Software version: V56 or later	Software version: V64 or later	Not supported
SPH200	Not supported	Software version: V34 or later	Not supported
SPH2000	All versions	All versions	NP1PM-256H (All versions) Other types are not supported.
D300winV2	V2.2.3.1 or later	Not supported	Not supported
D300winV3	All versions	V3.3.0.0 or later	V3.4.0.0 or later
Standard loader	V2.0.3.0 or later	Normal mode: V2.2.1.0 or later I/O extension mode: V2.2.2.1 or later	Not supported

When you use the NP1L-PS1, be sure to use the following version of CPU module and loader.

NP1L-PS1	Software version: V33 or later
SPH300	Software version: V25 or later
SPH200	Software version: V30 or later
SPH2000	All versions
D300winV2	V2.2.5.0 or later
D300winV3	V3.1.1.0 or later
Standard loader	V2.1.0.0 or later

Section 2 Specifications

2-1 General Specifications

Item		Specification
Physical environmental conditions	Operating ambient temperature	0 to +55°C
	Storage temperature	-25 to 77°C
	Relative humidity	20 to 95%RH, no condensation
	Pollution degree	2 (no condensation)
	Corrosion immunity	Free from corrosive gases. Not stained with organic solvents
	Operating altitude	2000 m or less above sea level Transport condition: 70 kPa (equivalent to 3000 m above sea level) or more
Mechanical service conditions	Vibration	Half amplitude: 0.15 mm, Constant acceleration: 19.6 m/s^2
	Shock	Peak acceleration: 147 m/s^2 (3 cycles in each direction)
Electrical service conditions	Noise immunity	Rise time 1 ns, pulse width 1 μs, 1.5 kV (noise simulator)
	Electrostatic discharge	Contact discharge: ±6kV, Aerial discharge: ±8kV (Class 3 of IEC 61000-4-2)
	Radioelectromagnetic field	80 MHz to 1000 MHz: 10 V/m (Class 3 of IEC 61000-4-3)
Isolation method		Photocoupler
Dielectric strength		500 V AC, 1 minute (between communication wires connected together and ground)
Insulation resistance		10 MΩ or more with 500 V DC megger (between communication wires connected together and ground)
Number of occupied slots		1
Internal current consumption		NP1L-PD1: 24 V DC, 200 mA or less 　　　　(supplied from the power module via the base board) NP1L-PS1: 24 V DC, 150 mA or less 　　　　(supplied from the power module via the base board)
Installation conditions	Structure	Panel built in type, IP20
	Cooling method	Natural air cooled
	Mass	NP1L-PD1: Approx. 250 g (module alone) NP1L-PS1: Approx. 180 g (module alone)
	Outside dimensions	W35 x H105 x D87 mm (excl. protrusions)

Section 2 Specifications

2-2 Transmission Specifications

2-2-1 List of transmission specifications

(1) NP1L-PD1

Item	Specification
Communication function	PROFIBUS-DP(VO) master function (DPM1: master class 1)
Number of connectable slave stations	Max. 32 (126 when repeaters are used)
Station No. (station address) setting range	0 to 125
Transmission line format	Bus configuration (multi-drop)
Communication protocol	Conforming to EN 50170 and DIN 19245
Data interchange system	1:N (polling / selecting system)
Transmission rate	9.6k, 19.2k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M, 12M (bps) *Set by configurator.
Transmission distance	Maximum transmission distance depends on transmission rate. 1200 m when 9.6, 19.2 or 93.75 kbps; 1000 m when 187.5 kbps; 400 m when 500 kbps; 200 m when 1.5 Mbps; and 100 m when 3M/6M/12Mbps
Number of input / output points	Normal mode: Total 128 words for input and output (see note1) PROFIBUS I/O extension mode: Total 510 words for input and output (see note1) I/O extension mode: Total 510 words for input and output (see note1 and 3) * In PROFIBUS I/O extension mode, the maximum words for input or output is 255.
Cable	PROFIBUS-DP dedicated cable (see note2)

(2) NP1L-PS1

Item	Specification
Communication function	PROFIBUS-DP(VO) slave function
GSD file	HMS_1003.GSD
Station No. (station address) setting range	0 to 99 (decimal)
Transmission line format	Bus configuration (multi-drop)
Communication protocol	Conforming to EN 50170 and DIN 19245
Data interchange system	1:N (polling / selecting system)
Transmission rate	9.6k, 19.2k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M, 12M (bps) *Set by configurator.
Transmission distance	Maximum transmission distance depends on transmission rate. 1200 m when 9.6, 19.2 or 93.75 kbps; 1000 m when 187.5 kbps; 400 m when 500 kbps; 200 m when 1.5 Mbps; and 100 m when 3M/6M/12Mbps
Number of input / output points	Total 128 words for input and output Maximum words for input or output: 122 *Depends on the parameter setting in the system configuration definition. (for D300win)
Cable	PROFIBUS-DP dedicated cable (see note2)

Note 1: Restriction on the number of I/O master input/output words in a multi-CPU configuration
Configure to satisfy the following formula in a multi-CPU configuration about the number of input/output words.
$$2048 > \text{Number of CPU modules} \times (\text{Number of I/O master input/output words} + 8)$$
$$+ \text{Number of modules except CPU} \times 1.5$$
$$+ \text{Total number of words of I/O modules directly connected to the SX bus} + 5 \text{ (words)}$$

Note 2: For more information about the PROFIBUS-DP dedicated cable, refer to "Section 4 Wiring."

Note 3: For using I/O extension mode, use a CPU module and loader that support it.

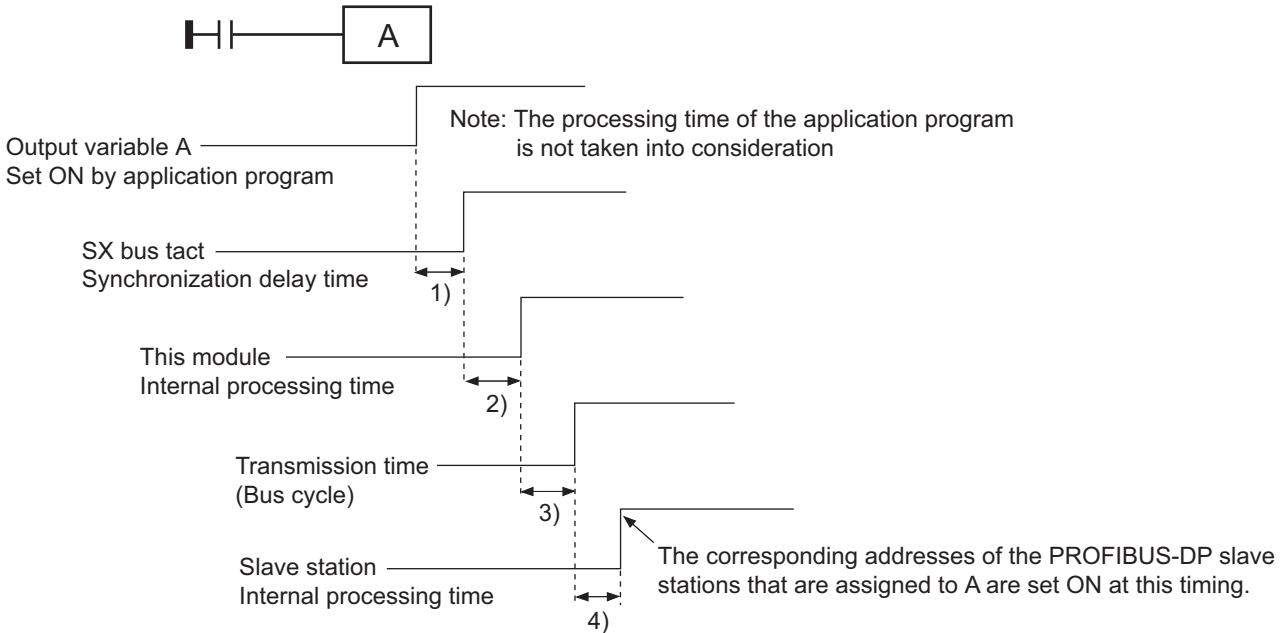# Section 2 Specifications

2-2 Transmission Specifications

2-2-2 Response speed

(1) NP1L-PD1 Response time of output data

NP1L-PD1 response time of output data means the time ruquired for data on an application to be output from the PROFIBUS-DP master module to the PROFIBUS-DP slave station.

<Elements for calculating response speed>

1) The time required for the output information written in output variable A to be transmitted to this module = max. one tact time

2) The time required to transmit the data from SX bus to the output buffer of this module
   - Earlier than V32
     (PD1 processing time) = 61 + 0.18 x No. of words (ms)
   - V32 or later
     (PD1 processing time max. value) = 1.5 + (1.2 + 0.01 x Number of words) x 2 (ms) (when single-CPU system is used)
     (PD1 processing time min. value) = 1.5 + (1.2 + 0.01 x Number of words) (ms) (when single-CPU system is used)
     (PD1 processing time max. value) = 1.2 + 0.2 x Number of CPU modules + 0.02 x Number of words
                         + (1.2 + 0.01 x Number of words) x 2 (ms) (when multi-CPU system is used)
     (PD1 processing time min. value) = 1.2 + 0.2 x Number of CPU modules + 0.02 x Number of words
                         + (1.2 + 0.01 x Number of words) (ms) (when multi-CPU system is used)

3) The time required to transmit the data from the output buffer of this module to the PROFIBUS-DP slave station (Bus cycle)
   → This transmission time depends on the transmission rate, the volume of the data etc. For more information about bus cycle, refer to "(3) Bus cycle".

4) The time required for the PROFIBUS-DP slave station to receive the data and output processed data = Depends on the specifications of the slave station

<Sample calculation of output data response time>

Supposing,
- SX bus tact time = 2 ms
- The volume of output data = 6 words
- Processing time of slave station = 1 ms (an assumed value)
- Transmission rate = 12Mbps

then,

Output response time = 1) + 2) + 3) + 4) = 2 + (1.5 + 0.01 x 6) x 2 + 1 + 1 = 7.12 ms

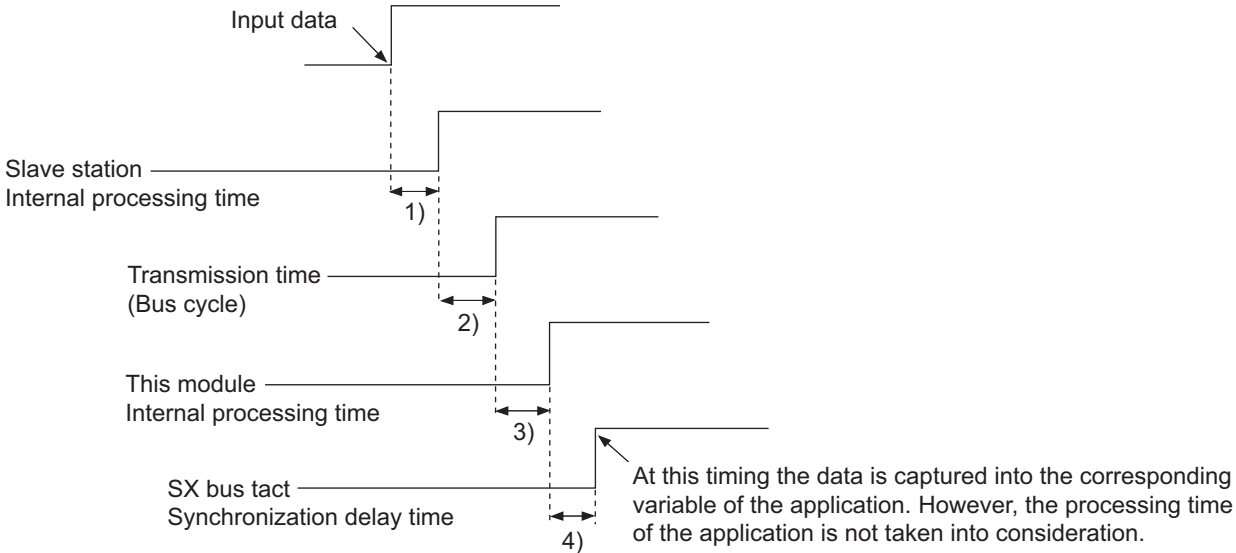Note: Bus cycle is assumed to be 1 ms in this example.

Section 2 Specifications

2-2 Transmission Specifications

(2) NP1L-PD1 Response time of input data

NP1L-PD1 response time of input data means the time ruquired for input ON data of the PROFIBUS-DP slave station to be transmissited to an application program via the PROFIBUS-DP master module.

\<Elements for calculating response speed\>

At this timing the data is captured into the corresponding variable of the application. However, the processing time of the application is not taken into consideration.

1) The time required for the PROFIBUS-DP slave station to transmit the data that is input from an external device to the output buffer of the slave station

2) The time required to transmit the data from SX bus to the output buffer of this module (Bus cycle)
   → This transmission time depends on the transmission rate, the volume of data etc. For more information about bus cycle, refer to "(3) Bus cycle".

3) The time required to transmit the data from the output buffer of this module to the PROFIBUS-DP slave station
   * Earlier than V32
     (PD1 processing time) = $80 + 0.2 \times$ Number of words (ms)
   * V32 or later
     (PD1 processing time max. value) = $(1.2 + 0.01 \times$ Number of words$) + 1.5 \times 2$ (ms)   (when single-CPU system is used)
     (PD1 processing time min. value) = $(1.2 + 0.01 \times$ Number of words$) + 1.52$ (ms) (when single-CPU system is used)
     (PD1 processing time max. value) = $(1.2 + 0.01 \times$ Number of words$) + (1.2 + (0.2 \times$ Number of CPU modules$)) \times 2$ (ms)
                                        (when multi-CPU system is used)
     (PD1 processing time min. value) = $(1.2 + 0.01 \times$ Number of words$) + (1.2 + (0.2 \times$ Number of CPU modules$)) \times 2$ (ms)
                                        (when multi-CPU system is used)
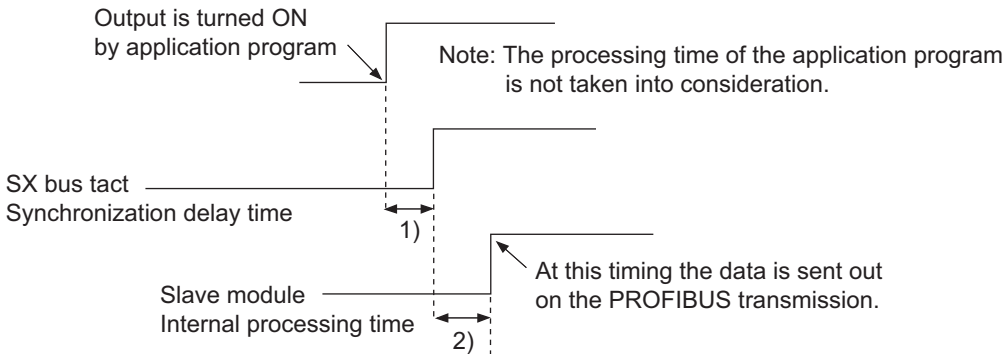   Note: The number of the words is the number that is set in the parameter in the system definition.

4) The time required to transmit the data from this module via SX bus to the I/O memory of the CPU = max. one tact time

\<Sample calculation of input data response time\>
Supposing,
   * SX bus tact time = 2 ms
   * The volume of input data = 6 words
   * Processing time of slave station = 1 ms (an assumed value)
then,
Input response time = 1) + 2) + 3) + 4) = $1 + 1 + (1.2 + 0.01 \times 6) \times 2 + 2 = 6.52$ ms

Note: Bus cycle is assumed to be 1 ms in this example.

Section 2 Specifications

2-2 Transmission Specifications

(3) NP1L-PS1 Response time of input data

NP1L-PS1 response time of input data means the time required between the instance when the data from the master station is received and the instance when the CPU (application) receives it.

<Elements for calculating response speed>
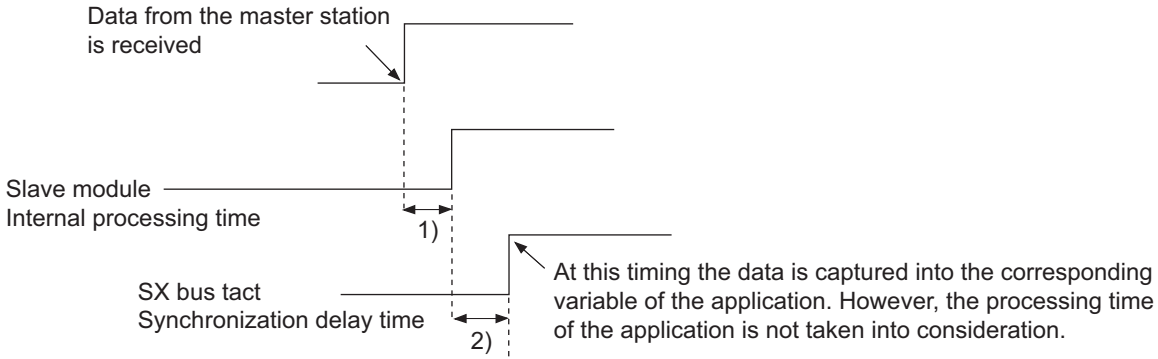
1) The time required for the PROFIBUS-DP slave module to transmit the received data from the master module to the buffer for transmitting it to the SX bus.
   (PS1 processing time max. value) = (0.8 + 0.01 x Number of input/output words) + 3 (ms)
   (PS1 processing time min. value) = (0.8 + 0.01 x Number of input/output words) + 0.1 (ms)

   Note: The number of the input/output words is the number that is set in the parameter in the system definition.

2) The time required to transmit the data from this module via SX bus to the I/O memory of the CPU = max. one tact time

(4) NP1L-PS1 Response time of output data

NP1L-PS1 response time of output data means the time required for data on an application to be output on the PROFIBUS transmission from the PROFIBUS-DP slave module.

<Elements for calculating response speed>

1) The time required for the data given in the application to be transmitted to the slave module = max. one tact time.

2) The time required for the PROFIBUS slave module to output the send data from the CPU on the PROFIBUS transmission.
   (PS1 processing time max. value) = (0.8 + 0.01 x Number of input/output words) + 3 (ms)
   (PS1 processing time min. value) = (0.8 + 0.01 x Number of input/output words) + 1.5 (ms)

   Note: The number of the input/output words is the number that is set in the parameter in the system definition.

Section 2 Specifications
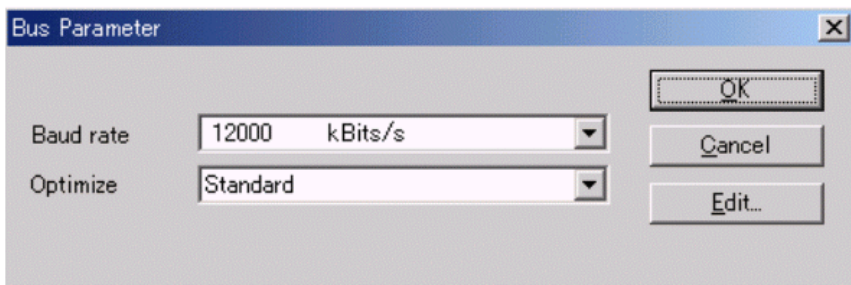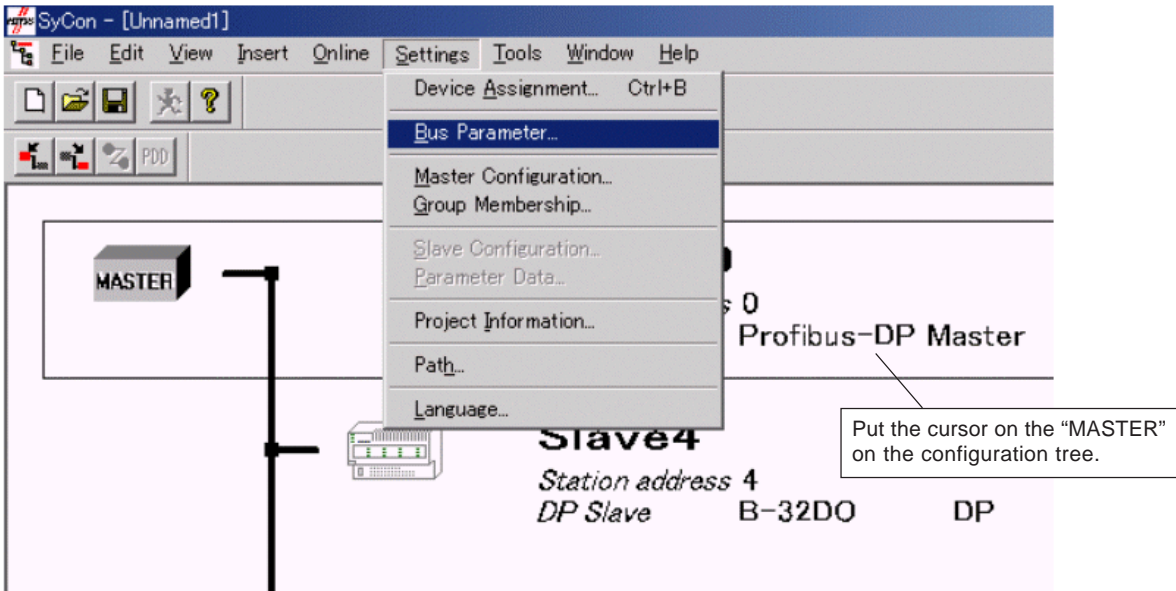
2-2 Transmission Specifications

(5) Bus cycle (Transmission time of PROFIBUS)

The transmission time = Bus cycle has been defined by the PROFIBUS specifications.
The data format is basically 11-bit configuration; the transmission header is 9 bytes for the data of a slave and Start, Stop and Parity are added per byte. In addition, the response time during data transmission, etc. depends on the transmission rate (baud rate) and individual products.
You can check the bus cycle by using the dedicated software (configurator) when creating the configuration data of PROFIBUS.

◆ After creating the configuration data of PROFIBUS, put the cursor on the "MASTER" on the configuration tree and click the [Settings] → the [Bus Parameter] on the menu bar to display the [Bus Parameter] dialog box. Then, click the [Edit] button.

Section 2 Specifications

2-2 Transmission Specifications

◆ The bus cycle is displayed on the "Target Time" part.

◆ When the transmission rate (Baud rate) is changed on this screen, the "Target Rotation Time" also changes with it.
   If 12000kbps on the above screen is changed into 6000kbps, the "Target Rotation Time" changes as shown in the following screen.
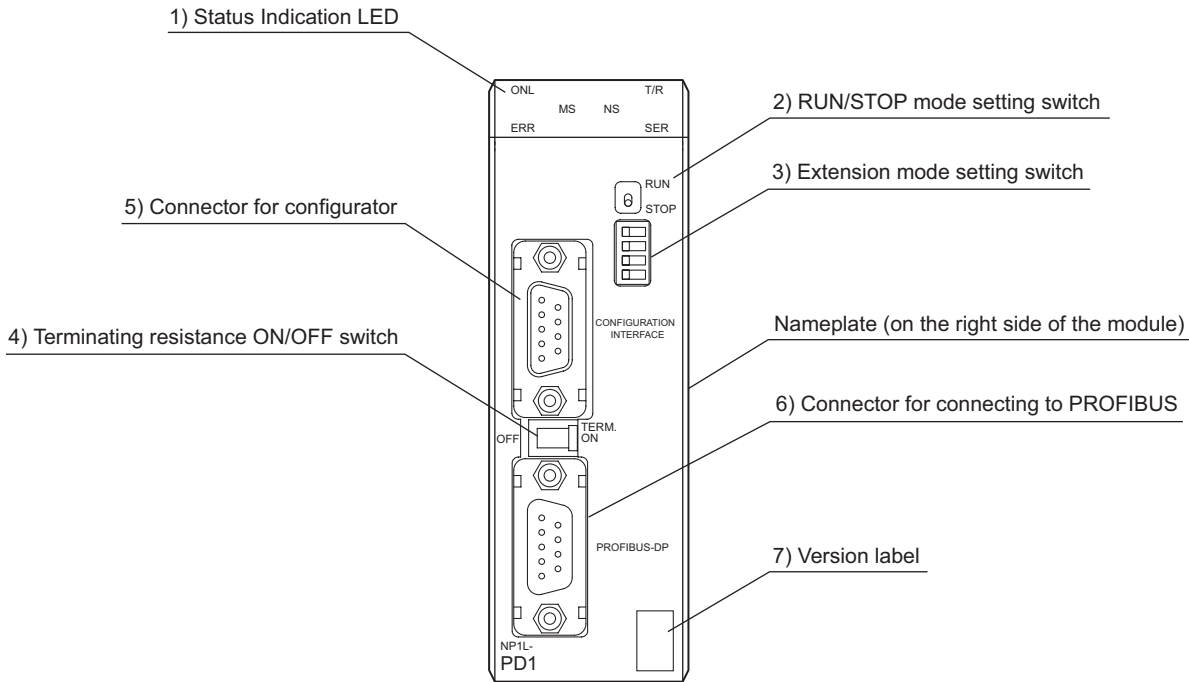
Section 2 Specifications

2-3 Names and Functions

2-3-1 NP1L-PD1

(1) Names

1) Status Indication LED
2) RUN/STOP mode setting switch
3) Extension mode setting switch
5) Connector for configurator
Nameplate (on the right side of the module)
4) Terminating resistance ON/OFF switch
6) Connector for connecting to PROFIBUS
7) Version label
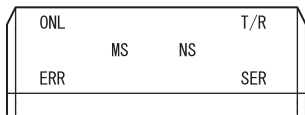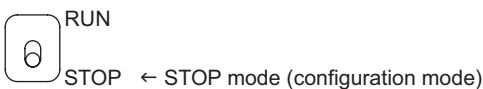
(2) Functions

1) Status indication LED

This LED indicates the current status of NP1L-PD1 module.

Symbol	Color	Description
ONL	Green	Lights when this module is operating normally; Blinks when SX bus is being connected; Unlit when SX bus is abnormal.
ERR	Red	Lights when this module is abnormal (module internal hardware error) or a cause of fatal fault is detected by software
T/R	Green	Lights when PROFIBUS-DP communication conditions are met and communication is being performed.
SER	Red	Blinks when in STOP mode (when the mode switch is set to "STOP".)
MS	Green	Lights when this module is operating normally.
MS	Red	Lights when this module is abnormal.
NS	Green	Lights when the network is in normal condition.
NS	Red	Lights when the network is abnormal.

2) RUN/STOP mode setting switch

This switch is set to STOP (configuration mode) when the configuration data of PROFIBUS-DP is to be downloaded to the NP1L-PD1 module. In STOP mode, no data is transmitted between the CPU module of SX series and PROFIBUS-DP. In STOP mode, the "SER" LED blinks.

RUN
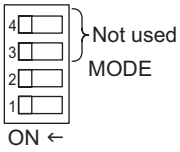STOP ← STOP mode (configuration mode)

Section 2 Specifications

2-3 Names and Functions

3) Extension mode setting switch

This switch is used to set the number of I/O points that the master module can control.

| SW1	SW2	Mode
OFF	OFF	Normal mode (Note 1)
ON	OFF	PROFIBUS extension mode (current mode)
OFF	ON	I/O extension mode (Note 1)
ON	ON	I/O extension + redundant mode (Note 2)

Note 1: Supported by software version V33 or later.
Note 2: Supported by software version V34 or later.

4) Terminating resistance ON/OFF switch

When an NP1L-PD1 module is connected to a cable end, be sure to set this switch to ON; set it to OFF when the module is connected in the middle of a cable.

5) Connector for configurator

D-sub 9-pin male connector. Used to connect to a configurator (personal computer) for RS-232C communication.
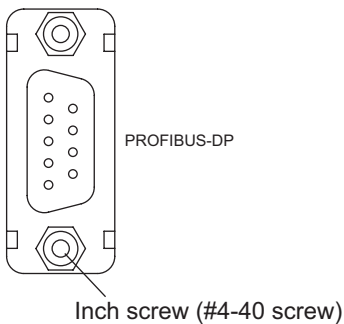
CONFIGURATION INTERFACE

Inch screw (#4-40 screw)
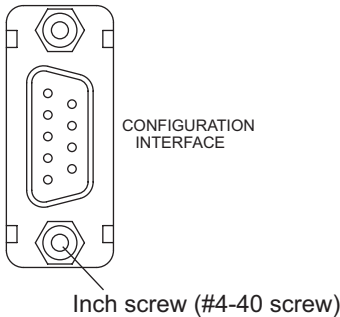
* For information about wiring, refer to "Section 4 Wiring".

Pin No.	Direction of signal	Signal name	Description
1	–	Not connected	
2	IN	RXD	Receive data
3	OUT	TXD	Send data
4	OUT	DTR	Data terminal ready
5	–	GND	GND
6	–	Not connected	
7	OUT	RTS	Request to Send
8	IN	CTS	Send enable
9	–	Not connected	
Metal part, screw	–		Safety ground

6) Connector for PROFIBUS-DP

D-sub 9-pin female connector

PROFIBUS-DP

Inch screw (#4-40 screw)

* For information about wiring, refer to "Section 4 Wiring".

Pin No.	Direction of signal
1	Shield
2	Not connected
3	Line B (wire color = red)
4	Request to Send (RTS) * Wiring is unnecessary for this signal.
5	Ground 5 V (M5) * Wiring is unnecessary for this signal.
6	Potential 5 V (Potential free 5 V) * Wiring is unnecessary for this signal.
7	Not connected
8	Line A (wire color = green)
9	Not connected
Metal part, screw	To be shielded

7) Version label

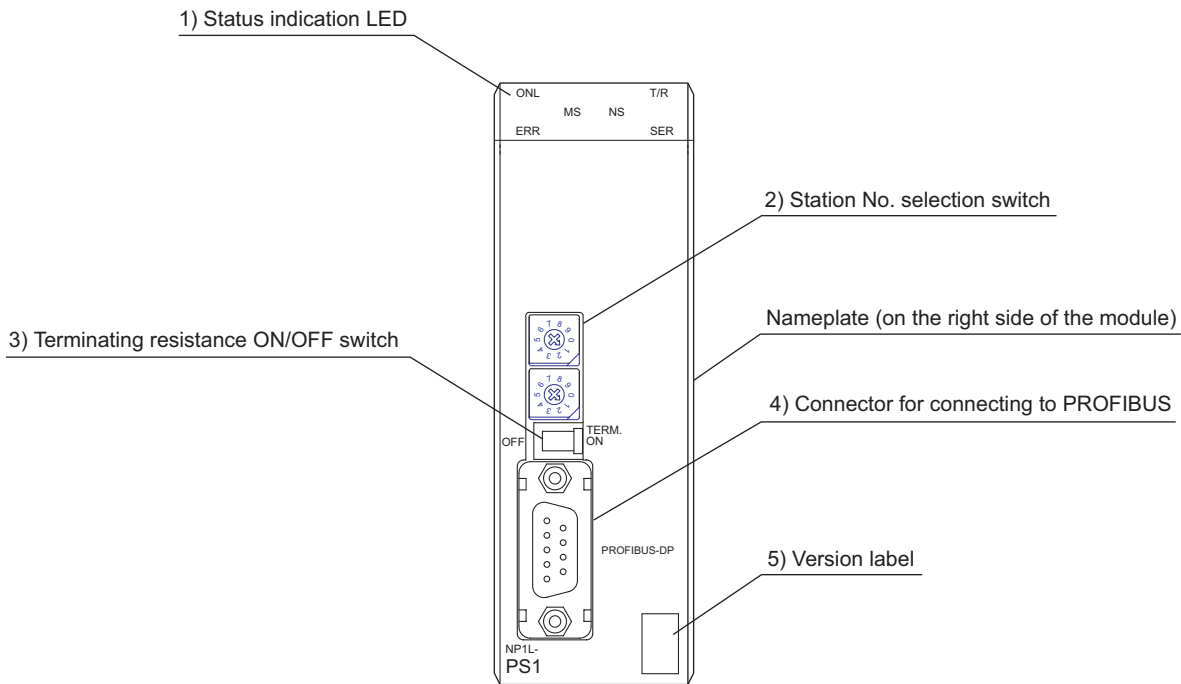Versions of the hardware and firmware of NP1L-PD1 module are indicated on this seal.

2 1 ← Hardware version

3 3 ← Firmware version
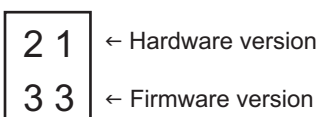
Section 2 Specifications

2-3 Names and Functions

2-3-2 NP1L-PS1

(1) Names

1) Status indication LED

3) Terminating resistance ON/OFF switch

2) Station No. selection switch

Nameplate (on the right side of the module)

4) Connector for connecting to PROFIBUS

5) Version label

(2) Functions

1) Status indication LED

This LED indicates the current status of NP1L-PS1 module.

Symbol	Color	Description
ONL	Green	Lights when this module is operating normally; Blinks when SX bus is being connected; Unlit when SX bus is abnormal.
ERR	Red	Lights when this module is abnormal (module internal hardware error) or a cause of fatal fault is detected by software
T/R	Green	Lights when PROFIBUS-DP communication conditions are met and communication is being performed.
SER	Red	Lights when in STOP mode (when the number of I/O words is 0/0 word.)
MS	Green	Lights when this module is operating normally.
MS	Red	Lights when this module is abnormal.
NS	Green	Lights when the network is in normal condition.
NS	Red	Lights when the network is abnormal.

2) Station No. selection switch

This switch sets the PROFIBUS-DP station number. The setup range is 00 to 99 (in decimal notation).

 ← High-order digit of station No. (set with the upper switch)   x 1

 ← Low-order digit of station No. (set with the lower switch)   x 10
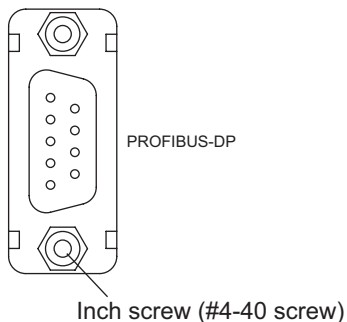
Section 2 Specifications

2-3 Names and Functions

3) Terminating resistance ON/OFF switch

When an NP1L-PS1 module is connected to a cable end, be sure to set this switch to ON; set it to OFF when the module is connected in the middle of a cable.

4) Connector for configurator

D-sub 9-pin male connector.
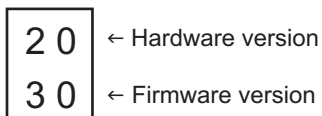
PROFIBUS-DP

Inch screw (#4-40 screw)

* For information about wiring,
   refer to "Section 4 Wiring".

Pin No.	Direction of signal
1	Shield
2	Not connected
3	Line B (wire color = red)
4	Request to Send (RTS) * Wiring is unnecessary for this signal.
5	Ground 5 V (M5) * Wiring is unnecessary for this signal.
6	Potential 5 V (Potential free 5 V) * Wiring is unnecessary for this signal.
7	Not connected
8	Line A (wire color = green)
9	Not connected
Metal part, screw	To be shielded

5) Version label

Versions of the hardware and firmware of NP1L-PS1 module are indicated on this seal.

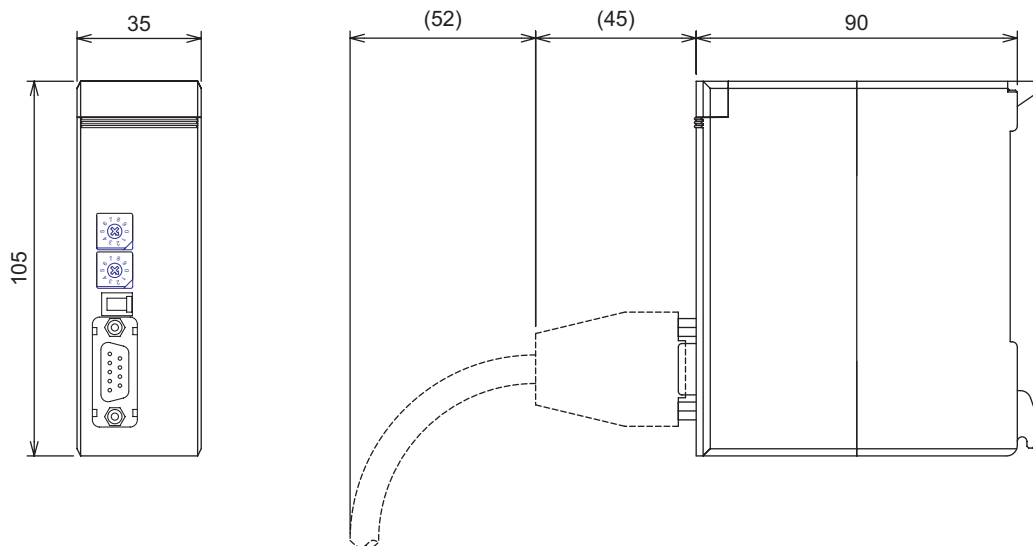2 0   ← Hardware version

3 0   ← Firmware version

Section 2 Specifications

2-4 Dimensions

2-4-1 NP1L-PD1
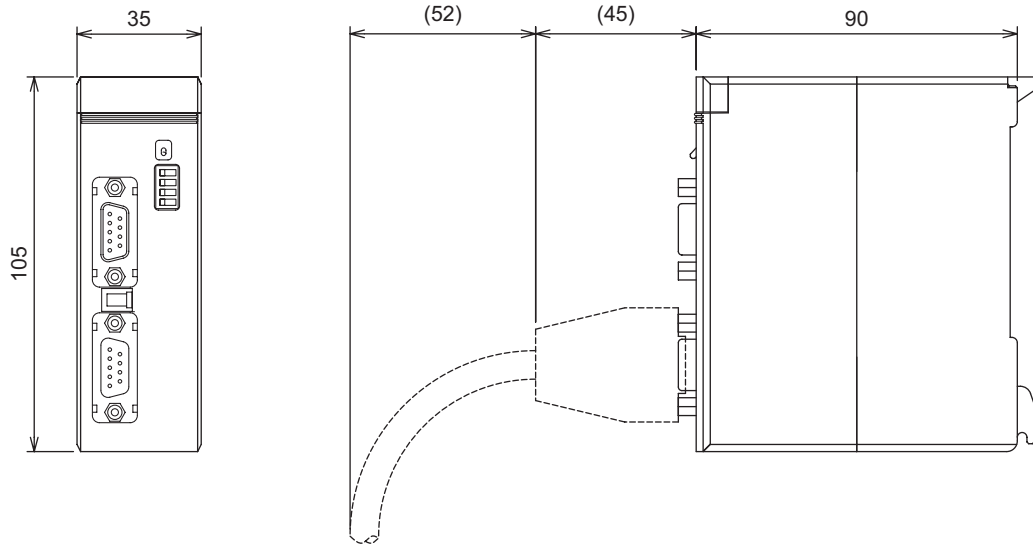
2-4-2 NP1L-PS1

Note: The bending radius of the cable needs to be taken into consideration.
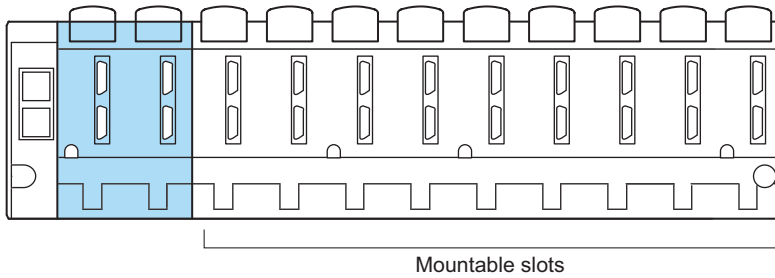
Section 3 System Configuration

3-1 Limits on Mounting

3-1-1 Mounting position

To use a PROFIBUS-DP master module (type: NP1L-PD1) and a PROFIBUS-DP slave module (type: NP1L-PS1), the modules need to be connected to the SX bus of MICREX-SX series SPH. They may be mounted at any location on a base board that is directly connected to the SX bus, but cannot be mounted on the OPCN-1, DeviceNet, T-link or other remote I/O base board.

NP1L-PD1 and NP1L-PS1 modules can be mounted in any slot except those for the power supply module.

<Base board other than 6-slot base board>

Mountable slots

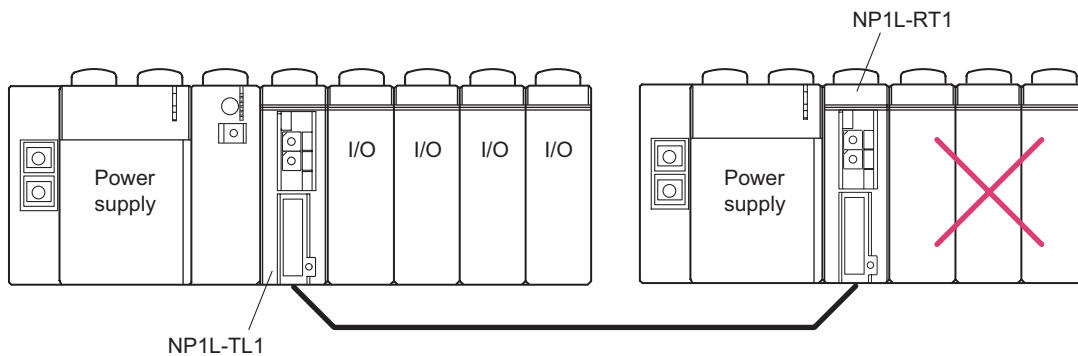**<3 or 6-slot base board>**

Mountable slots
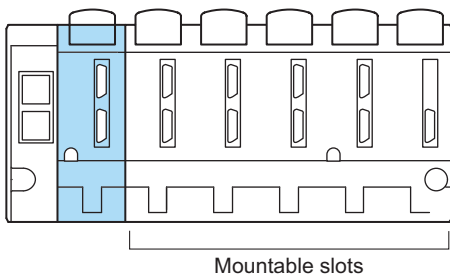
Note: The NP1L-PD1 and NP1L-PS modules cannot be mounted on T-link, OPCN-1, or other slave station base board.

Section 3 System Configuration

3-1 Limits on Mounting

3-1-2 Number of mountable modules

(1) Limit on the number of mountable I/O master or slave modules

Maximum eight NP1L-PD1 modules or NP1L-PS1 modules can be connected for one configuration. However, when T-link, OPCN-1, DeviceNet or other I/O master module or slave module is connected, the maximum number of mountable modules is eight including

(Number of mounted NP1L-PD1 module) + (Number of mounted NP1L-PS1 modules)
+ (Number of other I/O master modules mounted) + (Number of other I/O slave modules mounted) <= 8

(2) Limit on the number of mountable communication and function modules

In addition, when the modules listed below are connected to the same configuration, the system must be configured such that the total number of NP1L-PD1, NP1L-PS1 and the following modules becomes 16 or less.

| Name	Type
T-link master module	NP1L-TL1
T-link slave module	NP1L-TS1
OPCN-1 master module	NP1L-JP1
OPCN-1 slave module	NP1L-JS1
DeviceNet master module	NP1L-DN1
P-link module	NP1L-PL1
PE-link module	NP1L-PE1
FL-net module	NP1L-FL1
FL-net2 module	NP1L-FL2
LE-net loop module	NP1L-LL1
LE-net module	NP1L-LE1
General purpose communication module	NP1L-RS1/RS2/RS4
PC card interface module	NP1L-PC2
Memory card interface module	NP1L-MM1
ADS-net module	NP1L-AD1
Ethernet module	NP1L-ET1
WEB module	NP1L-WE1
LONWORKS interface module	NP1L-LW1
POD directly connected to SX bus	-

* The modules listed above get the "circuit No." when they are resistered to the SPH system.
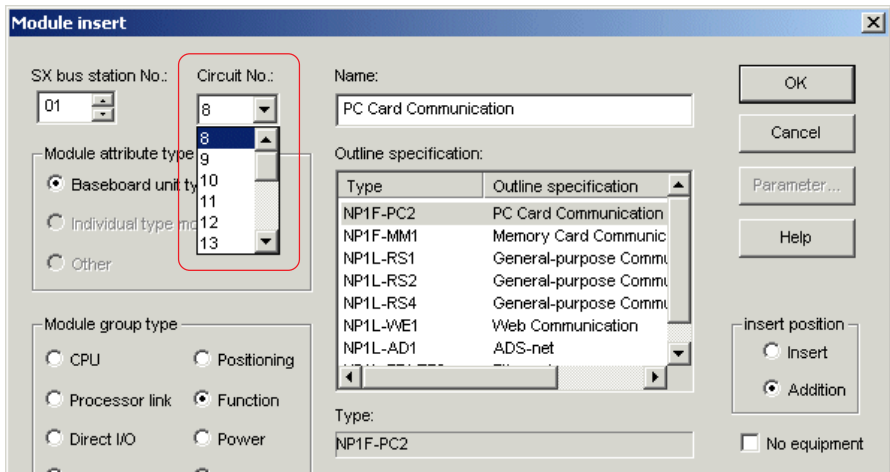
Section 3 System Configuration

3-2 Registration of System Configuration

For MICREX-SX systems, basically all the modules and units that are used for one configuration need to be registered in the system configuration definition. However, when a PROFIBUS-DP system is included in an SX system, only the NP1L-PD1 modules that are used as master are registered in the system configuration definition of D300win, while the PROFIBUS-DP slave stations that are connected to NP1L-PD1 are registered using a commercially available software called "configurator".
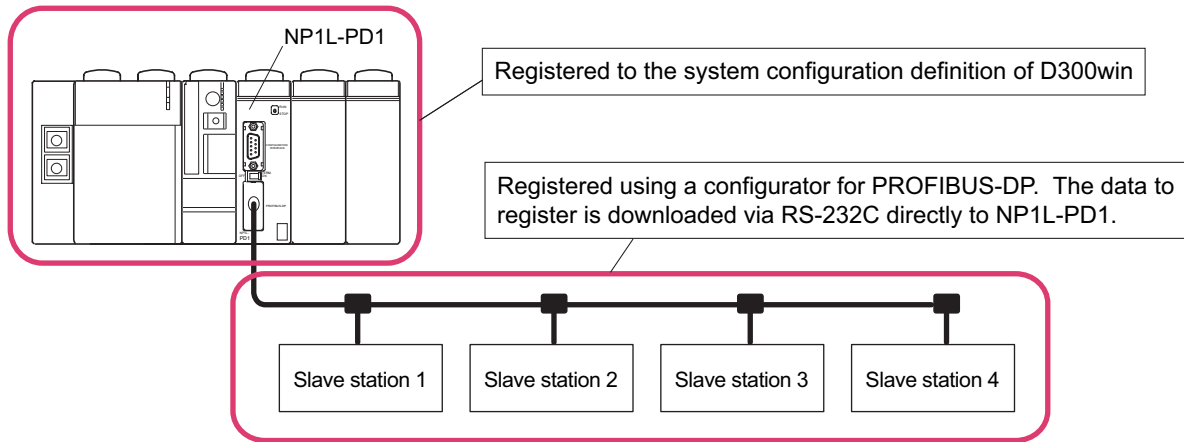
* For this purpose, be sure to use the following configurator.

Product type: CONF-PDP (Configurator for PROFIBUS-DP)
Manufacturer: HMS INDUSTRIAL NETWORKS (Japanese Office)
Where to contact: TEL 045-478-5340; FAX 045-476-0315

3-2-1 System definition by loader

From the NP1L-PD1 parameter setting screen under the system configuration definition screen of the loader, the number of words that are occupied by the slave stations connected to the NP1L-PD1 module is set. The slave stations that are connected to NP1L-PD1 are registered using a "configurator" and therefore need not be registered to the loader.

<Operation>

◆ Double-click "System_Definition" in the project tree. The system configuration registration screen is displayed. When using Standard loader in Package Display mode, execute [System Definition] command in the [PLC functions] menu to display the system configuration registration screen.
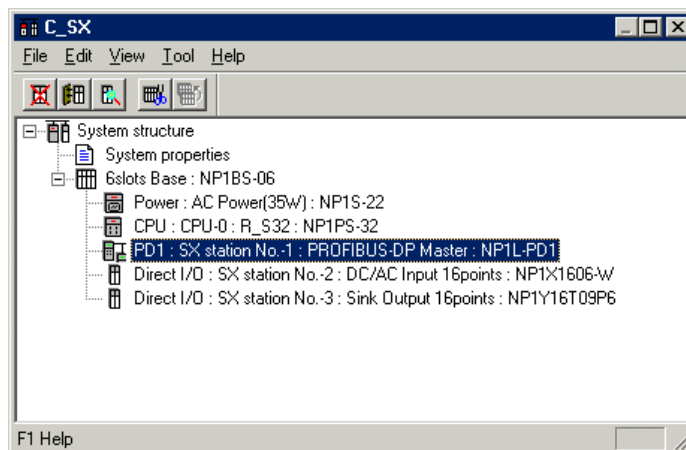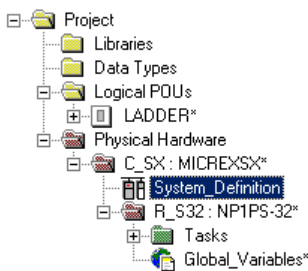
Section 3 System Configuration

3-2 Registration of System Configuration

◆ On the system configuration registration screen, select NP1L-PD1 and click the [Properties] button. The [Module properties] dialog box for NP1L-PD1 is displayed.

Click here.
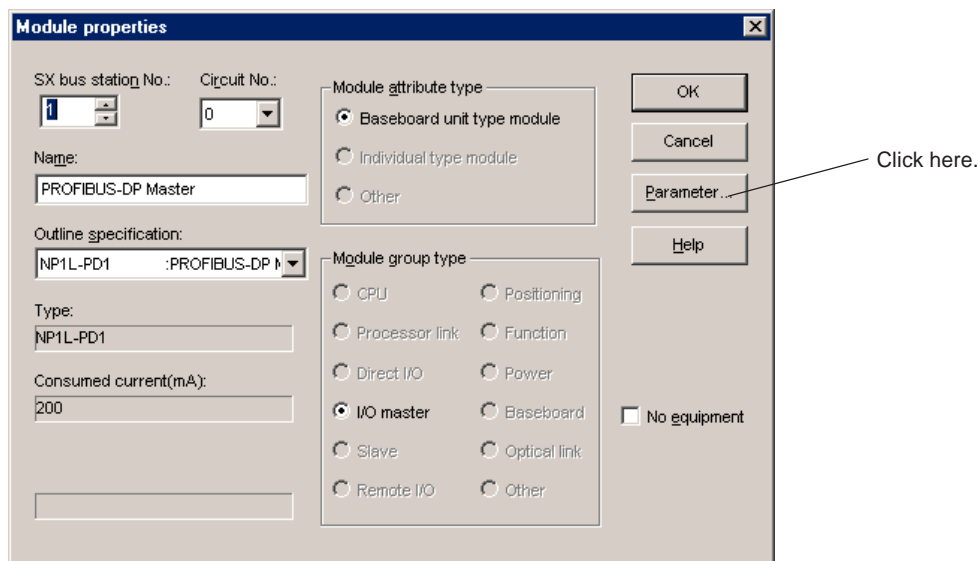
◆ Click the [Parameter...] button on the [Module properties] dialog box, and the [PROFIBUS-DP master parameter setting] dialog box will be displayed. On this dialog box, set the total number of input and output words for the slave stations that are connected to the NP1L-PD1 and click the [OK] button.
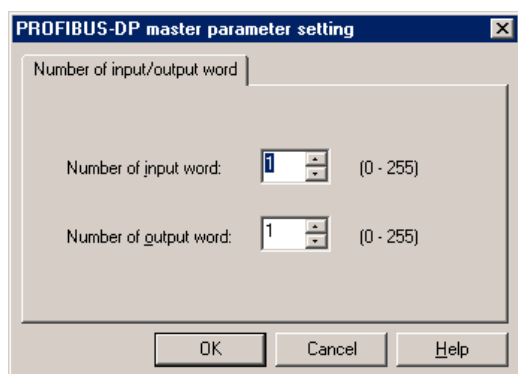
Note: In NP1L-PD1 whose software version is earlier than V33, the module was registered as "PROFIBUS-DP master". However, in a loader with the I/O extension function, for the conventional mode (PROFIBUS extension mode), register the module as "PROFIBUS-DP master (Ext)". "PROFIBUS-DP master" is for normal mode. If you make these settings wrongly, a "system configuration error" occurs.

Section 3 System Configuration

3-2 Registration of System Configuration

3-2-2 Registration of PROFIBUS-DP configuration

The configuration data of the PROFIBUS-DP stations that has been set with a configurator is downloaded directly to the nonvolatile memory of the NP1L-PD1 module.
Note: For the using method of configurator (CONF-PDP), refer to the corresponding instruction manual.

(1) Procedure for registering PROFIBUS-DP configuration to NP1L-PD1

1) System configuration is defined with the loader.
   The content of system configuration definition is downloaded to SX_CPU. Make sure that the SX system can be started normally when SX_CPU is reset.
2) Create configuration data with the configurator.
3) Set the mode setting switch on the front of the NP1L-PD1 to "STOP" (STOP mode) to turn ON the power supply for the SX system. In STOP mode, the status indicating "SER" LED of the NP1L-PD1 module blinks.
4) Connect the communication cable (the RS-232C cable supplied with CONF-PDP) to the connector for configurator on the front of the NP1L-PD1 module, and download the PROFIBUS-DP configuration data from the configurator (personal computer) to the NP1L-PD1 module.

* To communicate PROFIBUS-DP data by actually running the SX system, the mode switch of this modules needs to be set to RUN (operation mode) to power up again the SX system.

Note 1: Concerning the mode setting, the mode that was set at powering up the SX system (the NP1L-PD1 module) takes effect. Even when the mode switch is changed over during operation (while the SX system is activated), the change does not take effect, and the mode that was set at powering up continues to take effect. When you want to change mode, be sure to turn ON the power supply for the SX system after changing the mode switch setting.

Note 2: Even when the mode setting switch is set to "RUN", it is possible to download the configuration data from the configurator. However, when download is performed, the I/O operation of slave stations stops, and the CPU modules comes in a fatal error condition the moment downloading is completed. In addition, if the resetting of firmware or the monitoring of I/O is performed from the configurator, the system stops due to fatal error or I/O data is instantaneously turned off. To avoid this, operation from the configuration should be avoided when the mode setting switch is set to "RUN". And be sure to check that there is no problem on the system before executing.

Section 3 System Configuration

3-2 Registration of System Configuration

(2) Handling of NP1L-PD1 with the configurator

When a configurator is used, NP1L-PD1 needs to be registered as PROFIBUS-DP master.
Select [Insert] from the menu bar of the configurator (SYCON) and execute [Master] in the [Insert] menu to display the [Insert Master] window. On this window, select "Profibus-DP Master" to register it in the configuration tree. For this, be sure to set the master station No. to "0" (zero).
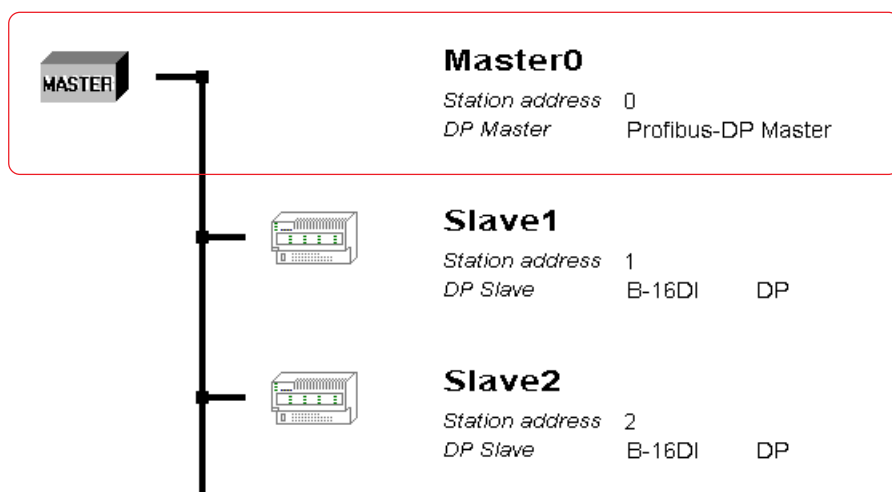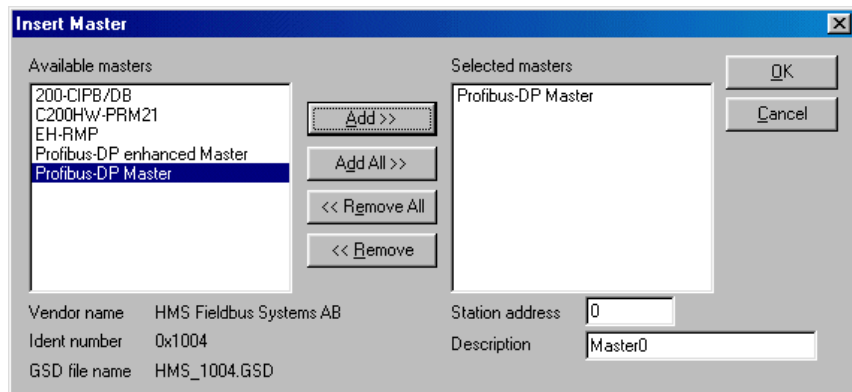
Note: NP1L-PD1 stores the information (normal / abnormal) of master station in the "remote I/O master - I/O module configuration / error information" area of the CPU internal memory, together with the information of slave stations. The information of master station is always displayed at the bit position for "station No. = 0". Therefore, when using the configurator, master station No. must be set to 0 (zero). The information of master station is displayed at the bit position of 0 (zero) even when master station No. is set to a value other than 0 (zero) with the configurator. If there is a slave station whose station No. is 0 (zero), the information of master station is given higher priority.
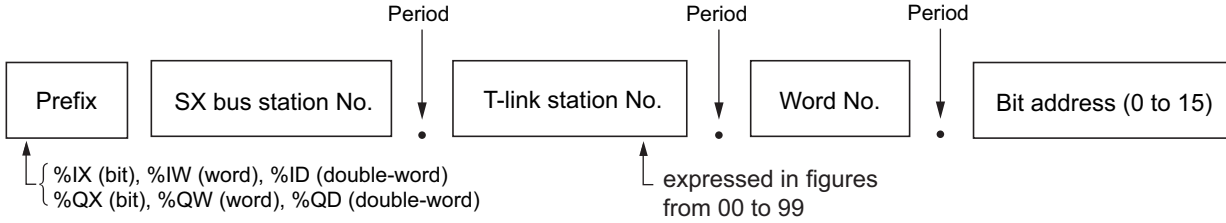
Section 3 System Configuration
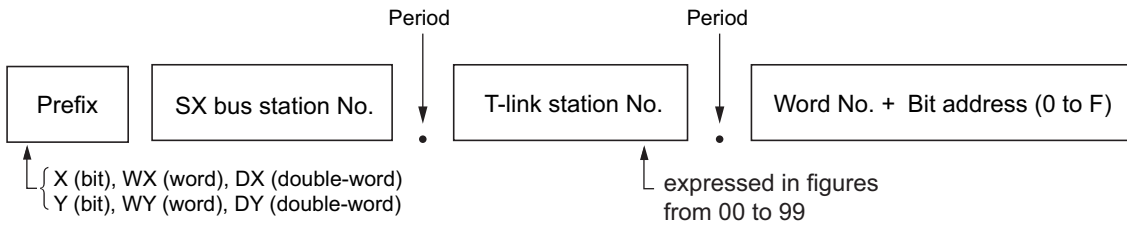
3-3 Assignment of Input / Output Address

3-3-1 Rules for address assignment

PROFIBUS-DP slave devices are allocated to the I/O area, like the I/O modules directly connected to SX bus. The rules for assigning addresses are as follows:
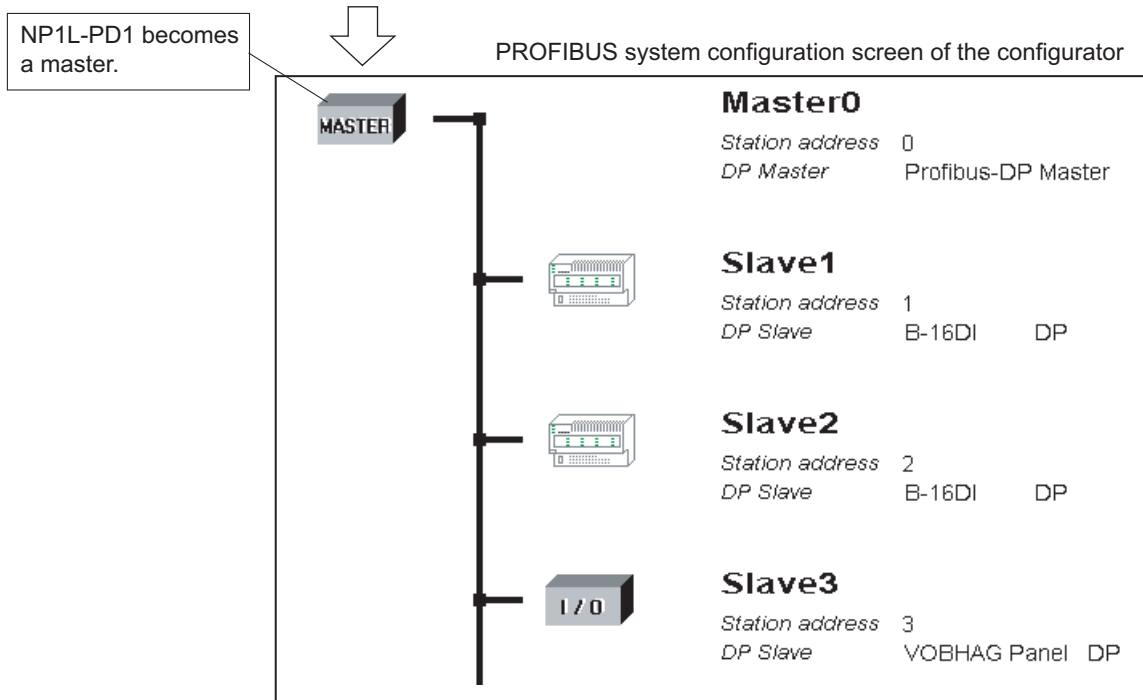
\<D300win\>

Prefix	SX bus station No.	Period	T-link station No.	Period	Word No.	Period	Bit address (0 to 15)

{ %IX (bit), %IW (word), %ID (double-word)
  %QX (bit), %QW (word), %QD (double-word)

expressed in figures from 00 to 99

\<SX-Programmer Standard\>

Prefix	SX bus station No.	Period	T-link station No.	Period	Word No. + Bit address (0 to F)

{ X (bit), WX (word), DX (double-word)
  Y (bit), WY (word), DY (double-word)

expressed in figures from 00 to 99

3-3-2 Example of address assignment

(1) Example of system configuration

NP1L-PD1
SX bus station No.: 1 (one)

NP1L-PD1 becomes a master.

PROFIBUS system configuration screen of the configurator

MASTER

Master0
Station address   0
DP Master   Profibus-DP Master

Slave1
Station address   1
DP Slave   B-16DI   DP

Slave2
Station address   2
DP Slave   B-16DI   DP

Slave3
Station address   3
DP Slave   VOBHAG Panel   DP
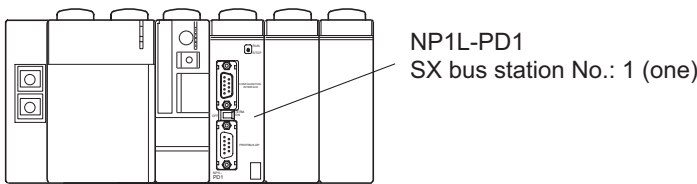
Section 3 System Configuration

3-3 Assignment of Input / Output Address

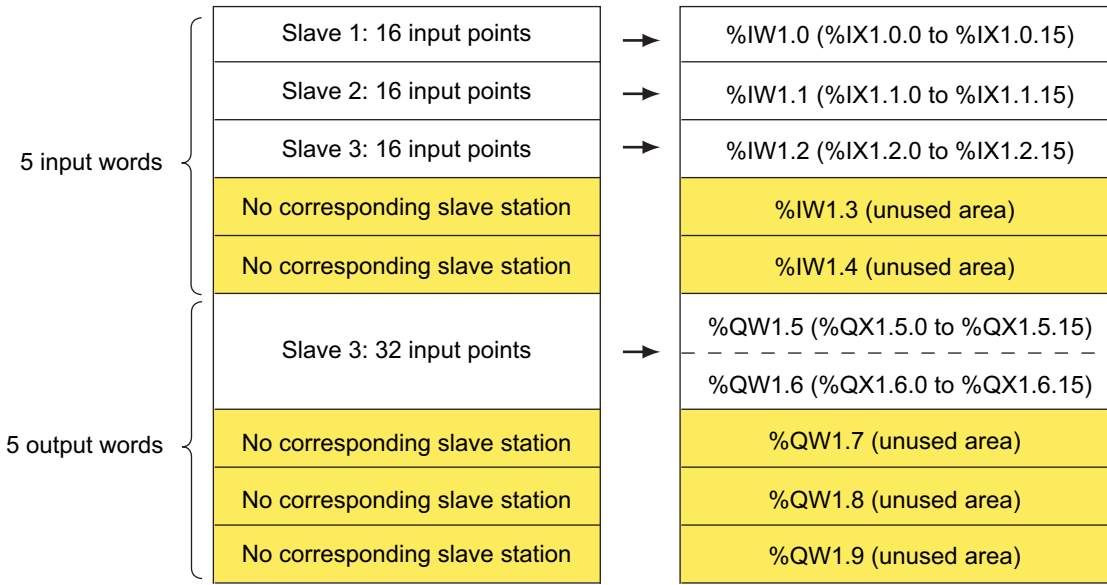### (2) Address table of the configurator

The address table for the sample system configuration shown in above (1) becomes as follows. In this example, slave 1 and slave 2 are the units that have 16 input points while slave 3 is the unit that has 16 input points and 32 output points.

Address Table

Station address   0   0 / Profibus-DP Master ▼   OK

Description   Master0

Addr.	Slot	Idx.	Device	Module	Symbol name	IType	I Addr.	I Len.	OType	O Addr.	O Len.
1	0	1	B-16DI DP	0 Byte Out, 2 Byte In	Module1	IB	0	2			
2	0	1	B-16DI DP	0 Byte Out, 2 Byte In	Module1	IB	1	2			
3	1	1	VOBHAG Panel DP	2 Byte In, 4 Byte Out	Module1	IB	2	2			
3	1	2		2 Byte In, 4 Byte Out	Module2				QB	0	4

Sort according to station addresses   Sort according to data addresses   Address Overview...

It is necessary to assign an address viewed from SX_CPU for each slave station according to the address table for the configurator.

(3) Address assignment

When both "Input words" and "Output words" are set to 5 for the number of occupied words for slave stations that are connected to the NP1L-PD1 module from the NP1L-PD1 parameter setting dialog box under the system configuration definition window of the loader, addresses are assigned in the following manner:

Slave 1: 16 input points	→ %IW1.0 (%IX1.0.0 to %IX1.0.15)
Slave 2: 16 input points	→ %IW1.1 (%IX1.1.0 to %IX1.1.15)
Slave 3: 16 input points	→ %IW1.2 (%IX1.2.0 to %IX1.2.15)
No corresponding slave station	%IW1.3 (unused area)
No corresponding slave station	%IW1.4 (unused area)
Slave 3: 32 input points	→ %QW1.5 (%QX1.5.0 to %QX1.5.15)
	%QW1.6 (%QX1.6.0 to %QX1.6.15)
No corresponding slave station	%QW1.7 (unused area)
No corresponding slave station	%QW1.8 (unused area)
No corresponding slave station	%QW1.9 (unused area)

5 input words (covers the first five rows)

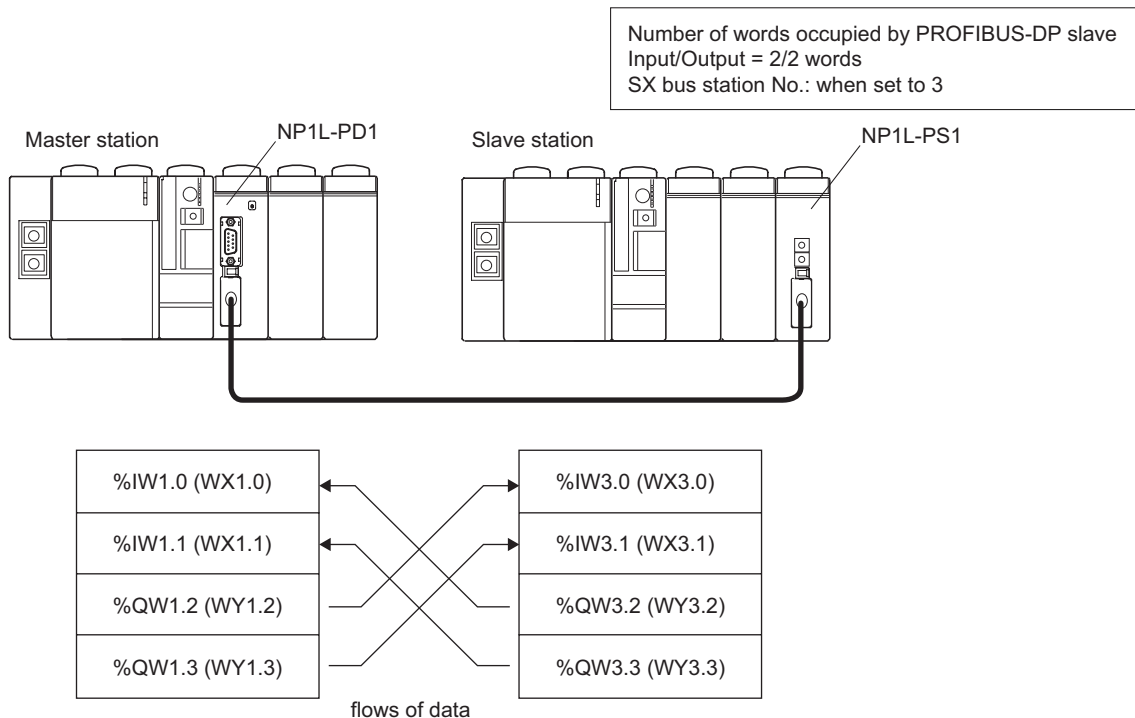5 output words (covers the last five rows)

Section 3 System Configuration

3-4 PROFIBUS-DP Slave System

I/O data (total number of I/O words: max.128) can be exchanged with a PLC system from other manufacturers which have the PROFIBUS-DP master function or the SPH system with a PROFIBUS-DP master module.

3-4-1 Example of slave system configuration

The I/O assignment of the PROFIBUS-DP slave system is explained below taking the MICREX-SX system as an example.


```
Number of words occupied by PROFIBUS-DP slave
Input/Output = 2/2 words
SX bus station No.: when set to 3
```

Master station   NP1L-PD1   Slave station   NP1L-PS1

%IW1.0 (WX1.0)	%IW3.0 (WX3.0)
%IW1.1 (WX1.1)	%IW3.1 (WX3.1)
%QW1.2 (WY1.2)	%QW3.2 (WY3.2)
%QW1.3 (WY1.3)	%QW3.3 (WY3.3)

flows of data

* ( ) is the expression of the address when using SX-Programmer Standard.

⬩ For the I/O assignment, always first comes input and then output from each CPU.

⬩ Set the number of I/O words which are occupied by the PROFIBUS-DP slave module with the configurator in the master side system, and moreover, set the number of occupied words with the loader in the slave side system.
The number of I/O words set on the master side and the number of the I/O words set on the slave system must agree.

# Section 3 System Configuration

3-4 PROFIBUS-DP Slave System

3-4-2 Setting on master station side

For the setting procedure on the master station side, the method of the registration with a configurator is explained below taking the case where the MICREX-SX system (NP1L-PD1 is the master) is the master as an example. On the master side, the registration of slave stations and the number of words are set.

(1) Registration of PROFIBUS-DP slave modules

◆ Click the [insert] and then [slave] in the menu of the configurator to display the following [Insert Slave] screen.
   By selecting "Anybus-S", the PROFIBUS-DP slave module is displayed on the configuration tree.
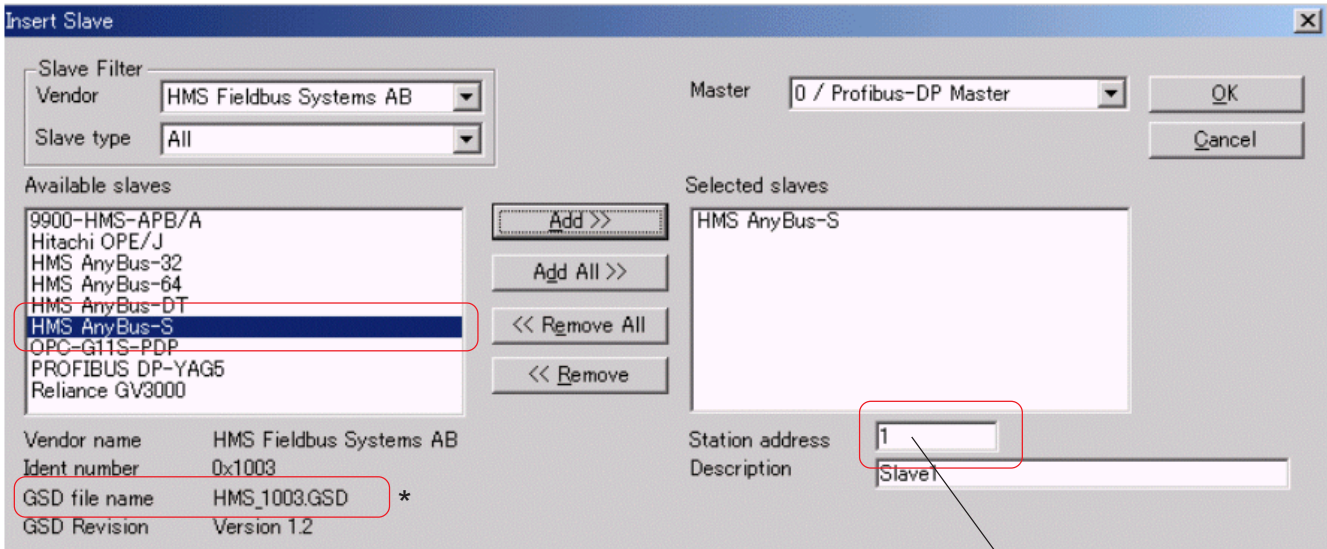
Set the station No.
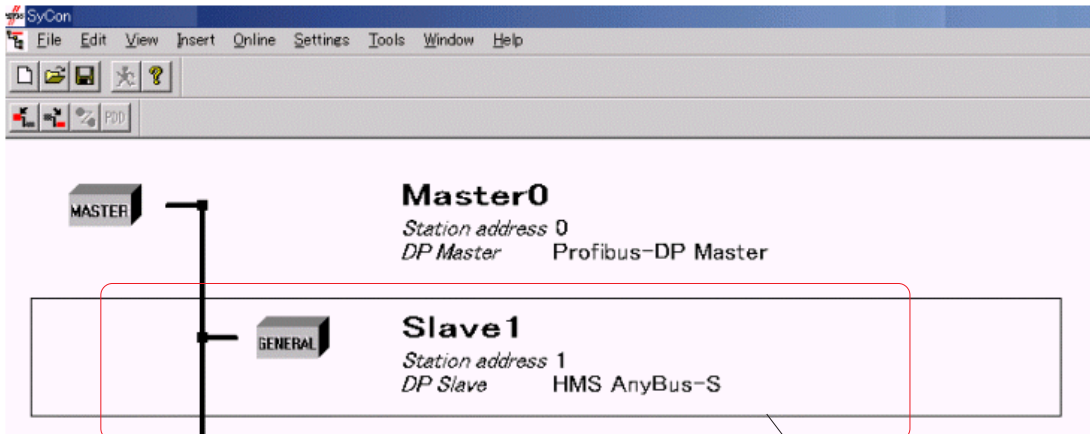
Displayed on the configuration tree.

  * The GSD file name of the PROFIBUS-DP slave module (type: NP1L-PS1) is "HMS_1003.GSD".
    The GSD file can be downloaded from the "Software libraries" in "Programmable Controllers" on FUJI website.
    (www. fujielectric.co.jp/fcs/eng)
    For information about the contents of the GSD file, refer to "(3) GSD file".

Section 3 System Configuration

3-4 PROFIBUS-DP Slave System

(2) Setting of the number of Input/Output words

Set the number of the words which are occupied by the PROFIBUS-DP slave module. This number of words of the slave module becomes the number of words for data communication between the master station and the slave station.

◆ Click the slave module part on the configuration tree screen to display the [Slave Configuration] screen.

Click here.

Number of words selection table

Address table
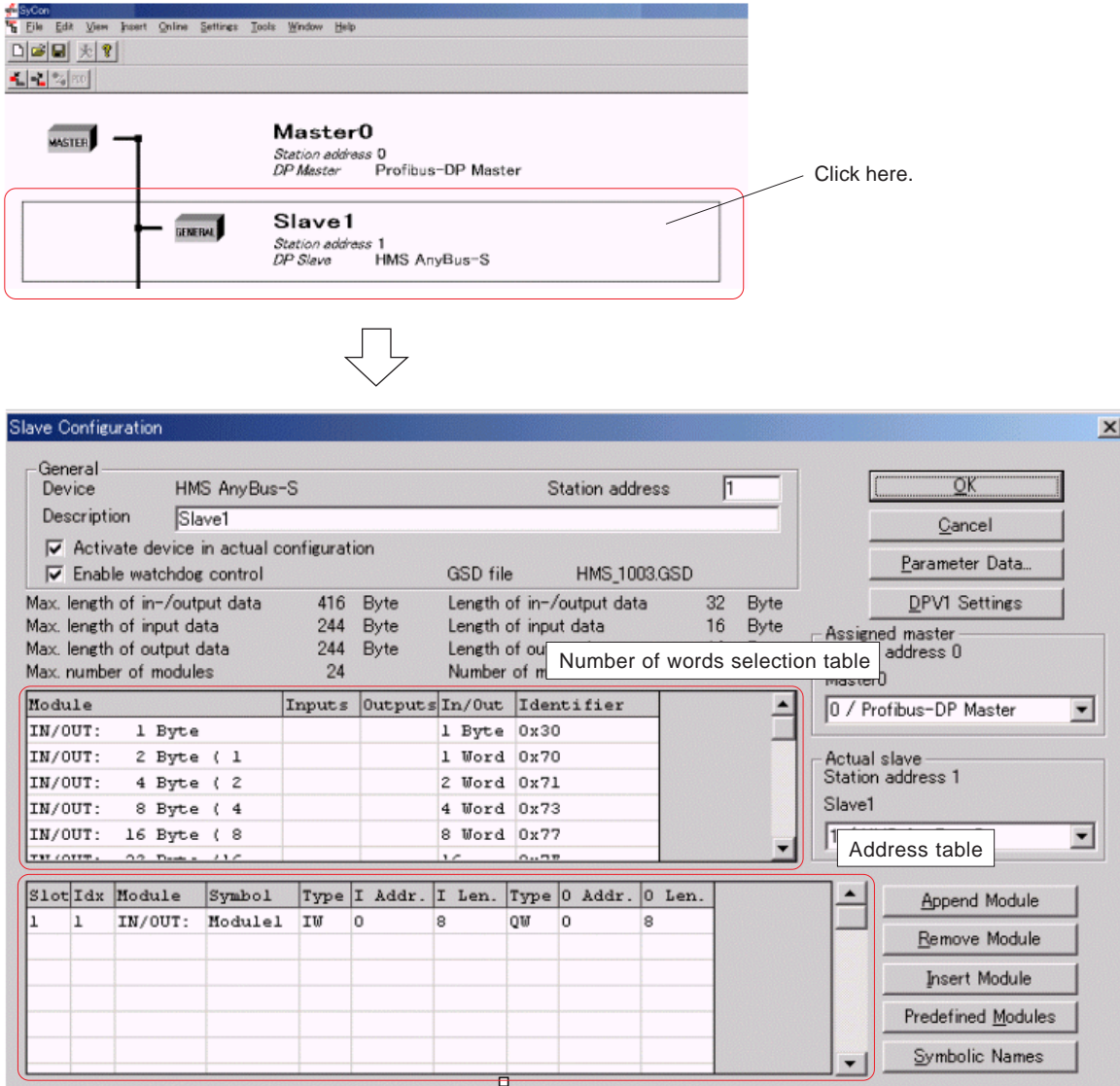
◆ Click the number of words which you want to set on the number of words selection table.

IN/OUT		INPUT		OUTPUT	
1/1	Byte	1	Byte	1	Byte
1/1	Word	1	Word	1	Word
2/2	Word	2	Word	2	Word
4/4	Word	4	Word	4	Word
8/8	Word	8	Word	8	Word
16/16	Word	16	Word	16	Word
32/32	Word	32	Word	32	Word
64/64	Word	64	Word	64	Word

* There are 24 selectable patterns of the number of words as shown in the the table above. The selected pattern is displayed on the address table.
* If the total number of words is within the specifications, multiple patterns can be selected. For example, when you want to set 40 words for input and 16 words for output, select 32 words and 8 words in input and then select 16 words in output
* If 1 byte is selected, an area for one word is occupied.

Section 3 System Configuration

3-4 PROFIBUS-DP Slave System

(3) GSD file of NP1L-PS1

The contents of the GSD file of NP1L-PS1 are as follows. By creating the following contents with a text editor etc. and supplying "GSD" to the extension, it can be used as a GSD file of NP1L-PS1.

```
;=============================================================
; Profibus Device Database File of:
;   HMS Fieldbus Systems AB
;   Pilefeltsgatan 93-95
;   S-30250 Halmstad
;   Sweden
;   Tel. (switch):   +46 35 172900
;   Tel. (support): +46 35 172920
;   FAX:            +46 35 172909
;   email:          support@hms.se
;   email (US):     us-support@hms.se
;
; Model:           AnyBus-32 IO PDP
; Description:     AnyBus-32 IO Profibus DP slave
; File Name:       HMS_1003.GSD
; Language:        English
; Last updated:    28 July 1999
; Author :         HMS Fieldbus Systems AB
;=============================================================
; History
;   Version 1.0
;   Date:            04.12.98
;
;   Version 1.1
;   Date:            28.07.1999
;   updated by:      AnK
;   changes:         - file header
;                    - change of the model name
;=============================================================
#Profibus_DP

GSD_Revision       = 1


; Device identification
Vendor_Name        = "HMS Fieldbus Systems AB"
Model_Name         = "HMS AnyBus-S"
Revision           = "Version 1.1"
Ident_Number       = 0x1003
Protocol_Ident     = 0              ; DP protocol
Station_Type       = 0              ; Slave device
FMS_supp           = 0              ; FMS not supported
Hardware_Release   = "Version 1.2"
Software_Release   = "Version 1.0"
; Supported baudrates
9.6_supp           = 1
19.2_supp          = 1
93.75_supp         = 1
187.5_supp         = 1
500_supp           = 1
```

Section 3 System Configuration

3-4 PROFIBUS-DP Slave System

```
1.5M_supp           = 1
3M_supp             = 1
6M_supp             = 1
12M_supp            = 1


; Maximum responder time for supported baudrates
MaxTsdr_9.6         = 60
MaxTsdr_19.2        = 60
MaxTsdr_93.75       = 60
MaxTsdr_187.5       = 60
MaxTsdr_500         = 100
MaxTsdr_1.5M        = 150
MaxTsdr_3M          = 250
MaxTsdr_6M          = 450
MaxTsdr_12M         = 800


; Supported hardware features
Redundancy          = 0         ; not supported
Repeater_Ctrl_Sig   = 2         ; TTL
24V_Pins            = 0         ; not connected
Implementation_Type = "SPC3"


; Supported DP features
Freeze_Mode_supp    = 1         ; supported
Sync_Mode_supp      = 1         ; supported
Auto_Baud_supp      = 1         ; supported
Set_Slave_Add_supp  = 0         ; not supported


; Maximum polling frequency
Min_Slave_Intervall = 1         ; 100 us


; Maximum supported sizes
Modular_Station     = 1         ; modular
Max_Module          = 24
Max_Input_Len       = 244
Max_Output_Len      = 244
Max_Data_Len        = 416
Modul_Offset        = 1


Fail_Safe           = 0         ; state CLEAR not accepted


Slave_Family        = 0
Max_Diag_Data_Len   = 6


; Definition of modules
Module = "IN/OUT:   1 Byte" 0x30
EndModule
;
Module = "IN/OUT:   2 Byte ( 1 word)" 0x70
EndModule
;
Module = "IN/OUT:   4 Byte ( 2 word)" 0x71
EndModule
```

Section 3 System Configuration

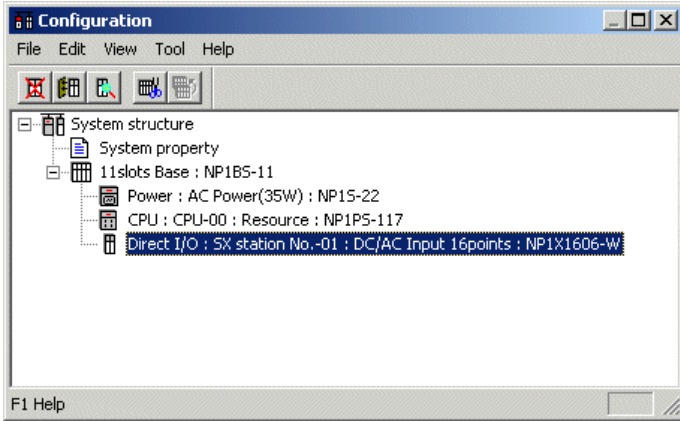## 3-4 PROFIBUS-DP Slave System

```
;
Module = "IN/OUT:   8 Byte ( 4 word)" 0x73
EndModule
;
Module = "UN/OUT:  16 Byte ( 8 word)" 0x77
EndModule
;
Module = "IN/OUT:  32 Byte (16 word)" 0x7F
EndModule
;
Module = "IN/OUT:  64 Byte (32 word)" 0xC0,0x5F,0x5F
EndModule
;
Module = "IN/OUT: 128 Byte (64 word)" 0xC0,0x7F,0x7F
EndModule
;
Module = "INPUT:    1 Byte" 0x10
EndModule
;
Module = "INPUT:    2 Byte ( 1 word)" 0x50
EndModule
;
Module = "INPUT:    4 Byte ( 2 word)" 0x51
EndModule
;
Module = "INPUT:    8 Byte ( 4 word)" 0x53
EndModule
;
Module = "INPUT:   16 Byte ( 8 word)" 0x57
EndModule
;
Module = "INPUT:   32 Byte (16 word)" 0x5F
EndModule
;
Module = "INPUT:   64 Byte (32 word)" 0x40,0x5F
EndModule
;
Module = "INPUT:  128 Byte (64 word)" 0x40,0x7F
EndModule
;
Module = "OUTPUT:   1 Byte" 0x20
EndModule
;
Module = "OUTPUT:   2 Byte ( 1 word)" 0x60
EndModule
;
Module = "OUTPUT:   4 Byte ( 2 word)" 0x61
EndModule
;
Module = "OUTPUT:   8 Byte ( 4 word)" 0x63
EndModule
;
```

Section 3 System Configuration

3-4 PROFIBUS-DP Slave System

```
Module = "OUTPUT:  16 Byte ( 8 word)" 0x67
EndModule
;
Module = "OUTPUT:  32 Byte (16 word)" 0x6F
EndModule
;
Module = "OUTPUT:  64 Byte (32 word)" 0x80,0x5F
EndModule
;
Module = "OUTPUT: 128 Byte (64 word)" 0x80,0x7F
EndModule
```

Section 3　System Configuration

3-4　PROFIBUS-DP Slave System

3-4-3　Setting on slave station side

The setting of the PROFIBUS-DP slave module on the slave station side is performed in the system configuration definition of the loader.

\<Setting Procedure\>

◆ To insert a slave module, select the preceding module and click the [Insert] button.

◆ Select "I/O master for Module group type and then select "NP1L-PS1" from Outline specification.
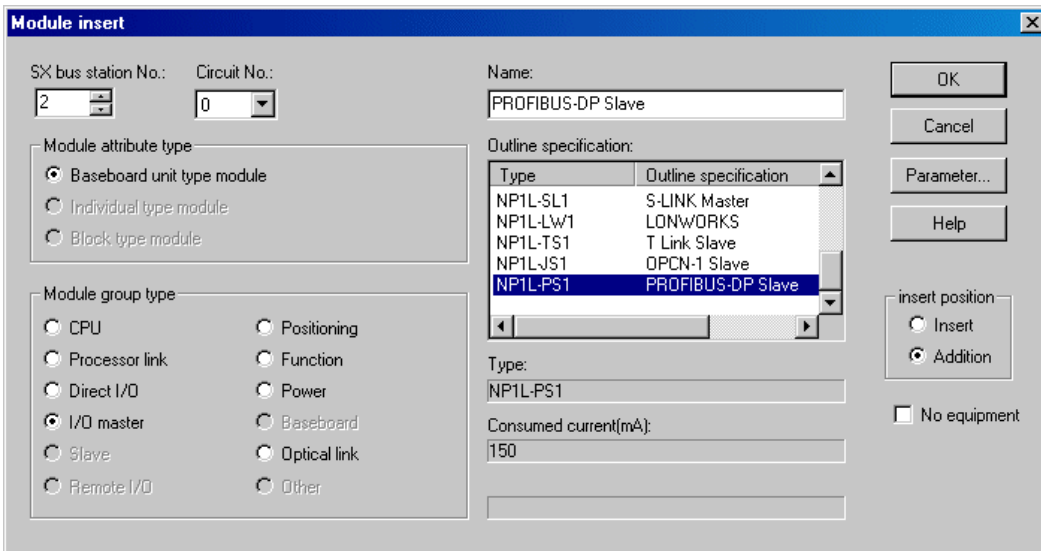
◆ Next, click the [Parameter] button. The [PROFIBUS-DP slave parameter setting] dialog box is displayed. Set the number of the words which communicate with the master station, then click the [OK] button.
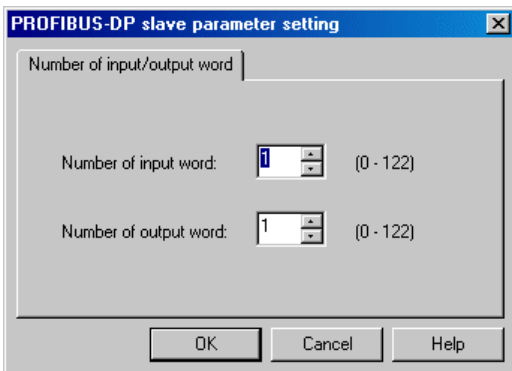
Note: The number of the input words on the master side becomes the number of the output words on the slave side and the number of the output words on the master side becomes the number of the input words on the slave side. Especially when the number of the input words and output words are different, be sure to note the point.

Section 3 System Configuration

3-4 PROFIBUS-DP Slave System

◆ Set the fail-soft operation of the PROFIBUS-DP slave module. Click the [Fail-Soft Operation Setting] tag on the [CPU parameter] dialog box and perform registration as shown below.
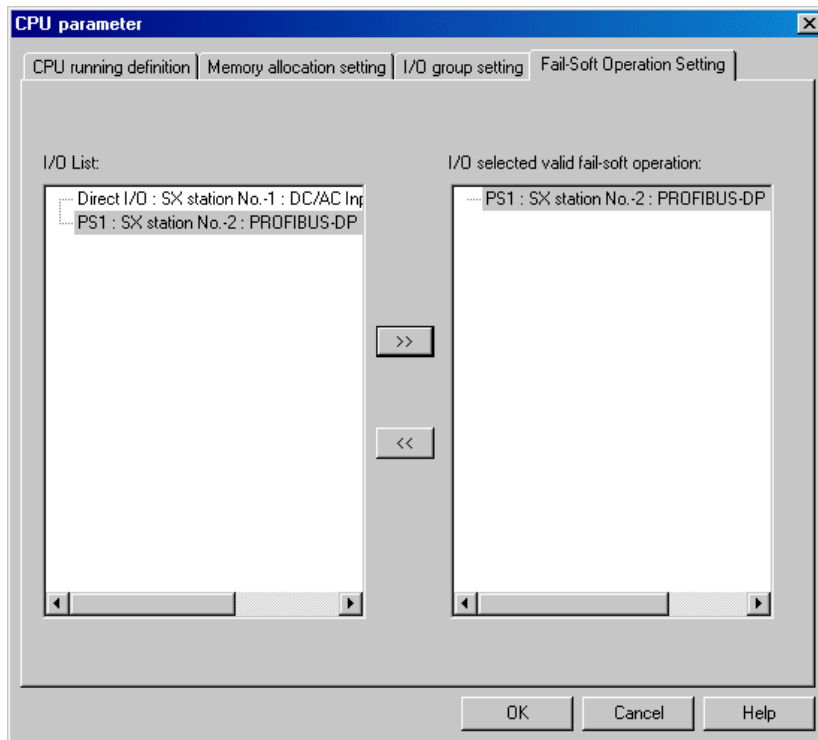
Note: If the fail-soft operation of the PROFIBUS-DP slave module is not set and communication with the master station stops due to disconnection of the master station or power-cut, the operation of the whole slave system stop as a communication error.

Section 4 Wiring

4-1 Connector and Cable to Use

For connecting to the NP1L-PD1 and NP1L-PS1, select proper connector and cable, referring to the figure below.

Inch screw (#4-40)

Cable
Use commercially available cable for PROFIBUS-DP
(shielded twisted-pair cable)

Connector
Use commercially available D-sub 9-pin (male) connector.
PROFIBUS-DP dedicated connectors are marketed.
Refer to "4-4 PROFIBUS-DP Dedicated Connector".
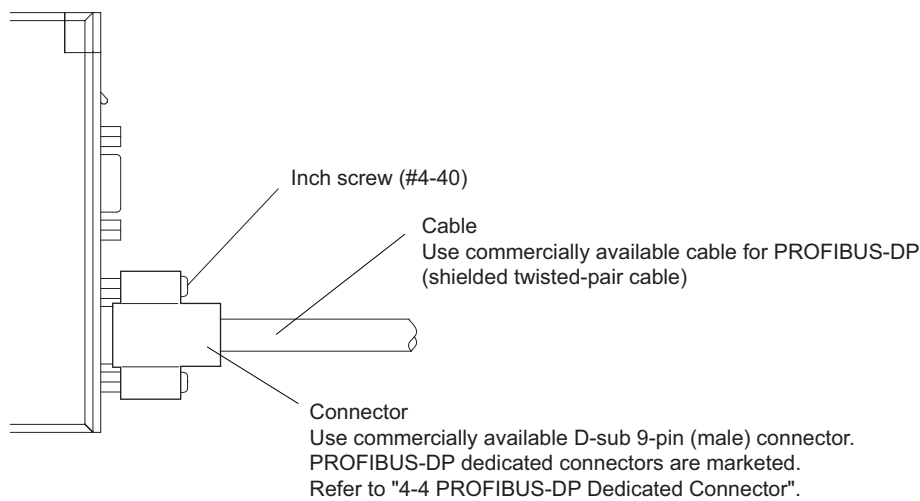
4-1-1 Cable

Use commercially available cable for PROFIBUS-DP (shielded twisted-pair cable).

Manufacturer	Type	Remarks
Siemens AG	6XV-830-0EH10	Standard type
	6XV-830-3EH10	High bending strength type
	6XV-830-0LH10	Fire and corrosion resistant type
	6XV-830-0FH10	High twisting strength type
Fujikura, Ltd.	F-LINK-P AWG22 x 1P	

4-1-2 Connector

(1) Contact (D-sub 9-pin male)

Manufacturer	Type	Remarks
Japan Aviation Electronics Industry, Ltd.	DE-9P-N	Wire soldering type
HIROSE ELECTRIC CO., LTD.	HDEB-9P	Wire soldering type
OMRON CORP.	XM2A-0901	Wire soldering type
Daiichi Denshi Kogyo K.K.	17JE-23090-02	Wire soldering type

(2) Cover

Manufacturer	Type	Remarks
Japan Aviation Electronics Industry, Ltd.	DE-C1-J6-S6	Ordinary type (plastic)
	DE-C4-J6-S1	EMI adapted type (aluminum die cast / nickel plated)
HIROSE ELECTRIC CO., LTD.	HDE-CTF (4-40)	Ordinary type (plastic)
	HDE-CTH (4-40)	EMI adapted type (plastic / nickel plated)
OMRON CORP.	XM2S-0913	EMI adapted type (plastic / nickel plated)
Daiichi Denshi Kogyo K.K.	17JE-09H-1C	EMI adapted type (plastic / nickel plated)

Section 4 Wiring

4-2 D-sub 9-pin Connector Internal Wiring

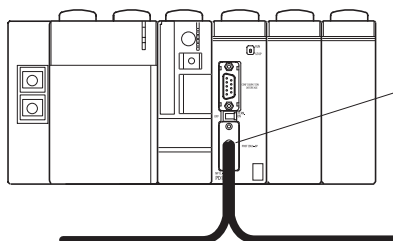The inside of D-sub 9-pin connector shall be wired as follows:
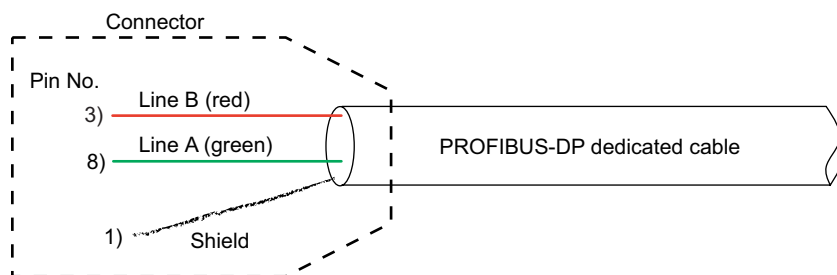
4-3 NP1L-PD1/PS1 Connecting Point

When commercially available D-sub 9-pin connector is used, it is recommended that NP1L-PD1 be connected to PROFIBUS-DP at cable end. In this case, be sure to set the Terminating resistance ON/OFF switch to ON.

<When connected to cable end>   <When connected in the middle of cable>
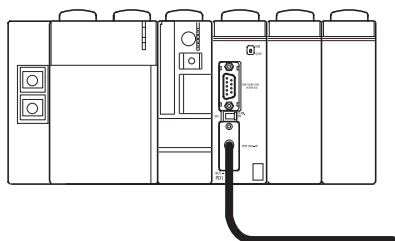
2 cables are connected to D-sub 9-pin connector.

* It is possible to connect NP1L-PD1 in the middle of a cable. In this case, 2 signal cables are connected to D-sub 9-pin connector.

Section 4 Wiring

4-4 PROFIBUS-DP Adapted Connector

PROFIBUS-DP dedicated connectors are structured, taking cable branching into consideration. Compared with commercially available D-sub 9-pin connectors, connector inside wiring is easy. An example of PROFIBUS-DP dedicated connector manufacturer is shown in the table below:

Manufacturer	Type	Remarks
Siemens AG	6ES7 972-0BA11-0XA0	Direction of cable: 90° (with built-in terminating resistance)
	6ES7 972-0BA40-0XA0	Direction of cable: 35° (with built-in terminating resistance)

Note 1: Type code and specifications may be changed.
Note 2: When dedicated connector is used, it may protrude over the connector for NP1L-PD1 configurator, depending on its shape. As a result, it may be impossible to connect a configurator during communication.
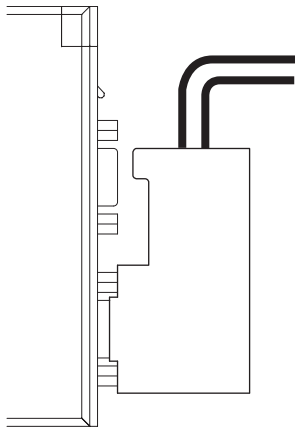
Cable direction 90 type   Cable direction 35 type
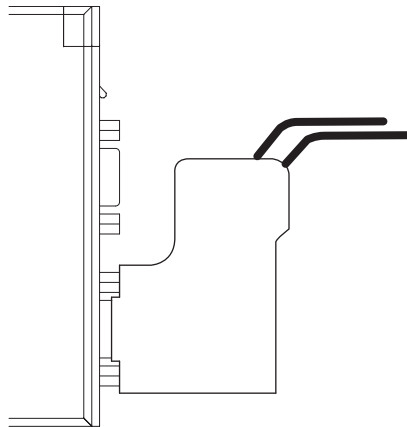
Note 3: When terminating resistance needs to be used, be sure to use the one of either NP1L-PD1/PS1 or dedicated connector.

Section 5 RAS Information

5-1 Diagnosing the NP1L-PD1/PS1 module with Loader

If the NP1L-PD1/PS1 module becomes abnormal, failure diagnosis can be performed with the loader.

5-1-1 Procedure for diagnosis

◆ For D300win, display the [Control] dialog box and click the [Failure diagnosis(E)...] button. The [Failure diagnosis] dialog box appears.
For Standard loader, execute [Failure diagnosis] command in the [PLC function] menu. The [Failure diagnosis] dialog box appears.
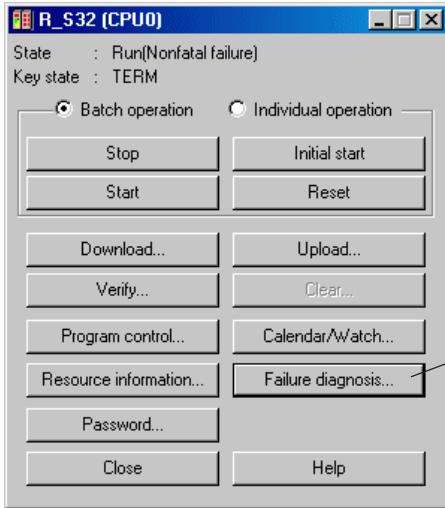
* This is an example of failure diagnosis when using a loader V3.
For NP1L-PD1 module, you can also diagnose it with a loader V2 (V2.2.3.0 or later).

Click here.

The detail RAS information of the selected module is displayed on the right side of the dialog box.
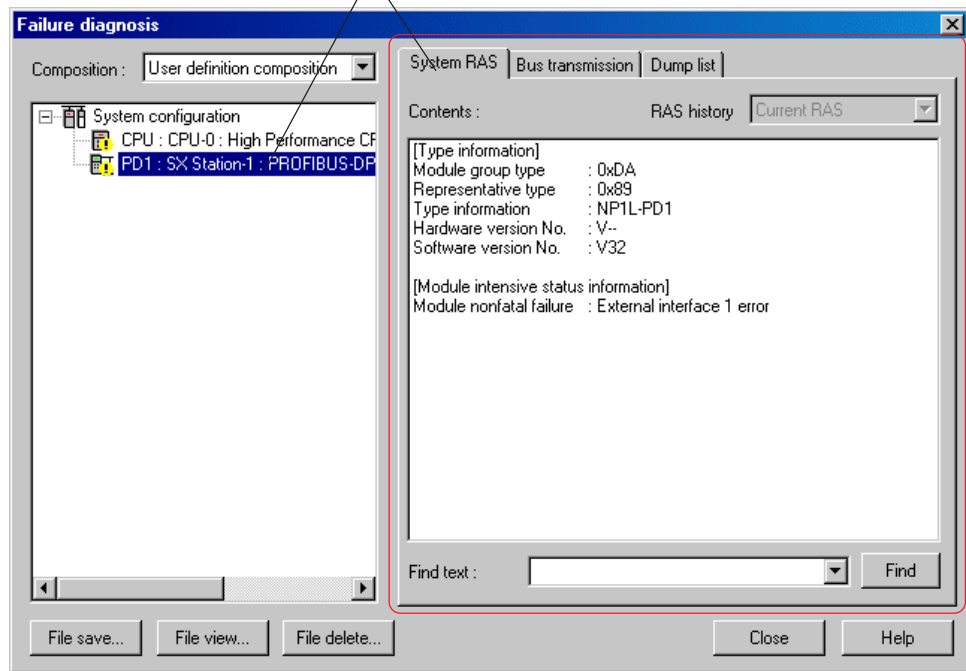
* As shown above, [System RAS], [bus transmission] and [Dump list] are provided in the detail RAS information of the NP1L-PD1/ PS1 module. You can select each information by clicking the corresponding tab.
  ◆ On the System RAS screen, "Type information" and "Module intensive status information" is displayed.
  ◆ On the Bus transmission screen, "SX bus transmission information" is displayed.
  ◆ On the Dump list screen, "PROFIBUS transmission status information", "Remote I/O station error information", "Remote I/O station intensive status information", "On board hard error factor", "Communication firmware information (for PD1only)" and "PROFIBUS initial setting information (for PD1 only)" is displayed.
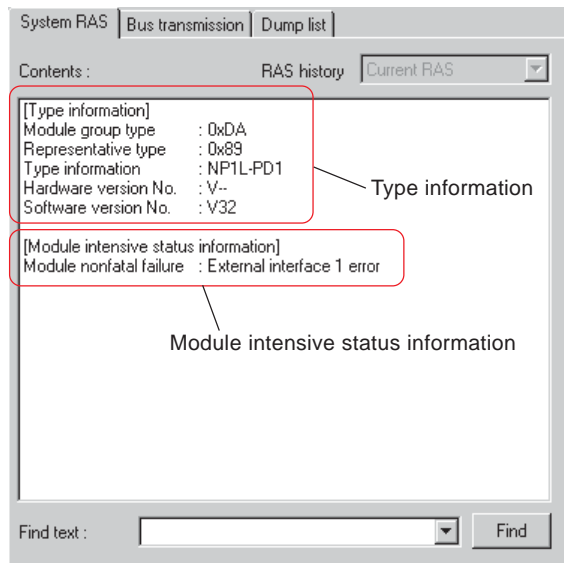
Note: "Setting error factor" is displayed on the dump list screen, which, however, is not supported by the NP1L-PD1/PS1module.

Section 5 RAS Information

5-1 Diagnosing the NP1L-PD1/PS1 module with Loader

5-1-2 System RAS

On the system RAS screen, "Type information" and "Module intensive status information" is displayed.
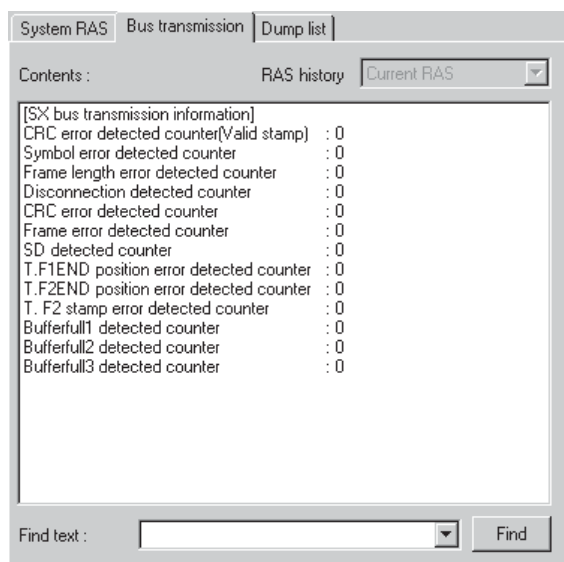

(1) Type information

The module group type, type information, software version etc. of this module are displayed.

(2) Module intensive status information

A summary of the module's status is displayed.

5-1-3 Bus transmission information

If noise interferes with the SX bus transmission line or if the wiring of SX bus is defective, various errors that are related to SX bus transmission are counted. When such error counter works, it means that the environment of the SX system is problematic with respect to noise. And some measure needs to be taken.

Section 5 RAS Information

5-1 Diagnosing the NP1L-PD1/PS1 module with Loader

5-1-4 Dump list

In the dump list, "PROFIBUS transmission status information", "Remote I/O station error information", "Remote I/O station intensive status information", "On board hard error factor", "Communication firmware information (for PD1only)" and "PROFIBUS initial setting information (for PD1 only)" are provided.

(1) PROFIBUS transmission status information

In the PROFIBUS-DP master module (type: NP1L-PD1), "Summary of transmission status", "Setting information" and "Status information" are provided. This information of the PROFIBUS-DP slave module (type: NP1L-PS1) is the internal code that is used basically by FUJI engineer for adjustment.
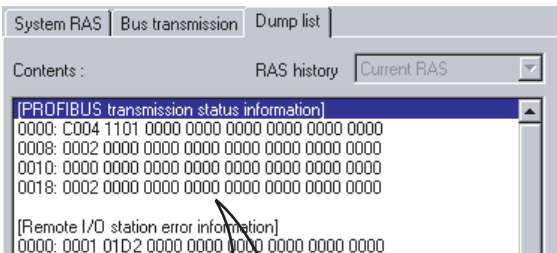

```
0000:4020 0000 0000 0000 0000 0000 0000 0000   ← Summary of transmission status (8 words)
0008:0006 0000 0000 0000 0000 0000 0000 0000   ← Setting information (8 words)
0010:0000 0000 0000 0000 0000 0000 0000 0000   ← Status information (8 words)
0018:0000 0000 0000 0000 0000 0000 0000 0000   ← Diagnosis enable information (8 words)
```

◆ Summary of transmission status
  This information is the internal code that is used basically by FUJI engineer for adjustment.

◆ Setting information
  Indicates whether or not slave station setting exists in the configurator, one bit for one slave station.
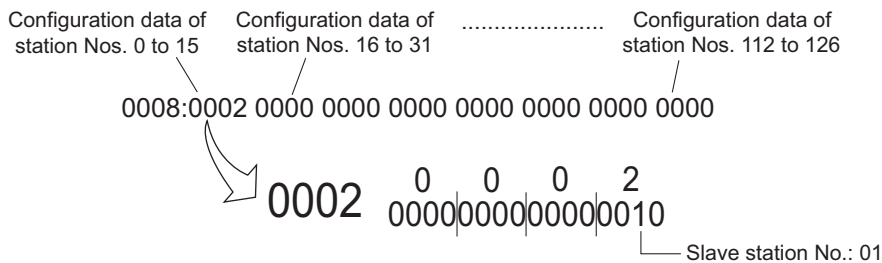
In this example, one slave station of station No. 1 is set.

◆ Status information
  Indicates the status of slave station, one bit for one slave station. When a slave station is communicating normally, the corresponding bit is set ON.

◆ Diagnosis enable information
  Indicates whether or not the diagnosing function of the configurator (CONF-PDP) can be used, one bit for one slave station. When the diagnosing function can be used for a slave station, the corresponding bit is set ON.

Section 5   RAS Information

5-1   Diagnosing the NP1L-PD1/PS1 module with Loader

(2) Remote I/O station error information

If the NP1L-PD1/PS1 module that has shifted over to ordinary communication mode found an abnormality on a slave station, the content of the abnormality is displayed on this area and notified to the CPU.
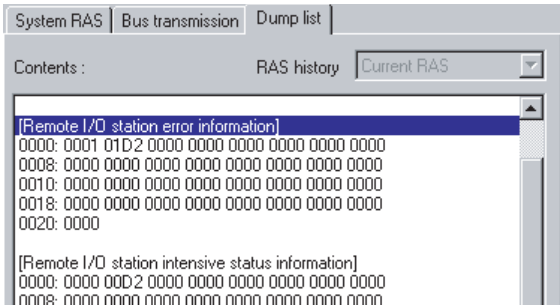
\<NP1L-PD1\>

In the following cases, the NP1L-PD1 module that has shifted over to ordinary communication mode stores the content of found error as well as the station number where the error occurred in this area and notifies the matter to the CPU:
 1) When the disconnection of a slave station is found from an abnormality such as no response
 2) When the notice of abnormality sent from a slave station is detected

\<NP1L-PS1\>

Only first two words are used. Whether or not there is a communication error and whether or not the master station is normal are indicated.

```
System RAS | Bus transmission | Dump list |

Contents :                    RAS history  Current RAS        ▼

[Remote I/O station error information]
0000: 0001 01D2 0000 0000 0000 0000 0000 0000
0008: 0000 0000 0000 0000 0000 0000 0000 0000
0010: 0000 0000 0000 0000 0000 0000 0000 0000
0018: 0000 0000 0000 0000 0000 0000 0000 0000
0020: 0000

[Remote I/O station intensive status information]
0000: 0000 00D2 0000 0000 0000 0000 0000 0000
0008: 0000 0000 0000 0000 0000 0000 0000 0000
```

\<NP1L-PD1\>

    Error counter   Error information

```
0000:0002 00D2 01D2 0000 0000 0000 0000 0000
0008:0000 0000 0000 0000 0000 0000 0000 0000
0018:0000 0000 0000 0000 0000 0000 0000 0000
0020:0000
```

   • Error information

15	8	7	0

  Error detected slave station No.   Error code
  00h to 7Dh   D2h: Disconnection of slave station

\<NP1L-PS1\>

    Error information   Error code

```
0000:0000 0000 0000 0000 0000 0000 0000 0000
0008:0000 0000 0000 0000 0000 0000 0000 0000
0018:0000 0000 0000 0000 0000 0000 0000 0000
0020:0000
```

   • Error information   • Error code
     0000: Normal   0000: Master station is normal
     0001: Abnormal   0001: Master station is abnormal

Section 5 RAS Information

5-1 Diagnosing the NP1L-PD1/PS1 module with Loader

(3) Remote I/O station intensive status information
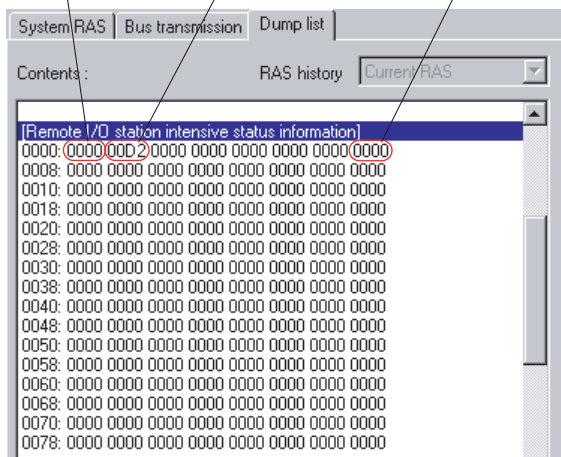
<NP1L-PD1>

In this area, the status of each slave station that is connected to the master module is stored, in the order of station No.

<NP1L-PS1>

The status of connection between the slave module and the master station is displayed. Only first one word is used and all other words are not used (fixed to "0").
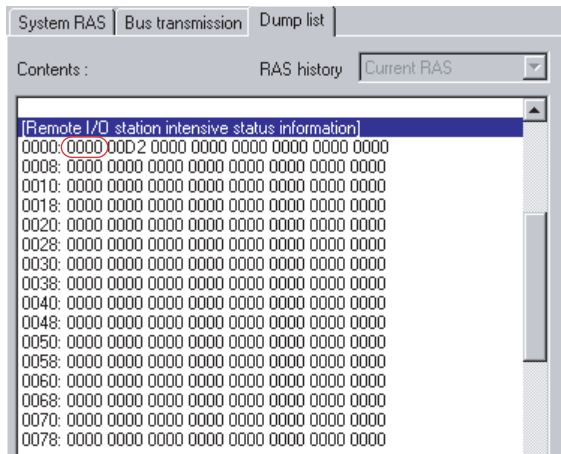
<NP1L-PD1>

Status of station 0   Status of station 1   Status of station 7

Status code:
  0000h: Nothing is set, or no station is connected
  0080h: Normal
  00D2h: Disconnection of slave station

<NP1L-PS1>

Status code:
  0080h: Master station is normal
  00D2h: Disconnection of master station

Section 5 RAS Information

5-1 Diagnosing the NP1L-PD1/PS1 module with Loader

(4) On board hard error RAS

The error status of processor, peripheral ROM, RAM, etc. that are used for the module is displayed. If this type of error information is displayed, the module's hardware is abnormal, and it is necessary to replace or repair the module.

(5) Communication firmware information

The firmware information (version, etc.) of the communication card installed in the NP1L-PD1 module is displayed. (For NP1L-PD1 only)

* This information is the internal code that is used basically by FUJI engineer for adjustment.

(6) PROFIBUS initial setting information

The initial setting of the communication card installed in the NP1L-PD1 module is displayed.

* This information is the internal code that is used basically by FUJI engineer for adjustment.