**Fe** *e-Front runners*

Integrated Controllers **MICREX-SX** Series
# Programmable Controllers



PROGRAMMABLE CONTROLLER SPH

⚠WARNING
⚠ Hazardous Voltage

# Control, operation and Supervisory Integrated Controllers
# MICREX-SX Series

Control operation

Supervision

**PROGRAMMABLE CONTROLLER SPH**

## Realizes High-Speed Advanced Machine Control

I/O control with a program capacity of up to 117K steps and up to 8192 points enables suitable system configuration ranging from small through to large scale.
1ms program scan and I/O refresh are possible. Function and performance distribution are possible in multi-CPU system configuration with up to 8 CPUs.

## Meets Increasing Demand for Higher Reliability

Compatible with CPU redundancy and power supply redundancy as standard functions. 1:1 warm standby or N:1 cold standby can be selected as required.

## Open Network Oriented

Both the hardware and software conform to the IEC 61131 international standard for programmable controllers.
Compatible with Ethernet, LonWorks, FL-net, DeviceNet, PROFIBUS-DP, AS-i, and other diverse open networks.

## Realizes Integrated Programming Support

Loaders for functional modules and POD, mainly loaders for programmable controllers realized on a personal computer, can be used in an integrated environment.
Sharing of variable names (labels) required for each loader, and mutual data reference at the time of programming and debugging, can be performed easily.
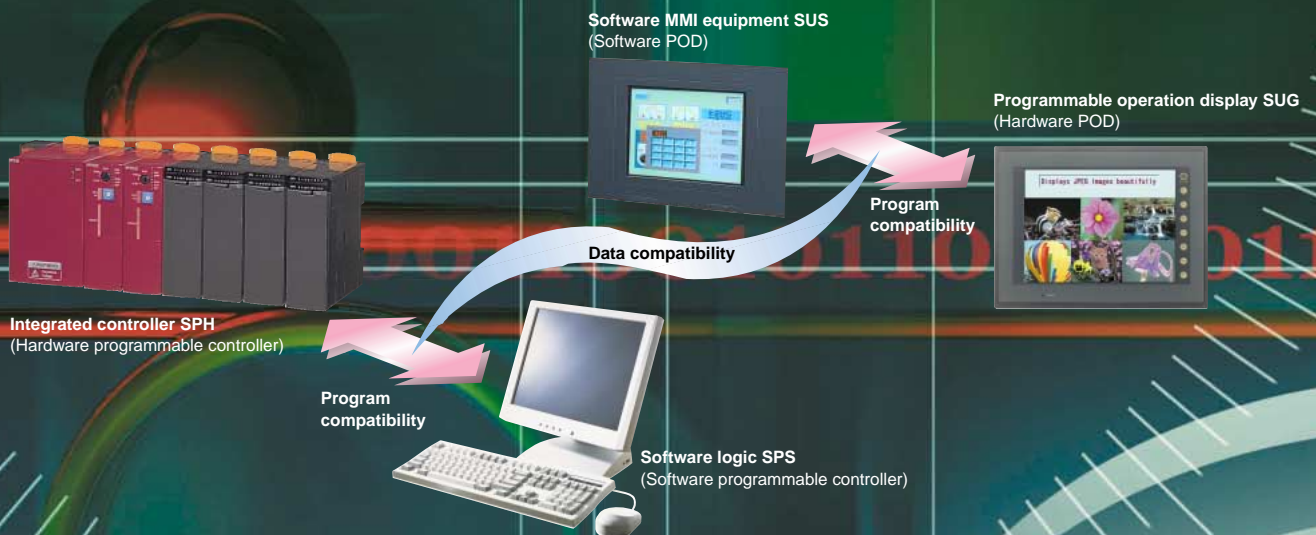
## Applicable to Software Control

Operates on a personal computer and panel controller, and the functions provide software equivalent to each hardware.
  Software programmable controller   SPS: Equivalent to programmable controller SPH
  Software POD                        SUS: Equivalent to the POD UG30/20 series
The OPC-coordinated library enables coordination with commercial SCADA software.

Note: This software accommodates system business talks. For details, contact our sales section.
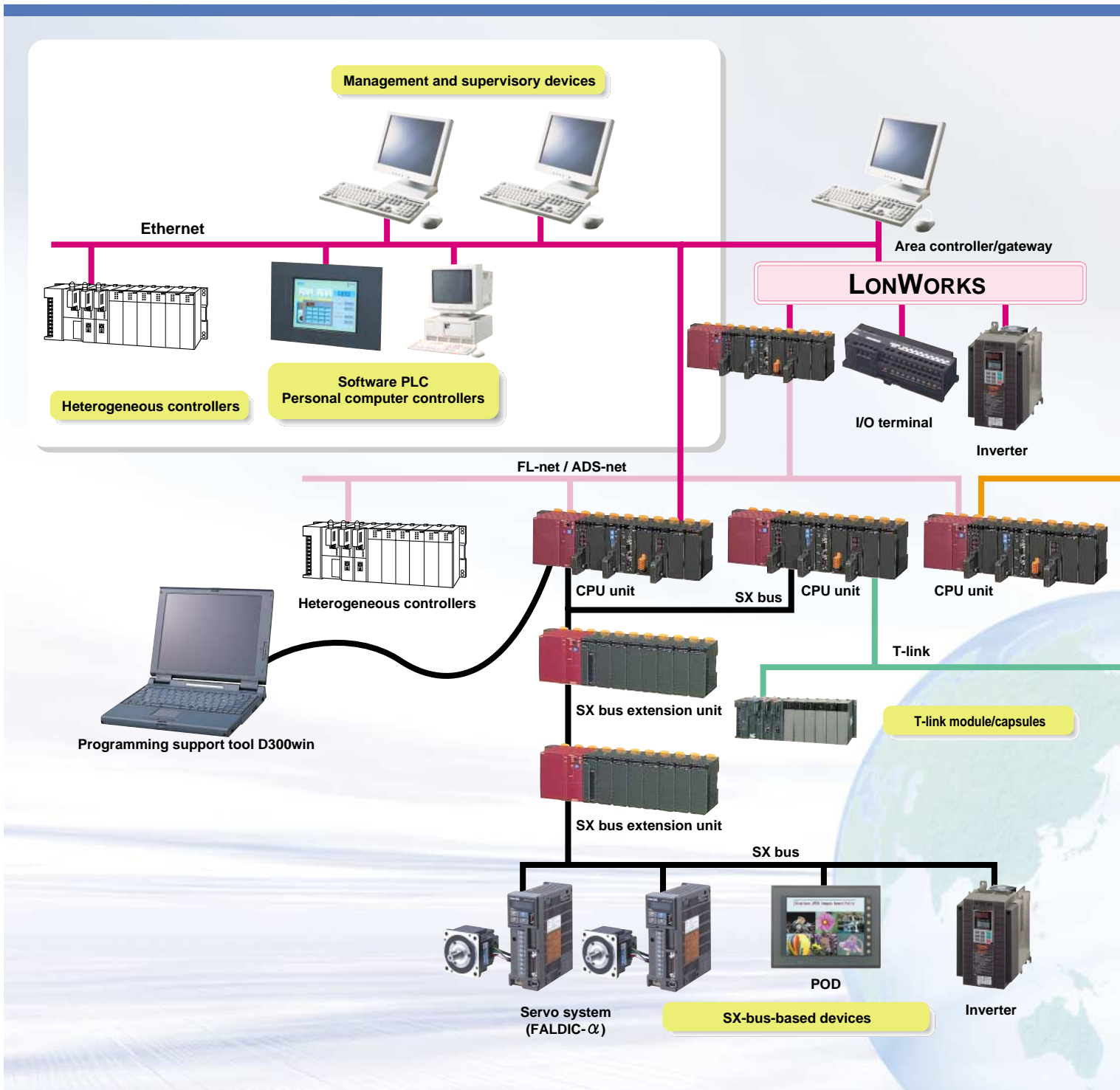
**Software MMI equipment SUS**
(Software POD)

**Programmable operation display SUG**
(Hardware POD)

Program compatibility

Data compatibility

**Integrated controller SPH**
(Hardware programmable controller)

Program compatibility

**Software logic SPS**
(Software programmable controller)

## SX Bus and Diverse Network Systems Enabling Seamless Access

**Management and supervisory devices**

Ethernet

**Heterogeneous controllers**

**Software PLC
Personal computer controllers**

**Area controller/gateway**

**LONWORKS**

**I/O terminal**

**Inverter**

FL-net / ADS-net

**Heterogeneous controllers**

**CPU unit**   **SX bus**   **CPU unit**   **CPU unit**

T-link

**SX bus extension unit**

**T-link module/capsules**

**Programming support tool D300win**

**SX bus extension unit**

SX bus

**POD**

**Servo system
(FALDIC-α)**

**SX-bus-based devices**

**Inverter**

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### LonWorks

Internationally noticeable open network for building management. System configuration as a device with distributed autonomous functions is enabled by the control functions incorporated in site devices. Replacement, update, addition, and removal of site devices can easily be performed.
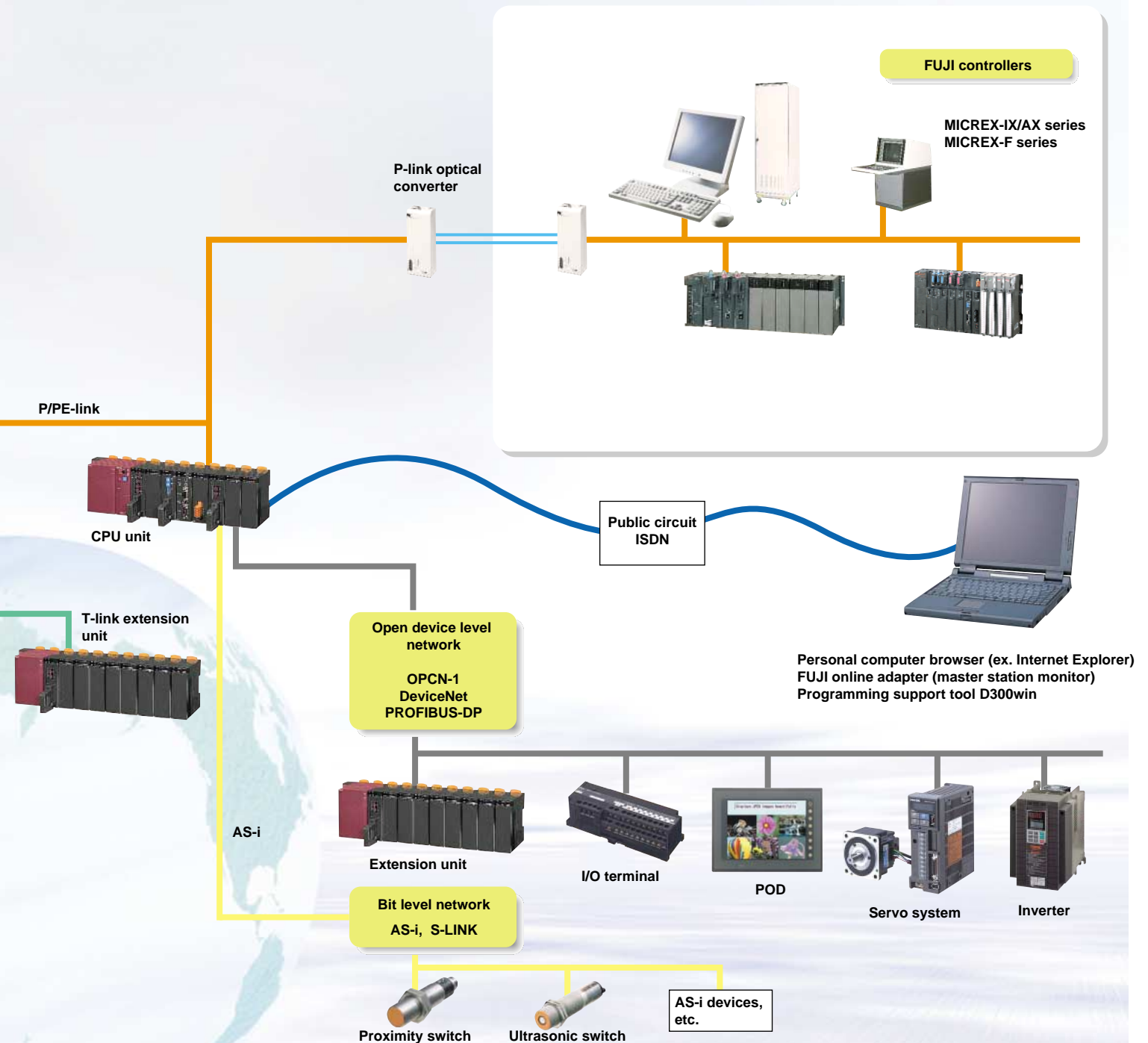
### FL-net (OPCN-2)

Open network at the FA application-type controller level established by the Manufacturing Science and Technology Center and the Japan FA Open Systems Promotion Group. Allows inter-connection with PC, CNC, and robots beyond the frame of a single manufacturer. The communication physical layer employs Ethernet.

### PROFIBUS-DP

Device level open network established by the EN 50170 European standard, which best suits time-critical applications between an automation system and distributed devices (remote I/Os, inverters, etc.)

**Fast, Distributed, Densely Linked SX bus Enables Seamless Connection of Operation Display Units and Servo Inverter.**
**Network System Variety Strongly Backs Up Optimum System Configuration from A Small System with Embedded Machine to A Large-scale Hierarchical Distributed System.**



FUJI controllers

MICREX-IX/AX series
MICREX-F series

P-link optical converter

P/PE-link

CPU unit

Public circuit ISDN

T-link extension unit

Open device level network

OPCN-1
DeviceNet
PROFIBUS-DP

Personal computer browser (ex. Internet Explorer)
FUJI online adapter (master station monitor)
Programming support tool D300win

AS-i

Extension unit

I/O terminal

POD

Servo system

Inverter

Bit level network

AS-i,  S-LINK

Proximity switch

Ultrasonic switch

AS-i devices, etc.

## OPCN-1

Device-level open network established by Japan Electrical Manufacturers Association. Allows connection with PC and robots using the same signal line beyond the frame of a single manufacturer, very effective in open system improvement and optimization.

## DeviceNet

Open device-level network which facilitates inter-connection of control equipment such as PCs, personal computers, sensors, and actuators.  Wiring cost reduction by minimizing wiring, and multi-vendor equipment connection simplify an economical system configuration.

## AS-i

Bit-level network optimum to distribution of the I/O equipment including proximity switches, photoelectric switches, pushbuttons, and intelligent equipment such as ultrasonic sensors.

# Realizes High-Speed Advanced Machine Control

## Ultra High-Speed 1ms Controller

### 1ms scan

- Program scan time of 1ms is implemented by increased instruction processing speed.
- Real number operation and high-precision positioning control have been put to practical use by dramatically improved floating-point operation speed.

|  | SPH300 | SPH200 |
|---|---|---|
| Basic instruction LD | 20ns | 70ns |
| MOV | 40ns | 140ns |
| Floating-point operation instruction | 80ns | 56000 to 85000ns |

\* For details on each instruction word's processing speed and takt cycle, see the User's Manual (FEH200).

### 1ms I/O refreshing

- 1024-point input/output is refreshed in 1ms
- Tact control assures a fixed I/O refresh interval. The I/O refresh cycle can be set to 1ms, 2ms, or up to 10ms, which is suitable for processing requiring strict tact time.
- The SPH300 allows tact time setting in 0.5ms units with a minimum setting of 0.5ms.

● **Operating Timing**
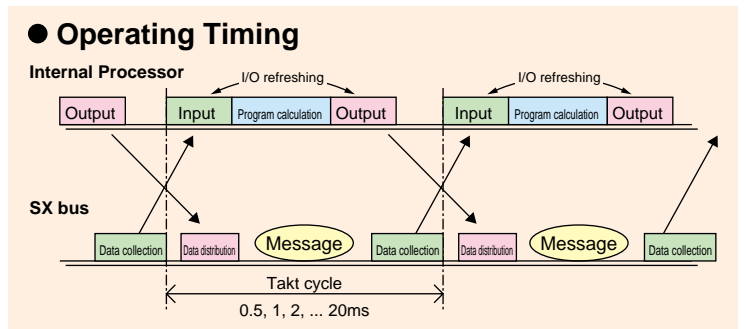


## Controller Conforms to International Standard

### Conforms to IEC 61131 international standard

- Both the hardware and software conform to the IEC 61131 international standard for programmable controllers.
- The programming language conforms to the IEC 61131-3 international standard.

### Conforming to international standard

- Conforms to the CE marking and UL standards as well as IEC standard.
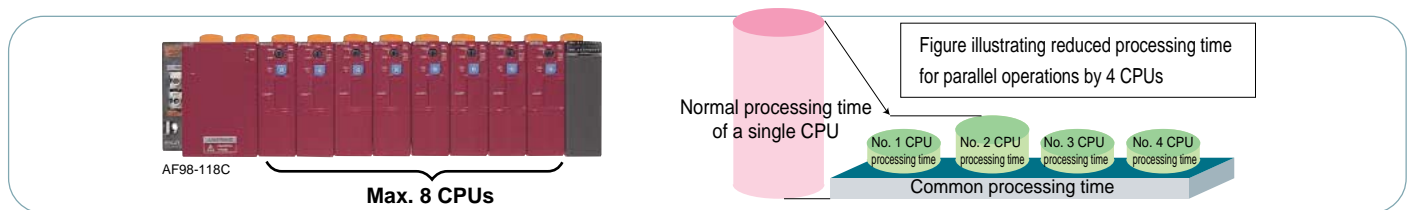- Conforms to the LR ship standard (England).
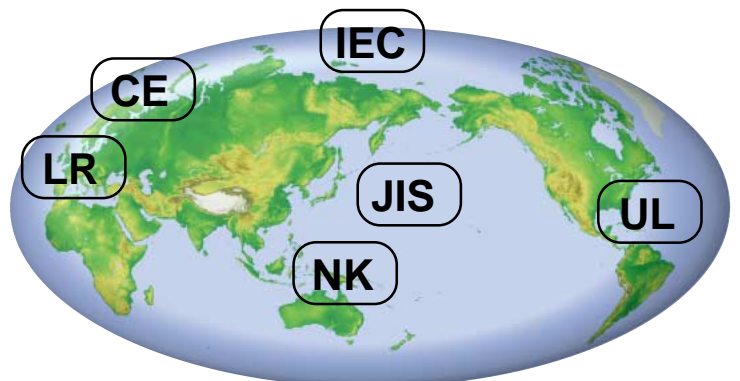
# Multi-CPU System Applicable to Up to 8 CPUs (SPH300)

## Parallel processing with up to 8 CPUs

Alleviates the load for each CPU allowing high speed processing of a large application program.
For example, the load can be distributed for advanced processing and sequence control processing with additional CPUs. I/O refresh control is performed automatically even if parallel processing by multiple CPUs is performed.

AF98-118C

**Max. 8 CPUs**

Figure illustrating reduced processing time for parallel operations by 4 CPUs

Normal processing time of a single CPU

No. 1 CPU processing time | No. 2 CPU processing time | No. 3 CPU processing time | No. 4 CPU processing time

Common processing time

# Redundant System Assuring System Safety and Reliability (SPH300)

## 1-to-1 warm-standby feature

This redundancy configuration enables continued operation without system downtime if a CPU fails.
(Control may temporarily stop due to fault detection and CPU changeover.)

- The same program is stored in CPUs for the active and backup systems, allowing constant data value equalization.

Active system — Backup system

Warm standby redundancy configuration with up to 4 CPU sets is possible.
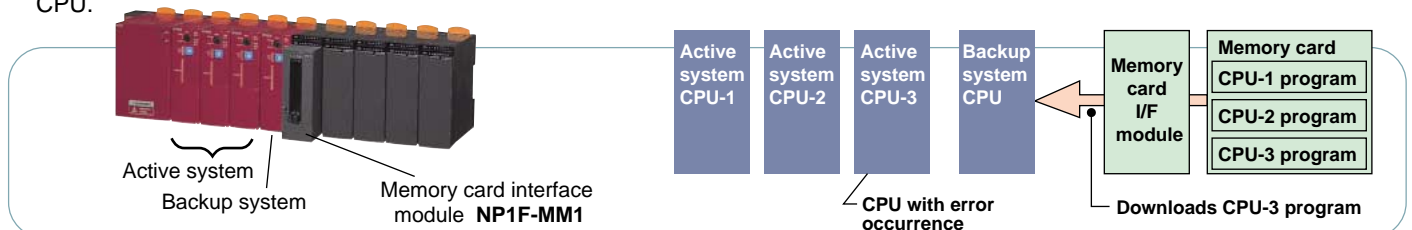
AF98-127C    AF98-125C

## N-to-1 backup feature

This redundancy configuration accepts a system down and minimizes the time for operation restart when a CPU is faulty.

- Data retained by the active system is not taken over. The backup system CPU performs initial start.

AF98-126C

Active system — Backup system   SX bus   Active system   AF98-127C   Backup system   AF97-559
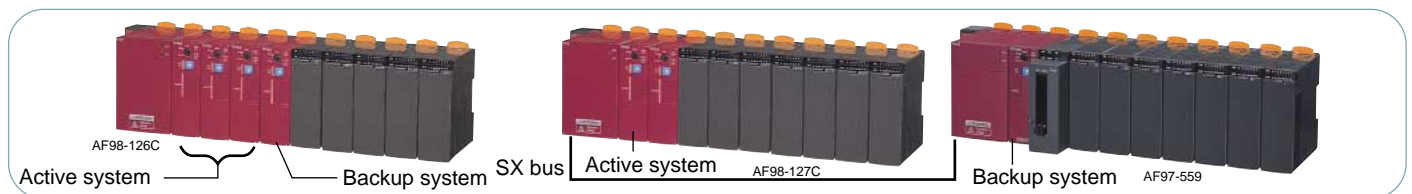
- Programs can be intensively controlled by a memory card.
  Programs for N units of systems can be stored on a memory card, which is installed in the memory card interface module for centralized control of the programs. The same processing programs as on the down CPU are downloaded to the backup system CPU.

Active system
Backup system
Memory card interface module  **NP1F-MM1**

| Active system CPU-1 | Active system CPU-2 | Active system CPU-3 | Backup system CPU |
|---|---|---|---|

Memory card I/F module

Memory card
CPU-1 program
CPU-2 program
CPU-3 program

CPU with error occurrence

Downloads CPU-3 program

Note: For the redundancy configuration buildup with the DC power supply, contact our sales section.

## Improves Programming Development Efficiency

# Realizes Integrated Programming Support

### Provision of Integrated Support Environment

The SPH can be used in an integrated environment consisting mainly of a programmable controller loader implemented on a personal computer, as well as a function module loader and POD loader.
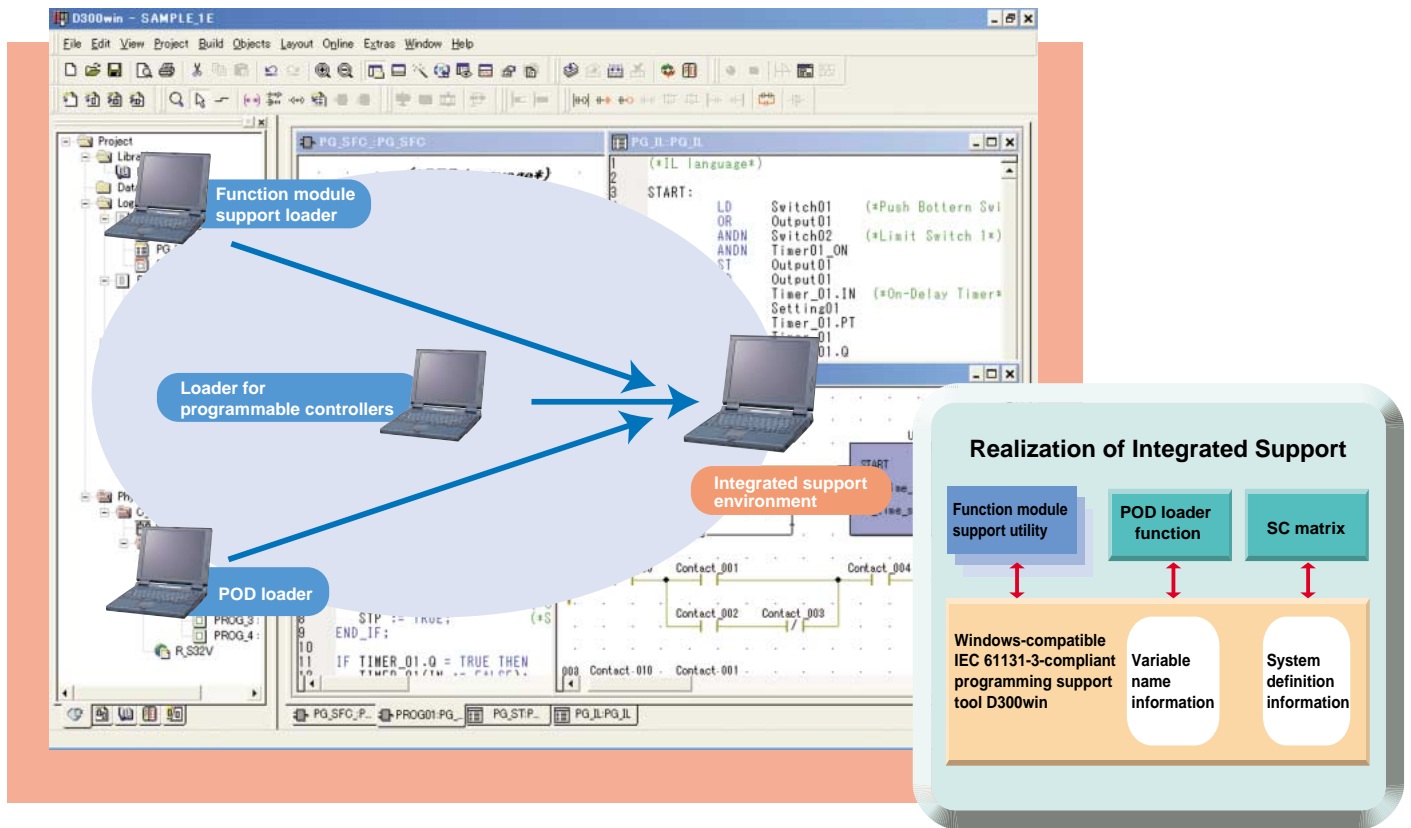


### Realizes Software-based Scalable System

External failure diagnosis, PID, and other regulation system operations and general-purpose protocol control and positioning control operations have been realized by software (extended FB) using the advanced processing functions of the CPU module.
The use of the extended FB allows efficient system configuration based not on each function module but on the standard I/O module, general-purpose communication module, and positioning module.
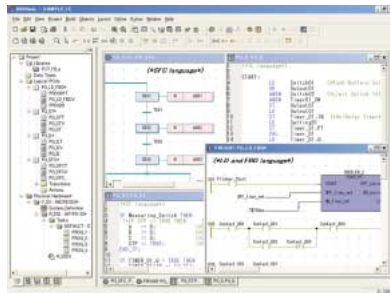
#### Application model
• The application model is a control model that incorporates diverse function software in addition to the extended FB above.
• A high-quality system can be configured in a short time simply by incorporating customer functions in the application model.
• For engineering support costs, please contact our sales section.

The D300win is a programming support tool that conforms to the IEC 61131-3 international standard and that runs under Windows NT/2000/XP.  It is a next-generation support tool with an abundance of features such as programming by variable names (labels), mixed-language programming, excellent documentation function, and basic ease of operation.  The D300win incorporates a number of features that simplify the programming environment.  Such features include the function to implement user-designed circuits on an FB, error & jump function, instruction entry guidance, and multi-window function.
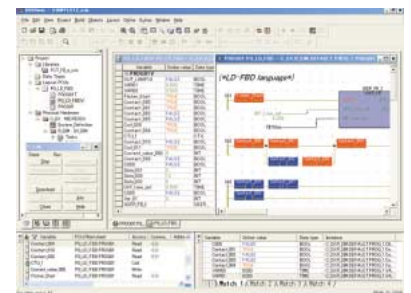
### Compatible with the IEC 61131-3 international standard

The use of a programming language system in compliance with international standards allows the user to produce programs that are understandable worldwide.

### Accommodates a mixture of code written in two or more programming languages.

The D300win completely supports five types of program representations specified by the standards.
It allows the programmer to code the combination of representations best suited for the control target.

**Supported representations**
IL    (Instruction List)
LD    (Ladder Diagram)
FBD (Function Block Diagram)
ST    (Structured Text)
SFC (Sequential Function Chart)

### Excellent documentation function

The documentation preparation function of the D300win has been substantially improved.  Not only can it print drawing numbers, dates, page, and . . .
borders, but also company logos and comments.  It also augments the print preview function, which allows the user to verify the print state on the screen before beginning printing, and its scaled printing function which

### Simulation function

The simulation function allows the user to conduct test runs of programs using the D300win built-in PLC function in place of a real machine.  This function simulates the operation of programs that are written in the IEC-compliant SX Series programming language.  The function can force any given signal to on or off and monitor its state.  It greatly enhances the efficiency of programming and debugging.
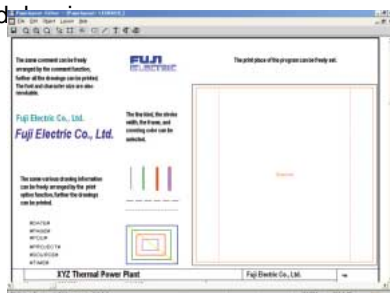
### Programmable Operation Display (POD) cooperation function

The D300win has implemented POD cooperation support functions as common support tools.

# SX Bus Meets Diverse Demands for System Extension

## Basic SX Bus Configuration

**Ultra Fast SX Bus Preserves Distributed Installation and Expandability Up To 254-module Direct Bus Connection.**

**SX bus implements distributed installation of equipment.**
The total length of the SX bus is 25m. Up to 25 extension base boards, PODs, and other SX-bus-based devices can be connected within 25m.

**Free topology is implemented by T branches.**
Use of T branches allows detailed, distributed installation of the SX bus. Expansion units and diverse equipment arranged in tree structure can be connected in the optimum way.

**SX bus implements connecting maximum 254 modules (within 512 words).**
The number of modules that can be connected to the SX bus is a maximum 254 units. The connectable units include CPU modules, communications modules, positioning modules, function modules, standard I/O modules, and SX-bus compatible equipment such as servo systems and PODs. The SX bus can also be easily connected to a large-scale system without being conscious of the module quantity limit.

### Classification of System Configuration

**Limit of modules connected in single configuration**

| Module Type | Max. Connected Units |
|---|---|
| Power module | Not limited in the number of power modules to be connected. |
| CPU module | 8 units (1 unit for the SPH200) |
| P/PE-link module | Total 2 units of FL-net modules, P-link modules, and PE-link modules |
| Type A module | 8 units (remote I/O master module) |
| Type B module | A total of 16 units including the SX bus communication unit of POD. |
| Type C module | 238 units including Type A and B connected modules (excluding FL-net modules, P-link modules, and PE-link modules) |

* Note: For details informastions, refer to the each manuals.

**Module classification**

| Type A | Type B | Type C |
|---|---|---|
| • OPCN-1 master module (**NP1L-JP1**)<br>• OPCN-1 slave module (**NP1L-JS1**)<br>• DeviceNet master module (**NP1L-DN1**)<br>• PROFIBUS-DP master module (**NP1L-PD1**)<br>• T-link master module (**NP1L-TL1**)<br>• T-link slave module (**NP1L-TS1**) | • Web module (**NP1L-WE1**)<br>• Ethernet module (**NP1L-ET1**)<br>• FL-net module (**NP1L-FL2**)<br>• ADS-net module (**NP1L-AD1**)<br>• P-link module (**NP1L-PL1**)<br>• PE-link module (**NP1L-PE1**)<br>• General-purpose communication module (**NP1L-RS1/RS2/RS4**)<br>• Memory card I/F module (**NP1L-MM1**) | • All modules other than those of Type A and B<br>* The AS-i master module is also included in category C. |

**No. of connectable base boards/units**

| Unit for supplying SX bus transmission power | Unit for receiving SX bus transmission power |
|---|---|
| • Base board (power ON)<br>• SX bus optical converter (external 24V connected) | • I/O terminal<br>• SX bus optical converter (external 24V not connected)<br>• UG30/20 series (POD)<br>• PCI-bus-based high performance CPU board (built in personal computer)<br>• AC servo FALDIC-$\alpha$ series<br>• Base board (power OFF) equivalent to 3 units above |

* Up to 10 units for receiving SX bus transmission power can be continuously connected to each of the IN and OUT connectors of the unit for supplying SX bus transmission power.

### Other connection notes

- Be sure to install the power supply module and at least one module other than the power supply module to the left of each base board.
- Up to 25 base boards including the T branch unit can be connected.
- Basically, base boards (power supply) in one configuration should be turned ON at one time. However, if it is necessary to turn OFF some base boards (power supply) for application convenience, up to 3 continuous base boards can be turned OFF in one configuration.

AF98-126

VICPAS
HMI Parts Center

■ **General specifications**

| Item | | Specification | |
|---|---|---|---|
| Physical environmental condition | Operating ambient temperature | 0 to 55°C | IEC 61131-2 |
| | Storage temperature | -25 to +70°C | |
| | Relative humidity | 20 to 95%RH no condensation | |
| | Pollution degree | 2 (Free from conductive dust) | |
| | Corrosion immunity | Free from corrosive gases. Not stained with organic solvents | |
| | Operating altitude | 2000m or less above sea level (Transport condition: 70kpa or more) | |
| Mechanical service condition | Vibration | Half amplitude: 0.15mm, Constant acceleration: 19.6m/s$^2$ two hours for each of three axes, total six hours. | |
| | Shock | Acceleration peak: 147m/s$^2$ three times for each of three axes | |
| Electrical service condition | Electrostatic discharge | Contact discharge: ± 6kV  Aerial discharge: ± 8kV | IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field | 80 to 1000MHz (10V/m) | IEC 61000-4-3 |
| | EFT/B (Electrical fast transient/burst) | ± 2kV (excluding the communication line) | IEC 61000-4-4 |
| | Lightning impulse surge | ± 4kV common mode, ± 2kV normal mode | IEC 61000-4-5 |
| | Conducted radio frequency | 150kHz to 80MHz, 10V | IEC 61000-4-6 |
| | Power frequency magnetic field | 50Hz, 30A/m | IEC 61000-4-8 |
| | Damped oscillatory wave | ± 2kV, 1MHz ring waves | IEC 61000-4-12 |
| | Square wave | ± 1.5kV rise time 1ns, pulse width 1μs 50Hz | |
| Construction | | Panel-mounting type    IP30 | |
| Cooling | | Self-cooling | |

## CPU Module: NP1P□-□□

### ■ Features

- Ultra high-speed processing
  SPH300 processes basic instructions in 20ns and application instructions in 40ns, the SPH200 carries out basic instructions in 70ns and application instructions in 140ns.
- Multi-CPU configuration (SPH300)
  Up to 8 CPUs can be configured, effective for high-speed control by load distribution.
- Redundancy (SPH300)
  1-to-1 hot standby feature and N-to-1 backup feature improves the system safety and reliability.
- IEC 61131-3
  Complete compliance with the IEC 61131-3 international standard languages enables programming understood worldwide.
- Compatible with USB and user ROM
  The SPH300 of the USB and user ROM versions with separate formats are offered (**NP1PS-32R/74R/117R**).

**SPH200/ SPH300**      AF98-131

**SPH300 * (Type R)**      AF01-98
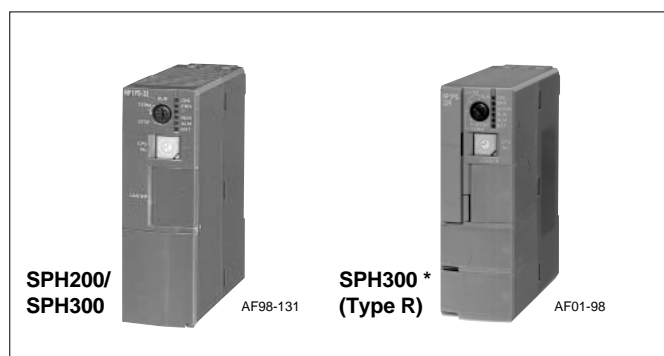
\* CPU modules of the type with trailing "R" (**NP1PS-□□R**) and the **NP1PS-117** have the same shape.

Enables USB-based high-speed communication, source program storage and user's data with user ROM, and user ROM operation. The SPH200 allows only user ROM operation but does not correspond to USB-based communication functions.

### ■ Performance specifications

| | | SPH200 | | SPH300 | | |
|---|---|---|---|---|---|---|
| Type | | **NP1PH-08** | **NP1PH-16** | **NP1PS-32/NP1PS32R** | **NP1PS-74/NP1PS74R** | **NP1PS-117/NP1PS-117R** |
| Control system | | Stored program, Cyclic scanning system (default task), periodic task, event task | | | | |
| Input / Output connection method | | Direct connection I/O (SX bus), remote I/O (DeviceNet, OPCN-1, and other remote I/O links) | | | | |
| I/O control system | | SX bus: Tact synchronization refresh  Remote I/O link: Refresh at 10-ms fixed intervals (not synchronized with scan) | | | | |
| CPU | | 16-bit OS processor, 16-bit execution processor | | 32-bit OS processor, 32-bit execution processor | | |
| Memory types | | Program memory, Data memory, Temporary | | | | |
| Programming language | | IL language     (Instruction List)  ST language    (Structured Text)  LD language    (Ladder Diagram)  FBD language  (Function Block Diagram)  FSC elements  (Sequential Function Chart)   To IEC 61131-3 | | | | |
| Length of instructions | | Variable length (depending on language) | | | | |
| Instruction execution speed | Sequence instruction | 70ns or more/instruction | | 20ns or more/instruction | | |
| | Applied instruction | 140ns or more/instruction | | 40ns or more/instruction | | |
| Program memory capacity | | 8192 steps | 16384 steps | 32768 steps | 75776 steps | 119808 steps |
| Program steps in a POU | | 4096 steps | | 4096 steps | | |
| memory (Note 1) | I/O memory (I/Q) | 512 words (Max. 8192 points) | | 512 words (Max. 8192 points) | | |
| | General memory (M) | 4096 words | 8192 words | 8192 words | 32768 words | 131072 words |
| | Retain memory (M) | 2048 words | 4096 words | 4096 words | 16384 words | 32768 words |
| | Instance memory for User FB (M) | 2048 words | 4096 words | 4096 words | 16384 words | 32768 words |
| | Instance memory for system FB (M) | 4096 words | 8192 words | 16384 words | 65536 words | 65536 words |
| | Timer | 128 points | 256 points | 512 points | 2048 points | 2048 points |
| | Integrating timer | 32 points | 64 points | 128 points | 512 points | 512 points |
| | Counter | 64 points | 128 points | 256 points | 1024 points | 1024 points |
| | Edge detection | 256 points | 512 points | 1024 points | 4096 points | 4096 points |
| | Others | 2048 points | 4096 points | 8192 points | 32768 points | 32768 points |
| | System memory (M) | 512 words | | 512 words | | |
| Temporary area | | 4096 words | | 8192 words | | |
| Available basic data type (Note 2) | | BOOL, INT, DINT, UINT, UDINT, REAL, TIME, DATE, TOD, DT, STRING, WORD, DWORD | | | | |
| Data type nesting | | One level (array of arrays, structure of arrays, array of structures, structure of structures) | | | | |
| No. of structure data type members | | 200 | | | | |
| No. of array data type elements | | Limited by the size of the the memory area used. With "Standard memory" with 8192 words, up to 8192 words can be used. | | 16-bit data format: 4096, 32-bit data format: 2048 | | |
| No. of tasks | | Default tasks (Cyclic scanning): 1  Periodic tasks: 4  Event tasks: 4 (Total of 4 tasks when Periodic task is used) | | | | |
| Program instance (No. of POUs/resource) | | 64 (Max. number of registrations in one task: 64) | | 256 (Max. no. of instances allowed in one task=128) | | |
| No. of POUs in program | | 2000 (including POUs in the library) | | | | |

Note: 1) The area sizes of standard memory, retain memory, the instance memory for user FBs, and the instance memory for system FBs can freely be increased or decreased. Default values are shown in the above table.
   2) This depends on each instruction.

## ● Performance specifications

| Item | | SPH200 | | SPH300 | | |
|---|---|---|---|---|---|---|
| | | **NP1PH-08** | **NP1PH-16** | **NP1PS-32/NP1PS-32R** | **NP1PS-74/NP1PS-74R** | **NP1PS-117/NP1PS-117R** |
| No. of user function blocks | | 256 | | 512 | | |
| Nesting depth of user function blocks | | 64 levels | | 127 levels | | |
| No. of user functions | | 256 | | 512 | | |
| Nesting depth of user functions | | 64 levels | | | | |
| FB instance | | 620/POU (Up to 620 FBs allowed in one POU) | | | | |
| Variable | Global variable | 8000 | | Earlier than D300win version V1.2: 8000 D300win version 2.0 or later: 15000 | | |
| | Local variable | 8000 | | Earlier than D300win version V1.2: 8000 (Total for all POUs) D300win version 2.0 or later: 15000/POU | | |
| No. of user FB terminals | | VAR_INPUT : Up to 128 }  128 in total VAR_OUTPUT: Up to 128 } | | | | |
| Library | No. of registered libraries | 16/project | | | | |
| | Nesting depth | 8 levels | | | | |
| Diagnostic function | | Self-diagnosis (memory check, ROM sum check), System configuration supervising, Module fault monitoring | | | | |
| Security function | | Password | | | | |
| Calendar | | Up to 31 Dec. 2069 23:59:59 ± 27sec/month (when active) | | Up to 31 Dec. 2069 23:59:59 ±27sec/month (when active) When multi-CPU system is used, time is synchronized. | | |
| Battery backup | | Backup range: Application programs, system definitions, ZIP files, data memory, calendar IC memory Battery used: Lithium primary battery Backup time: 5 years (25° C) Replacement time: Within 5 minutes (25° C) | | Data memory, calendar IC memory Primary lithium battery Switching time: within 5 min. (at 25° C) Durability (at 25° C): **NP1PS-32** 5 years   **NP1PS-74** 1.3 years   **NP1PS-117R** 1.3 years | | |
| Memory backup by flash ROM (contained in CPU module) | | Application programs, system definitions, and ZIP files can be saved in the user ROM card. | | Application programs, system definitions, and ZIP files can be saved in the flash memory built in the CPU. | | |
| Memory backup by user ROM card (removable) (only for NP1PS-117R) | | Application programs, system definitions, and ZIP files can be saved in the user ROM card. | | Application programs, system definitions, zip files and compressed projects can be saved in user ROM card (compact flash card). | | |
| Internal current consumption | | 24V DC 70mA or less | | 24V DC 200mA or less | | |
| Mass | | Approx. 170g | | Approx. 200g (**NP1PS32/NP1PS74/NP1PS117**) Approx. 220g (**NP1PS32R/NP1PS74R/NP1PS117R**) | | |

## ■ Outer view

• SPH200 (**NP1PH-08/NP1PH-16**)
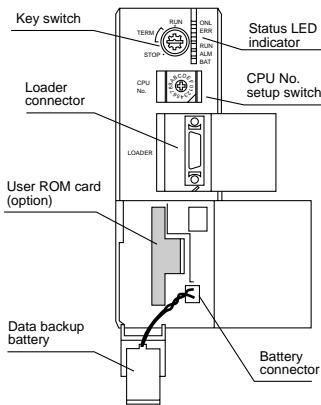


• SPH300 (**NP1PS-32/NP1PS-74**)
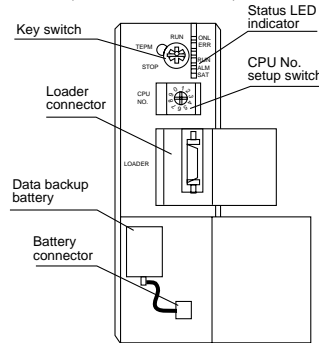


• SPH300 (**NP1PS-117**)
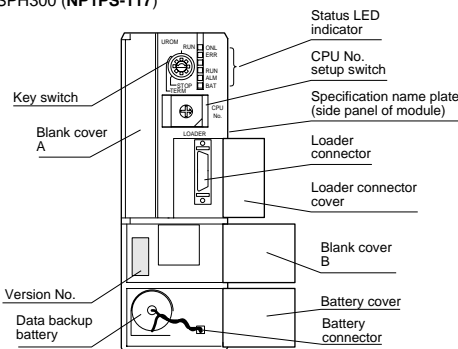


• SPH300 (**NP1PS-32R/NP1PS-74R/NP1PS-117R**)

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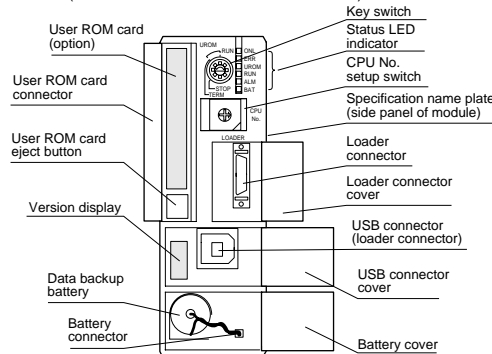
## Power Supply Module: NP1S- □□

### ■ Features

● Redundant power supply module (**NP1S-22/NP1S-42**)
Redundancy of the power supply has been realized by supplying the power from multiple (up to 3) power supply modules. The redundant configuration of the power supply section with the highest failure rate can improve the system reliability.

● Small capacity power supply module (**NP1S-91**)
The use of the 100VAC small capacity power supply module (single slot) on a 6-slot basis allows effective use of one slot.

**NP1S-22/NP1S-42**
AF98-130

**NP1S-81/NP1S-91**
AF01-101

### ■ Power supply specifications

| Item | Specification | | | |
|---|---|---|---|---|
| Type | **NP1S-22** | **NP1S-42** | **NP1S-81** | **NP1S-91** |
| Rated input voltage | 100 to 120V AC / 200 to 240V AC | 24V DC | 200 to 240V AC | 100 to 120V AC |
| Voltage tolerance | 85 to 132V AC / 170 to 264V AC | 19.2 to 30V DC | 170 to 264V AC | 85 to 132V AC |
| Rated frequency | 50/60Hz | — | 50/60Hz | |
| Dropout tolerance | 1 cycle or less (Rated voltage, rated load) | 10ms or less (Rated voltage, rated load) | 1 cycle or less (Rated voltage, rated load) | |
| AC waveform distortion factor | 5% or less | — | 5% or less | |
| Ripple factor tolerance | — | Three-phase full-wave rectification can be used 5% or less | — | |
| Leakage current | 0.25mA or less | | | |
| Inrush current | 22.5Ao-p or less (Ta=25° C not repeated) | 150Ao-p or less    2ms or less | 25Ao-p or less (Ta=25° C not repeated) | 22.5Ao-p or less (Ta=25° C not repeated) |
| Power consumption | 110VA or less | 45W or less | 50VA or less | 40VA or less |
| Rated output voltage | 24V DC (22.8 to 26.4V DC) | | | |
| Output current | 0 to 1.46A | | 0 to 0.625A | |
| Isolation method | Transducer | | | |
| Dielectric strength | 2900Vrms AC, 1 second, between power input terminals and ground | 560Vrms AC, 1 second, between power input terminals and ground | 1800Vrms AC, 1 second, between power input terminals and ground | |
| Insulation resistance | 10MΩ  or more (500V DC megger) | | | |
| No. of occupied slots | 2 slots | | 1 slot (specialized for a 6-slot basis) | |
| Alarm output | Relay NC contact output (Monitoring of output voltage: 24V DC, 0.3A or less) | | None | |
| Multiple power supply | Compatible | | None | |
| Mass | Approx. 330g | Approx. 360g | Approx. 180g | |

## Base Board: NP1B □ - □□

| Name | Type | No. of slots | Maximum no. of modules | Internal current consumption | Mass | Remarks |
|---|---|---|---|---|---|---|
| Standard base board | **NP1BS-06** | 6 slots | 5 (Not contain the power supply) | 45mA or less | Approx. 420g | SX bus 6 slots, processor bus 4 slots |
| | **NP1BS-08** | 8 slots | 6 (Not contain the power supply) | 50mA or less | Approx. 540g | SX bus 8 slots, processor bus 3 slots |
| | **NP1BS-11** | 11 slots | 9 (not contain the power supply) | 60mA or less | Approx. 720g | SX bus 11 slots, processor bus 3 slots |
| | **NP1BS-13** | 13 slots | 11 (Not contain the power supply) | 70mA or less | Approx. 840g | SX bus 13 slots, processor bus 3 slots |
| High-performance base board | **NP1BP-13** | 13 slots | 11 (Not contain the power supply) | 70mA or less | Approx. 840g | SX bus 13 slots, processor bus 10 slots |

Note: * High performance base board is used for the P/PE-link high-speed handling of large amounts of data or for the multi-CPU configuration with the system processing speed increased.  The standard base board is sufficient for a system operating at the normal processing speed.

### ■ Dimensions, mm
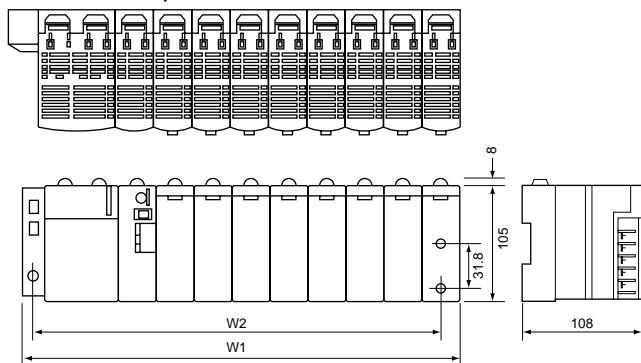


| No. of slots | W1 | W2 |
|---|---|---|
| 6 | 238 | 220 |
| 8 | 308 | 290 |
| 11 | 413 | 395 |
| 13 | 483 | 465 |

When the connector is mounted, depth is max. 195.3 mm.
The bracket is already mounted on the base.

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## Digital Input Module: NP1X □

### ■ Performance specifications

| Type | Input | No. of input points | Rated voltage | Rated current | Operating voltage | | Input delay time | | Isolation method | Status indication | No. of points /common | External wire connection | Internal current consumption (24V DC) | Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | OFF to ON | ON to OFF | OFF to ON | ON to OFF | | | | | | |
| **NP1X1606-W** | DC input, sink/ source | 16 | 24V DC | 7mA | 15 to 30V | 0 to 5V | 1 to 100ms Variable by parameter setting | | Photocoupler | LED indication | 8 (x 2) | Terminal block | 35mA or less | Approx. 150g |
| **NP1X3206-W** | | 32 | | 4mA | | | | | | | 32 (x 1) | Connector | 50mA or less | Approx. 130g |
| **NP1X3202-W** | | | 5 to 12V DC | 3 to 9mA | 3.5 to 13.2V | 0 to 1V | | | | | | | 50mA or less | Approx. 130g |
| **NP1X6406-W** | | 64 | 24V DC | 4mA | 15 to 30V | 0 to 5V | | | | | 32 (x 2) | | 85mA or less | Approx. 180g |
| **NP1X0810** | AC input | 8 | 100 to 120V AC | 10mA | 80 to 132V | 0 to 20V | Approx. 10ms | Approx. 10ms | | | 8 (x 1) | Terminal block | 35mA or less | Approx. 130g |
| **NP1X1610** | | 16 | | | | | | | | | 16 (x 1) | | 40mA or less | Approx. 170g |
| **NP1X0811** | | 8 | 200 to 240V AC | | 160 to 264V | 0 to 40V | | | | | 8 (x 1) | | 35mA or less | Approx. 130g |
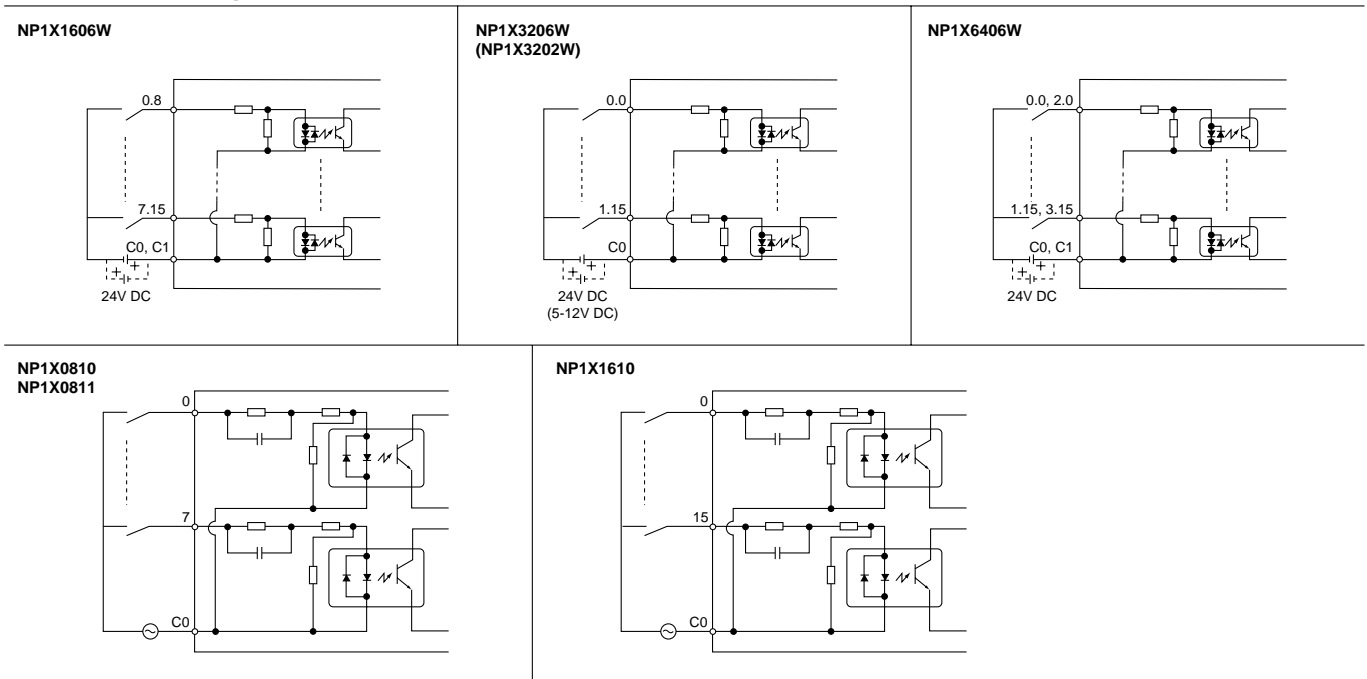
### ■ Internal circuit diagram



NP1X1606W



NP1X3206W
(NP1X3202W)



NP1X6406W



NP1X0810
NP1X0811



NP1X1610

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## Digital Output Module: NP1Y □

### ■ Performance specifications

| Type | Output | No. of output points | Rated voltage | Max. load current Per point | Max. load current Common | Response time OFF to ON | Response time ON to OFF | Isolation method | Status indication | No. of points / common | Surge protection | External wire connection | Internal current consumption (24V DC) | Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NP1Y08T0902 | Transistor output sink | 8 | 12 to 24V DC | 2.4A | 8A | 1ms or less | 1ms or less | Photocoupler | LED indication | 8 (x 1) | Varistor | Terminal block | 33mA or less | Approx. 150g |
| NP1Y16T09P6 | | 16 | | 0.6A | 4A | | | | | 8 (x 2) | | | 42mA or less | Approx. 160g |
| NP1Y32T09P1 | | 32 | | 0.12A | 3.2A | | | | | 32 (x 1) | Zener diode | Connector | 52mA or less | Approx. 130g |
| NP1Y64T09P1 | | 64 | | | | | | | | 32 (x 2) | | | 90mA or less | Approx. 180g |
| NP1Y08U0902 | Transistor output source | 8 | | 2.4A | 8A | | | | | 8 (x 1) | Varistor | Terminal block | 33mA or less | Approx. 150g |
| NP1Y16U09P6 | | 16 | | 0.6A | 4A | | | | | 8 (x 2) | | | 43mA or less | Approx. 160g |
| NP1Y32U09P1 | | 32 | | 0.12A | 3.2A | | | | | 32 (x 1) | Zener diode | Connector | 45mA or less | Approx. 140g |
| NP1Y64U09P1 | | 64 | | | | | | | | 32 (x 2) | | | 90mA or less | Approx. 180g |
| NP1Y06S | SSR output | 6 | 100 to 240V AC | 2.2A | 4.4A | 10ms or less | 10ms or less | | | 2 (x 3) | CR absorber and varistor | Terminal block | 60mA or less | Approx. 190g |
| NP1Y08S | | 8 | | | 2.2A | | | | | All points are independent | | | 80mA or less | Approx. 200g |
| NP1Y08R-04 | Relay output | 8 | 110V DC/ 240V AC | 30V DC/ 264V AC: 2.2A / 110V DC: 0.2A | 30V DC/ 264V AC: 4A / 110V DC: 0.8A | Approx. 10ms | Approx. 10ms | Relay | | 4 (x 2) | Varistor | | 80mA or less | Approx. 150g |
| NP1Y16R-08 | | 16 | | 30V DC/ 264V AC: 2.2A / 110V DC: 0.2A | 30V DC/ 264V AC: 8A / 110V DC: 1.6A | | | | | 8 (x 2) | | | 176mA or less | Approx. 190g |

### ■ Internal circuit diagram

NP1Y08T0902



NP1Y16T09P6



NP1Y32T09P1



NP1Y64T09P1



NP1Y08U0902



NP1Y16U09P6



NP1Y32U09P1



NP1Y64U09P1



NP1Y06S



NP1Y08S



NP1Y08R-04



NP1Y16R-08
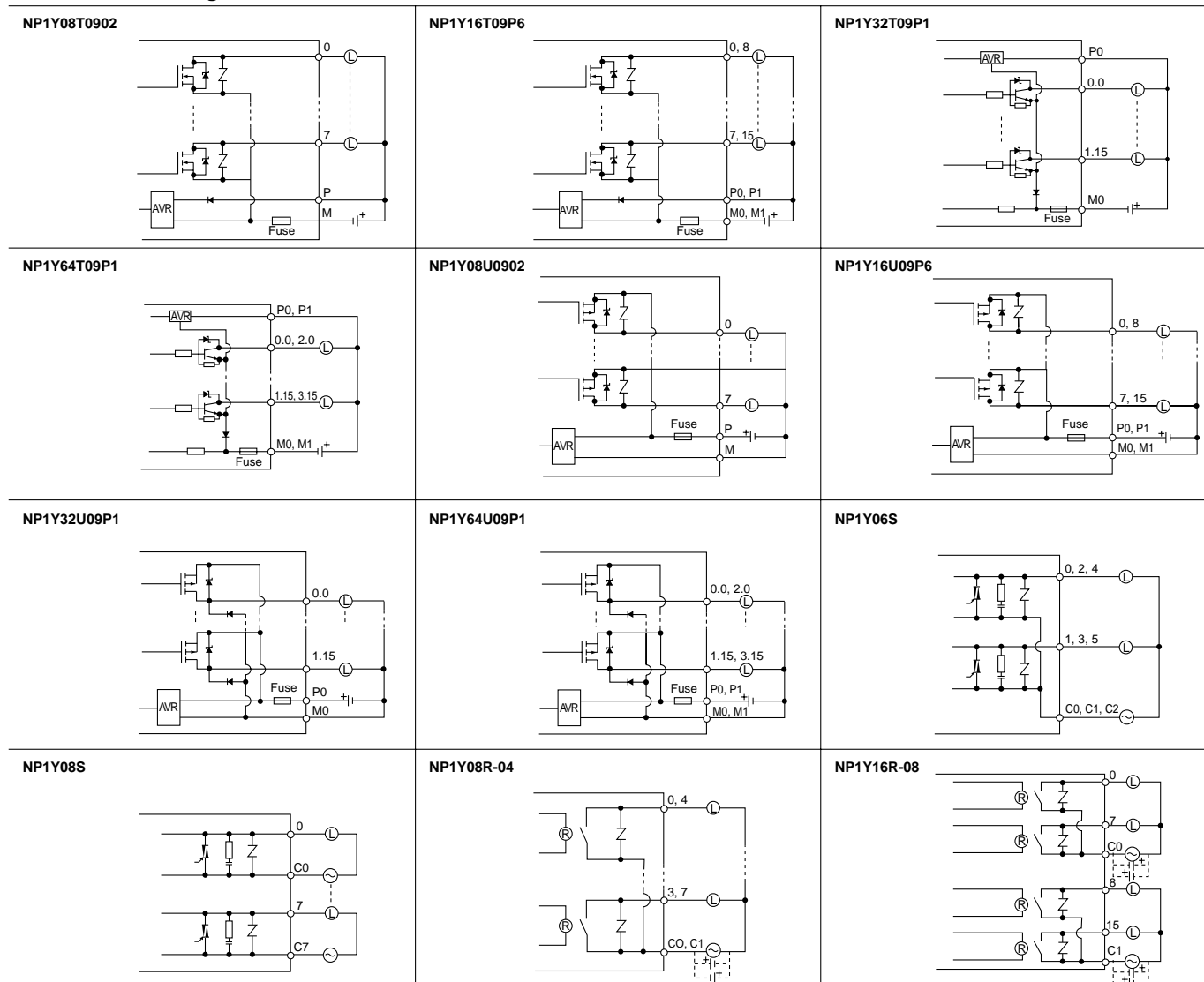
## Digital Input/Output Module: NP1W □

### ■ Performance specifications

| Type | Input | | | | | Output | | | | | | | Common | | | | |
|------|-------|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|
| | Input | No. of input points | Rated voltage | Rated current | No. of points / common | Output | No. of output points | Rated voltage | Max. load current Per point | Common | No.of points/ common | | Isolation method | Status indication | External wire connection | Internal current consumption (24V DC) | Mass |
| NP1W1606T | DC input, source | 8 | 24V DC | 7mA | 8 (x 1) | Transistor output, sink | 8 | 12 to 24V DC | 0.6A | 4A | 8 (x 1) | | Photocoupler | LED indication | Terminal block | 35mA or less | Approx. 150g |
| NP1W3206T | | 16 | | 4mA | 16 (x 1) | | 16 | | 0.12A | 1.6A | 16 (x 1) | | | | Connector | 50mA or less | Approx. 140g |
| NP1W1606U | DC input, sink | 8 | | 7mA | 8 (x 1) | Transistor output, source | 8 | | 0.6A | 4A | 8 (x 1) | | | | Terminal block | 35mA or less | Approx. 150g |
| NP1W3206U | | 16 | | 4mA | 16(x 1) | | 16 | | 0.12A | 1.6A | 16 (x 1) | | | | Connector | 50mA or less | Approx. 140g |

### ■ Internal circuit diagram

**NP1W1606T**
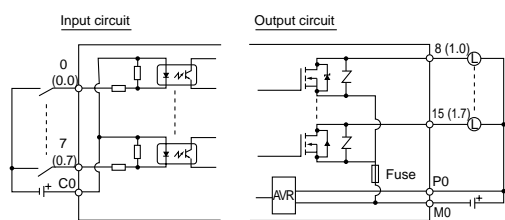


**NP1W1606U**
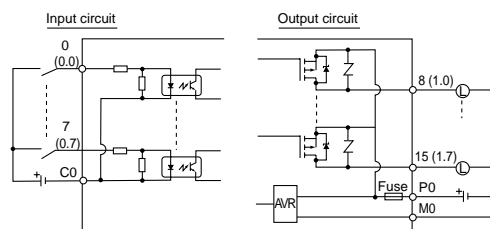


**NP1W3206T**
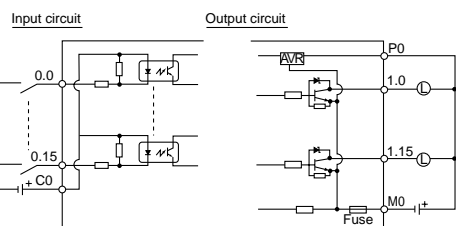


**NP1W3206U**
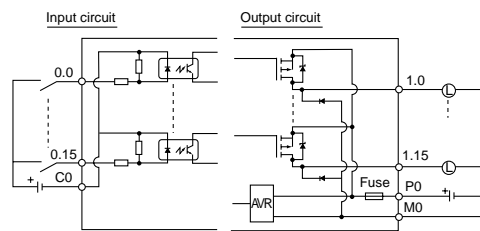


## High-speed Digital Input Module: NP1X3206-A

• Digital input module with pulse catch input
• Pulse catch input of minimum 20μs or normal input
• Pulse counter input function of maximum 20kHz, 4 ch. (two-phase)

### ■ Specifications

| Type | Input | No. of input points | Rated voltage | Rated current | Operating voltage | | Input delay time | | Isolation method | Status indication | No. of points /common | External wire connection | Internal current consumption (24V DC) | Mass |
|------|-------|---------------------|---------------|---------------|-------------------|---|------------------|---|------------------|-------------------|----------------------|--------------------------|---------------------------------------|------|
| | | | | | OFF to ON | ON to OFF | OFF to ON | ON to OFF | | | | | | |
| NP1X3206-A | 24V DC, source | 32 | 24V DC | 4mA | 15 to 30V | 0 to 5V | 0.1 to 100ms Variable by parameter setting | | Photocoupler | LED indication | 24 (x 1) 2 (x 4) | Connector | 50mA or less | Approx. 130g |

### ■ Internal circuit diagram

**NP1X3206-A**



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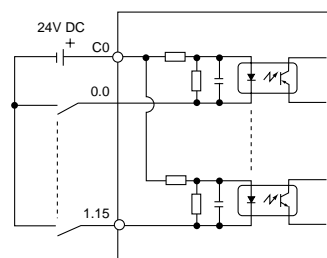
## Pulse Train Output Built-in Digital Output Module: NP1Y32T09P1-A

• Module with transistor output and pulse train output built-in
• Pulse train output (20kHz) can be selected up to maximum 4 ch. x 2 phases

### ■ Specifications

| Type | Ouput | No. of output points | Rated voltage | Max. load current | | Respose time | | Isolation method | Status indication | No. of points /common | Surge protection | External wire connection | Internal current consumption (24V DC) | Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Per point | Commom | OFF to ON | ON to OFF | | | | | | | |
| **NP1Y32T09P1-A** | Transistor output, sink | 32 | 12 to 24V DC | 0.12A | 3.2A | 20μs or less, 1μs or less at port sections | 20μs or less, 1μs or less at port sections | Photocoupler | LED indication | 32 (x 1) | Zener diode | Connector | 50mA or less | Approx. 200g |

### ■ Built-in pulse train output specifications

| Item | Specification |
|---|---|
| No. of pulse train output channels | Max. 4 ch. x 2 phases (only when pulse train output mode is selected) |
| Max. output frequency | 20kHz |
| Pulse output mode | (1) Forward pulse, reverse pulse |
| | (2) Pulse train + Sign |
| Output pulse counting method | Built-in 16-bit up-down counter |
| Operation mode | Start, stop, and clear operations, Ring operation |
| | Frequency/rotation direction/output mode settings |
| No. of general-purpose output points | 32 points (min. 24 points in pulse train output mode) |

### ■ Internal circuit diagram

**NP1Y32T09P1-A**
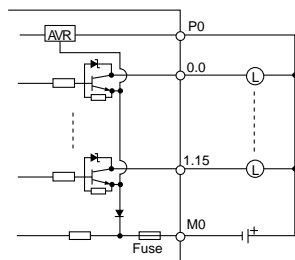
## Analog Input Module: NP1AX □

### ■ Performance specifications

| Type | Input | No. of channels | Signal range | Digital output value | Digital resolution | Total accuracy | Converting speed | Occupied word | External wire connection | Internal current consumption (24V DC) | Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NP1AXH8V-MR | Multi-range input | 8-ch | 0 to 5V DC<br>0 to 10V DC<br>1 to 5V DC<br>-10 to +10V DC | -8000 to +8000<br>or<br>0 to 16000 | 14 bits | ±0.1% or less (at 18 to 28℃)<br>±0.2% or less (at 0 to 55℃)<br>±0.3% or less (at 0 to 55℃, 1-5V range ) | 2.5ms or less /8ch | 8 words + 4 words | Terminal block | 200mA or less | Approx. 240g |
| NP1AXH8I-MR | | | 0 to 20mA DC<br>4 to 20mA DC<br>-20 to +20mA DC | | | ±0.1% or less (at 18 to 28℃)<br>±0.4% or less (at 0 to 55℃) | | | | | |
| NP1AXH4-MR | | 4-ch | 0 to 5V DC<br>0 to 10V DC<br>1 to 5V DC<br>-10 to +10V DC | -8000 to +8000<br>or<br>0 to 16000 | 14 bits | ±0.1% or less (at 25℃)<br>±1.0% or less (at 0 to 50℃) | 1ms/4ch | 8 words + 2 words | | 120mA or less | Approx. 200g |
| NP1AX04-MR | | | -5 to +5V DC<br>0 to 20mA DC<br>4 to 20mA DC | -500 to +500<br>or<br>0 to 1000 | 10 bits | ±0.5% or less (at 25℃) | 4ms/4ch | | | | |
| NP1AX08-MR | | 8-ch | -20 to +20mA DC | | | ±0.5% or less (at 25℃)<br>±1.0% or less (at 0 to 50℃) | 5ms/8ch | 16 words + 2 words | | | |

### ■ Characteristic diagram

Characteristic pattern 1



Characteristic pattern 2



Characteristic pattern 3



### ■ Input value and converted value

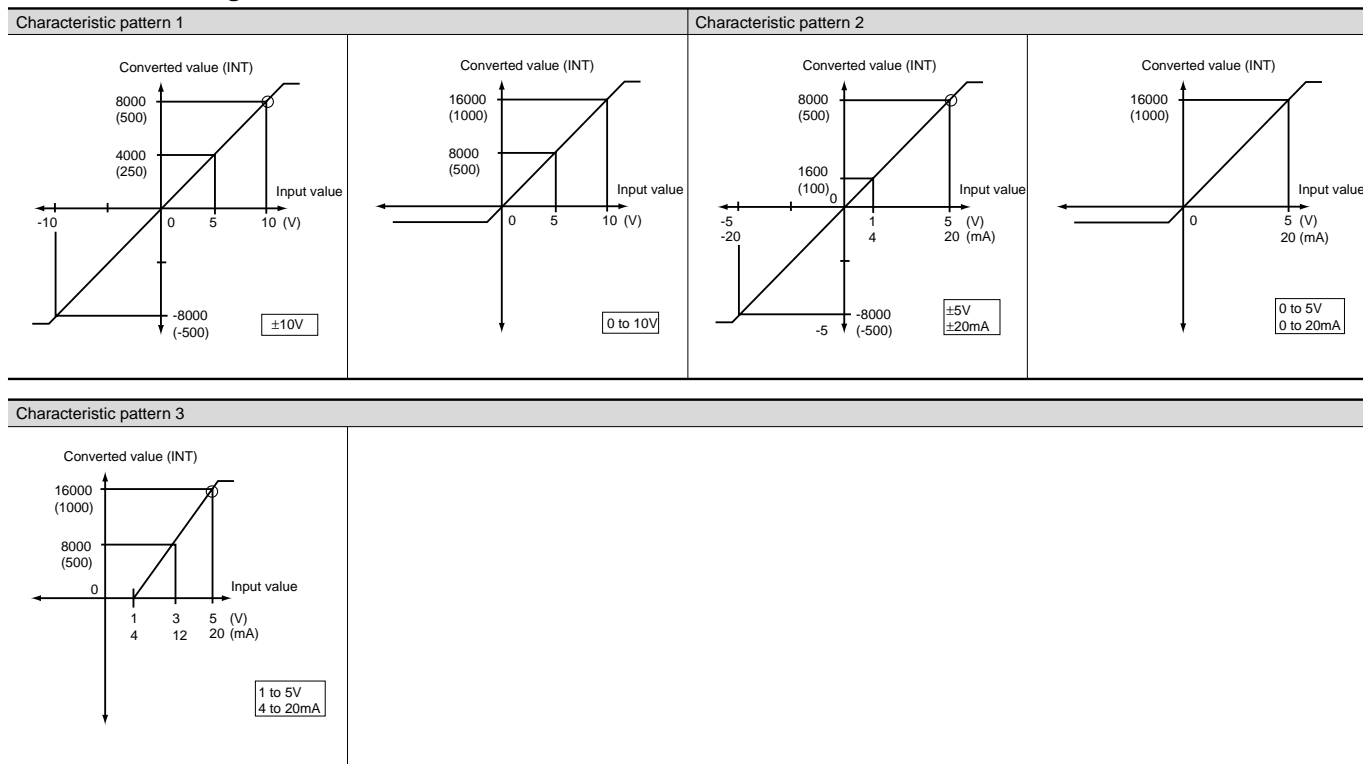| Characteristic pattern<br>Range of input | 1 | 2 | 3 |
|---|---|---|---|
| ± 5V | | ± 8000 (± 500) | |
| 0 to 5V | | 16000 (1000) | |
| 1 to 5V | | | 16000 (1000) |
| 0 to 10V | 16000 (1000) | | |
| ± 10V | ± 8000 (± 500) | | |
| 0 to 20mA | | 16000 (1000) | |
| 4 to 20mA | | | 16000 (1000) |
| ± 20mA | | ± 8000 (± 500) | |

## Analog Output Module: NP1AY☐

### ■ Performance specifications

| Type | Input | No. of channels | Signal range | Digital output value | Digital resolution | Total accuracy | Converting speed | Occupied word | External wire connection | Internal current consumption (24V DC) | Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NP1AYH8V-MR | Multi-range output | 8 ch | 0 to 5V DC 0 to 10V DC 1 to 5V DC, -10 to +10V DC | -8000 to +8000 or 0 to 16000 | 14 bits | ±0.1% or less (at 18 to 28°C) ±0.2% or less (at 0 to 55°C) ±0.3% or less (at 0 to 55°C, 1 to 5V range) | 2ms/8ch | 4 words + 8 words | Terminal block | 240mA or less | Approx. 240g |
| NP1AYH8I-MR | | | 0 to 20mA DC 4 to 20mA DC | 0 to 16000 | | ±0.1% or less (at 18 to 28°C) ±0.4% or less (at 0 to 55°C) | | | | 300mA or less | |
| NP1AYH4V-MR | | 4 ch | 0 to 5V DC 0 to 10V DC 1 to 5V DC, -10 to +10V DC | -8000 to +8000 or 0 to 16000 | | ±0.1% or less (at 18 to 28°C) ±0.2% or less (at 0 to 55°C) ±0.3% or less (at 0 to 55°C, 1 to 5V range) | 1ms/4ch | 4 words + 4 words | | 200mA or less | |
| NP1AYH4I-MR | | | 0 to 20mA DC 4 to 20mA DC | 0 to 16000 | | ±0.1% or less (at 18 to 28°C) ±0.4% or less (at 0 to 55°C) | | | | | |
| NP1AYH2-MR | | 2 ch | 0 to 5V DC 0 to 10V DC 1 to 5V DC, -10 to +10V DC | -8000 to +8000 or 0 to 16000 | | ±0.1% or less (at 25°C) ±1.0% or less (at 0 to 50°C) | 1ms/2ch | 2 words + 4 words | | 120mA or less | Approx. 200g |
| NP1AY02-MR | | | -5 to +5V DC 0 to 20mA DC 4 to 20mA DC | -500 to +500 or 0 to 1000 | 10 bits | ±0.5% or less (at 25°C) ±1.0% or less (at 0 to 50°C) | 2ms/2ch | | | | |

### ■ Characteristic diagram

| Characteristic pattern 1 | Characteristic pattern 2 |
|---|---|



| Characteristic pattern 3 | |
|---|---|



### ■ Input value and converted value

| Characteristic pattern / Range of input | 1 | 2 | 3 |
|---|---|---|---|
| ± 5V | | ±8000 (± 500) | |
| 0 to 5V | | 16000 (1000) | |
| 1 to 5V | | | 16000 (1000) |
| 0 to 10V | 16000 (1000) | | |
| ± 10V | ± 8000 (± 500) | | |
| 0 to 20mA | | 16000 (1000) | |
| 4 to 20mA | | | 16000 (1000) |

## Resistance Bulb Input Module: NP1AXH4-PT

- IEC Standards conformed sensors (platinum resistance thermometer bulb) can be connected. Batch setting is possible for all channels.
- Error detection (the detection of sensor wire breakage or short-circuit) is possible.
- Temperature scale is selectable between Celsius and Fahrenheit.

### ■ Specifications

| Item | Specification |
|---|---|
| Measurement accuracy | ± 0.3% (ambient temperature 18 to 28°C) |
| | ± 0.7% (ambient temperature 0 to 55°C) |
| | |
| | With the 0.0 to 100.0°C and -20.0 to 80.0°C ranges |
| | ± 0.4% (ambient temperature 18 to 28°C) |
| | ± 0.8% (ambient temperature 0 to 55°C) |
| Allowable input wiring resistance | 10Ω or less |
| Sampling interval | 500ms/4ch |
| Input filtering time | Hardware (time constant): 50ms |
| | Software filter: 1s (variable from 1 to 100s by program) |
| No. of input channels | 4 ch (insulation between channels) |
| No. of occupied I/O points | Input 8 words, output 8 words |
| Internal current consumption | 150mA or less |
| External connection | Removable terminal block M3, 20 pins |
| Mass | Approx. 240g |

### ■ Type of resistance thermometer element and Resolutions

| Type of resistance thermometer element | Celsius (°C) Measuring temperature range | Fahrenheit (°F) Measuring temperature range | Resolution of data |
|---|---|---|---|
| Pt | 0 to 200 | 32 to 392 | 1 |
| | -20 to 80 | -4 to 176 | |
| | 0 to 100 | 32 to 212 | |
| | 0 to 400 | 32 to 752 | |
| | -200 to 200 | -328 to 392 | |
| | -200 to 600 | -328 to 1112 | |
| | 0.0 to 200.0 | 32.0 to 392.0 | 0.1 |
| | -20.0 to 80.0 | -4.0 to 176.0 | |
| | 0.0 to 100.0 | 32.0 to 212.0 | |
| | 0.0 to 400.0 | 32.0 to 752.0 | |
| | -200.0 to 200.0 | -328.0 to 392.0 | |
| | -200.0 to 400.0 | -328.0 to 1112.0 | |
| JPt | 0 to 200 | 32 to 392 | 1 |
| | -20 to 80 | -4 to 176 | |
| | 0 to 100 | 32 to 212 | |
| | 0 to 400 | 32 to 752 | |
| | -200 to 200 | -328 to 392 | |
| | -200 to 500 | 328 to 932 | |
| | 0.0 to 200.0 | 32.0 to 392.0 | 0.1 |
| | -20.0 to 80.0 | -4.0 to 176.0 | |
| | 0.0 to 100.0 | 32.0 to 212.0 | |
| | 0.0 to 400.0 | 32.0 to 752.0 | |
| | -200.0 to 200.0 | -328.0 to 392.0 | |
| | -200.0 to 500.0 | -328.0 to 932.0 | |

### ■ Characteristic diagram
In case of PT0.0 to 400.0°C



(In 0.1°C units) (In 1°C units) Conversion value
4000   400
Temperature input value (°C)
400

## Thermo-couple Input Module: NP1AXH4-TC

- The following thermocouples that conform to IEC, ASTN and DIN Standards can be connected. Batch setting is possible for all channels.
  IEC: R, K, J, S, B, E, T, N    ASTN: W5Re, W26Re, PLII
  DIN: U, L
- Error detection (the detection of sensor wire breakage or short-circuit) is possible.
- Temperature scale is selectable between Celsius and Fahrenheit.
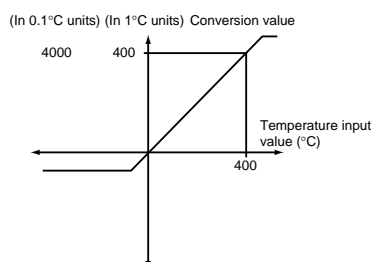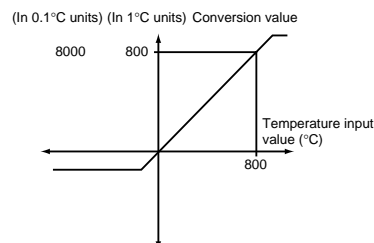
### ■ Specifications

| Item | Specification |
|---|---|
| Measurement accuracy | ± 0.3% (ambient temperature 18 to 28°C) |
| | ± 0.7% (ambient temperature 0 to 55°C) |
| | |
| | With K (0.0 to 400.0°C, 0.0 to 500.0°C, 0.0 to 800.0°C) |
| | and T (0.0 to 400.0°C) ranges |
| | ± 0.4% (ambient temperature 18 to 28°C), |
| | ± 0.8% (ambient temperature 0 to 55°C) |
| Cold contact compensation accuracy | ± 1°C (ambient temperature 18 to 28°C) |
| Allowable input wiring resistance | 100Ω or less |
| Sampling interval | 500ms/4ch |
| Input filtering time | Hardware (time constant): 50ms |
| | Software filter: 1s (variable from 1 to 100s by program) |
| No. of input channels | 4ch |
| No. of occupied words | Input 8 words, output 8 words |
| Internal current consumption | 150mA or less |
| External connection | Removable terminal block M3, 20 pins |
| Mass | Approx. 240g |

### ■ Thermocouple Types and Resolutions

| Thermocouple type | Celsius (°C) Measuring temperature range | Fahrenheit (°F) Measuring temperature range | Resolution of data |
|---|---|---|---|
| K | 0 to 1300 | 32 to 2372 | 1 |
| | 0 to 500 | 32 to 932 | |
| | 0 to 800 | 32 to 1472 | |
| | 0.0 to 400.0 | 32.0 to 752.0 | 0.1 |
| | 0.0 to 500.0 | 32.0 to 932.0 | |
| | 0.0 to 800.0 | 32.0 to 1472.0 | |
| B | 0 to 1800 | 32 to 3272 | 1 |
| R | 0 to 1700 | 32 to 3092 | 1 |
| S | 0 to 1700 | 32 to 3092 | 1 |
| E | 0 to 400 | 32 to 752 | 1 |
| | 0 to 700 | 32 to 1292 | |
| | 0.0 to 700.0 | 32.0 to 1292.0 | 0.1 |
| J | 0 to 500 | 32 to 932 | 1 |
| | 0 to 800 | 32 to 1472 | |
| | 0.0 to 400.0 | 32.0 to 752.0 | 0.1 |
| | 0.0 to 500.0 | 32.0 to 932.0 | |
| | 0.0 to 800.0 | 32.0 to 1472.0 | |
| T | 0 to 400 | 32 to 752 | 1 |
| | 0.0 to 400.0 | 32.0 to 752.0 | 0.1 |
| N | 0 to 1300 | 32 to 2372 | 1 |
| U | 0 to 400 | 32 to 752 | 1 |
| | 0 to 600 | 32 to 1112 | |
| | 0.0 to 600.0 | 32.0 to 1112.0 | 0.1 |
| L | 0 to 400 | 32 to 752 | 1 |
| | 0 to 900 | 32 to 1652 | |
| | 0.0 to 400.0 | 32.0 to 752.0 | 0.1 |
| | 0.0 to 900.0 | 32.0 to 1652.0 | |
| PL II | 0 to 1200 | 32 to 2372 | 1 |
| W5Re, W26Re | 0 to 2300 | 32 to 4172 | 1 |

### ■ Characteristic diagram
In case of K0.0 to 800.0°C



(In 0.1°C units) (In 1°C units) Conversion value
8000   800
Temperature input value (°C)
800

**23**

## I/O Connection of Connector-type Modules

The following types of modules are connected using connectors and recommended for the I/O connection use.

### ■ Connector type module list

| Item | Type | Specification |
|---|---|---|
| Digital input module | **NP1X3206-A** | 24V DC, 32 points, 4mA 0ms to 100ms variable, with 20kHz x 4 ch. built-in pulse counter |
| | **NP1X3206-W** | 24V DC, 32 points, 4mA 1ms to 100ms variable |
| | **NP1X3202-W** | 5/12V DC, 32 points, 3/9mA 1ms to 100ms variable |
| | **NP1X6406-W** | 24V DC, 64 points, 4mA 1ms to 100ms variable |
| Digital output module | **NP1Y32T09P1-A** | Tr. Sink, 24V DC, 32 points, 0.12A/point, 3.2A/common, with 20kHz x 4 ch. built-in pulse train output |
| | **NP1Y32T09P1** | Transistor sink, 12 to 24V DC, 32 points, 0.12A/point, 3.2A/common |
| | **NP1Y64T09P1** | Transistor sink, 12 to 24V DC, 64 points, 0.12A/point, 3.2A/common |
| | **NP1Y32U09P1** | Transistor source, 12 to 24V DC, 32 points, 0.12A/point, 3.2A/common |
| | **NP1Y64U09P1** | Transistor source, 12 to 24V DC, 64 points, 0.12A/point, 3.2A/common |
| Digital input /output module | **NP1W3206T** | 24V DC, 16 points, Source input, 12 to 24V DC, Tr sink 16-point output |
| | **NP1W3206U** | 24V DC, 16 points, Sink input, 12 to 24V DC, Tr source 16-point output |
| High-speed counter module | **NP1F-HC2** | 500kHz x 2 ch, 90-degree phase difference 2-phase signal, pulse + directional signal, others |
| Multi-channel high-speed counter module | **NP1F-HC8** | 50kHz x 8 ch, , 90-degree phase difference 2-phase signal, pulse + directional signal, others |
| Pulse train output positionig control module | **NP1F-HP2** | Pulse train command 250kHz x 2 ch. |
| Pulse train positioning control combined module | **NP1F-MP2** | 2-axis pulse train command positioning control combined module output pulse: 250kHz, Feedback pulse: 500kHz |
| Analog command positioning control combined module | **NP1F-MA2** | 2-axis analog command positioning control combined module feedback pulse: 500kHz |

### ■ Recommended connector

| Description | Type (Fujitsu) | |
|---|---|---|
| Solder type * | Socket: FCN-361J040-AU | Cover: FCN-360C040-B |
| Crimp-style type | Housing: FCN-363J040 | Cover: FCN-360C040-B |
| | Contact: FCN-363J-AU | |
| Pressure-welding type | FCN-367J040-AU/F (no cover needed) | |

Note: * For the solder-type, the Fuji Electric connector (**NP8V-CN**) is available.
For details information of Fujitsu made connector, contact our sales section.

### ■ Recommended relay terminal blocks and connection cables

● Type, model, and product cod
• Unit

| Model | No. of terminal block pins | No. of connector pins | Rating (connector) | Performance | Product code |
|---|---|---|---|---|---|
| AU-CW41B1-11 | 41 | 40 | Insulation voltage: 60V (AC,DC) Conductive current: 1A (40°C) | Insulation resistance: 100mΩ or more Withstand voltage: 500V, 1 minute Allowable ambient temperature: -5 to +40°C Allowable ambient humidity: 45 to 85%RH Flame resistance: UL94-V1 | LP1W-41BA5 |

• Connection cable

| Applicable terminal block model | No. of pins | Cable type | Connection cable model | Product code |
|---|---|---|---|---|
| AU-CW41B1-11 | 40 | Multi-core cable | AUX011-40□ | LP911-40□ |
| | | Flat cable | AUX021-40□ | LP921-40□ |

* □ indicates the length of the multi-core cable and flat cable.
1:1m (standard), 2:2m, 3:3m

● Recommended cables
• Cable with connectors
AUX011-40 □ type (Fujitsu)
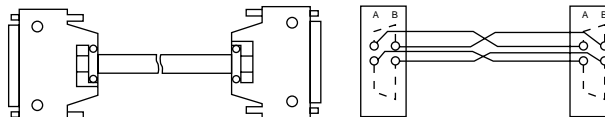
• Flat cable with connectors
AUX021-40 □ type (Fujitsu)
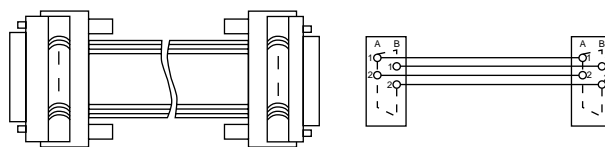
● Dimensions, mm (AU-CW41B1-11 type)



212
202
192
Connection diagram  Connector
53
33
15.6
9.4
6
M3.5
4.5
44
6
35
8.6
20.5 11.2
33.5 13.5

12 8.89 7.1  Cover  8.89 16.5
44.7
8

**Connection diagram**

Connector No. /Terminal block No.

B | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
A | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
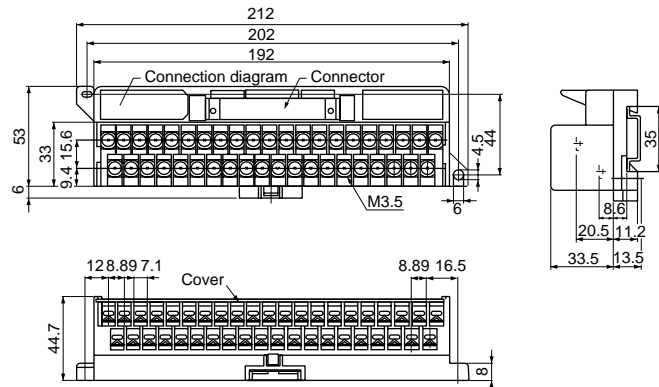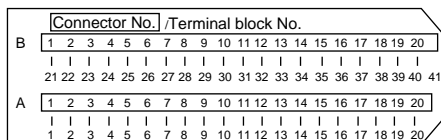
AU-CW41B1-11 connector mounting direction (viewed from the fitting side)

B1 — 20
A1 — 20
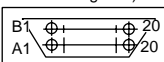
## Terminal Relay

### ■ Features

- Minimum width of 110mm has been achieved.
  The external dimension is as compact as 110mm (W) x 52mm (D) x 37mm (H).  In particular, the minimum width in this field has been implemented.  (As of Sept. '97)
- Push-set terminal facilitates tightening screws.
  Push-set terminal is used in the terminal section, eliminating the screw tightening time and preventing screws from being lost.
- LED operation indication facilitates I/O ON/OFF operation check.
  Operation indication LED is arranged in 1:1 correspondence with the relay.  This makes the ON/OFF relay operation status clear at a glance.
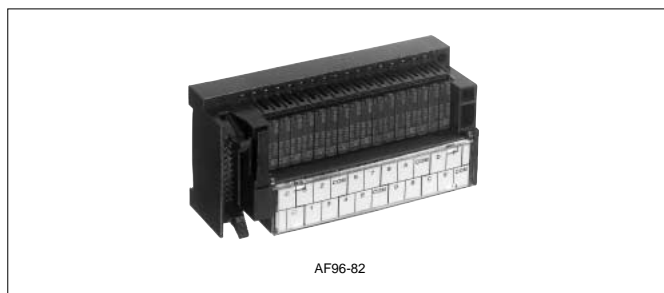
AF96-82

- Two types of relays available for output and input.
- With surge protection diode provided.
- Terminal cover is installed as standard allowing device No. indication.
- With the built-in relay remover.
- Used for both DIN rail installation and rear-side screw mounting.

### ■ Performance specifications

| Item | | Performance |
|---|---|---|
| Operating duration | | 10ms or less |
| Recovery duration | | 10ms or less |
| Vibration resistance | Malfunction | 10 to 55Hz, Duplex amplitude 1.0mm |
| | Durability | 10 to 55Hz, Duplex amplitude 1.0mm |
| | | 3 times each in X, Y, and Z directions to total 18 times |
| Impact resistance | Malfunction | 100 m/s$^2$ |
| | Durability | 200 m/s$^2$ |
| | | 2 hours each in X, Y, and Z directions to total 6 hours |
| Operation ambient temperature | | -25 to +55 °C (no condensation) |
| Operation ambient humidity | | 35 to 85% RH |
| Terminal screw size | | M3 |
| External connection tightening torque | | 0.5 to 0.7 N·m |
| Mounting method | | Rail mounting (screw mounting also possible) |
| Applicable round-type crimp-style terminal | | R1.25 to 3 (max.6mm wide) |
| Connection wire | | max. ø1.4 |
| LED indication color | | Operation indication: Red, Power indication: Green |
| Coil surge protection element | | Diode |
| Relay removal count | | 50 times |
| Insulation resistance (initial) | | 100 MΩ or more (with 500V DC megger) |
| Voltage resistance | Between contact coils | For 1 min. at 2000V DC |
| | Between contacts with same polarity | For 1 min. at 1000V DC |
| | Between contacts with different polarity | For 1 min. at 2000V DC |
| Mass | | 200g |

### ■ Type/Model/Ordering code

| Model (Ordering code) | I/O type | No. of points | Rated voltage | Common line handling on Connector side |
|---|---|---|---|---|
| **RS16-□04** | Output | 16 points | 5V DC [DY] | NPN compatible (+ common) |
| **RS16-□04P** | | (1a x 16) | 24V DC [DE] | PNP compatible (- common) |
| **RS16E-□04** | Input | 16 points | | NPN compatible (+ common) |

### ■ Rating
Opening section, connector side (per RB105 1 point)

| | | RS16 (output) | | | | RS16E (input) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Item | Load | Resistance load (cosø =1, L/R=0ms) | | Inductive load (cosø =0.4, L/R=7ms) | | Resistance load (cosø =1, L/R=0ms) | | Inductive load (cosø =0.4, L/R=7ms) | |
| Rated load, rated voltage/current | | 220V AC 2A | | 220V AC 2A | | 24V DC 1A | | 24V DC 1A | |
| Rated conducting current | | 2A  * (1) | | | | 1A  * (2) | | | |
| Contact resistance | | 30mΩ or less | | | | 30mΩ or less | | | |
| Voltage/current applicable to min. applicable load (P standard reference value) | | 0.1V  0.1mA | | | | 0.1V  0.1mA | | | |
| Mechanical lifetime | | 20 mil. times | | | | – | | | |
| Electrical lifetime | | 0.2 mil. times | 0.3 mil. times | 0.1 mil. times | 0.06 mil. times | | | | |

(1) The relay (RB105) is a 5A rated conducting current product.  However, the main unit rated conducting current is restricted to 2A due to the structural characteristics of the terminal relay.
(2) The relay (RB105) is a 5A rated conducting current product.  However, the main unit rated conducting current is restricted to 1A due to the structural characteristics of the terminal relay.

Operating coil I/O specification (per RB105 1 point)                                              (at 20°C)

| Rated voltage | Rated current | Coil resistance ±10% | Operating voltage | Recovery voltage | Max. allowable voltage | Power consumption | |
|---|---|---|---|---|---|---|---|
| | | | | | | Per 1 point | Per 16 points |
| 5V DC | 40mA | 125Ω | 70% or less of rated voltage | 10% or more of rated voltage | 110% of rated voltage | 0.2W | 3.2W |
| 24V DC | 8.3mA | 2,880Ω | 70% or less of rated voltage | 10% or more of rated voltage | 110% of rated voltage | 0.2W | 3.2W |

Note: Current supplied to LED is approximately 1mA.  To calculate the power supply capacity, add the current value.
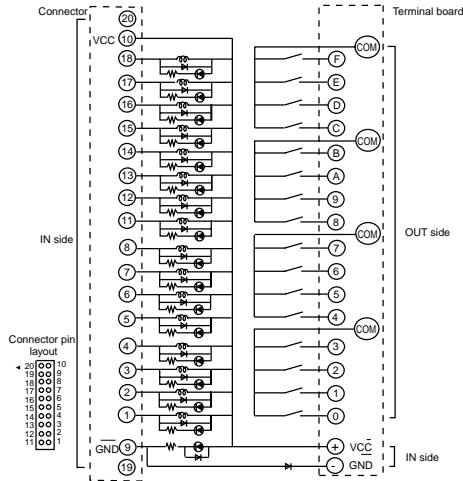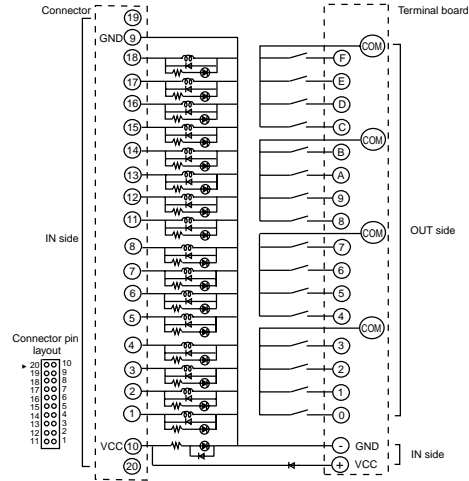
## ■ Internal connection diagram

● **RS16-DE04** (output, applicable to NPN)



● **RS16-DE04P** (output, applicable to PNP)



● **RS16E-DE04** (input, applicable to NPN)
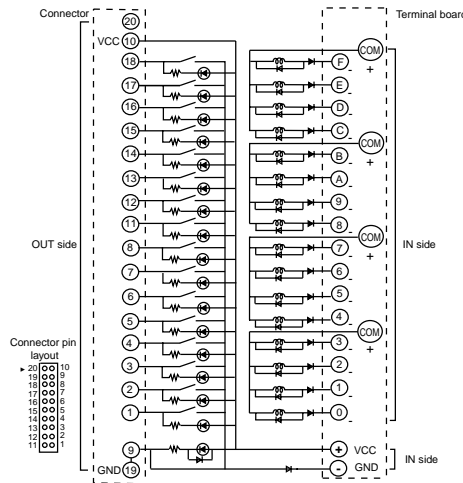


## ■ Using the push-set terminal

(1) Push up the terminal screw with a screwdriver, etc.



AF95-388

(2) When the terminal screw is pushed up, insert the solderless terminal.



AF95-389

(3) When the solderless terminal is inserted, push down the terminal screw with a screwdriver and then fasten screws.



AF95-390

(Note) Fasten the screw of unused terminals.

## ■ Dimensions

Units: mm



Remover

Power indicator lamp (green)   Operation indicator lamp (red)

110

52

4.7

M3 x 22

Connector Hirose HIF3CA-20PA-2.54DSA

50 (for rail height 15)
42.5 (for rail height 7.5)
(39)
37
33

35mm wide DIN rail

Panel hole dimension (for panel mounting)

111 (min. installation pitch)

43.5

14.8

2- ø4.2
(M3 to M4 screw hole for screw mounting)

91

4.2
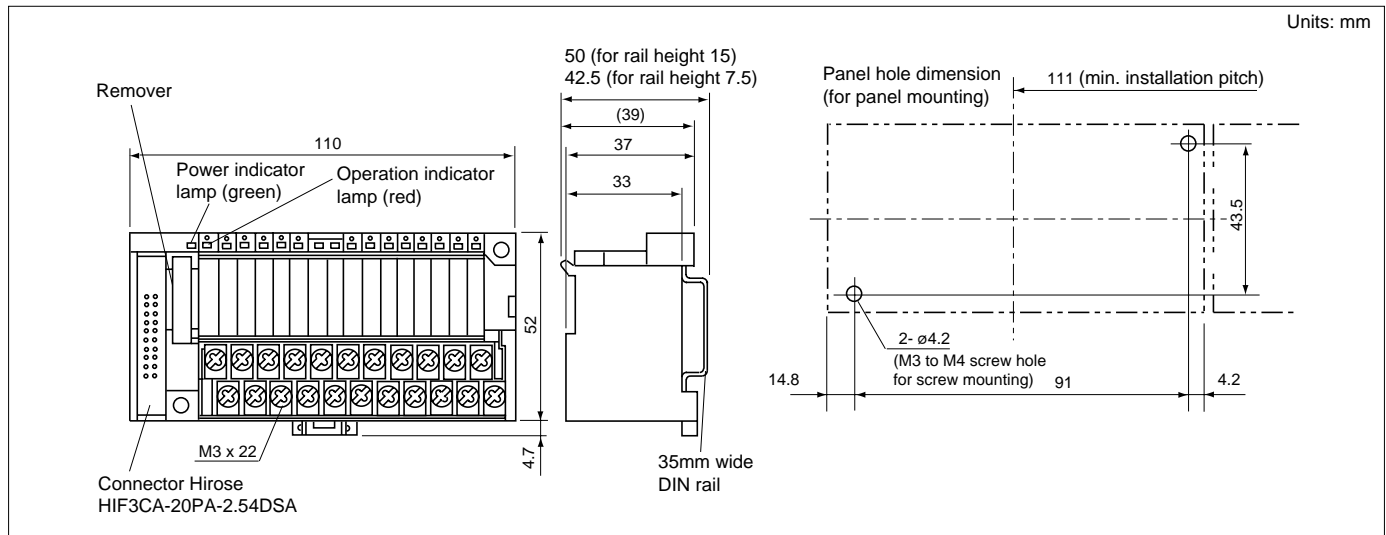
■ **Terminal relay cable**
● Type/Model/Ordering code

| Type | Cable Length | Model (ordering code) |
|---|---|---|
| Cable with connectors (1:2) | 1,000mm | **RS910M2-0104** |
| For MICREX-SX | 2,000mm | **RS910M2-0204** |
| (for input, output) | 3,000mm | **RS910M2-0304** |

● Dimension specification

| Model (ordering code) | I/O type | Compatible PLC | | External specification | |
|---|---|---|---|---|---|
| **RS910M2-□□04** | Output | MICREX-SX series Tr output module **NP1Y32**□ *1 **NP1Y64**□ | | | |
| Numeric in □□ indicates a cable length. 01: 1m 02: 2m 03: 3m | Input | MICREX-SX series Input module **NP1X32**□ **NP1X64**□ **NP1W3206T**□ | | Controller side — Connector: Fujitsu FCN367J040 -AU/F — Straight length (without bending) — Connector: Hirose HIF3BA-20D -2.54R — Terminal relay side | |

*1 **NP1Y32T09P1-A** (with the pulse train output function) is not applicable.

⚠ **Notes on use**

(1) Attachment direction
Although there is especially no limitation on the attachment direction, when the relay can be attached horizontally with respect to the floor surface, the direction where the connector comes to the lower side, as shown at right, is recommended. This direction makes the moving section of the relay come to the lower side, thus improving the resistance to vibration. In this case, use retainer fitting TS-XT to prevent the section from dropping downward.
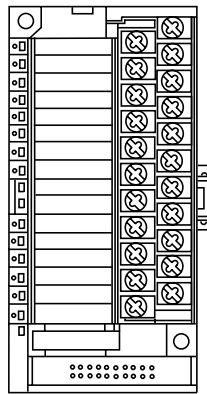
(2) Attach the relay to or remove it from the socket so that it be perpendicular to the surface of the socket. Attaching or removing the relay slantly may cause bend of the relay terminal or damage to the socket. Use the provided pull-out tool when attaching or removing the relay.

(Connector side)
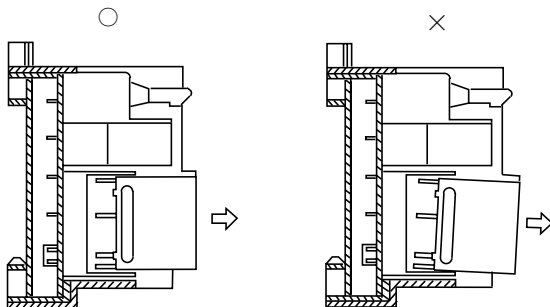
(3) The type of the relay corresponding to the card relay terminal relay applicable to the terminal relay is RB105. As the replacement relay, use a relay of the same type and with the same voltage specification as the one supplied at the time of delivery.

(4) When attaching the PC terminal to the control panel, etc., leave a space between the adjacent equipment or duct and the PC terminal to secure a space for connector removal handle operation, as shown at right.
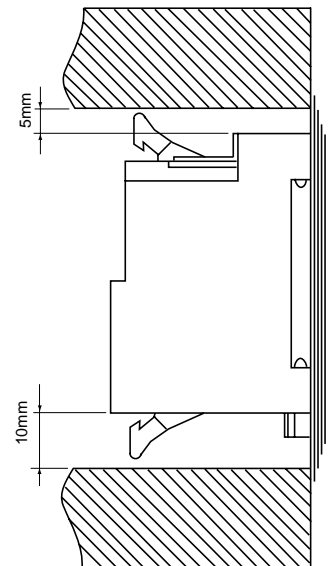
(5) As for connector selection, use connectors prepared as an option. When using commercial products, use products from Hirose Electric. Using a connector from other manufacturers may cause inferior connection or other failures.

## Computer-level Communication Module
### Web Module: NP1L-WE1

### ■ Features

Through the Internet and Intranet, this module realizes equipment supervision by Web browser, E-mail sending at failure occurrence, and remote control and remote maintenance (monitoring/program modification) by the programming support tool.
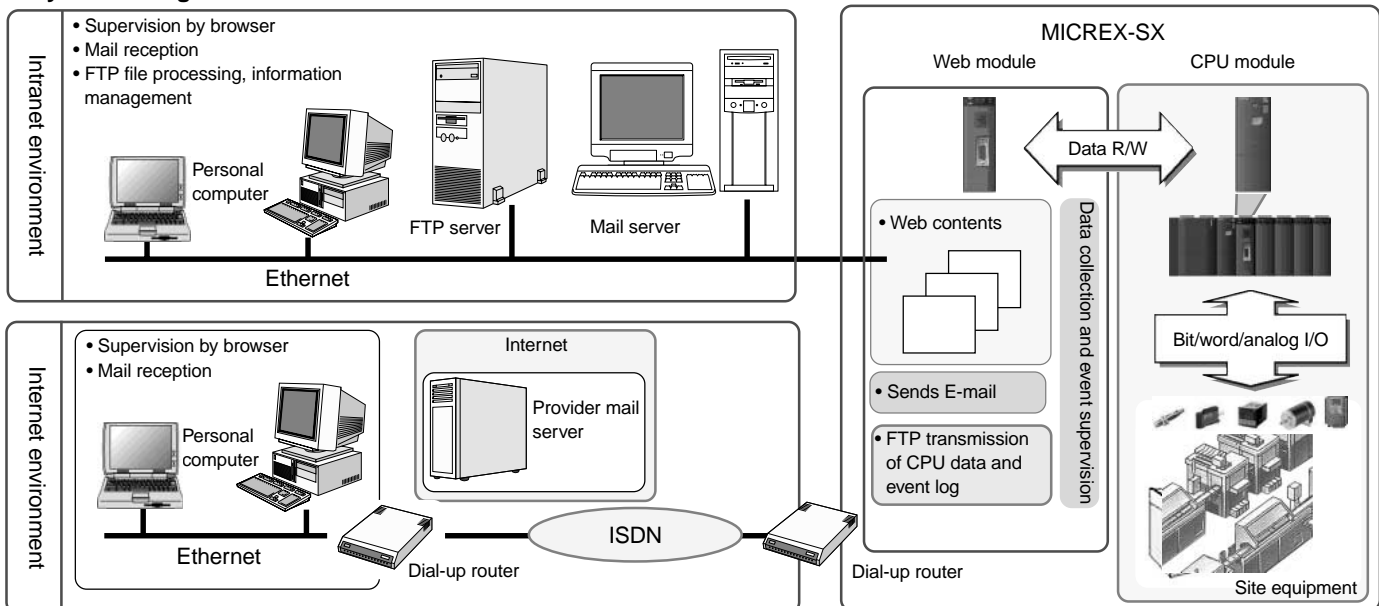
**NP1L-WE1**
KD02-041A

### ■ Functional specifications

| Item | Specification |
|---|---|
| Web server functions | Controller data can be monitored and set using a browser (Internet Explorer) on a remote personal computer. Mounts the tabular form data display and trend graph display functions as standard. Initial setup items for the Web modules are all set in the browser screen. |
| E-main send function | Sends E-mail (failure alarm notification, etc.) to the specified destination address at occurrence of a set event. |
| FTP function | Saves trend data and CPU data (binary file) in external FTP server at occurrence of a set event. Saved data can be processed to generate a daily/monthly report or trend graph. |
| Security function | Limits users and setup operations by user name and password. |
| Remote loader function | Remote operation of SX support tool (D300win), such as monitoring of SPH sequence, from a personal computer |
| PPP function (option) | Realizes the above functions through telephone circuit connection service, PPP connection, etc. |
| User contents creation function | Incorporates user-created contents in the Web module. |

### ■ Functional specifications

| Item | Specification |
|---|---|
| Ethernet interface | 10BASE-T/100BASE-TX, RJ45 modular jack x1 Auto negotiation |
| RS-232C interface (Option for PPP connection) | 115.2kbps max. Dsub 9-pin (male) connector x1 Character format Data length: 7/8 bits Parity: Even/odd parity Stop bits: 1/2 bits Hardware flow control: Provided |
| No. of units mounted | 4 or less recommended (in the same configuration) |
| Internal current consumption | 24V DC, 140mA or less |
| Mass | Approx. 140g |

### ■ System configuration



- Intranet environment
  - Supervision by browser
  - Mail reception
  - FTP file processing, information management
  - Personal computer
  - FTP server
  - Mail server
  - Ethernet

- Internet environment
  - Supervision by browser
  - Mail reception
  - Personal computer
  - Internet / Provider mail server
  - Ethernet
  - Dial-up router
  - ISDN
  - Dial-up router

- MICREX-SX
  - Web module
  - CPU module
  - Data R/W
  - Web contents
  - Sends E-mail
  - FTP transmission of CPU data and event log
  - Data collection and event supervision
  - Bit/word/analog I/O
  - Site equipment

**VICPAS**
HMI Parts Center

## Ethernet Interface Module: NP1L-ET1
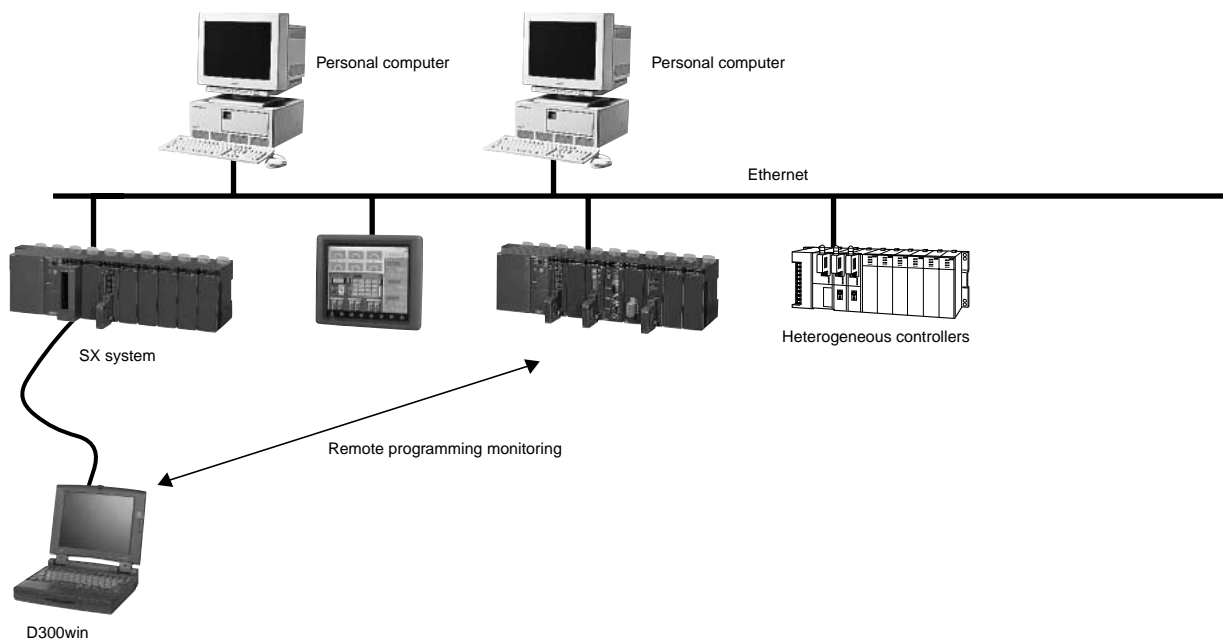
### ■ Features
- Supports the 100BASE-TX interface as well as 10BASE-T.
  (Automatic selection by the auto negotiation function)
- Supports three different communication modes.
- Genera-purpose communication mode
  (TCP/IP or UDP/IP protocol communication)
- Fixed buffer communication mode
  (Handshake communication between PC and specific node)
- Loader command communication mode
  (MICREX-SX loader command function)

**NP1L-ET1**
KD02-040A

### ■ Performance specifications

| Item | | NP1L-ET1 |
|---|---|---|
| Communication function | Application | General-purpose communication |
| | communication mode | Fixed buffer communication |
| | Loader command automatic reception mode | Automatic transmission communication |
| Interface | | 10BASE-T/100BASE-TX |
| | | Automatic selection by the auto negotiation function |
| Media control | | IEEE 802.3/IEEE 802.3u |
| Transmission rate | | 10Mbps/100Mbps |
| Transmission medium | | Twist pair cable (UTP) |
| Protocol | | TCP/IP, UDP/IP |
| Max. number of nodes for simultaneous communication | | 16 stations (ports) |
| Max. number of transmit words | | 1017 words |
| Max. number of loader connections simultaneously | | 8 units |
| No. of units mounted | | 4 or less recommended (in the same configuration) |
| Internal current consumption | | 24V DC, 140mA or less |
| Mass | | Approx. 140g |

### ■ System configuration

Personal computer

Personal computer

Ethernet

SX system

Heterogeneous controllers

Remote programming monitoring

D300win

## Online Adapter: FOA-ALFA2

### ■ Features

This module allows easy remote maintenance system configuration simply by connecting the online adapter to the loader port without changing any program on the PC (MICREX-SX SPH) side.

- Bi-directional communication between the master station (personal computer) and slave station (SPH)
- Diverse functions
  - Failure monitor function   • Data accumulation function
  - Integrated time monitor function
- Calendar function (year, month, day, hour, minute, second)
- Data backup function (data memory, calendar IC memory)
- Communication status display by LED indicators

### ■ Specifications
- General specifications

| Item | | Specification |
|---|---|---|
| Physical environment | Operating ambient temperature | 0 to ± 55°C (without condensation) |
| | Storage temperature | -20 to ± 70°C (without condensation) |
| | Relative humidity | 20 to -90%RH (without condensation) |
| | Contamination | Contamination level 2 |
| | Corrosion resistance | No corrosive gas is present, no organic solvent adhesion |
| | Operating altitude/air pressure | Altitude of 2000m or less (air pressure of 70kPa or higher during transportation) |
| Mechanical operating condition | Resistance to vibration | One amplitude: 0.15mm, constant acceleration: 9.8m/s², 2 hours for each direction, 6 hours total |
| | Resistance to shock | Peak acceleration: 294m/s², 3 times for each direction |
| Electrical operating condition | Resistance to noise | Noise simulator method, rise time of 1ns, pulse width of 1us, 1kV |
| | Resistance to electrostatic discharge | Contact discharge method: ± 6kV, air discharge method: ± 8kV |
| | Resistance to radiation electromagnetic field | 10V/m (80 to 1000MHz) |
| Cooling system | | Natural cooling |
| Insulation characteristic | Insulation resistance | 10MΩ or more (between connectors and ground) with a 500V DC megger Supplies 24V DC from PC or 12V DC from AC adapter. |
| Power supply method Current consumption | | 24V: 60mA or less 12V: 120mA or less |
| Mass | | Approx. 320g |
| Calendar accuracy | | ± 90 seconds/month (25°C, conduction) |
| Battery type/operating life | | Lithium primary battery 3.6V **NP8P-BT** (FUJI ELECTRIC)/ 5 years (ambient temperature of 25°C) |

Note: For operating environment, take into consideration the specifications of the communication devices used.
\* Use the AC adapter only at the time of initial setup data transmission. Do not use it for connection with SPH.

### ■ System configuration



Specialized connection cable (option) **NP4H-CB2**

### ■ Initial setup loader (Model: FOA-LOADER2-CD) <Japanese version>

The initial setup loader is provided with the following functions:
- Creates initial setup data (each function setup). Sets the failure monitor, data accumulation, integrated time monitor functions and registers AT commands for communication.
- Writes the initial setup data to the online adapter. After creating setup data (each function setup) using the initial setup loader, writes the data to the online adapter.
- Reads the initial setup data from the online adapter. Loads the initial setup file of the online adapter in the initial setup loader screen.
- Reads the version information in the online adapter. Loads the version information of the online adapter in the initial setup loader screen.
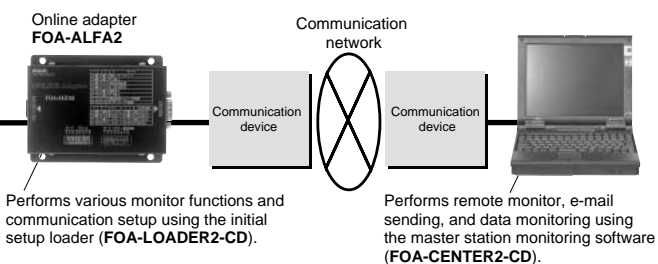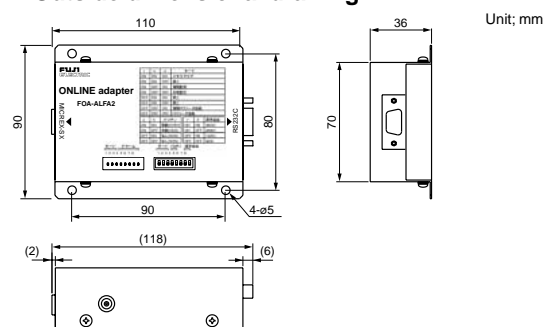


**FOA-ALFA2**
KD02-024B

- Functional specifications

| Mode | Contents |
|---|---|
| Online adapter mode | Execution mode of various monitor functions |
| Loader mode | Monitors SPH programming monitor locally. |
| Remote mode | Monitors SPH programming monitor from a remote site. |
| Initial setup mode | Writes setup data necessary for various monitor functions using the initial setup loader |
| Memory clear mode | Backup memory initialization (clear) mode |

### ■ Outside dimensional drawing



Unit; mm

Online adapter **FOA-ALFA2**

Communication network

Communication device

Communication device

Performs various monitor functions and communication setup using the initial setup loader (**FOA-LOADER2-CD**).

Performs remote monitor, e-mail sending, and data monitoring using the master station monitoring software (**FOA-CENTER2-CD**).

### ■ Master station monitoring software (Model: FOA-CENTER2-CD) <Japanese version>

The master station monitoring software is provided with the following functions:
- Slave station monitor function (reception of notification from slave station)
  - Failure monitor function   • Data accumulation function
  - Integrated time monitor function
- Access from the master monitor software (personal computer) to slave station.
- Reads data accumulated in the online adapter.
- Automatically collects data by time specification (with circuit connection each time).
- Updates the initial setup data from a remote site. (Remote update function)
- Uses the personal computer loader software from a remote site.
- Other functions
  - Saves receive data as CSV files.
  - Monitors accumulated data in bar graph form.
  - Upon reception of failure information, automatically transfers the failure information to E-mail-based mobile tool through the internet using the online adapter.

## Controller-level Communication Module
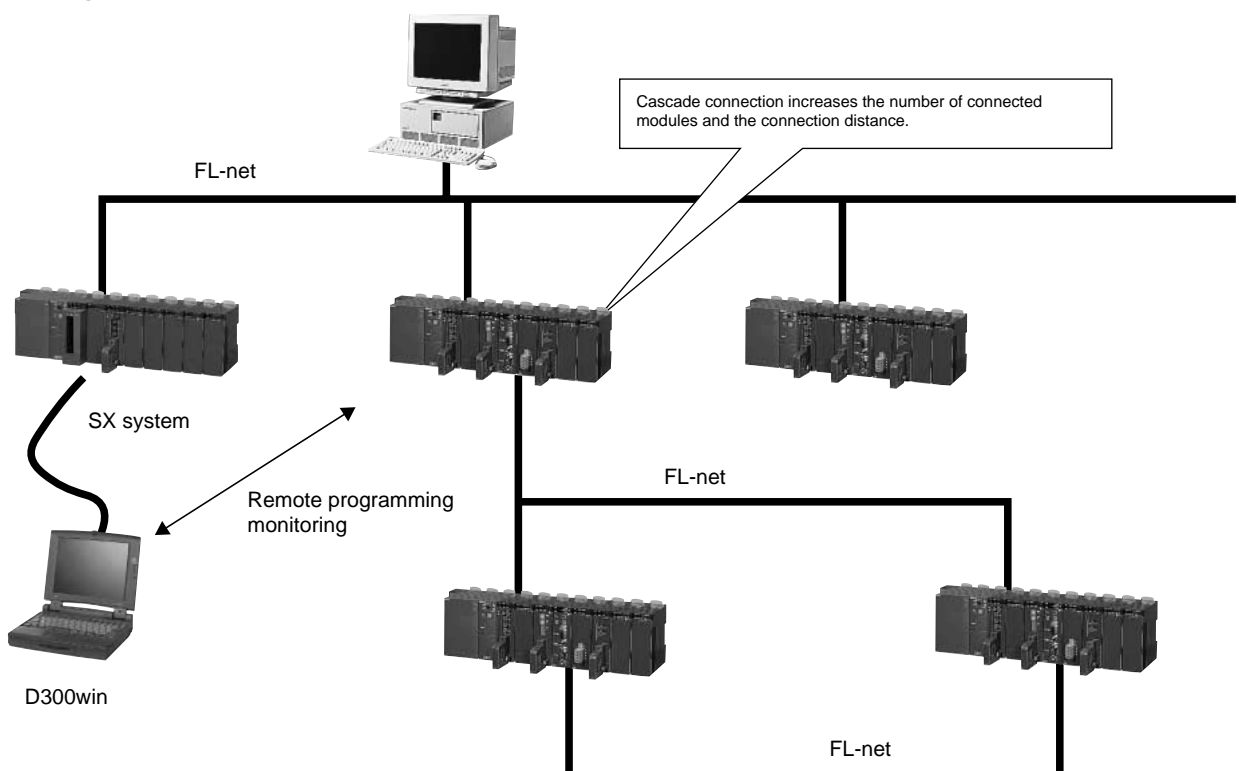## FL-net (OPCN-2) Ver. 2.0 Module: NP1L-FL2

### ■ Features
- Up to 2 communication modules including P/PE-link can be installed on the base board equipped with CPU.
- Data exchange between processors
  Cyclic data communication, message communication
- FL-net loader commands supported
- SX system loader functions via network are supported.

**NP1L-FL2**    AF99-339

### ■ Performance specifications

| Item | Specification | |
|---|---|---|
| Transmission specification | **10BASE 5** | **10BASE T** |
| No. of SX bus connectable modules | Max.2 /configuration (including P/PE-link) | |
| Max. number of system nodes | 254 units (100 units/segment) | 254 units (2 units/segment) |
| Transmission line format | Bus configuraiton (multi-drop) | |
| Transmission line | Ethernet coaxial cable | UTP (unshilded twisted pair cable) |
| Framing method | Ethernet II | |
| Access control | CSMA/CD | |
| Transmission method (code) | Base band (Manchester coding) | |
| Transmission speed | 10Mbps | |
| Max. segment length | 500m (2500m max. with repeater) | 100m (between node and hub) (max. 200m with repeater) |
| Max. nodes | 254 (However, it is necessary to increase the segment by using the repeater.) | |
| Min. node interval | 2.5m (multiplying integer of 2.5m) | – |
| Protocol | FA link protocol, UDP/IP, ICMP, ARP | |
| IP address | Class C | |
| Data exchange method | • Cyclic broadcast transmission method    Data size: Max. 8.5kW | |
| | • Message transmission method    Data size: Max. 512W | |
| Host interface | Common memory cyclic refresh method, block data read/write | |
| Internal current consumption | 24V DC, 105mA or less | |
| Mass | Approx. 220g | |

### ■ System configuration

Cascade connection increases the number of connected modules and the connection distance.

FL-net

SX system

Remote programming
monitoring

FL-net

D300win

FL-net

## ADS-net Module: NP1L-AD1

### ■ Features
- Supports the Autonomous Decentralized Protocol (R3.0) * and is provided with the following functions:
  - Multicast communication function
  - Existence signal transmit function
  - Trouble information transmit function
- Supports the test support function.
- Supports input and output of I/O transactions and up to 16 TCDs.
- Supports the 10BASE-T (TPI) and 10BASE5 (AUI) interfaces.

\* The Autonomous Decentralized Protocol is a protocol decided by FA Open Systems Promotion Forum (FAOP) of Manufacturing Science and Technology Center (MSTC, Japan), and the protocol is being discussed in ISO.

**NP1L-AD1**
KD02-039A

### ■ Performance specifications

| Item | Specification (overview) |
|---|---|
| Communication function | • Multicast communication (function class: Base-1) Note 1 |
| | • Existence signal transmission (function class: Base-2) Note 2 |
| | • Trouble information transmission (function class: Base-3) Note 3 |
| Message size | Up to 1024 bytes (user data section) |
| Message buffer size | Selected from 256/512/1024 bytes. |
| No. of data fields registered | 1 data field |
| No. of multicast groups registered | Up to 8 groups |
| No. of output transaction codes | Up to 16 TCD |
| No. of input transaction codes | Up to 16 TCD |
| Test node setup | Possible |
| Interface selector switch | Selected by the switch on the front panel of the module. |
| Interface | 10BASE-T or 10BASE5 |
| Media control | IEEE 802.3 |
| Transmission rate | 10Mbps |
| Max. segment length | 10BASE-T: 100m, 10BASE5: 500m (2500m max. with repeaters) |
| Max. number of nodes | 10BASE-T: 1 unit/segment, 10BASE5: 100 units/segment |
| Protocol | UDP/IP, autonomous distribution protocol (R3.0) |
| External power supply | 12V DC, 500mA Note 2 |
| Internal current consumption | 24V DC, 140mA or less |
| Mass | Approx. 220g |

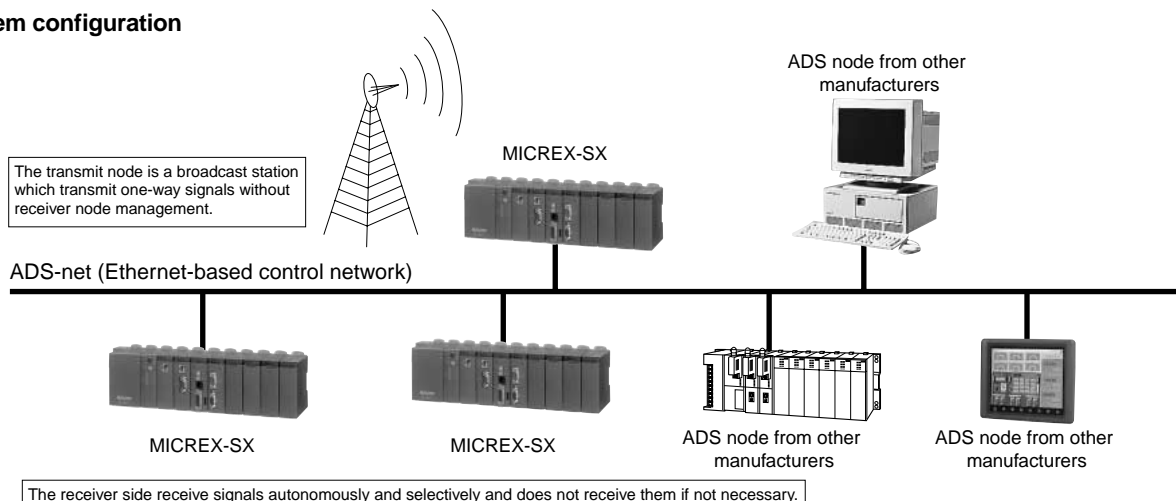Note 1: 10BASE-T and 10BASE5 cannot be used at the same time.
Note 2: When 10BASE5 is used, an external power supply (12V DC) is required. Use an external power supply (12V DC) which satisfies the specifications of the transceiver and transceiver cable (AUI cable).
**[Reference]**
IEEE 802.3 defines the following specifications of the transceiver and transceiver cable (AUI cable):
• Transceiver I/O terminal voltage: 12V DC-6% to 15V DC+5%
• Transceiver cable DC resistance: 40 Ω/km or less, maximum total length 50m
• Transceiver maximum current consumption: 500mA

### ■ System configuration

ADS node from other manufacturers

The transmit node is a broadcast station which transmit one-way signals without receiver node management.

MICREX-SX

ADS-net (Ethernet-based control network)

MICREX-SX

MICREX-SX

ADS node from other manufacturers

ADS node from other manufacturers

The receiver side receive signals autonomously and selectively and does not receive them if not necessary.

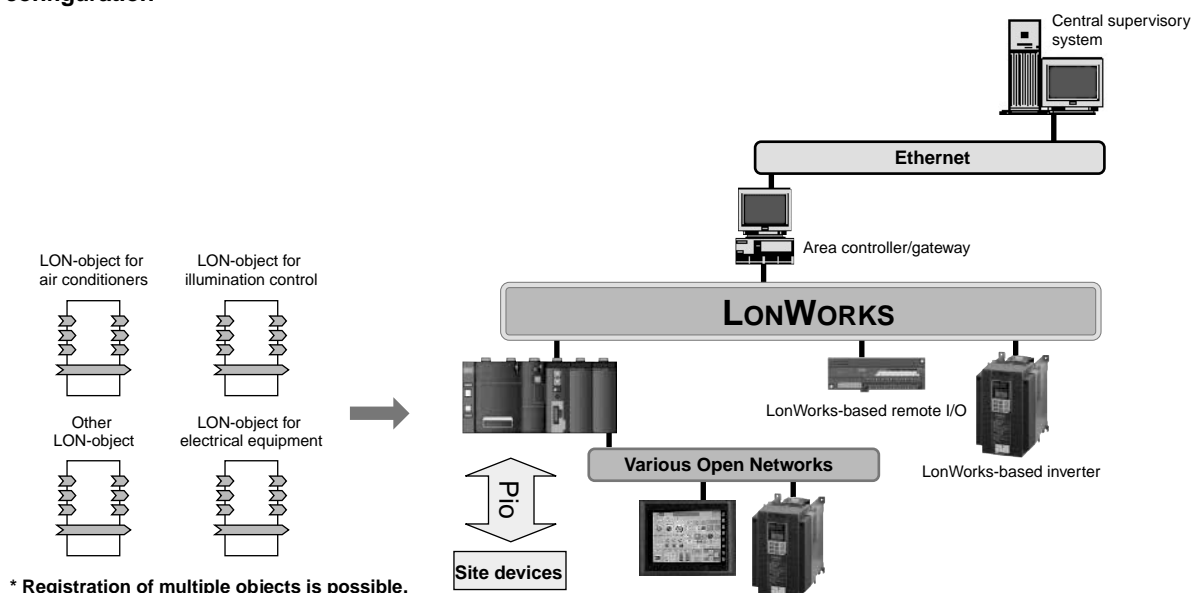## LonWorks Network Interface Module: NP1L-LW1

### ■ Features
- Uses the communication extension FB compatible with the LonWorks network, making it easier to transfer and receive MICREX-SX application data to/from other LonWorks nodes.
- Max. number of NVs: 300, Number of CPs: Up to 200 intelligent nodes can be configured.
- Up to two units can be mounted in one system (configuration).

**NP1L-LW1**
AF00-197

### ■ Specifications

| Item | Specification | Remarks |
|---|---|---|
| Applicable standards | LonTalk (EIA-709.1), LonMark | |
| Transmission rate | 78k bit/sec | |
| Transmission distance | 2200m | Uses 16AWG for communication with the bus type. |
| | 500m | Uses 16AWG for with free topology. |
| No. of node connections | 64 units | No. of node connections in the same segment |
| Transceiver | FTT-10A | |
| Control LSI | TMPN3120 | Application programs operate on SPH. |
| No. of LonWorks modules mounted | Up to 2 modules | Can be used through connection to two LonWorks networks. |
| Max. number of NVs | 300 | Depends on the definition. |
| Max. number of CPs | 200 | Depends on the definition. |
| Total data size of NV+CP | 8K words + 128 words | |
| Pio area size | 128 words | Used for NV and CP. |
| Memory area size | Size x 4 blocks, a total of 8K words or less | Used for NV and CP. |
| No. of address entries | Fixed to 15 | No. of nodes for NVo variable binding |
| No. of domain table entries | Fixed to 2 | |
| Internal current consumption | 24V DC, 140mA or less | |
| Mass | Approx. 200g | |

### ■ System configuration



Central supervisory system

Ethernet

Area controller/gateway

LONWORKS

LON-object for air conditioners
LON-object for illumination control
Other LON-object
LON-object for electrical equipment

LonWorks-based remote I/O
LonWorks-based inverter

Various Open Networks

Pio

Site devices

**\* Registration of multiple objects is possible.**

## LonWorks Network Interface Module Support Tool: NP4N-LNDF [Japanese Version]

### ■ SLDEF (Model: NP4N-LNDF)
- To perform communication with the LonWorks network, it is necessary to define network variables using the specialized tool compatible with the LonWorks network (neuron C language programming).
- SLDEF makes it possible to define these variables with an ACCESS file without knowledge of the neuron C language.
- The information (SXD files) defined by SLDEF are downloaded from programming support tool D300win to the LonWorks module.
- Since the node object definition specified by LonMark is offered as FB, LonWorks control can be defined by PLC programming.

## P-link/PE-link Module: NP1L-PL1 (P-link)
## NP1L-PE1 (PE-link)

### ■ Features
- Up to 2 P/PE-link modules can be installed in a single system configuration.
- N-to-N communications in the token passing method
- Data exchange between processors
  Broadcast communication, message communication
- User program upload/download and processor start/stop are possible from the host computer.
- Remote programming for other processor is possible via the P/PE-link.

**NP1L-PL1**    AF98-133

### ■ Performance specifications

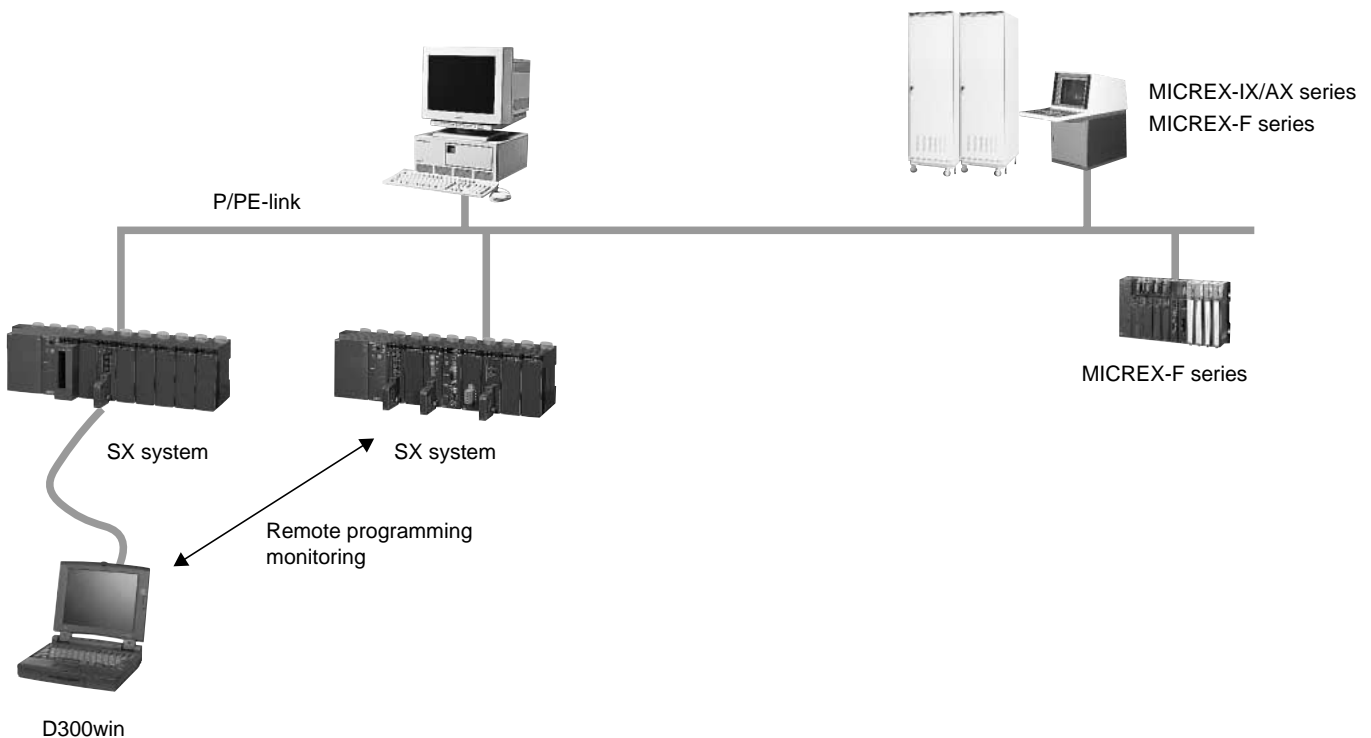| Item | Specification | |
|---|---|---|
| Type | **NP1L-PL1** (P-link) | **NP1L-PE1** (PE-link) |
| No. of SX bus connetable modules | Max.2 /configuration | |
| No. of P/PE links | Max. 16 | Max. 64 |
| Transmission line format | Bus configuration (multi-drop) | |
| Transmission line | Coaxial cable | Coaxial cable |
| | Total length: Max.250m | Total length: Max.500m |
| Transmission method | Half-duplex, serial transmission | |
| Data exchange method | N: N (token passing) method, memory refresh method | |
| Transmission speed | 5Mbps | |
| Data transfer | Broadcast communication, message transmission | |
| Cable | Coaxial cable /5C-2V (conforming to JIS C 3501) | |
| Internal current consumption | 24V DC, 160mA or less | |
| Mass | Approx. 235g (module), approx. 40g (P/PE-link connector) | |

### ■ P/PE-link connection equipment

| Classification | Series | | Type | Link | Remarks |
|---|---|---|---|---|---|
| PC | MICREX-F70S | | **NC1H-PL1** | P-link | |
| | MICREX-F120S to 150S | | **FPC220P** | P-link | |
| | | | **FPC420P** | PE-link | |
| FA personal computer | FMV5233FA or later | | **CNVAD120-01** | P-link | |
| | | | **CNVAD190-01** | PE-link | |
| Optional | MICREX-F | (Optical converter) | **FNC200B-□** | P-link | |
| | | | **FNC302A-□** | PE-link | |
| | | | **FNC320A-□** | PE-link | Long-distance type |
| | | (Electrical repeater) | **FRP200A-C10** | P-link | |

□ indicates the power supply type.
C10: 100 to 110V AC, 110V DC
A20: 200 to 240V AC

### ■ System configuration

P/PE-link

MICREX-IX/AX series
MICREX-F series

MICREX-F series

SX system    SX system

Remote programming monitoring

D300win

## General Purpose Communication Module: NP1L-RS□

### ■ Features
- Can be combined with an expansion FB (Function Block) for communications with diverse equipment without creating any communication control program.
- Communication port can be used as the loader connection port, which is effective in debugging from the SX bus expansion side installed at a distance.
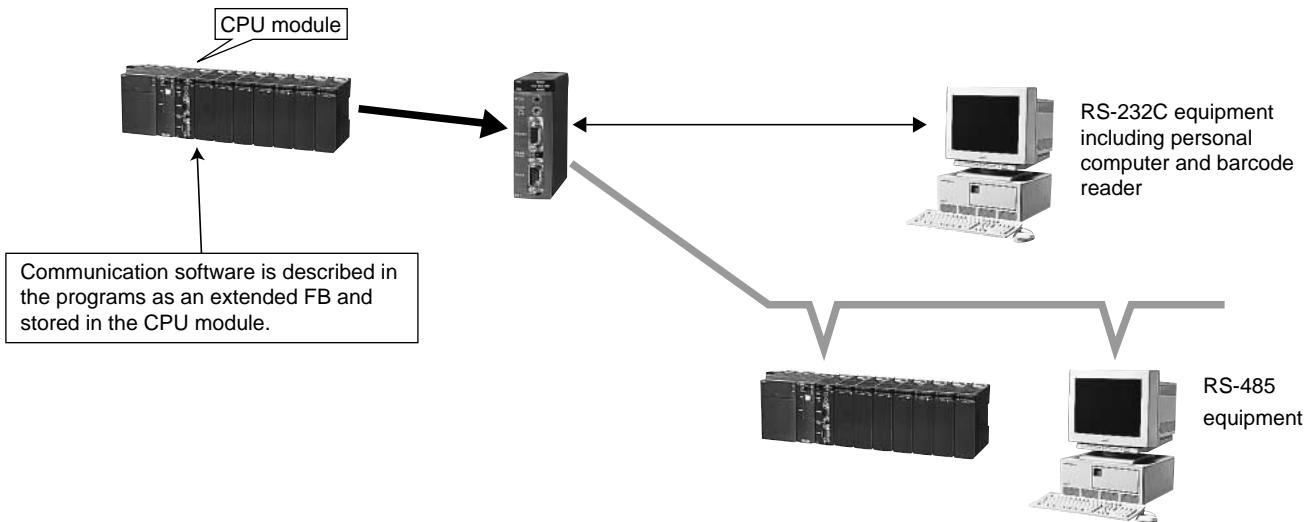
**NP1L-RS □** RS1    AF97-527
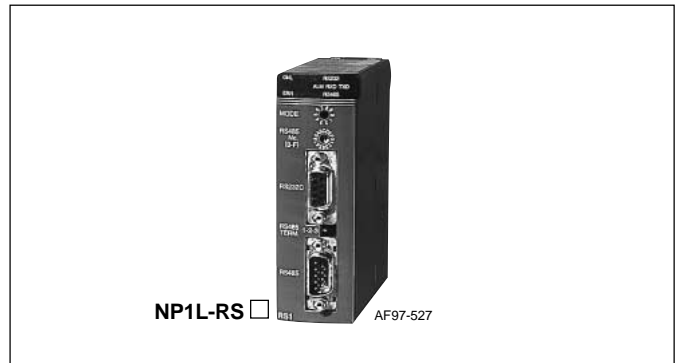
### ■ Performance specifications

| Item | Specification | |
|---|---|---|
| Type | **NP1L-RS1** (RS-232C), **NP1L-RS2** | **NP1L-RS1** (RS-485), **NP1L-RS4** |
| No. of SX bus connectable modules | Max. 16 /configuration | |
| Port | RS-232C x 1 channel | RS-485 x 1 channel |
| Communication method | Full-duplex or half-duplex communication Note 1 | |
| Synchronization method | Start-stop synchronous transmission | |
| Transmission speed | 1200/2400/4800/9600/19200/38400/57600/76800/115200bps (115200bps or less in total of 2-ch.) Note 2 | |
| Transmission distance | 15m or less | 1km or less (transmission speed : 19200bps or less) |
| No. of connectable modules | 1:1 (One external device) | 1:N (Max. 31) |
| Connection method | D-sub, 9-pin connector (female) | D-sub, 9-pin connector (male) |
| Transmission protocol | Depends on the application program(Expansion FB) in the CPU module | |
| Internal current consumption | **NP1L-RS1**: 24V DC, 110mA or less / **NP1L-RS2**: 24V DC, 90mA or less / **NP1L-RS4**: 24V DC, 80mA or less | |
| Mass | **NP1L-RS1**: Approx. 170g, **NP1L-RS2**: Approx. 160g, **NP1L-RS4**: Approx. 160g | |

Note 1: The use of the non-procedure FB allows full-duplex communication on applications.
Note 2: For transmission rates 300, 600, 76800, and 115200 bps, use FBs corresponding to the transmission rate.

### ■ System configuration

CPU module

Communication software is described in the programs as an extended FB and stored in the CPU module.

RS-232C equipment including personal computer and barcode reader

RS-485 equipment

### ■ Support tool network function
Use of general-purpose communication modules enables supporting multiple systems with one unit of personal computer loader or remotely supporting the system via modem.

General purpose communication module

Modem

Modem

Personal computer loader
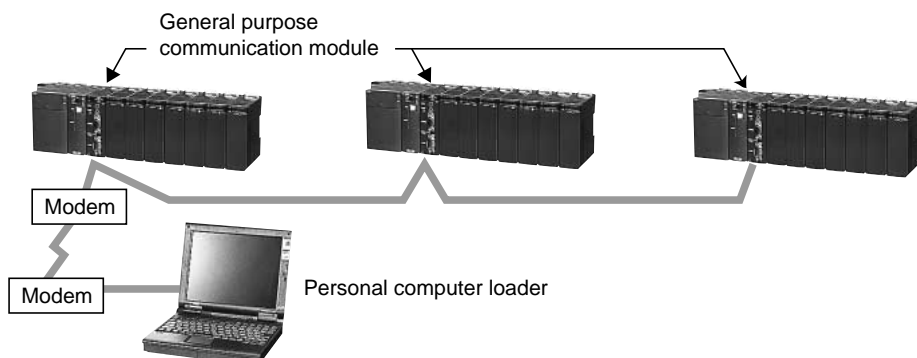
## General Purpose Communication Package for Factory Automation Machine: NP4N-COMFV3 [Japanese Version]

NP4N-COMF is an expansion FB software package that is used in combination with general-purpose communication modules to implement the target communication functions.  The expansion FB is stored in the CPU module to implement various communication protocols.

### ■ Communication expansion FB list

| Package classification | Extended FB type | Applicable equipment | Extended FB name |
|---|---|---|---|
| Standard general-purpose communication FB (D300win included as standard) | Start-stop protocol | FB for implementing the start-stop communication protocol using application programs | _C_free |
| | | | _Cfr252 |
| | | | _Cfr128 |
| | | | _Cfr64 |
| | | | _Cfr32 |
| | | | _Cfrpr (Built-in protocol) |
| | | | _Cfrp2 (Built-in protocol) |
| | Temperature controller communication protocol | Fuji Electric: PYX | _CfdPYX |
| | BCR communication protocol | Fuji Electric: PK2 | _CfdPK |
| | Inverter communication protocol | FUJI ELECTRIC: FRENIC5000 | _CfdFRN |
| | | For FVR-C11 (FGI-BUS) | _CfdFVR |
| | | For FVR-C11 (FGI-BUS) (Reduces the capacity of communication programs.) | _Cfvrpr |
| FA equipment general-purpose communication package NP4N-COMFV3 [Japanese Version] | MODBUS | The MICREX-SX functions as a master station to communicate with MODBUS slave stations. | _C_modm |
| | Temperature controller protocol | RKC INSTRUMENT INC.: REX-F, REX-D, FAREX-SR series | _CrkREX |
| | | OMRON: Digital temperature controller E5AX, E5XJ series | _Com AX |
| | | OMRON: Digital temperature controller E5CK series | _ComCK |
| | | Yamatake: Digitronics temperature controller SDC40A/40G series | _CymSDC |
| | ID system protocol | OMRON: V600 series | _ComV6 |
| | | SHARP MANUFACTURING SYSTEM: Microwave ID plate system DS series | _CshDS |
| | | Yamatake: Code recognition ID system WAM120 series | _CymWAM |
| | | IDEC IZUMI: Data carrier system FP1A serie | _CizFP |
| | Barcode reader protocol | Token: TCD8200/8500, TLMS-3200RV series | _Ctk TCD |
| | | NIPPON ELECTRIC INDUSTRY: BCC2600 series | _CndBCC |
| | | KEYENCE: BL180, BL500, BL700 series | _CkyBL |
| | | IZUMI DATA LOGIC: Barcode reader DS series | _CizDS |
| | SECS protocol | SECS procedure semiconductor manufacturing system (only SECS-I supported) | _C_SECS |
| | NC protocol | FANUC: FANUC series 18i | _CDNC2 |
| | Serial printer protocol | NEC: PC-PR201 series | _C_print |

**Device-level Communication Module**
OPCN-1 Master Module: NP1L-JP1
OPCN-1 Slave Module: NP1L-JS1
OPCN-1 Interface Module: NP1L-RJ1

### ■ Features
**NP1L-JP1**
- Up to 8 units can be connected in a single system configuration.
- Up to 31 units of slave equipment can be connected to a single master unit.
- Number of I/O points is maximum 8192 points (512 words).
- Line speed can be changed to 1Mbps, 500kbps, 250kbps, or 125kbps.

**NP1L-JS1**
- I/O data link through the OPCN-1 is possible between CPUs.
- Number of I/O points is maximum 2048 points (128 words)

**NP1L-JP1**

AF97-522

**NP1L-RJ1**
- Slave station configuration, conforming to the OPCN-1 Standard, implements compact, economical, centralized remote I/O as a multi-vendor network.
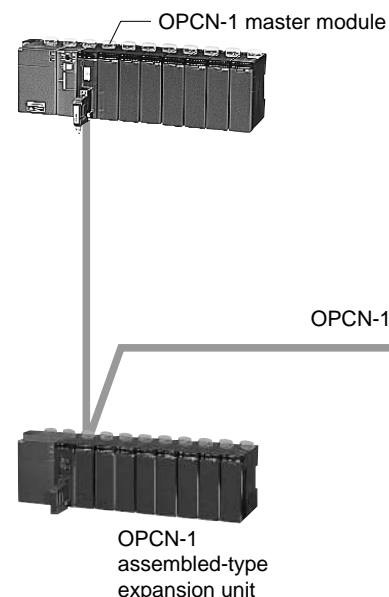- Input fitering time of the input module can be set with DIP switch on the front.

### ■ Communication specifications

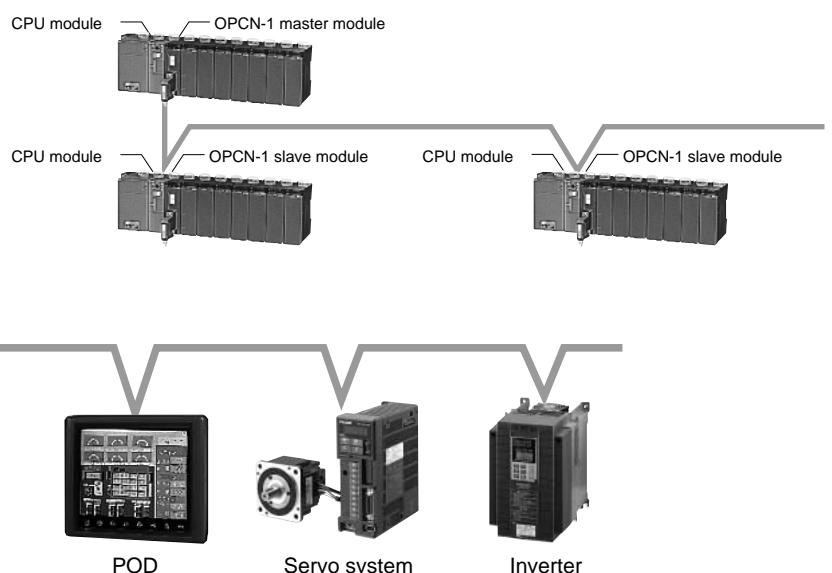| Item | Specification | | |
|---|---|---|---|
| Type | **NP1L-JP1** | **NP1L-JS1** | **NP1L-RJ1** |
| Applicable class | TYPE-M51 I | | TYPE-S51 I |
| No. of SX bus connectable modules | Max. 8 /configuration | | – |
| No. of connectable slaves | 31/master module | – | |
| Station No. setting range | 00 fixed | 01 to 7F | |
| Transmission line format | Bus configuration (multi-drop) | | |
| Transmission line | Shielded twisted pair cable | | |
| Transmission method | Half-duplex, serial transmission, based on EIA RS-485 | | |
| Transmission speed (Max. total length)* | 125kbps (1000m), 250kbps (800m), 500kbps (480m), 1Mbps (240m) | | |
| Encoding method | NRZI (Non Return to Zero Inverted) | | |
| Error check | ECS ($X^{16}+X^{12}+X^5+1$) and retry | | |
| Communication function | • Initial setting service<br>• I/O service<br>• Reset service<br>• JEM-TR192 service (data read/write service) | • Initial setting service<br>• I/O service<br>• Reset service<br>• Simultaneous broadcast service | |
| No. of I/O points | Max. 8192 points (512 words) /1 master | Max. 2048 points (128 words) /1 slave | |
| No. of message points | Max. length of single transmission: 250 bytes<br>(data section for the data read/write service) | – | |
| Internal current consumption | 24V DC, 130mA or less | | |
| Mass | Approx. 230g (module), Approx. 40g (OPCN-1 connector) | | |

Note: * The transmission distance applies to T-KPEV-SB 1.25mm² from Furukawa Electric Co. Note that the distance may vary with the cable characteristics.

### ■ System configuration
- OPCN-1 remote I/O system

OPCN-1 master module

- OPCN-1 slave system

CPU module — OPCN-1 master module

CPU module — OPCN-1 slave module

CPU module — OPCN-1 slave module

OPCN-1

OPCN-1 assembled-type expansion unit

I/O terminal

POD

Servo system

Inverter

| DeviceNet Master Module: | NP1L-DN1 |
|---|---|
| DeviceNet Interface Module: | NP1L-RD1 |

### ■ Features

**NP1L-DN1**

- Up to 8 units can be connected in a single system configuration.
- Up to 63 units of remote I/O equipment can be connected to a single master unit.
- Number of I/O points is maximum 2032 points (127 words).
- Line speed can be changed to 125kbps (500m), 250kbps (250m), or 500kbps (100m).
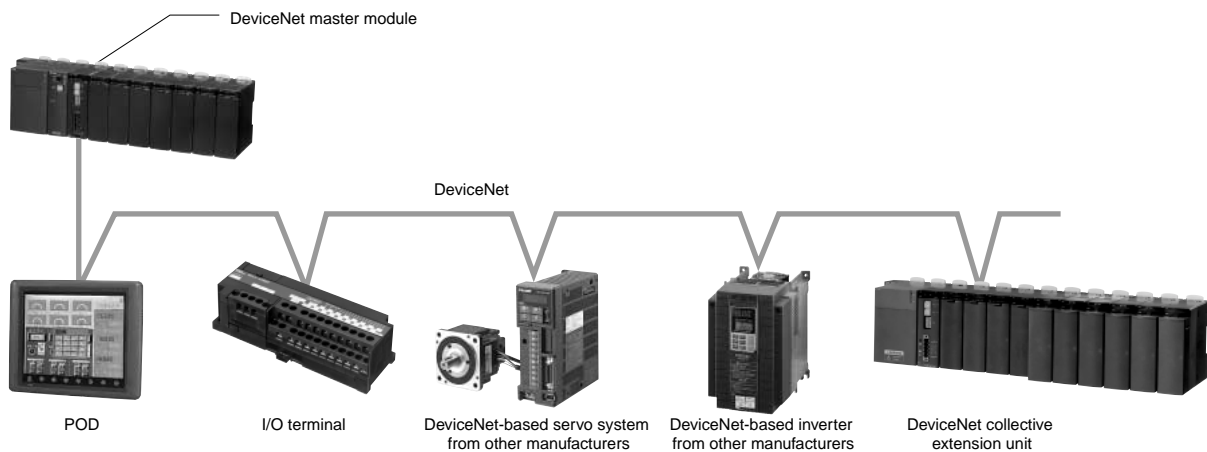
**NP1L-RD1**

- Realizes small economic collective remote I/O as a DeviceNet slave station.

**NP1L-DN1**

AF99-340

### ■ Communication specifications

| Item | Specification | |
|---|---|---|
| Type | **NP1L-DN1** | **NP1L-RD1** |
| No. of SX bus connectable modules | Max. 8/configuration | – |
| No. of remote I/O stations | 63 units/master module | – |
| MAC ID setting range | 00 to 63 | |
| Transmission line format | Bus configuration (multi-drop), tree-structure, branch-structure | |
| Transmission line | Trunk (thick cable), drop (thin cable) | |
| Transmission method | Half duplex serial communication method | |
| Data rate (distance) | 125kbps (500m), 250kbps (250m), 500kbps (100m) | |
| Media access control | CSMA/NBA | |
| Modulation | Base band | |
| Media linking | DC coupling-type differential Tx/Rx | |
| Encoding method | Non-zero recovery using the bit stuff function  NRZ (Non Return to Zero) | |
| Error check | FCS (Frame Check Sequence CRC-16) | |
| Communication function | I/O message<br>Poll command/response<br>Bit-Strobe command/response<br>Change of state/Cyclic ACK not provided<br>Change of state/Cyclic ACK provided<br>Explicit message (implements the client/server function to set<br>and diagnose the remote I/O stations Low priority communication traffic) | Poll command/response<br>Explicit message |
| Vendor ID | 319 (Fuji Electric) | |
| Device type | Communication Adapter (Code: 0x0C) | |
| No. of I/O points | Max. 2032 points (127 words)/master | |
| No. of message points | Max. length 492 bytes per transmission (Explicit message) | |
| Network current consumption | 24V DC, 45mA or less (supplied from DeviceNet power supply) | |
| Internal current consumption | 24V DC, 90mA or less | |
| Mass | Approx. 170g | |

### ■ System configuration

DeviceNet master module

DeviceNet

| POD | I/O terminal | DeviceNet-based servo system from other manufacturers | DeviceNet-based inverter from other manufacturers | DeviceNet collective extension unit |
|---|---|---|---|---|

| T-link Master Module: | NP1L-TL1 |
|---|---|
| T-link Slave Module: | NP1L-TS1 |
| T-link Interface Module: | NP1L-RT1 |

### ■ Features
**NP1L-TL1**
- Up to 8 units can be connected in a single system configuration.
- Up to 32 units of slave equipment can be connected to a single master unit.
- Number of I/O points is maximum 8192 points (512 words).
- T-link equipment for such as MICREX-F and FLEX-PC can be used. (Some types excluded.)
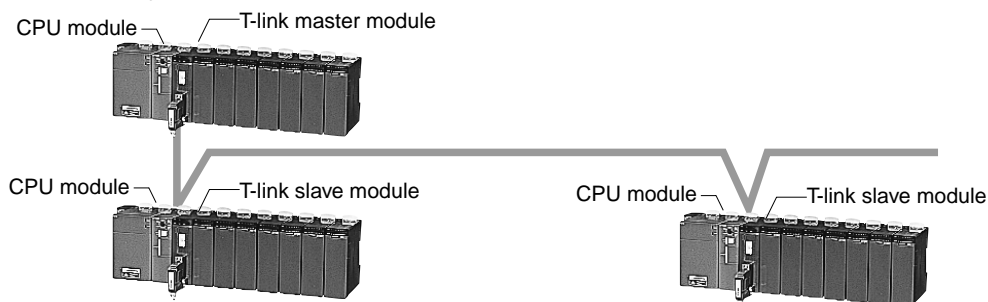
### ■ Communication specifications

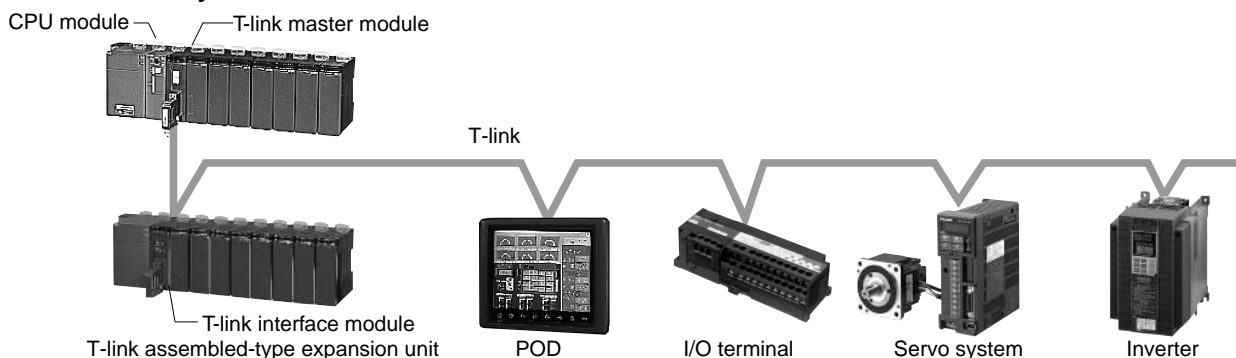| Item | Specification | | |
|---|---|---|---|
| Type | **NP1L-TL1** | **NP1L-TS1** | **NP1L-RT1** |
| No. of SX bus connectable modules | Max. 8 /configuration | | – |
| No. of connectable T-link slaves | 32 /master module | – | |
| Transmission line format | Bus configuration (multi-drop) | | |
| Transmission line (Max. total length)* | Bus transmission line: Shielded twisted pair cable  Total length: Max. 1000m  Optical transmission line:  SI/GI quarts cable, multicomponet cable  (Optical connector FNC120/130 is needed for the optical transmission line) | | |
| Transmission method | Half-duplex, serial transmission | | |
| Data exchange method | 1:N (polling / selecting) method | | |
| Transmission speed | 500kbps | | |
| Error check | FCS ($X^{16}+X^{12}+X^5+1$) | | |
| No. of I/O points | 2048 points (128 words) | | |
| No. of message points | Max. length per transmission: 220 bytes | | |
| Internal current consumption | 24V DC, 140mA or less | | |
| Weight | About 200g (module), about 40g (T-link connector) | | |

Note: * Transmission distance is the length when using the T-KPEV-SB
1.25mm$^2$ cable manufactured by Furukawa Electric Co.  However, note
that the distance may occasionally vary due to the cable characteristics.

### ■ System configuration

#### ● T-link slave system



CPU module — T-link master module

CPU module — T-link slave module          CPU module — T-link slave module

#### ● T-link remote I/O system



CPU module — T-link master module

T-link

T-link interface module
T-link assembled-type expansion unit          POD          I/O terminal          Servo system          Inverter


NP1L-TL1
AF98-132

**NP1L-TS1**
- Data link by I/O data between CPUs through T-link is possible.
- Five different number of I/O points (1 word/1 word, 2 words/2 words, 4 words/4 words, 8 words/8 words, 32 words/32 words) can be selected according to application.

**NP1L-RT1**
- Realizes small economic collective remote I/O as a T-link slave station.

### ■ Option

| Category | Series name | | | Remarks |
|---|---|---|---|---|
| Option | MICREX-F | Optical converter | **FNC100C-C10** | |
| | | | **FNC100C-A20** | |
| | | | **FNC110A-C10** | Long-distance type |
| | | | **FNC110A-C10** | Simplified type |
| | | | **FNC120A-A10** | Simplified type |
| | | | **FNC120A-G10** | Advanced type |
| | | Electrical repeater | **FRC200A-C10** | |

A10, A20, C10, and G10 indicate electrical types.
A10:  100–240V AC
A20:  200–240V AC
C10:  100–110V AC, 110V DC
G10:  110V DC

## PROFIBUS-DP Master Module: NP1L-PD1

### ■ Features
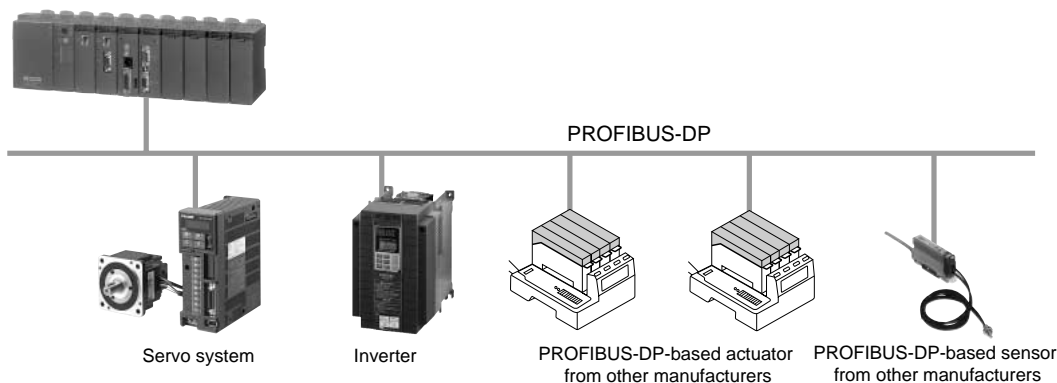
● Open system
Diverse slave products of PROFIBUS-DP can be connected (from more than 300 vendors). As for the DP slave, the compatibility authenticated by the PROFIBUS association has been confirmed.

● Flexible system configuration
In addition to the basic configuration consisting of one DP master and multiple DP slaves, combination with multiple DP masters and multiple DP slaves are possible, making it easier to distribute master functions.
The maximum number of unit connections (including master stations) is 126. With 33 units or more, repeaters are required.

● Transmission rate
Can be selected from seven options: 9.6/19.2/93.75/187.5/500/1500/12000kbps. (The upper limit depends on the type of the DP slave.)



**NP1L-PD1**
KD02-038A

### ■ Performance specifications

| Item | Specification |
|---|---|
| Applicable standards | IEC 66158, EN 50170, DIN 19245 |
| Communication function | PROFIBUS-DP master (DPM1) function |
| No. of slave station connections | Up to 32 units (up to 126 units with repeaters) |
| Station No. (station address) setup range | 0 to 125 |
| Transmission line form | Bus configuration (multi-drop) |
| Communication standard | Applicable to EN 50170 and DIN 19245. |
| Data exchange system | 1:N (polling/selecting) |
| Transmission rate | Seven options (set by configuration) 9.6/19.2/93.75/187.5/500/1500/12000 kbps |
| Transmission distance | 1200m with a transmission rate of 9.6kbps, 100m with a transmission rate of 12Mbps (Refer to the table below.) |

| Baud rate (kbps) | 9.6 | 19.2 | 93.75 | 187.5 | 500 | 1500 | 12000 |
|---|---|---|---|---|---|---|---|
| Distance/segment | 1200m | 1200m | 1200m | 1000m | 400m | 200m | 100m |

| Item | Specification |
|---|---|
| Cable | PROFIBUS-DP cable (Shielded twist pair cable) |
| No. of I/O points | Max. total number of I/O points: 510 words (Max. number of input or output points: 255 words) |
| Internal current consumption | 24V DC, 200mA or less |
| Mass | Approx. 250g |

### ■ System configuration



PROFIBUS-DP

Servo system    Inverter    PROFIBUS-DP-based actuator from other manufacturers    PROFIBUS-DP-based sensor from other manufacturers

### ■ Configurator Software: KONF-PDP
Used to download the system configuration information to the PROFIBUS-DP master module. Required to update the initial setup or system configuration.

### ■ Please purchase from
HMS INDUSTRIAL NETWORKS

## I/O Terminal: NR1 □

Compact type I/O terminal applicable to diverse field networks with a common frame size.
Wiring can be made directly to the main unit using the optional common extension terminal block without using the relay terminal block, allowing 25% reduction of the total installation space in comparison with the conventional wiring method.

### ■ Features

● Compatible with diverse device level networks
  Device level network which performs high-speed communication of I/O information and messages between a programmable controller, a personal computer, and other controllers and an inverter, a servo, an MMI device, and other FA devices, among diverse networks consisting of an FA system, ranging from the computer level to the bit level.
  The I/O terminal corresponds to open device level networks: OPCN-1, DeviceNet, T-link, LonWorks, and SX bus.
● Easy maintenance
  Since removable terminal blocks are used as the terminal blocks for the communication section, power supply, and I/O, the main unit can be attached and removed easily.
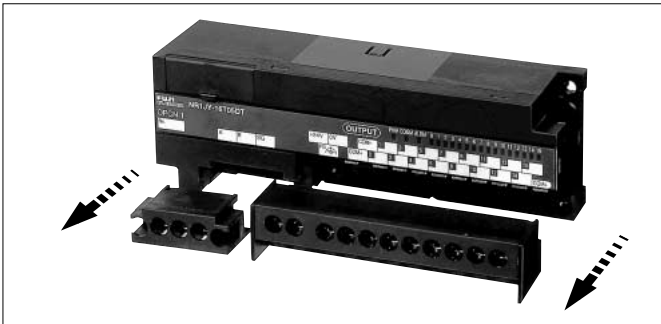


● Efficient safe terminal block structure
  This terminal block has terminal screws which are self-lifting by themselves after loosening, thus preventing screws from being lost at the time of wiring to the round amplifier terminal, increasing the wiring work efficiency.
  The use of power supply and I/O terminal blocks with the finger protection fitting (IP20) contributes to the safety of machines and equipment.



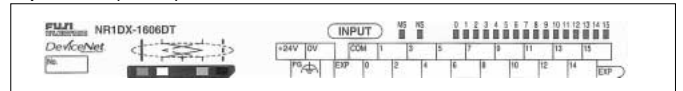(Self-lifting screw terminals/Finger protection fitting)
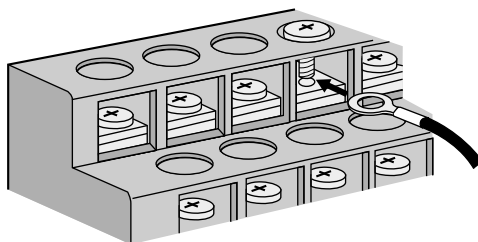
● Preventing mis-wiring
  Uses different colors for the surface sheets of the main unit: input (white), output (black), and I/O mixture (zebra).
  Applicable networks are also displayed, enabling determination of the unit type at a glance.
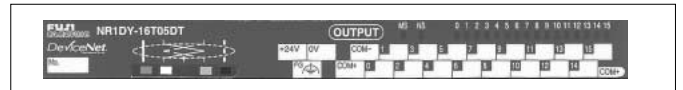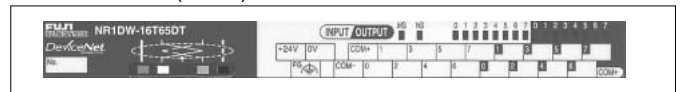


AF00-187,188

Input unit (white)



Output unit (black)



I/O mixture unit (zebra)



● 25% reduction of total installation space
  "Common extension terminal block" which extends the number of common terminals with one-touch operation is optionally available.
  The use of "common extension terminal block" eliminates the necessity of the separate relay terminal block for common extension, reducing the total installation space by 25%.



25% reduction of the total installation space
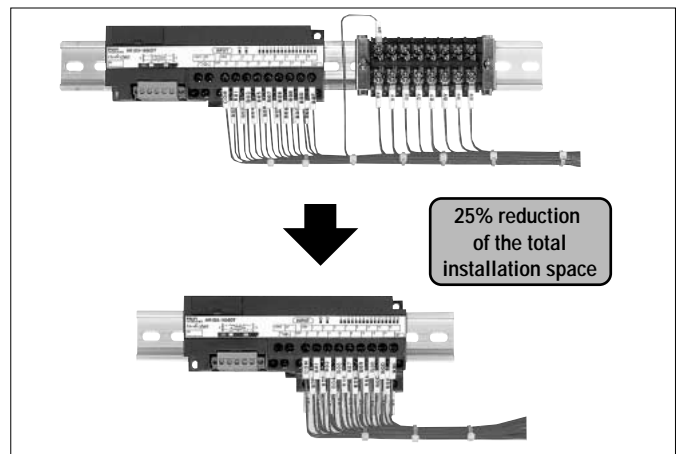
● Contributing to panel design standardization
  The unit frame is unified to a compact size of 148x50x40 (WxHxD: mm), allowing design standardization without worrying about external view modifications by I/O specifications and network specifications. Network modifications can be dealt only with unit replacement.
● Enabling DIN rail attachment
  Not only usual screw attachment but also DIN rail attachment is possible.

## ■ Models

| Product name | | Model (= Product code) | Specification |
|---|---|---|---|
| OPCN-1 | 16-point input | **NR1□X-1606DT** | 24V DC, 16-point bi-directional input, removable terminal block |
| SX bus | 8-point Ry output | **NR1□Y-08R07DT** | 240V AC/110V DC, 8-point Ry output, removable terminal block |
| T-link | 16-point Tr output *2 | **NR1□Y-16T05DT** | 24V DC, 16-point Tr sink output, removable terminal block |
| DeviceNet *1 | 8/8-point mixture | **NR1□W-16T65DT** | 24V DC, 8-point source input, 12-24V DC, 8-point Tr sink output, removable terminal block |
| LonWorks | 16-point input | **NR1LX-1606DT** | 24V DC, 16-point bi-directional input (4 points can be used as pulse inputs), removable terminal block |
| | 8-point Ry output | **NR1LY-08R07DT** | 240V AC/110V DC, 8-point Ry output, removable terminal block |
| | 9-point input/2-point output | **NR1LW-11R80DT** | 24V DC, 9-point source input (4 points can be used as pulse inputs), 2-point Ry output, removable terminal block |
| Option | | **NR1XV-CB1** | Common extension terminal block (9 pins) |

*1: □ specification (applicable network specification): J=OPCN-1, S=SX bus, T=T-link, D=DeviceNet
*2: Tr output products without a fly-wheel diode are also offered. (Model: **NR1□Y-16T05DTZ701**)

## ■ Specifications

● General specifications

| Item | | Specification |
|---|---|---|
| Applicable standards | | IEC 61131-2, UL508 |
| Physical environment | Operating ambient temperature | 0 to ± 55°C (Lon Works-based product: -10 to +55°C) |
| | Storage temperature | -20 to +70°C |
| | Relative humidity | 20 to 95%RH (without condensation) |
| | Dust | No dust present |
| | Contamination | Contamination level 2 |
| | Corrosion resistance | No corrosive gas is present, no organic solvent adhesion |
| | Operating altitude/air pressure | Altitude of 2000m or less (air pressure of 70kPa or higher during transportation) |
| Mechanical operating condition | Resistance to vibration | One amplitude: 0.15mm, constant acceleration: 19.6m/s², 2 hours for each direction, 6 hours total |
| | Resistance to shock | Peak acceleration: 147m/s², 3 times for each direction |
| Electrical operating condition | Electrostatic discharge | Contact discharge: ± 6kV, air discharge: ± 8kV |
| | Radiative radio frequency electromagnetic field | 80 to 1,000MHz: 10V/m |
| | Fast transient burst wave | 2kV |
| | Conductive radio frequency interference | 0.15 to 80MHz, 10Vrms |
| | Lightning surge | Common mode 2kV, normal mode: 1kV |
| | Square wave noise | Noise power supply 1.5kV, pulse width 1us, Rising time 1ns |
| Installation and wiring conditions | Structure | IP20 Panel-mount type |
| | Screw fastening torque | Terminal screw, terminal block mounting screw: 0.5-0.6N·m Unit mounting screw: 1 to 1.5N·m |
| | Cooling system | Natural cooling |

● Power supply specifications

| Item | | Specification |
|---|---|---|
| Rated input voltage | | 24V DC |
| Input voltage range | | 21.6 to 26.4V DC (LonWorks-based product: 20.4 to 27.6V DC) |
| Dropout tolerance | | 1ms |
| Inrush current | | 5A, 1ms or less (LonWorks-based product: 3A, 5ms or less 25A, 5ms or less for the **NR1LY-08R07DT**) |
| Dielectric strength | | 1500V AC, 1 minute (Between input terminal and ground) |
| Insulation resistance | | 10MΩ or more (500V DC megger) (Between input terminal and ground) |
| Power consumption | OPCN-1 SX bus T-link DeviceNet | **NR1□X-1606DT** (16-point input): 1.4W or less **NR1□Y-08R07DT** (8-point Ry output): 3W or less **NR1□X-16T05DT** (16-point Tr output): 1.4W or less **NR1□X-16T65DT** (8/8-point mixture): 1.4W or less |
| | LonWorks | **NR1LX-1606DT** (16-point input): 1.6W or less **NR1LY-08R07DT** (8-point Ry output): 3W or less **NR1LW-11R80DT** (9-point input/2-point Ry output): 1.6W or less **NR1LW-11R67DT** (9-point input/2-point Ry output): 1.6W or less |

● I/O specifications

(1) I/O specifications of OPCN-1/SX bus/T-link/DeviceNet-based products

● Input specifications

| Item | Specification |
|---|---|
| Type | **NR1□X-1606DT, NR1□W-16T65DT** * |
| Rated input voltage | 24V DC |
| Max. input voltage | 26.4V DC |
| Ripple percentage | 5% or less |
| Rated input current | 7mA |
| Input type | No polarity |
| Input impedance | 3.3kΩ |
| Operating voltage | ON voltage range: 15 to 26.4V OFF voltage range: 0 to 5V |
| Input delay time ON/OFF filtering time | OPCN-1, DeviceNet: 3ms/3ms SX bus: Can be changed collectively through parameter setup. T-link: 5ms/5ms |
| No. of points per common | 16 points/common (Mixture model: 8 points/common) |
| Isolation | Photocoupler |
| Dielectric strength | 1500V AC, 1 minute (Between input terminals and ground) |
| Insulation resistance | 10MΩ or more (500V DC megger) (Between input terminals and ground) |
| Internal current consumption | 24V DC, 70mA or less (When all points are turned ON) |

* [OFF to ON] - [ON to OFF]: 1-1, 3-3 (default), 3-10, 10-10, 30-30, 100-100ms

● Transistor output specifications

| Item | Specification |
|---|---|
| Rated output voltage | 24V DC |
| Allowable output voltage range | 19.2-30V DC |
| Output format | Sink |
| Rated load current | 0.5A/point (30V DC), 4A/common |
| Max. load current | 0.6A/point (30V DC), 4.8A/common |
| Output voltage drop | 1.5V or less (0.5A) |
| Output delay time | OFF to ON: 1ms or less ON to OFF: 1ms or less |
| Leakage current when OFF | 0.1mA max. |
| Surge current | 2A, 10ms |
| Surge suppresser circuit | Clamp diode |
| Common configuration | 16 points/common (8 points/common only for mixture products) |
| Insulation method | Photocoupler insulation |
| Dielectric strength | 1500V AC, one minute, between input terminals and FG |
| Insulation resistance | 10MΩ or more with a 500V DC megger Between input terminals and FG |
| Internal current consumption | 24V DC, 70mA or less (all points ON) |

● Relay output specifications

| Item | Specification |
|---|---|
| Rated output voltage | 240V AC, 110V DC |
| Max. allowable output voltage | 264V AC or less, 110V DC or less |
| Max. load current | 30/250V DC: 2A/point, 110V DC: 0.2A/point |
| Output delay time | OFF to ON: 10ms or less ON to OFF: 10ms or less |
| Leakage current when OFF | None |
| Surge suppresser circuit | None |
| Min. load voltage, current | 5V DC, 1mA |
| Max. open/close frequency | 1800 times/hour |
| Common configuration | 1 point/common |
| Insulation method | Relay insulation + photocoupler insulation |
| Dielectric strength | 1500V AC, one minute, between input terminals and FG |
| Insulation resistance | 10MΩ or more with a 500V DC megger Between input terminals and FG |
| Internal current consumption | 24V DC, 140mA or less (all points ON) |

**(2) I/O specification of LonWorks-based product**

**• Input specification**

| Item | Specification | |
|---|---|---|
| | **NR1LX-1606DT** | **NR1LW-11R80DT** |
| No. of input points | DI: 12 points, PI (Pulse input) : 4 points*1 | DI: 5 points, PI (Pulse input) : 4 points*1 |
| Input common composition | 16 points/common | 9 points/common |
| Input type | None polarity | Source input |
| Rated voltage | 24V DC | |
| Max. voltage | 26.4V DC | |
| Rated current | 7mA | |
| Input inpedance | 3.3kΩ | |
| Max. pulse input frequency | 20Hz | |
| Pulse input measurement range | 0-2147483648 (31 bits, incremental method) | |
| Standard operation range | OFF to ON 15 to 26.4V, ON to OFF 0 to 5V | |
| Input delay time | OFF to ON 10ms or less, ON to OFF 10ms or less | |
| Input type | DC (EN 61131 Type 2) | |
| Insulation | Photo coupler | |
| Delating condition | None | |

* 1 PI can be used also as DI.

**• Output specification**

| Item | Specification | |
|---|---|---|
| | **NR1LY-08R07DT** | **NR1LW-11R80DT** |
| No. of output points | DO: 8 points | DO: 2 points |
| Output common composition | 1 point/common | |
| Rated voltage | 240V AC  110V DC | |
| Max. load current | Relay output  30V DC/240V AC: 2A, 110V DC: 0.2A | |
| | | Voltage output 24V DC: 50mA/point |
| Min. load current | 5V DC: 1mA | |
| Output delay time * 1 | OFF to ON  10ms or less | |
| | ON to OFF  10ms or less | |
| Leakage current at the time of OFF | 0.1mA or less (200V AC  60Hz) | |
| Surge protection | None | Varistor |
| Output protection | None | |
| Max. operating frequency | 1800 times/hour | |
| Insulation | Photo coupler+Relay | Relay |
| Output type * 1 | Relay output | Relay output or 24V DC voltage output |
| Delating condition | None | |

**● Communication specifications**

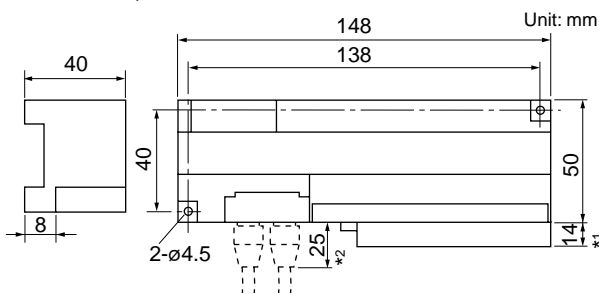| Item | Specification | | | | |
|---|---|---|---|---|---|
| | DeviceNet | OPCN-1(Former JPCN-1) | SX bus | T-link | LonWorks |
| Transmission line format | Bus configuration (multi-drop, T-branching) | Bus configuration (multi-drop) | Bus configuration (ring) | Bus configuration (multi-drop) | Free topology (bus-structure/star-structure) |
| Max. signal point | 128 words (2048 points)/master (When configurator is not used) | 127 words (2032 /master) | 512 words (8192 points) | 100 words (8192 points) | 228 bytes |
| Transmission speed/distance | 125kbps/500m 250kbps/250m 500kbps/100m (Changes with the switch) | 125kbps/1km 250kbps/800m 500kbps/480m 1Mbps/240m (Changes with the switch) | 25Mbps/25m | 500kbps/1km | 78kbps/500 to 2700m |
| No. of connected stations | 64 node | 31 stations | 254 stations (including CPU module)*2 | 32 stations | 64 units/segment |
| Electric characteristics | – | EIA RS-485 | EIA RS-422 | Pulse transfer method | – |
| Transmission line | DeviceNet cable | Shielded twist pair cable | SX bus expansion cable | Shielded twist pair cable | Twist pair (1P-S) |
| No. of occupied words*1 | 8 points: 1 word  16 points: 1 word  8/8 (Mixture): 2 words | | | | |

*1 When the master module of MICREX-SX series is used
*2 The maximum number of I/O terminal connections is 10 per base. Up to 22 units can be connected by extending the number of base boards between I/O terminals.

**■ System configuration**
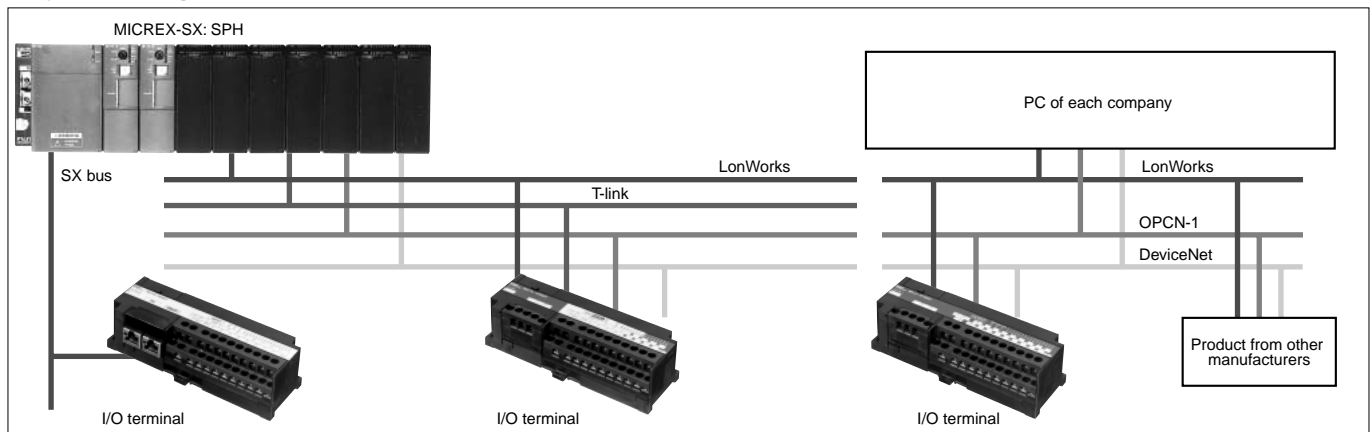


**■ Dimensions, mm**



Notes: *1 When the extension terminal block is mounted.
*2 When the SX bus-adapted unit is connected.

**■ Extension terminal block**
Used to extend the common terminal block that is mounted on the lower side of the main unit.
Type: **NR1XB-CB1**

The terminals are divided into two groups for electrical connection: ☐ and ■ as shown below.



43

### Bit-level Communication Module
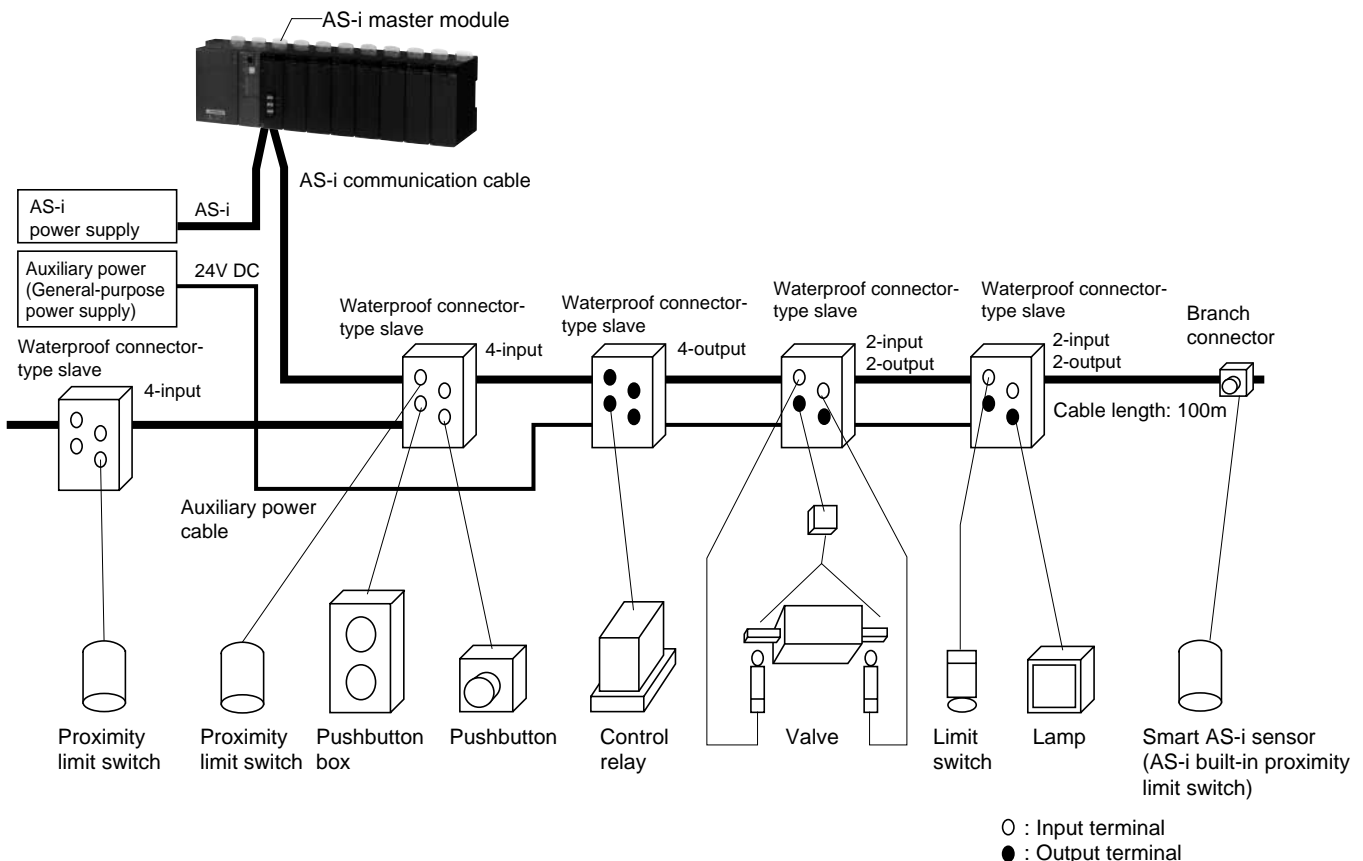### AS-i Master Module: NP1L-AS2

■ **Features**
- The **NP1L-AS2** is based on the AS-i communication protocol Version 2.1.
- Up to 12 units can be connected in a single system configuration. configuration.
- Can be connected to diverse types of actuators and sensors conforming to the AS-i Standards.
- Line length: Total 100m
- Up to 62 slave stations can be connected to a single master station.
- Up to 336 I/O points can be controlled.
- The AS-i master module is communicate to between the analog slave station automatically.

**NP1L-AS2**

AF00-196

■ **Communication specifications**

| Item | Specification |
|---|---|
| No. of SX bus connectable modules | Max. 12 /configuration |
| No. of connectable slaves | Max. 62 /master module |
| Transmission line format | Tree-structure, line-structure, star-structure, ring-structure |
| Transmission distance | 100m (Max.300m at using a repeater) |
| Transmission method | Half-duplex, serial transmission |
| Transmission speed | 167kbps |
| Applicable cable | AS-i cable |
| Refresh time | Approx. 10ms (when 62 units connected)   Approx. 5ms (when 31 units connected) |
| No. of I/O points | Input points: Max. 168     Output points: Max. 168   (Input / Output: 21 words / 21 words) |
| Current consumption of AS-i master section | 30V DC, 100mA or less (supplied from the AS-i power supply, and insulated from the SX bus.) |
| Internal current consumption | Inside of module (supplied from the SX bus): 24V DC, 100mA or less |
| Mass | Approx. 180g |

■ **System configuration**



AS-i master module

AS-i communication cable

AS-i power supply

AS-i

Auxiliary power (General-purpose power supply)

24V DC

Waterproof connector-type slave

Waterproof connector-type slave
4-input

Waterproof connector-type slave
4-output

Waterproof connector-type slave
2-input 2-output

Waterproof connector-type slave
2-input 2-output

Branch connector

Cable length: 100m

Waterproof connector-type slave
4-input

Auxiliary power cable

Proximity limit switch

Proximity limit switch

Pushbutton box

Pushbutton

Control relay

Valve

Limit switch

Lamp

Smart AS-i sensor (AS-i built-in proximity limit switch)

○ : Input terminal
● : Output terminal

VICPAS
HMI Parts Center

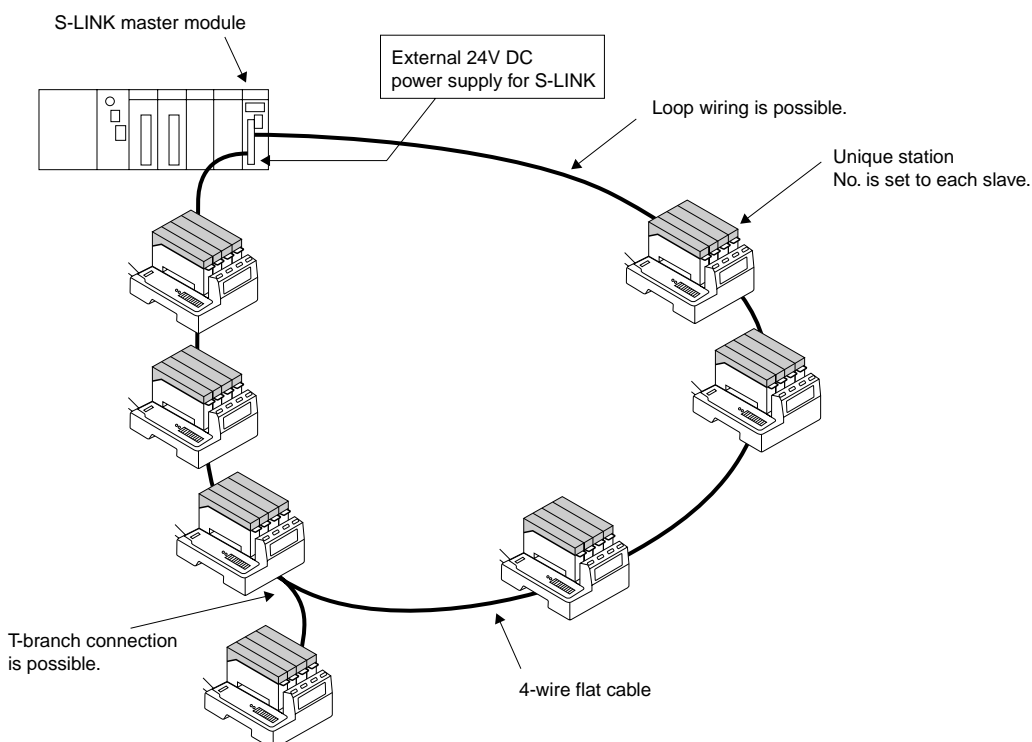## S-LINK Master Module: NP1L-SL1

### ■ Features
- Connected to the S-LINK (bit) level serial transmission provided by SUNX.
- 128-point I/O control can be performed for each master station. There is no limitation on the number of master connections.

**NP1L-SL1**
AF01-187,102

### ■ Communication specifications

| Item | Specification |
|---|---|
| No. of SX bus connections | No limitation (within the limit of the maximum number of SX bus connections of 8192 points) |
| No. of slave connections | No limitation |
| Transmission system | Bi-directional time-division multiplex transmission system |
| Synchronization system | Bit synchronization, frame synchronization |
| Protocol | 2-wire protocol |
| Transmission rate | 28.5kbps |
| | Signal trunk line: Total length 200m |
| Connection method | Multi-drop connection |
| No. of I/O points | Up to 128 points |
| Cable | Cable from SUNX: 4-wire flat cable |
| Refresh time | 32 points: 1.4 to 2.9ms |
| | 64 points: 2.5 to 5.2ms |
| | 96 points: 3.6 to 7.4ms |
| | 128 points: 4.7 to 9.6ms |
| S-LINK master section current consumption | 24V DC, 1.6mA or less (supplied from an external power supply, and insulated from the SX bus.) |
| Internal current consumption | Inside of module (supplied from the SX bus): 24V DC, 80mA or less, S-LINK communication section (supplied from an external power supply): 24V DC, 1.6A or less |
| Mass | Approx. 200g |

### ■ System configuration

S-LINK master module

External 24V DC power supply for S-LINK

Loop wiring is possible.

Unique station No. is set to each slave.

T-branch connection is possible.

4-wire flat cable

## SX Bus Optical Link Module:    NP1L-OL1
## SX Bus Optical Converter Unit: NP2L-OE1

### ■ Features
**NP1L-OL1**
- Mounted on the base board to transmit the SX bus signal as an optical signal.
- Maximum transmission distance is 25.6km (25°C).

**NP2L-OE1**
- This unit connects between the SX bus cable and optical fiber cable to transmit the SX bus signal as an optical signal.
- Maximum transmission distance is 25.6km (25°C).

**NP1L-OL1**
AF00-195

**NP2L-OE1**
AF00-198

### ■ Transmission specifications

| Item | | Specification | |
|---|---|---|---|
| Type | | **NP1L-OL1** | **NP2L-OE1** |
| No. of connectable modules | | Max. 64 /configuration (Total No. of **NP1L-OL1** and **NP2L-OE1**) | |
| Optical fiber | Type | PCF (Polymer clad fiber) | |
| | Core/Clad diameter | Core: 200μm Clad: 230μm | |
| | Min. bending radius (Note 1) | 50mm | |
| | Optical connector | Type: F07 | |
| Transmission distance (Note 1) | | Between stations: Max. 800m (Total extention distance 25.6km) | |
| Internal current consumption | | 24V DC  54mA or less | |
| Power supply terminal | Rated input voltage | – | 24V DC, 70mA or less |
| (External power supply) | Rush current | – | 165mA or less: When a switching power supply is used (Note 3) |
| (Note 2) | | | 50Ao-p-70μs: When 24V DC is directly turned ON |
| Mass | | Approx. 135g | Approx. 155g |

Notes: 1  Minimum bending radius depends on what type of optical-fiber cable is used.  Above table shows the values when the HG-20/08 from Sumitomo Electric Industries, Ltd. is used.
2  As an external power supply, use a switching power supply (conforming to the UL standard) with "reinforced insulation" of 24V DC 1A or more for each unit.
3  When 24V DC is directly turned ON, the rush current is 50Ao-p, 70μs (reference value). This value depends on power conditions.

- Recommended cables
- Optical fiber cable:            HG-20/08 (type H-PCF) from Sumitomo Electric Industries, Ltd.
- Optical fiber cable connector: CF-2071 from Sumitomo Electric Industries, Ltd.
- Crimping tool:                 CAK-0057 from Sumitomo Electric Industries, Ltd.

### ■ System configuration
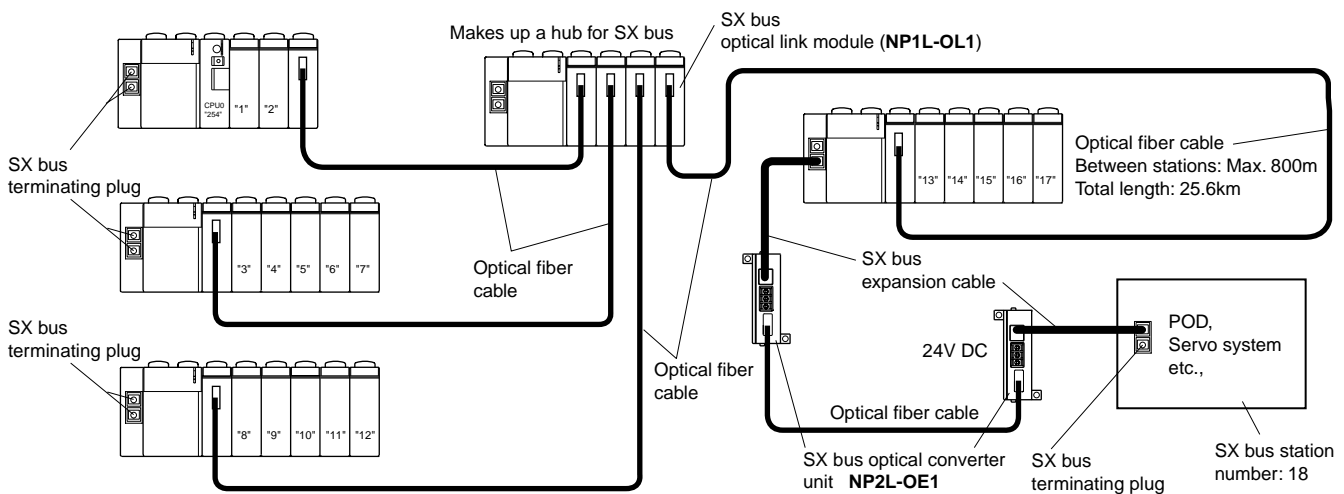
## Memory Card Interface Module: NP1F-MM1

### ■ Features
- Equipped with 1 slot for PC card interface (PCMCIA) as standard.
- Use of commercially available memory card enables storing data from the CPU modules or reading control and/or management information from the memory card.
- Programs can be uploaded/downloaded from/to CPU module.
- Files can be read/written from the personal computer via the PC card slot.
- Used to back up programs when configuring a redundant (N:1) system for CPU modules.

**NP1F-MM1**

AF99-14

### ■ Performance specifications

| Item | Specification |
|---|---|
| No. of SX bus connectable modules | Max. 16 /configuration |
| Memory card interface | Based on JEIDA Ver. 4.1 /PCMCIA Rel.2.01  Type I, II x 1 slot, 5V |
| Card type | SRAM card |
| Internal current consumption | 24V DC, 90mA or less |
| Mass | Approx. 210g (excluding the memory card) |

### ■ Functional specifications

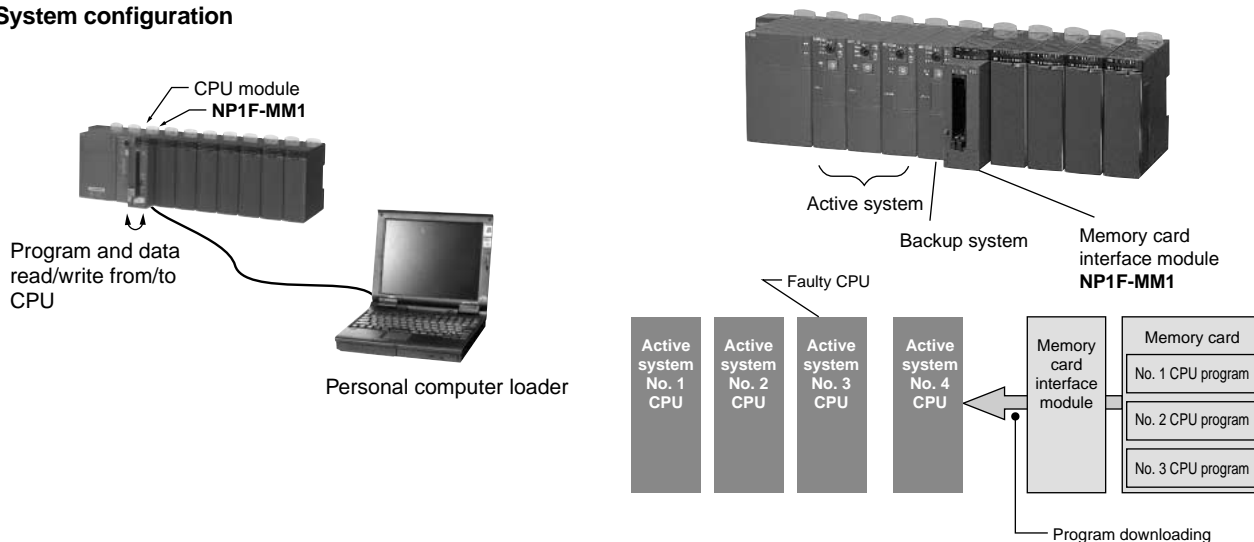| Item | Specification |
|---|---|
| Data read/write from CPU module | Data read/write between CPU module and memory card by application programs |
| Program read/write from memory card interface module | Program read/write between CPU module and memory card by the front SW operation of the memory card interface module. Program write to the memory card by the D300win operation after memory card installation in the PC card slot of the personal computer. |
| Self-diagnosis/RAS function | Supervise the current status of the local station for error detection, and notify the error to the CPU module. |

### ■ Memory card selection reference

| Item | Specification (Example) | Application restrictions and conditions | Remarks |
|---|---|---|---|
| Power supply voltage | 5 ± 0.25V DC | Available if the product is specified for 5V | Give priority to the memory card specification range rather than the operating range of this module. |
| Current consumption | 90mA or less at 5V DC | **NP1F-MM1**: Available if the total is 300mA or less. | |
| Operating temperature range | 0 to 60 °C | When a memory card is mounted in the module, heat generation in the module increases the temperature by 10°C.  Thus, the max. operating temperature with this memory card used is 50°C. | |
| Operating humidity range | 10 to 90% RH, no condensation | No problem because wider than the environment range of this module. | |
| Storage temperature range | -20 to 70°C | No problem due to the same conditions as the common specification of this module. | |
| Card removal count | 5,000 times or more (outdoor) 10,000 times or more (indoor) | Make sufficient consideration for the removal count. | |
| Vibration/shock | Vibration: 147m/s²p-p (max.) in operation Shock: 490m/s² (max.) in operation | Module's vibration/shock resistance performance can be met by securing the memory card with the metal bracket, included in this module. | |

Note: Be sure to purchase the memory card for which "electrostatic countermeasure" has been taken as well as having the items specified above.

### ■ System configuration

CPU module
**NP1F-MM1**

Program and data read/write from/to CPU

Personal computer loader

Active system

Backup system

Memory card interface module
**NP1F-MM1**

Faulty CPU

| Active system No. 1 CPU | Active system No. 2 CPU | Active system No. 3 CPU | Active system No. 4 CPU |

Memory card interface module

Memory card
No. 1 CPU program
No. 2 CPU program
No. 3 CPU program

Program downloading

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## Dummy Module: NP1F-DMY

### ■ Features
- When your system will be expanded in the future, the dummy module can be used as a substitute for the extension module.
- If an active module has failed during operation of the system, the system can be restarted when you replace the failed module with the dummy module (which, however, cannot perform the functions of the failed module).

**NP1F-DMY**

AF00-44

### ■ Specifications

| Item | Specification |
|---|---|
| Type | **NP1F-DMY** |
| Substituted module | All modules except power module and CPU module |
| Mounting place | On a base board directly connected to SX bus<br>Cannot be mounted on a T-link base board or other remote I/O module. |
| Occupied words | 0 word |
| Internal current consumption | 24V DC, 26mA or less |
| Mass | Approx. 120g |

## High-speed Counter Module: NP1F-HC □

### ■ Features

**NP1F-HC2**
- Fast input pulses can be counted up to 2-channel 500kHz.
- Compatible with 3 types of input signals.
  1) 90° phase-difference pulse
  2) Forward/reverse pulse
  3) Pulse + sign
- 4 types of operation modes
  1) Ring operation
  2) Gating operation
  3) Compare detecting operation
  4) Phase-Z detecting operation

**NP1F-HC8**
- Fast input pulses can be counted up to 8-channel 50kHz.
- Compatible with 3 types of input signals.
  1) 90° phase-difference pulse
  2) Forward/reverse pulse
  3) Pulse + sign
- 3 types of operation modes
  1) Ring operation
  2) Gating operation
  3) Reset operation

**NP1F-HC2**

AF97-520

### ■ Performance specifications

| Item | | Specification | |
|---|---|---|---|
| Type | | **NP1F-HC2** | **NP1F-HC8** |
| Count input signal | Input signal | 2-phase signal (90° phase difference), forward /reverse signal, coded pulse (Selected by the software) | |
| | Level | Open collector signal or differential signal | Open collector signal |
| Counter | Function | Ring counter function, reset function, gate function, comparison function (**NP1F-HC2**), phase Z detection (**NP1F-HC2**) | |
| | No. of channels | 2 channels (independent) | 8 channels (independent) |
| | Counting speed | 500kHz | 50kHz |
| | Counting range | Signed 32-bit binary (80000000 to 7FFFFFFFH) | Signed 16-bit binary (8000 to 7FFFH) |
| | Multiplication function | x 4 (2-phase signal, 90° phase difference only) | |
| | Reset function | Soft command | |
| | Gate function | External input signal and soft command | |
| | Comparison function | Hard circuit and soft command | – |
| | Phase Z detection | External input signal and soft command | – |
| Comparison | No. of output points | 1 point /channel | – |
| | Comparison range | Same as the counting range | – |
| | Comparison contents | (Counted value) ≥ (Compared value) to Output ON | – |
| | Comparison output | Open collector output (sink type) 24V DC | – |
| Occupied words | | Input: 8 words / Output: 8 words (total: 16words) | Input: 10 words / Output: 2 words (total: 12words) |
| Internal current consumption | | 24V DC 85mA or less | 24V DC 100mA or less |
| Mass | | Approx. 120g | Approx. 195g |

### ■ Functions

| Function | Description |
|---|---|
| Linear operation (**NP1F-HC2**) | Counting operation for detecting underflow/overflow when the pulse count value is under/over the minimum/maximum value. |
| Ring operation | Ring-type counting operation to set the minimum value when the pulse count value exceeds the maximum value or to set the maximum value when the count value is less than the minimum value. |
| Gating operation | Pulse counting operation activated only when the internal or external gate input is in the counting enabled state. |
| Reset operation | Resetting the counter value to zero (0) by internal command. |
| Compare detecting operation (**NP1F-HC2**) | Comparing the preset compare value and a count value to output the result to the compare output. |
| Phase-Z detecting operation (**NP1F-HC2**) | Reading a count value for each phase-Z detection. |

### ■ System configuration

NP1F-HC2/8

Expansion FB

Expansion FB

Expansion FB

High-speed counter FB

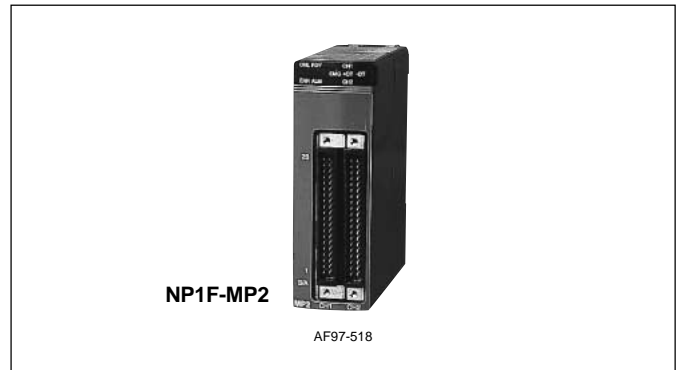Comparison output (**NP1F-HC2**)

Inputs the pulse train output from the encoder.

M

PG

## Two-axis Pulse Train Output Positioning Control Module: NP1F-HP2
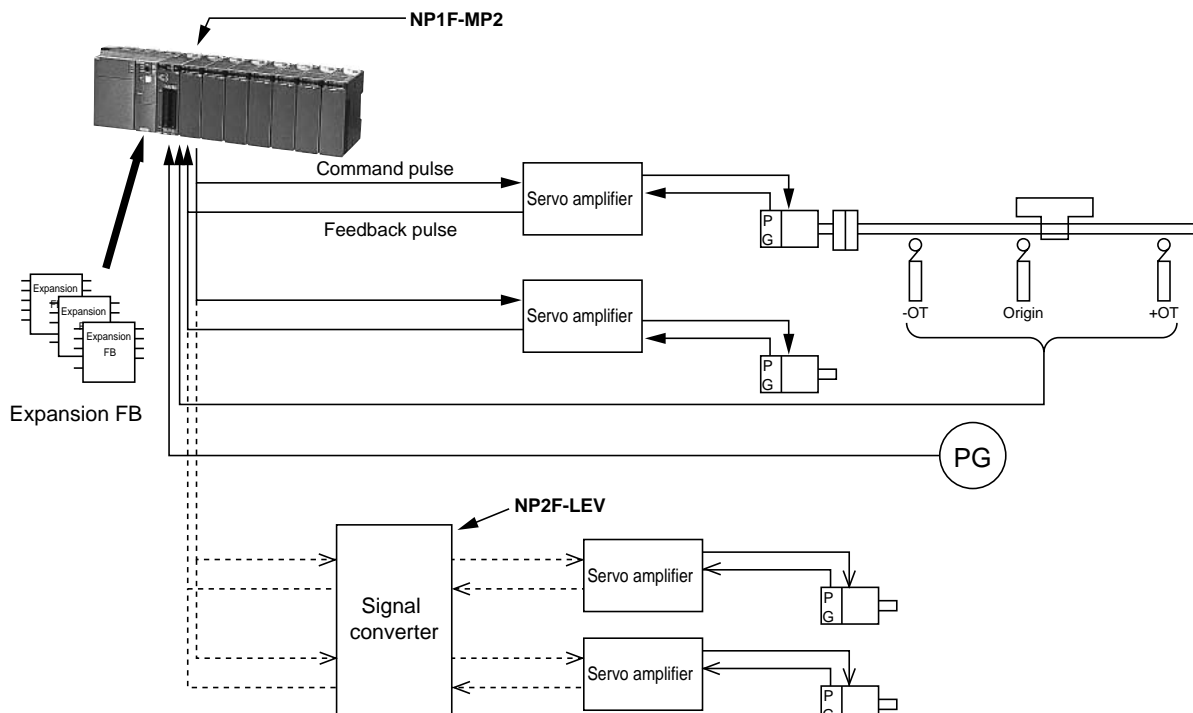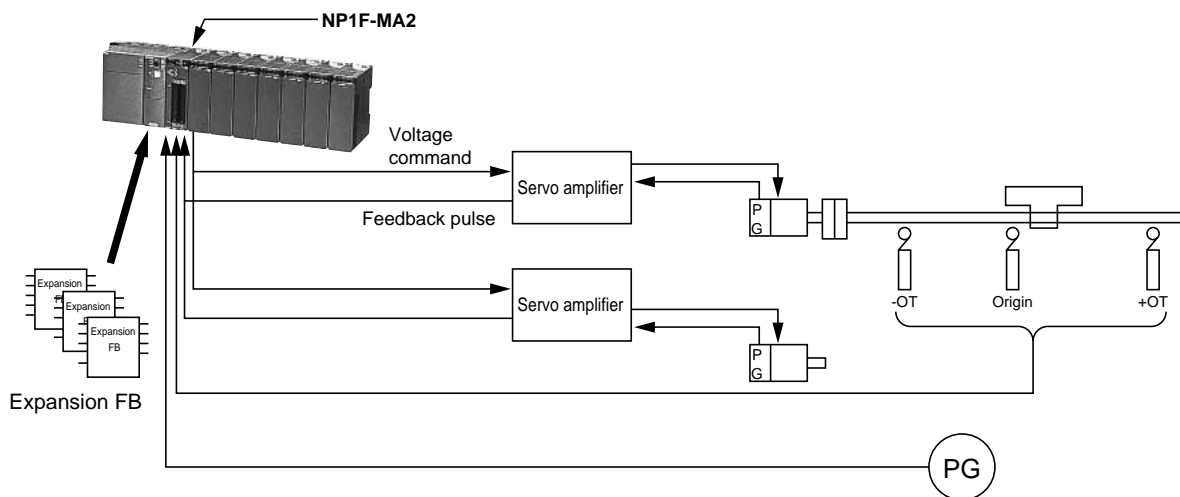
### ■ Features
- Combined with the servo amplifier motor of the pulse train command input type or the stepping motor driver allows high-precision positioning.
- Use of an expansion FB facilitates embedding necessary functions including axis-independent single-function positioning to multi-axis simultaneous start positioning (pseudo linear interpolation).
- Use of the signal converter (**NP2F-LEV**) enables connecting the differential input type equipment.

**NP1F-HP2**

AF97-517

### ■ Performance specifications

| Item | | Specification |
|---|---|---|
| No. of control axes | | 2 axes |
| Positioning control | | Open loop |
| Acceleration /deceleration characteristics | | Trapezoidal (at pulse generation mode) |
| Position data | | Max. $2^{32}-1$ pulse /command |
| Command pulse | Command frequency | 250kHz |
| | Frequency resolution | 16 bits /20 bits |
| | Output type | Open collector output (forward pulse + reverse pulse) |
| Control function | | Pulse generation mode |
| Combination actuator | | Servo system prepared pulse train command input or stepping motor |
| Occupied word | | Input: 8 words/Output: 8 words (total: 16 words) |
| Internal current consumption | | 24V DC 95mA or less |
| External power supply | | 24V DC 35mA or less |
| Mass | | Approx. 180g |

### ■ System configuration



NP1F-HP2

Command pulse

Servo amplifier

Expansion
Expansion
Expansion FB

Expansion FB

NP2F-LEV

Signal converter

Servo amplifier

-OT    Origin    +OT
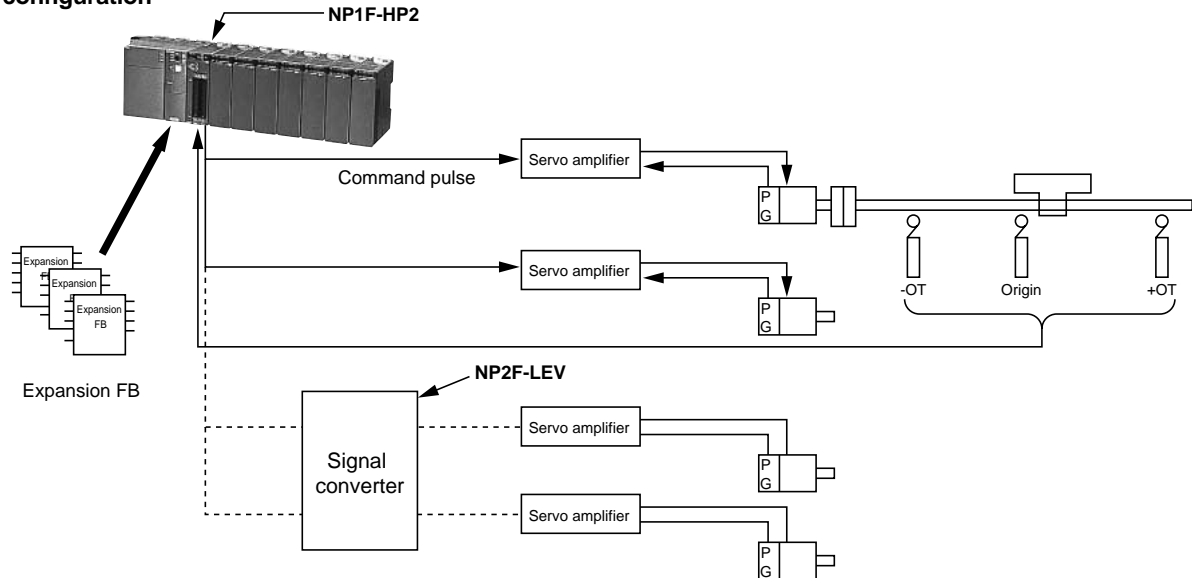
### ■ Signal converter (NP2F-LEV) specifications

| Item | | Specification |
|---|---|---|
| No. of control axes | | 2 axes (4 channels) |
| Input signal | Input frequency | Max. 1MHz |
| | Input type | Open collector input |
| Output signal | Output frequency | Max. 1MHz |
| | Output type | Differential signal |
| External power supply | | 24V DC, 35mA |
| Mass | | Approx. 130g |

### ■ Dimensions, mm



10  29.8  (36)  47.2  95

85  95

40

6mm dia.
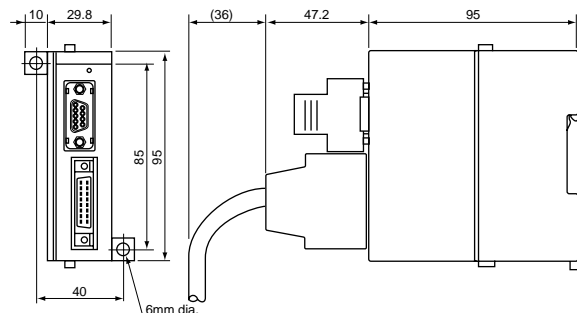
## Two-axis Pulse Train Multiple Positioning Control Module: NP1F-MP2

### ■ Features
- Combined with the servo amplifier motor of the pulse train command input type or the stepping motor driver allows high-precision positioning.
- Use of an expansion FB facilitates embedding necessary functions including axis-independent single-function positioning to multi-axis simultaneous start positioning (pseudo linear interpolation), interpolation, and cam/running cut.
- Current position (current feedback value) can be detected with the feedback pulse.  2 types of operation modes are available: pulse generation mode and position command mode.
- Use of the signal converter (**NP2F-LEV**) enables connecting differential input type equipment.

**NP1F-MP2**

AF97-518

### ■ Performance specifications

| Item | | Specification |
|---|---|---|
| No. of control axes | | 2 axes |
| Positioning control | | Open loop |
| Acceleration /decelerations characteristics | | Trapezoidal (at pulse generation mode) |
| Position data | | Max. $2^{32}$-1 pulse /command |
| Command pulse | Command frequency | 250kHz |
| | Frequency resolution | 16 bits /20 bits |
| | Output type | Open collector output (forward pulse + reverse pulse) |
| Feedback pulse | Input frequency | 500kHz |
| | Input type | Open collector input or differential signal (90° phase difference, phase A, B and phase Z) |
| Manual pulse unit | Input frequency | 500kHz |
| | Input type | Open collector input or differential signal (90° phase difference, phase A, B or forward pulse + reverse pulse) |
| Control function | | Pulse generation mode, positioning command mode |
| Combination actuator | | Servo system prepared pulse train command input or stepping mode |
| Occupied word | | Input: 14 words / Output: 8 words (total: 22 words) |
| Internal current consumption | | 24V DC 95mA or less |
| External power supply | | 24V DC 35mA or less |
| Mass | | Approx. 200g |

### ■ System configuration



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## Two-axis Analog Multiple Positioning Control Module: NP1F-MA2

### ■ Features

● Combined with the servo amplifier motor of the pulse train command input type or the stepping motor driver allows high-precision positioning.
● Use of an expansion FB facilitates embedding necessary functions including axis-independent single-function positioning to multi-axis simultaneous start positioning (pseudo linear interpolation), interpolation, and cam/running cut.
● 3 types of operation modes are available: pulse generation mode, position control mode, and position command mode.

**NP1F-MA2**

AF97-519

### ■ Performance specifications

| Item | | Specification |
|---|---|---|
| No. of control axes | | 2 axes |
| Positioning control | | Semi-closed loop |
| Acceleration /deceleration characteristics | | Trapezoidal (at pulse generation mode) |
| Position data | | Max. $2^{32}-1$ pulse /command (at pulse generation mode) |
| Speed command | Command voltage | Analog speed command (0 to ±10.24V) |
| | Signal type | Analog voltage command |
| Feedback pulse | Input frequency | 500kHz |
| | Input type | Open collector input or differential signal (90° phase difference, phase A, phase B and phase Z) |
| Manual pulse unit | Input frequency | 500kHz |
| | Input type | Open collector input or differential signal (90° phase difference, phase A, phase B, or forward pulse + reverse pulse) |
| Control functions | | Pulse occurrence mode, positioning command mode, positioning control mode |
| Combination actuator | | Servo system prepared analog speed command input |
| Occupied words | | Input: 14 words / Output: 8 words (total: 22 words) |
| Internal current consumption | | 24V DC 150mA or less |
| Mass | | Approx. 200g |

### ■ System configuration



**NP1F-MA2**

Voltage command

Servo amplifier

Feedback pulse

P G

Servo amplifier

P G

Expansion FB

-OT          Origin          +OT

PG

## MC Module: NP1F-MC8P1

### ■ Features
- 8-axis 8-task motion control can be performed with a single module. Axis control can be interpolated with any combination.
- A tabular form programming language is used, allowing conversion the spreadsheet (Excel).
- Sequence control is performed by the CPU and motion control by this module, realizing multi-axis control without loading the CPU.
- Motion control programs are created with the optional MC module programming support tool.

**NP1F-MC8P1**
AF01-96

### ■ Performance specifications

| Item | Specification |
|---|---|
| No. of control axes | 8-axis/module |
| Max. position data | -2147483647 to 2147483647 pulses (in 1-pulse steps) |
| Control operation interval | 2ms (4-axis control) or more |
| Control function | PTP, interpolation |
| Interpolation function | Straight line interpolation for up to 4 axes, 2-axis arc interpolation |
| Program form | Tabular form |
| Simultaneous execution program | Up to 8 tasks |
| No. of program stored | Up to 500 |
| Program size | Up to 2500 steps/program, total number of steps: 12500 steps |
| Combination actuator | Servo system model **RYS □□□ S3-VSS** (FUJI ELECTRIC) |
| Actuator interface | SX-MC bus (25MHz) |
| No. of occupied words | Input 28 words/output 28 words |
| External power supply current consumption | Input power supply (for external interrupt signal): 24V DC ± 5%, 5mA or less |
| | SX-MC bus drive power supply: 24V DC ± 5%, 500mA or less |
| Internal current consumption | 24V DC ± 5%, 150mA or less |
| Mass | Approx. 186g |

### ■ System configuration

Personal computer

MC module programming support tool

Teaching box (under development)

53
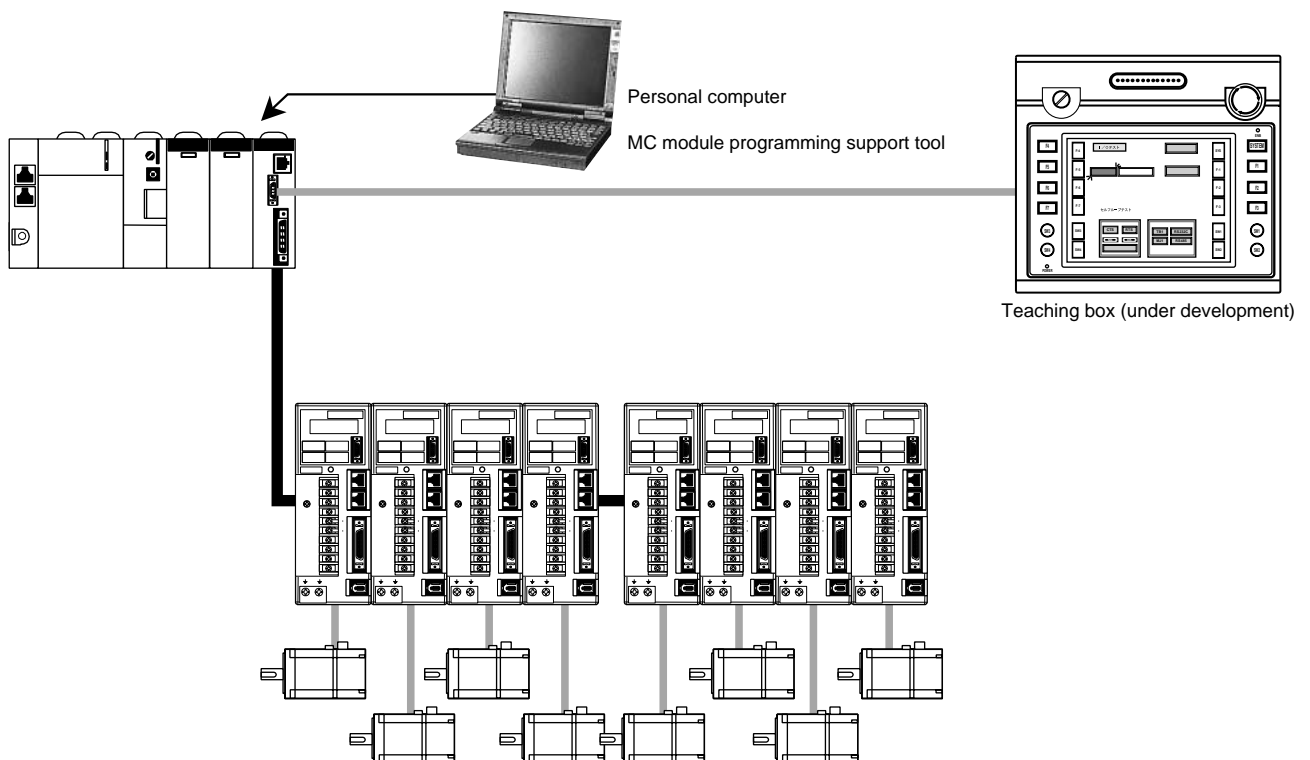
## ■ Positioning Module Function List

| No. | Function | Description | NP1L-HP2 Pulse generation | NP1L-MP2 Pulse generation | NP1L-MP2 Position command | NP1L-MA2 Pulse generation | NP1L-MA2 Position control | NP1L-MA2 Position command |
|---|---|---|---|---|---|---|---|---|
| 1 | Pulse train command | Outputs the pulse train command signal for forward and reverse pulses. | ○ | ○ | | | | |
| 2 | Pulse generation mode positioning | References the pulse count and frequency data in the CPU module and carries out positioning by generating the command pulse using the built-in pulse generator. | ○ | ○ | | ○ | | |
| 3 | Position control mode positioning | Directly references position and speed data in the CPU module and carries out positioning. | | | | | ○ | |
| 4 | Position command mode positioning | References position data in the CPU module and carries out positioning by generating the command pulse using the built-in pulse generator. | | | ○ | | | ○ |
| 5 | Current value count | Counts the command pulse and detects the current command value (multiplied by 4). | ○ | ○ | ○ | ○ | ○ | ○ |
| | | Counts the feedback pulse and detects the current feedback value (multiplied by 4). | | ○ | ○ | ○ | ○ | ○ |
| 6 | Phase-Z position detect (Origin return operation) | Detects the command position at the phase-Z rising edge (or falling edge). | ○ | ○ | ○ | | | |
| | | Detects the deviation amount at the phase-Z rising edge (or falling edge). | | ○ | ○ | ○ | ○ | ○ |
| | | Detects the current feedback position at the phase-Z rising edge (or falling edge). | | ○ | ○ | ○ | ○ | ○ |
| 7 | Interrupt position detect (Interrupt positioning operation) | Detects the command position at the rising edge (or falling edge) of the external interrupt signal. | ○ | ○ | ○ | | | |
| | | Detects the deviation value at the rising edge (or falling edge) of the external interrupt signal. | | ○ | ○ | ○ | ○ | ○ |
| | | Detects the current feedback position at the rising edge (or falling edge) of the external interrupt signal. | | ○ | ○ | ○ | ○ | ○ |
| 8 | Automatic-start frequency setting | Allows the user to set the automatic-start frequency. | ○ | ○ | | ○ | | |
| 9 | Trapezoidal acceleration/ deceleration computation | Computes trapezoidal acceleration/deceleration. | ○ | ○ | | ○ | | |
| 10 | Deceleration point automatic computation | Automatically computes the deceleration point. | ○ | ○ | | ○ | | |
| 11 | Continuous frequency change | Continuously updates the command frequency of the pulse generator. | ○ | ○ | | ○ | | |
| 12 | Command pulse count additional setting | Sets the additional command pulse count during pulse generator output. | ○ | ○ | | ○ | | |
| 13 | Pulse output stop processing | Two types of acceleration can be selected for trapezoidal deceleration when the pulse output is interrupted. | ○ | ○ | | ○ | | |
| 14 | Emergency stop processing | Carries out quick stop when an emergency stop error is detected. | ○ | ○ | | | | |
| | | Immediately stops the pulse output. | | | ○ | | | |
| | | Immediately clears the speed command voltage to 0V. | | | | ○ | ○ | ○ |
| 15 | Over travel ( Plus or minus error detection) | Carries out deceleration and stop when a +/-OT error is detected. | ○ | ○ | | ○ | | |
| | | Immediately stops the pulse output. | | | ○ | | | |
| | | Performs exponential deceleration and stop. | | | | | ○ | ○ |
| 16 | Transmission error monitoring | Monitors a module control program error on the CPU module side, and carries out quick stop when a transmission error is detected. | ○ | ○ | | ○ | | |
| | | Immediately stops the pulse output. | | | ○ | | | |
| | | Performs exponential deceleration and stop. | | | | | ○ | ○ |
| 17 | External pulse count | Counts the external input pulse for manual pulse unit operation or synchronous operation. | | ○ | ○ | ○ | ○ | ○ |
| 18 | Positioning data first read | Up to four items of positioning data per axis can be registered in the FIFO buffer.  The registered positioning data is executed sequentially.  It is also possible to make additional settings in the FIFO buffer during operation. | | ○ | | ○ | | |
| 19 | Positioning data write | Sets additional positioning data during continuous frequency change processing. | | ○ | | ○ | | |
| 20 | External input signal detect | Detects the input status of all DI signals. | ○ | ○ | ○ | ○ | ○ | ○ |
| 21 | External output signal setting | All DO signals can be switched with the CPU module. | ○ | ○ | ○ | ○ | ○ | ○ |

## Positioning Extension FB Software Package [Japanese Version]

| Product name | Model | Description |
|---|---|---|
| Positioning FB package | **NP4N-PTPFV3** | 1-axis PTP positioning FB (pseudo linear interpolating function included), highly-functional 1-axis positioning FB, compact 1-axis positioning FB |
| Electronic cam FB package | **NP4N-CAMFV3** | Cam operation FB (running cut function included), variable cam FB |

High-speed counter extended FB, high-speed input counter FB, and simplified positioning expansion FB are included with the programming support tool D300win as standard.

### ■ High-speed counter extended FB
This FB is installed to use the high-speed counter. Multi-functional and simple-functional FBs are available.

### ■ High-speed input counter FB
This FB is installed to use the pulse counter input function of the high-speed digital input module (NP1X3206-A).

### ■ Simplified positioning expansion FB
This is a simplified positioning FB for the digital output module (NP1Y32T09P1-A) with pulse train output built-in. It carries out positioning of 1-axis PTP using the pulse train command.

### ■ Positioning FB package
● 1-axis PTP positioning FB (pseudo linear interpolating function included) (SPH300)
This FB is used to accelerate to the set speed, decelerate-and-stop at the specified position, and perform position management. Thus, the specified positioning can be implemented by only setting the target position and speed from the sequence program side. This FB allows speed changeover using a function such as the override function during operation so that the user can easily reduce the conveyance time by fast travel and make high-precision positioning by low-speed travel. The position command and speed command can be set in units of mm or mm/s. The pulse count for the position data is converted by this FB to facilitate the operation. This FB is the most suitable for equipment conveying or assembling basic loaders and unloaders.
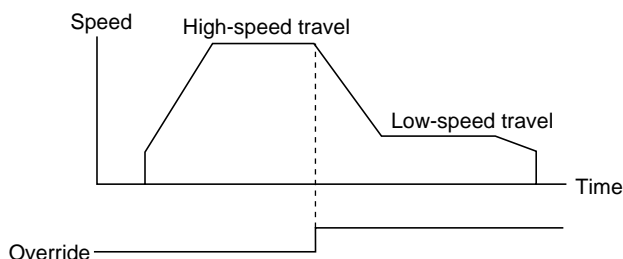


In addition, pseudo linear interpolating operation is implemented by 2-axis, 3-axis, or 4-axis simultaneous start. This operation can be applied to control of most types of multi-layer warehouses and assembling equipment, and is also available for conveyor line control. This FB can be applied to the pulse train positioning control combined module, analog positioning control combined module, and pulse train output positioning module.

● Highly-functional 1-axis positioning FB (SPH300)
This FB has the 1-axis PTP positioning function with S-shape acceleration/deceleration and manual pulse unit operating functions added. This FB is required for electronic cam or running cut operation. It can be applied to the pulse train positioning control combined module and analog positioning control combined module.
● Compact 1-axis FB
This FB has a compact program size and a reduced memory data count for applying the pulse train positioning control combined module or analog positioning control combined module. It performs 1-axis PTP positioning and is best suited for application to SPH200.

### ■ Electronic cam FB package (SPH300)
Positioning implemented by cam control operation is very frequently applied in diverse types of machines such as packaging. Use of this FB package allows accommodating various types of cam mechanism operation (cam patterns), eliminating complicated gear changes of the mechanical cam. It also enables implementing operations impossible with the mechanical cam.

● Cam operation FB
This FB executes 1-axis cam operation positioning. It can implement operations impossible with the mechanical cam as well as operations superseding the conventional mechanical cams. This FB can be applied to the pulse train positioning control combined module and analog positioning control combined module.

The extended FB with functions necessary for control of a running cut machine is also available. Operation synchronous with the conveyer speed does not need conveyer stop and restart, greatly contributing to machine speed increase. This extended FB is used for various types of machine control as well as for the running cut machine. Use of this FB allows easily implementing synchronous control.
This extended FB can be applied to the pulse train positioning control combined module and analog positioning control combined module.

• Rotary shear control
Rotary shear control refers to control of the roll-shaped cutting section (cutter or press) to cut continuously fed material (film, paper, and so on) by feeding at the same speed as the original feed speed. It can be used for such diverse machines as packaging and film manufacture.
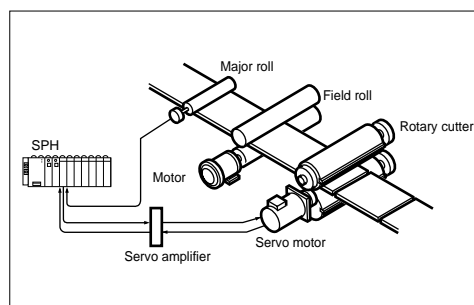
• Flying shear control

Flying shear control means controlling so that the cutting section (cutter or press), consisting of ball screw, rack-and-pinion, or equivalent, will cut the continuously fed material (iron plate, external wall material, clay, and so on) by feeding at the same speed as the original feed speed. It can be used for such diverse machines as metal processing, tile manufacturing, and coating.
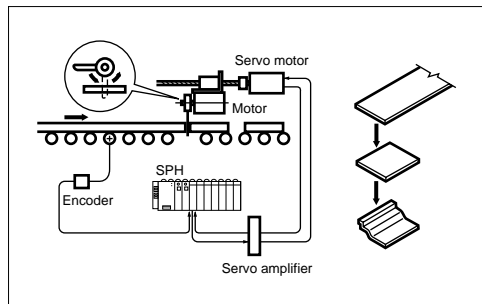


• Flying cutter control

Flying cutter control is to control so that the cutting section (cutter or water jet), consisting of the ball screw, rack and pinion, chain, and so on, will cut the continuously fed material (film, paper, plastic, etc.) by feeding at a constant ratio to the material's feed speed and at a certain angle to the material. It can be used for such diverse machines as board manufacturing.
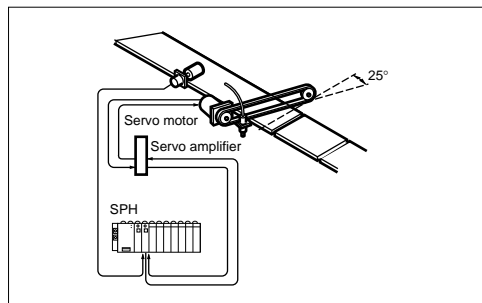


● Variable cam FB

This FB realizes the variable cam function. It detects the machine's main shaft angle (current work value), and turns ON/OFF the output signal of the set main shaft angle (work position). This FB can be applied to the pulse train positioning control combined module, analog positioning control combined module, and pulse train output positioning module.

## Functional Extension FB Software Package [Japanese Version]

### ■ Easily realizes functional extension by software

External fault diagnostic and adjustment system functions can also be implemented with software (an expansion FB) by using the enhanced processing functions of the CPU module. The software processing section is placed in the CPU section as an expansion FB and only the external equipment interface processing is separately performed in the I/O section. Thus, an optimum system can be configured according to the function and performance requirements.

### ■ Diagnostic FB package: NP4N-TRBFV3

Necessary diagnosis can be conducted only by selecting an extended FB for each diagnostic function. If this software is stored in the CPU module for control programs, it is not necessary to add any other special function module. When it is used in the multi-CPU configuration, independence of the control CPU can also be preserved.
For notification of the diagnostic results to the external equipment, Ethernet or a network of general-purpose communication modules or equivalent can also be used.

● Expansion FB packages which implement the fault diagnostic functions
The following diagnostic and data sampling FBs are available:
• Sequence/time diagnostic FB
• Time diagnostic FB
• Upper/lower limit diagnostic FB
• Data sampling FB

### ■ PID FB package: NP4N-PIDFV3

Instrumentation control and sequence control were conventionally separated with respect to both hardware and software. When packaged as an extended FB, this adjustment system computing function is a true linkage between instrumentation control and sequence control.
In addition, the restriction on the control loop count has sufficient expandability in a multi-CPU configuration. (The number of FBs that can be stored in a CPU module is limited by the number of program steps and the sampling rate.)

● Extension FB package realizing the temperature regulation system operation function
• ON/OFF control FB
• PID FB with auto-tuning

### ■ Extension FB package set: NP4N-FSETV3

This set includes the following five different extension FB packages:

| | |
|---|---|
| FA Device General-Purpose Communication Package: | **NP4N-COMFV3** |
| Positioning FB Package: | **NP4N-PTPFV3** |
| Electronic Cam FB Package: | **NP4N-CAMFV3** |
| Failure Diagnosis FB Package: | **NP4N-TRBFV3** |
| PID FB Package: | **NP4N-PIDFV3** |

**Programming Support Tool**

**Programming Support Tool Conforming to International Standard IEC 61131-3 (D300win): NP4H-SEDBV3**

■ **Features**
● **Complete conformity to IEC 61131-3 International Standard**
D300win supports five types of program representations completely conforming to the IEC 61131-3 International Standard.  It allows the programmer to code the combination of program representations best suited for the control target.

● **Supported representations**
• IL (Instruction List)
• FBD (Function Block Diagram)
• SFC (Sequential Function Chart)
• LD (Ladder Diagram)
• ST (Structured Text)
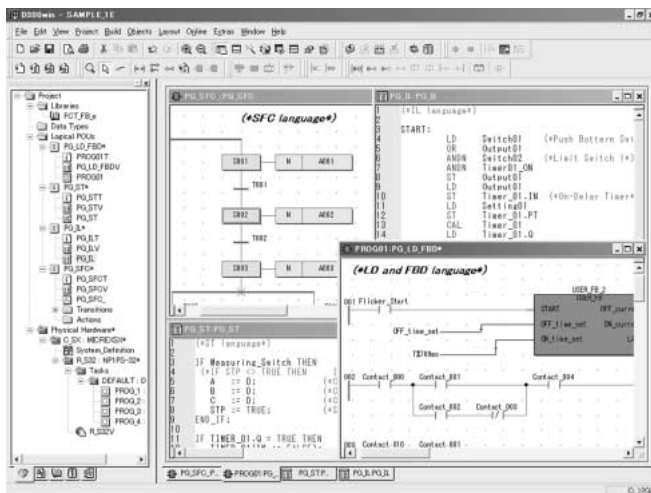


● **Structured programming**
Programmability in units of POU or worksheets allows separate program creation for each function or process so that the programmer can easily generate programs with a structured design and good readability.  In addition, this structured programming enables multiple designers to divide the design work to effectively reduce the program creation time.
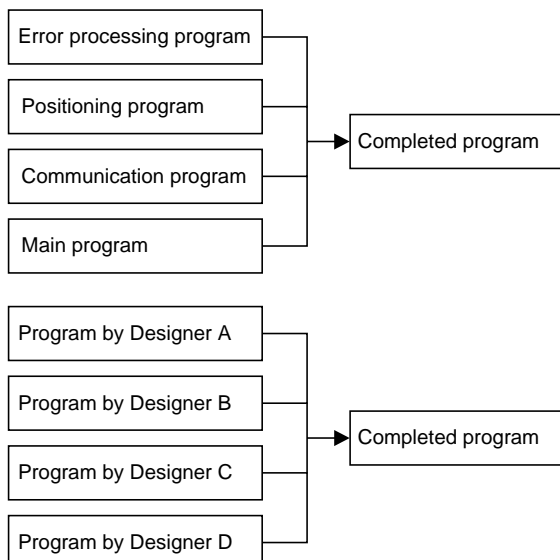


● **Free description of programs and comments**
Programs can be described in any location on a worksheet to facilitate understanding of the processing relationships such as in linkage between the interlock condition and the sequence processing section/computing section, allowing efficient programming.
In addition, when a comment is described on a worksheet, the programmer can put a local comment for each circuit block as well as a comment in units of contacts, coils, or circuits, greatly contributing to ease of reading and understanding.
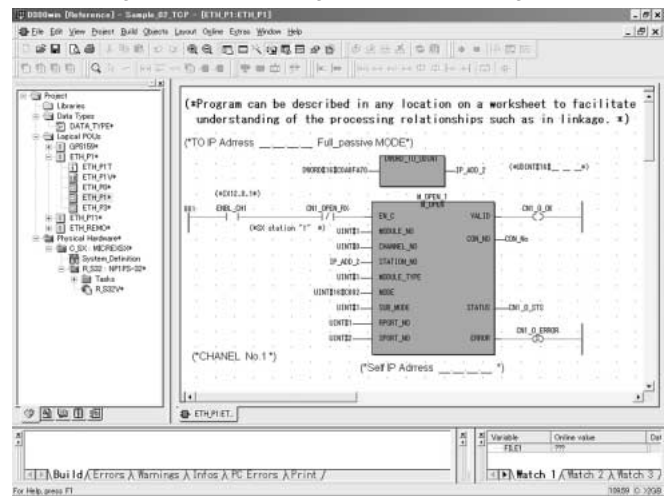


● **Programming with variables (labels)**
Differing from conventional programming, the D300win Programming Support Tool uses label programming (addresses are automatically assigned) in which the address section is described like conventional comments, enabling program coding without being conscious of memory addressing.  After the programming, any changes in address assignment can be accommodated by merely changing the corresponding label definition to update the program.
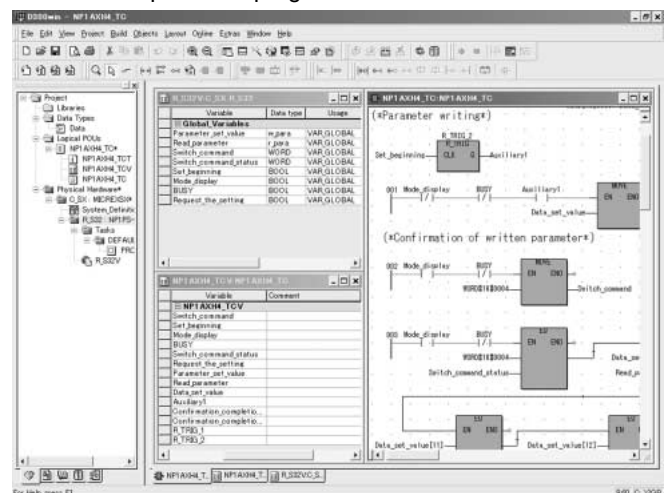
**● Integrates user-original circuits into an FB**

Frequently used routine programs or circuits can be integrated into an FB so that the programmer can easily reuse them. For FB generation, the user can select a language compatible with IEC 61131-3 supported by D300win instead of a special language. If the programs or circuits are stored in library form, the target function can be effectively used without being conscious of debugging.

This is also effective for circuit standardization or structuring if a single control block is integrated into an FB.



**● Simulation function**

This tool enables program logic test using the software PLC function for simulation built in D300win, without using the actual unit.

It performs operating simulation of a program written with a programming language conforming to IEC 61131-3. It enables forced ON/OFF and monitoring of any signal, possibly resulting in remarkable improvement of the programming and debugging efficiency for the SX series.



**● Enlarge/reduction display, multi-window display**

Frequent demands at the time of programming include legibility, with large characters and display of many circuits to facilitate understanding of the entire process. The tab-key screen selection function, overview function, and quadruple display function make it easier to grasp the program structure and improve program editing efficiency.

**● Error & jump check function**

The tool performs program syntax check at the time of program compilation to detect syntax errors. It is possible to jump to an error position by double-clicking an error detection section. This function, together with the cross-reference function and data watch window function, exhibits its power in program correction and testing.

● **Documentation function**

The documentation preparation function has been substantially improved. Not only can it print drawing numbers, dates, page, and drawing borders, but also company logos and comments. It also augments the print preview function, which allows the user to verify the print state on the screen before beginning printing, and the scaled printing function which eliminates the need to select the paper size.

**Layout function**

The layout function allows the user to print a program list in a free, user-original format. The created layout can be stored as a layout library, which can be used when necessary.

Frame creation: Program list can be printed with frames. The frames can be freely designed facilitating reproduction of a conventionally used drawing sheet.
Company logo: Company logo can be attached to a document. It is created as BMP data and pasted to the frames.
Drawing number: Drawing number can be placed in a specified position within the frame.
Page: Page number can be placed in a specified position within the frame.
Comment: Comments can be placed in a specified position within the frame.
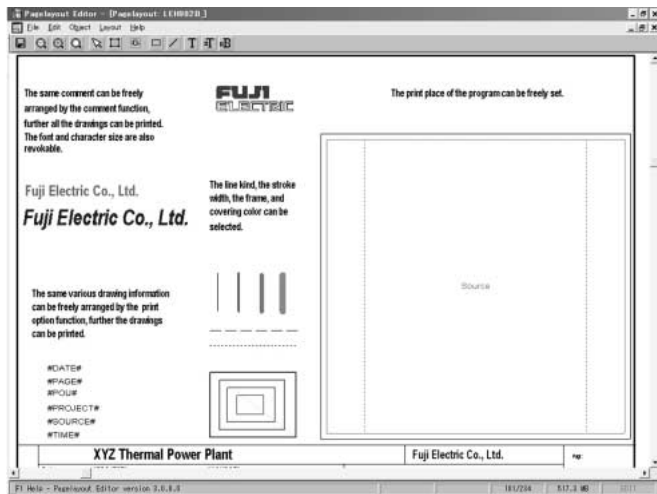


**Preview function**

Use of the preview function before printing allows the user to verify the print image.
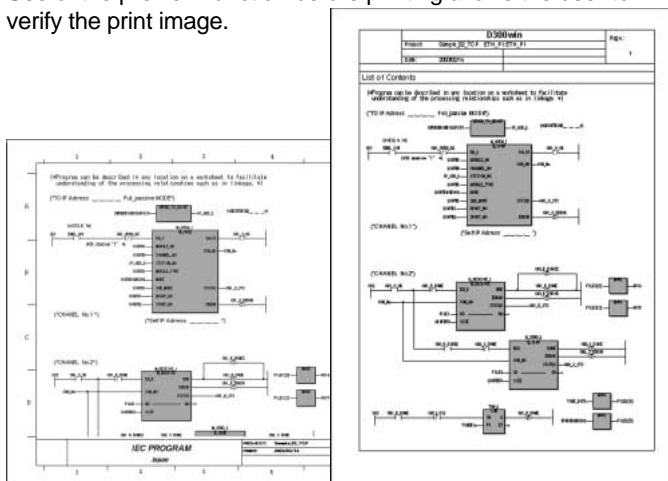


**Scaled printing**

Documents can be printed in enlarged or reduced size. The paper size can be freely selected according to the purpose. The number of programs printed on a single sheet can be freely adjusted to provide united documentation.

● **Function module support**

The function module support (built-in each extended FB software package) has been realized as a common support tool. Thus, a dedicated loader is not required.

**Sharing program definitions including variable names**

Labels and files defined/created with the D300win programming support tool can be used as is from the function module support tool. This allows not only reducing the programming workload, but also unifying management of programs.

**Sharing the support tool connection port**

The function module support tool can be used even when the IEC programming support tool remains connected to the CPU module. The support function can be used only by starting the function module support tool, thus, it is not necessary to change the connection by replacing the CPU module with the function module. Parameter transmission between the CPU module and the function module is carried out by the extended FB.





Function module

CPU support tool connecting slot
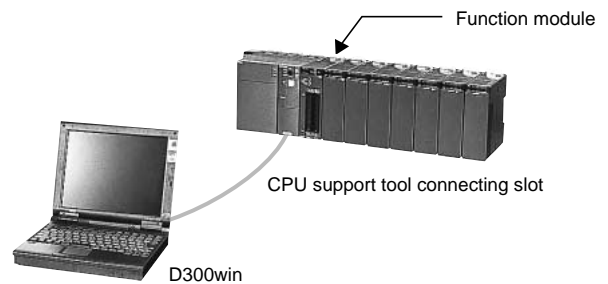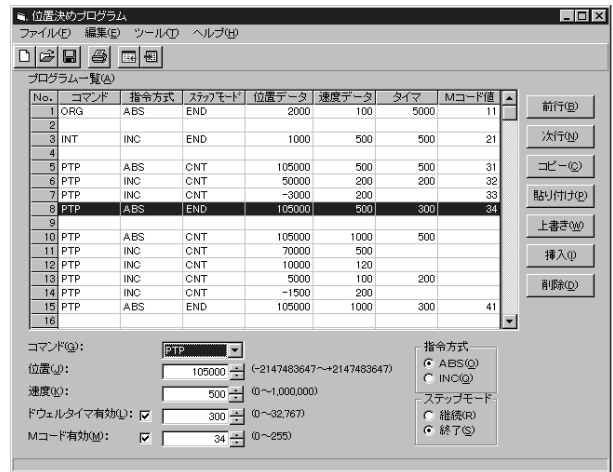
D300win

# MICREX-SX series SPH
# Programming Support Tool (D300win)

**VICPAS**
HMI Parts Center

● **POD cooperated support**

Screen creation for the Programmable Operation Display (POD) can be performed using variable names set with D300win.

**POD screen creation software**

POD screen creation software and D300win run on a personal computer, which is the common platform.



● USB interface

The connection method using the full-speed USB (Universal Serial Bus) 1.1 has been added as a loader connection method. Communication with the advanced CPU module (NP1PS-□□R) can be performed at high speed using a commercial USB cable.

● Uploading and downloading a project

This tool makes it possible to download a project to the user ROM card (compact flash card) attached to the advanced CPU module (NP1PS-□□R), upload it from the user ROM card, and perform project collation.

## ■ Operating environment

| Item | | Specification |
|---|---|---|
| D300win system software | | **NP4H-SEDBV3** |
| Hardware | | IBM-PC/AT compatible |
| CPU | | Intel Pentium 233MHz or higher (350MHz or higher recommended when WindowsXP is used) |
| Hard disk | | Free space of 220M bytes or more ( D300win system software: 100MB or more / Standard extension FB software package: 120MB or more ) |
| CD-ROM unit | | 1 unit (x 4 speed or faster), media: ISO 9660 format |
| Memory capacity | | 64M bytes or more (128M bytes or more recommended when WindowsXP is used) |
| Keyboard | | 101 keyboard |
| Mouse | | USB mouse, serial mouse, bus mouse, or PS2 mouse |
| Indicator | | 800 x 600-dots resolution or higher (1024 x 768-dots resolution or higher recommended) |
| Communication interface | RS-232C | 9600bps-57600kbps (default setup according to resource model selection) |
| | Ethernet | Possible |
| | ISDN | Possible (analog port is used) |
| | USB | Possible with V1.1 (Target CPU: NP1PS-□□R) |
| | P/PE-link | Possible |
| | SX bus | Possible |
| | FL-net | Possible |
| OS | | WindowsNT4.0 (SP6 or later)/2000/XP |
| Other software | | Internet Explorer 5.0 or later |
| Portability | | Depends on commercial mobile personal computer. |
| Environmental durability | | Depends on environmental conditions of commercial personal computer. |

## ■ System configuration

Personal computer



RS-232C

SPH

Support tool connection cable: **NP4H-CB2**
+
RS-232C/RS-422 signal converter: **NW0H-CNV**

D300win
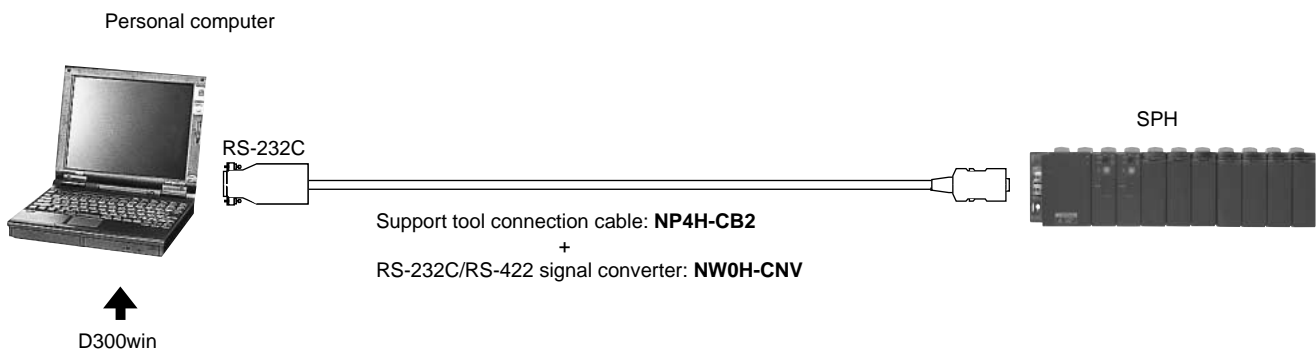
**Programming Automatic Generation Tool  SC Matrix: NP4H-SESV2 [Japanese Version]**

■ **Features**
● **Suitable for process step control**
This programming tool is intended to create process step control programs necessary for machine control and line control.

● **Matrix programming using Excel**
The SC matrix operates on Microsoft Excel.  Process step programming is made simply by setting I/O conditions on a matrix basis using Excel worksheets.  Program downloading to the PC is performed by means of D300win.

**SC matrix table**
This table is used to set the process step condition and output conditions for each process.  Up to 98 processes and up to 100 transitional conditions can be described in one table.  Up to 64 Excel worksheets can be registered, allowing creation of up to 64 tables.
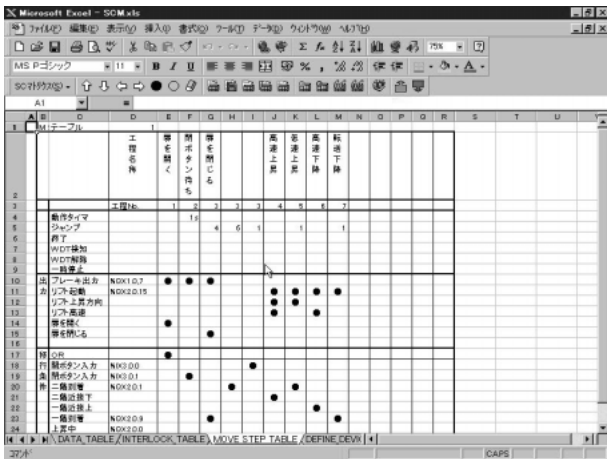


**Output condition table**
This table defines the devices to be output to a specific input.  It corresponds to the SC matrix table and allows setting of interlock condition for each output.  The condition is monitored regardless of the process step and, if a condition is met, the specified device is turned ON.
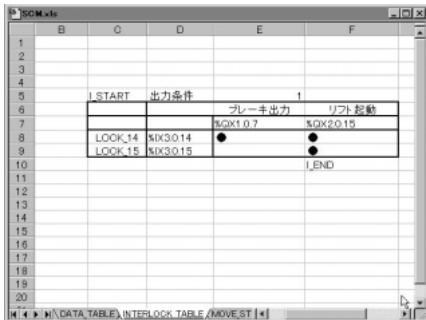


**Data table**
This table defines the data trains to be transferred to the PC using the SC matrix table.  It relates the definition number starting with "DT" to the setting and target device.  Data trains of up to 4000 points can be set as integers or double-precision integers.  Multiple data tables can be registered which can be selected during each operation.
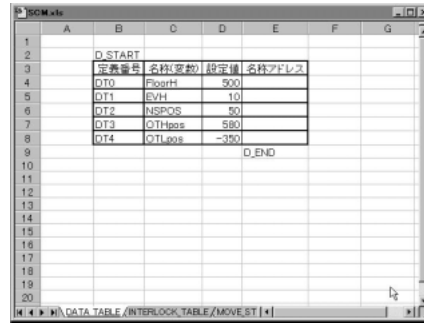


● **Programming by variable (label)**
Like D300win, since variables can be used for the PC address, programming can be made without being aware of the memory address.

● **Automatic generation programming**
PC programs are generated automatically by compiling programs created on Excel.  PC programs can be created without the knowledge of programming languages specific to the PC, allowing PC novices to make programs easily.

● **Monitoring**
The PC monitor can also be displayed in the same screen as the Excel worksheet.  This makes it easier to grasp the machine process step and perform adjustment and maintenance of machines.

**Overall monitor**
This screen monitors the entire SC matrix table.  It is suitable for overlooking the entire process operation.  Other tables can be monitored easily by switching between worksheets.
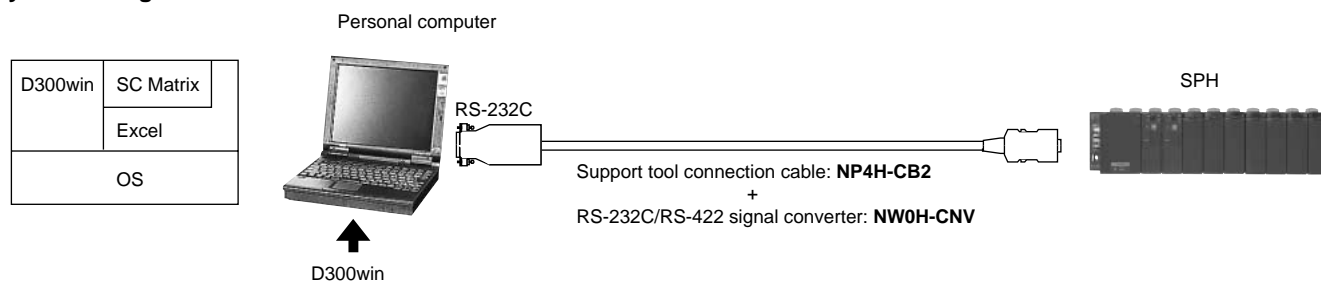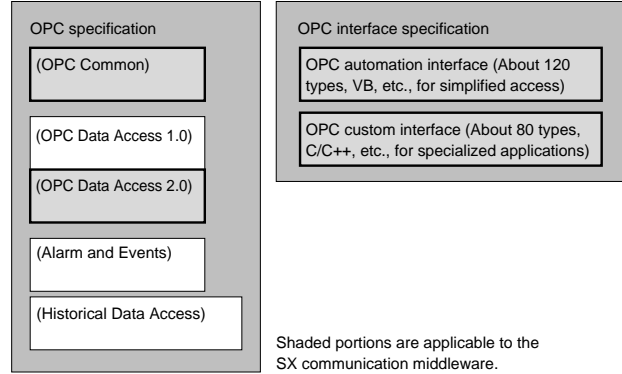


**61**

**Partial monitor**

This screen monitors only the current process being executed.
It displays the relationship between the operating output signal
and the transitional conditions.



## ■ Operating environment

| Item | | Specification |
|---|---|---|
| Hardware | | IBM-PC/AT compatible |
| CPU | | Intel Pentium 233MHz or higher |
| Hard disk | | Free space of 10M bytes or more (with additional disk space for D300win and Excel) |
| CD-ROM unit | | 1 unit (x 4 speed or faster), media: ISO 9660 format |
| Memory capacity | | 32M bytes or more (64M bytes or more recommended) |
| Keyboard | | 101 keyboard |
| Mouse | | USB mouse, bus mouse, or PS2 mouse |
| Indicator | | 800 x 600-dots resolution or higher (1024 x 768-dots resolution or higher recommended) |
| Communication interface | RS-232C | 9600bps to 57600kbps |
| | Ethernet | Possible |
| | ISDN | Possible (analog port is used) |
| | USB | Possible with V1.1 (Target CPU: **NP1PS-**□□**R**) |
| OS | | Windows95/98/NT4.0/2000 |
| Excel version | | Excel97/2000 |
| Portability | | Depends on commercial mobile personal computer. |
| Environmental durability | | Depends on environmental conditions of commercial personal computer. |

## ■ System configuration

Personal computer

SPH

| D300win | SC Matrix |
| | Excel |
| OS | |

RS-232C

Support tool connection cable: **NP4H-CB2**
+
RS-232C/RS-422 signal converter: **NW0H-CNV**

D300win

## MC Module Programming Support Tool: NP4H-MC1 [Japanese Version]

This tool is used to create and support MC module programs.
It allows parameter setup, tabular form programming, monitoring, etc.

### ■ Editing positioning parameters
This tool allows diverse parameter setups for performing position control using the MC module.

| | |
|---|---|
| I/O selection parameters: | I/O area setup, initial value, axis name, etc. |
| Interpolation operation parameter: | Synthetic high-speed limiter, acceleration/deceleration time, etc. |
| Axis control standard parameter: | Actuator control information (up to 8 axes) |
| Axis control extension parameter: | Machine control, correction information (up to 8 axes) |



### ■ Editing positioning parameters
This tool allows editing of MC module positioning programs in tabular form.
Programming with up to 2500 lines can be performed, allowing execution of a large program.



### ■ Offline operation for parameter setup information check
Machines connected to a motor can be operated without intervention of an SPH application, thus preventing machine failure at the time of debugging and maintenance.
The functions include alarm reset, position preset, return-to-origin, manual feed, deviation reset, etc.

### ■ Operating environment

| Item | | Specification |
|---|---|---|
| Hardware | | IBM-PC/AT compatible |
| CPU | | Intel Pentium 233MHz or higher |
| Hard disk | | Free space of 10M bytes or more |
| CD-ROM unit | | 1 unit (x 4 speed or faster), media: ISO 9660 format |
| Memory capacity | | 32M bytes or more (64M bytes or more recommended) |
| Keyboard | | 101 keyboard |
| Mouse | | USB mouse, bus mouse, or PS2 mouse |
| Indicator | | 800 x 600-dots resolution or higher (1024 x 768-dots resolution or higher recommended) |
| Communication interface | RS-232C | 38400bps |
| OS | | Windows95/98/NT4.0 |
| Portability | | Depends on a commercial mobile personal computer. |
| Environmental durability | | Depends on environmental condition of a commercial personal computer. |

### ■ System configuration



Personal computer

RS-232C

Support tool connection cable: **NP4H-CB2**
+
RS-232C/RS-422 signal converter: **NW0H-CNV**

MC module

MC module programming support tool

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## OPC-Coordinated Library  SX Communication Middleware: NP4N-MDLW [Japanese Version]

### ■ Features
● **OPC-coordinated library**
Among various specifications established by OPC Foundation, this library is compatible with the OPC common specification and data access specification.  The OPC automation interface and OPC custom interface are prepared as programming interfaces.

● In combination with a commercial SCADA software (RSView32 from ROCKWELL AUTOMATION, Intouch from SUMITOMO METAL SYSTEM SOLUTION, etc.), this library makes it possible to display the SPH-controlled data to the supervisory screen and utilize the data for the SPH setup data from the operation screen.

| OPC specification |
| --- |
| (OPC Common) |
| (OPC Data Access 1.0) |
| (OPC Data Access 2.0) |
| (Alarm and Events) |
| (Historical Data Access) |

| OPC interface specification |
| --- |
| OPC automation interface (About 120 types, VB, etc., for simplified access) |
| OPC custom interface (About 80 types, C/C++, etc., for specialized applications) |

Shaded portions are applicable to the
SX communication middleware.

### ■ Operating environment

| Item | | Specification |
| --- | --- | --- |
| Hardware | | IBM-PC/AT compatible |
| CPU | | Intel Pentium 233MHz or higher |
| Hard disk | | At least 1 unit, free space of 10M bytes or more (with additional disk space for D300win) |
| CD-ROM unit | | 1 unit (x 4 speed or faster), media: ISO 9660 format |
| Memory capacity | | 128M bytes or more |
| Keyboard | | 101 keyboard |
| Mouse | | USB mouse, bus mouse, or PS2 mouse |
| Indicator | | 1024 x 768-dots resolution or higher |
| Communication interface | Ethernet | Commercial Ethernet board |
| | RS-232C | Commercial personal computer |
| | Modem | Commercial personal computer |
| | FL-net | Commercial Ethernet board |
| | SX bus | NP3L-SX1SASS |
| Software (OS) | | Windows NT4.0/2000 |
| Environmental durability | | Depends on environmental condition of a commercial personal computer. |
| Models to be connected | | MICREX-SX SPH series |
| Language for user application software development | | Microsoft Visual Basic |
| | | Microsoft Visual C++ |

### ■ Sample application system
The example at right is a centralized monitor system for line equipment configured using SPH as a controller.
• The monitor screen makes status display and data collection of each I/O device.
• The operation screen sets production command data for each line.

### ■ Sample application monitor screen
The following is a sample application monitor screen using the SCADA software.



| Monitor screen |
| --- |
| SCADA software |

| SX communication middleware | |
| --- | --- |
| | D300win |

| OS |

Personal computer

SX bus

POD             Servo system
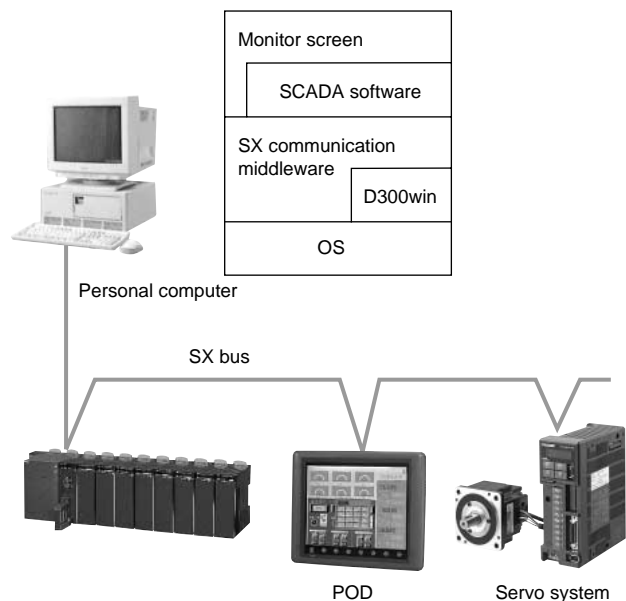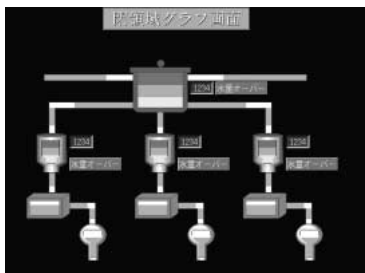
The SX communication middleware accommodates system business talks.  For details, please contact our sales section.

## PCI-Bus-Based SPH300 CPU Board: NP3PS-SX1PCS□

### ■ Features
● The board is provided with an extension connector of the SX bus, FUJI ELECTRIC original high-speed bus, allowing connection to diverse SX-based devices (indicators, remote I/Os, servo units, etc.) as well as standalone operation on a personal computer.
● When programming supporting tool D300win conforming to IEC is installed in a personal computer with this board mounted, programming and maintenance can be performed from the personal computer. Like the SPH300, this board is provided with a loader connector as standard. This makes it possible to perform programming and maintenance also from other personal computers with D300win using a specialized loader cable (**NP4H-CB2**) and a signal converter (**NW0H-CNV**).
● This board is connected to the PCI bus through 8K-word dual port memory, allowing high-speed data transmission. It can interface to applications for personal computers.
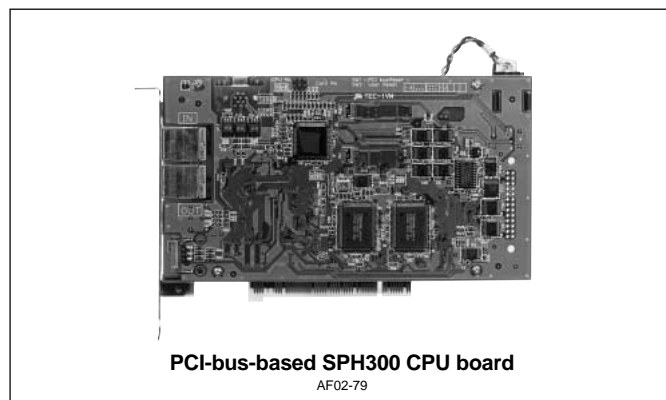


**PCI-bus-based SPH300 CPU board**
AF02-79

● A communication driver for data access with this board has been prepared.

### ■ Performance specifications
Performance and specifications of the built-in board type CPU board **NP3PS-SXPCS32/NP3PS-SXPCS74** are equivalent to those of the module type **NP1PS-32/NP1PS-74**.

| Built-in board type | Module type | Program memory capacity |
|---|---|---|
| **NP3PS-SXPCS32** | **NP1PS-32** | 32768 steps |
| **NP3PS-SXPCS74** | **NP1PS-74** | 75776 steps |

For details on performance and specifications, refer to "CPU Module: **NP1P□-□□**" on pages 13 and 14 of this catalog.

### ■ Operating environment

| Item | | Specification |
|---|---|---|
| Hardware | | IBM-PC/AT compatible (DOS/V PC)* |
| CPU | | Intel Pentium 133MHz or higher |
| Hard disk | | At least 1 unit, free space of 5M bytes or more |
| External storage unit/interface | Floppy disk unit | At least 1 unit, media: 2HD1.25M/1.44M-byte 3.5-inch floppy disk |
| | CD-ROM unit | At least 1 unit, (x 4 speed or faster recommended), media: ISO 9660 format |
| Memory capacity | | 32M bytes or more (64M bytes or more for D300win operation) |
| Keyboard | | 101 English keyboard |
| Mouse | | USB mouse, bus mouse, or PS2 mouse |
| Indicator (resolution) | | 800 x 600-dots resolution or higher |
| Current consumption | | Personal computer with a power capacity capable of supplying 1.5A or more to this board |
| Operating system | | WindowsNT4.0 Workstation Service Pack3 or later, Windows2000 Professional Service Pack1 or later |
| Others | | TCP/IP protocol |

* This board is not applicable to the multi-CPU configuration. Use a personal computer with the single-CPU configuration.

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## PCI-Bus-Based FL-net (OPCN-2) Ver. 2.0 Board: NP3L-FL2PCS

### ■ Features
● Two different communication functions by application
  With cyclic communication, this board supports both the common memory function, which allows each node to share the same data, and the message communication function, which exchanges only necessary information when required.
● Large capacity common memory
  The capacity of the common memory is 8K bits and 8K words.
● High-reliability by the master-less method
  Since no master exists, participation and removal of each node can freely be performed without affecting communication of other nodes.  The power of any node can be turned ON or OFF, allowing easy maintenance.



**PCI-bus-based FL-net board**
AF02-80

### ■ Performance specifications
Performance and specifications of the built-in board type FL-net board **NP3L-FL2PCS** are equivalent to those of the module type **NP1L-FL2**.

### ■ Operating environment

| Item | | Specification |
|---|---|---|
| Hardware | | IBM-PC/AT compatible (DOS/V PC)* |
| CPU | | Intel Pentium 133MHz or higher |
| Hard disk | | At least 1 unit, free space of 5M bytes or more |
| External storage unit/interface | Floppy disk unit | At least 1 unit, media: 2HD1.25M/1.44M-byte 3.5-inch floppy disk |
| | CD-ROM unit | At least 1 unit, (x 4 speed or faster recommended), media: ISO 9660 format |
| Memory capacity | | 32M bytes or more (64M bytes or more for D300win operation) |
| Keyboard | | 101 English keyboard |
| Mouse | | USB mouse, bus mouse, or PS2 mouse |
| Indicator (resolution) | | 800 x 600-dots resolution or higher |
| Current consumption | | Personal computer with a power capacity capable of supplying 1A or more to this board |
| Operating system | | WindowsNT4.0 Workstation Service Pack3 or later, Windows2000 Professional Service Pack1 or later |

* This board is not applicable to the multi-CPU configuration.  Use a personal computer with the single-CPU configuration.

## ■ Dimensions

### (1) Power supply module
#### 1) **NP1S-22**, **NP1S-42**
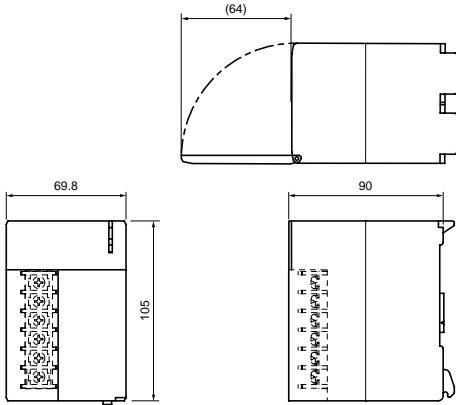


#### 2) **NP1S-91**, **NP1S-81**
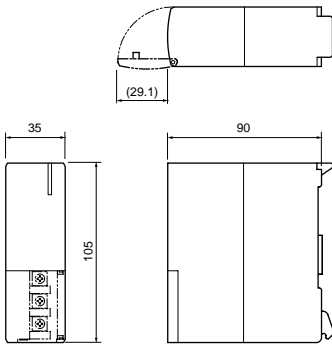


### (2) CPU module
#### 1) High-Performance CPU **NP1PS-32**, **NP1PS-74**, **NP1PS-117**
Standard CPU **NP1PH-16**, **NP1PH-08**
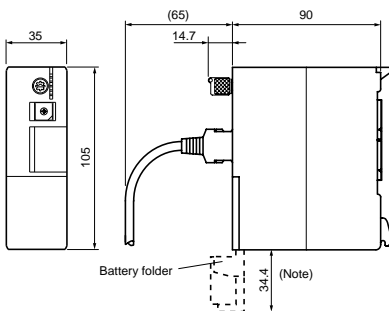


Note: For the standard CPU, open the battery folder at an angle of 180° when user ROM card is removed.

#### 2) High-Performance CPU (User ROM card adapted CPU) **NP1PS-32R**, **NP1PS-74R**, **NP1PS-117R**
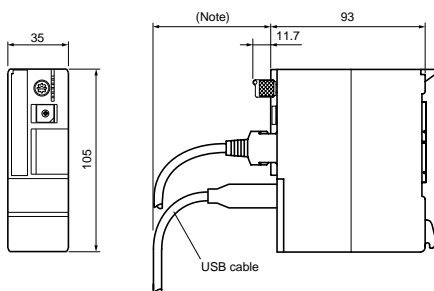


Note: For bend radius, check the specification for the loader cable you use.

### (3) Base board
#### 1) **NP1BP-13**, **NP1BS-13**
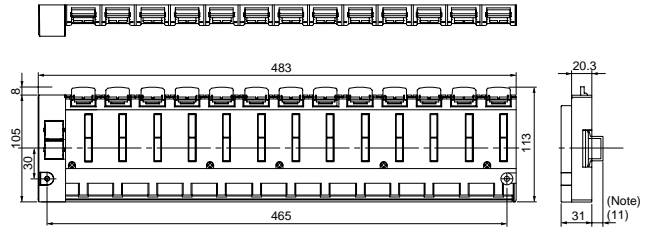


Note: ( ) means to use the rail (TH35-15AL) made by FUJI.

#### 2) **NP1BS-11**
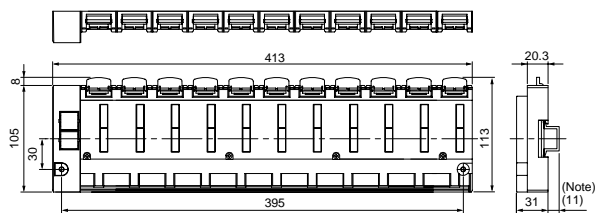


Note: ( ) means to use the rail (TH35-15AL) made by FUJI.
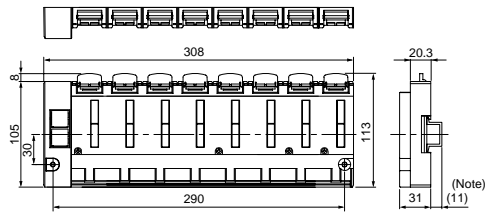
#### 3) **NP1BS-08**



Note: ( ) means to use the rail (TH35-15AL) made by FUJI.
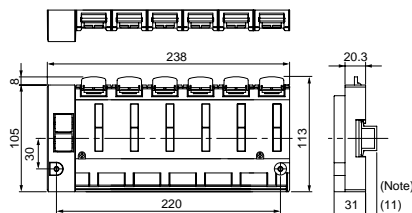
#### 4) **NP1BS-06**



Note: ( ) means to use the rail (TH35-15AL) made by FUJI.

### (4) Base board mounting bracket (accessories for base board)

| Type | L (mm) |
| --- | --- |
| For NP1BP-13/NP1BS-13 | 476.5 |
| For NP1BS-11 | 406.5 |
| For NP1BS-08 | 301.5 |
| For NP1BS-06 | 231.5 |
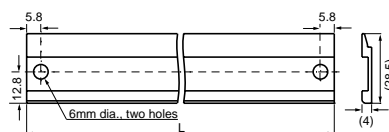


### (5) Base board mounting stud **NP8B-ST**
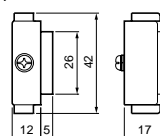
(6) I/O module
1) 6-point/8-point module (digital)
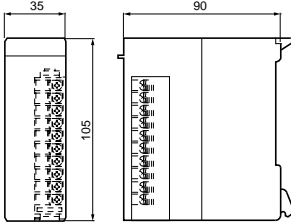


Note: Transistor sink 8-point output type (NP1Y08T0902) and SSR 8-point output type (NP1Y08S) are equivalent to the 16-point module below.

2) 16-point module (digital) / Analog input module /
Analog output module
(**NP1AY□2-MR**, **NP1AX□4-MR**, **NP1AX08-MR**)
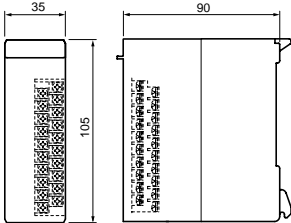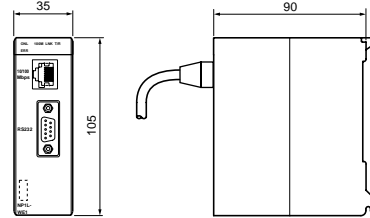


3) 32-point module
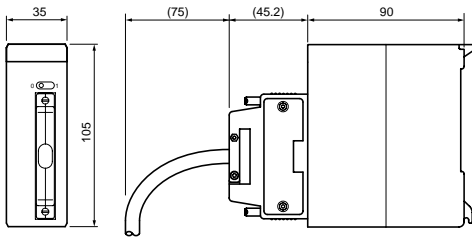


4) 64-point module
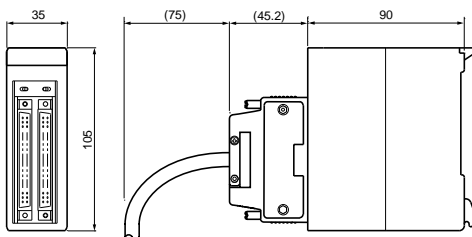


5) Terminal block protrusion module
(Resistance temperature sensor input module **NP1AXH4-PT**,
Thermocouple input module **NP1AXH4-TC**,
Analog I/O module
**NP1AXH8□-MR**, **NP1AYH8□-MR**, **NP1AYH4□-MR**)
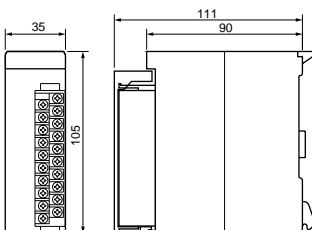


(7) Communication module
1) Web module **NP1L-WE1**, **NP1L-ET1**



2) General purpose communication module **NP1L-RS1/2/4**,
PROFIBUS-DP master module **NP1L-PD1**
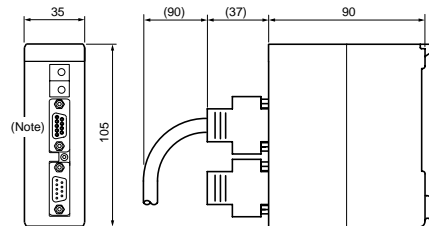


3) T-link master module **NP1L-TL1**,
T-link slave module **NP1L-TS1**,
T-link interface module **NP1L-RT1**,
P-link module **NP1L-PL1**,
PE-link module **NP1L-PE1**,
OPCN-1 master module **NP1L-JP1**,
OPCN-1 slave module **NP1L-JS1**,
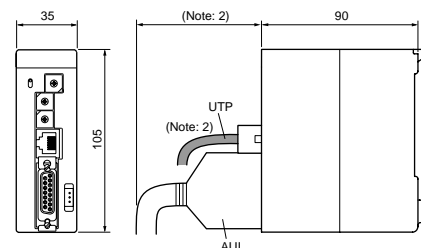OPCN-1 interface module **NP1L-RJ1**
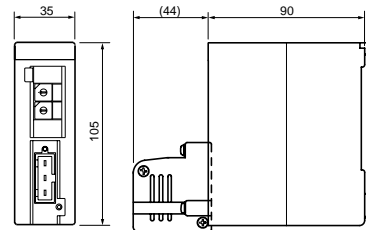


Note: This differs by type, whether or not connectors and switches exist, but outside dimensions are the same for all types.
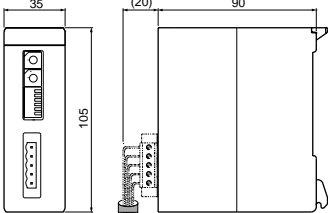
4) AS-i master module **NP1L-AS2**
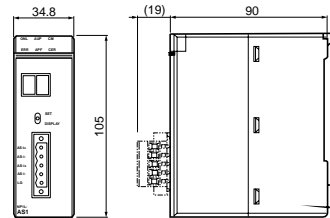


5) FL-net module **NP1L-FL2**,
ADS-net module **NP1L-AD1**



Note: 1) This differs by type, whether or not switches exist, but outside dimensions are the same for all types.
Note: 2) For AUI and UTP cables, you need to take connector dimensions and cable bend into consideration. (For bend radius, check the specification for the cable you use.)

6) DeviceNet master module **NP1L-DN1**,
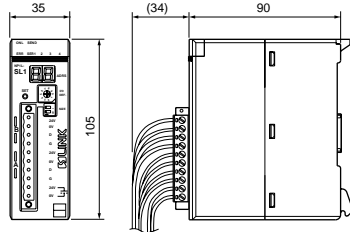DeviceNet interface module **NP1L-RD1**
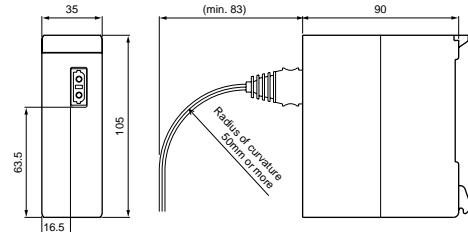


7) LonWorks interface module **NP1L-LW1**
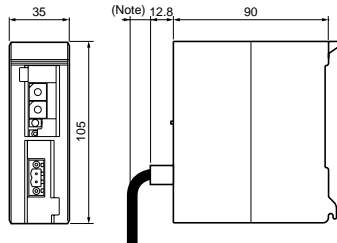


Note: For bend radius, check the specification for the loader cable you use.
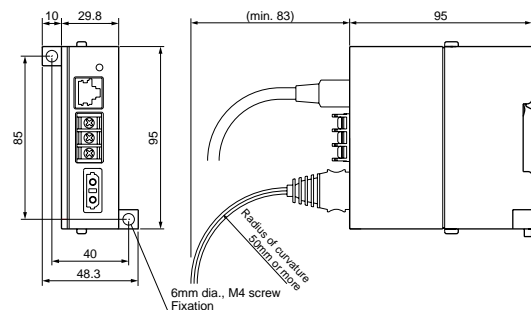
8) S-LINK master module **NP1L-SJ1**
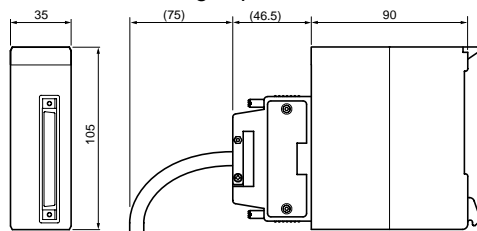


9) SX bus optical link module **NP1L-OL1**



10) SX bus optical link converter **NP2L-OE1**



6mm dia., M4 screw
Fixation

(8) Positioning control module / Unit
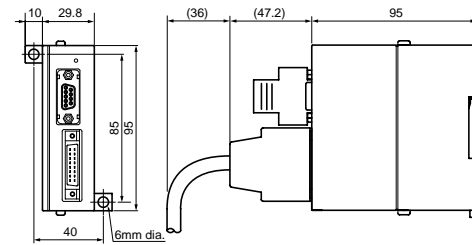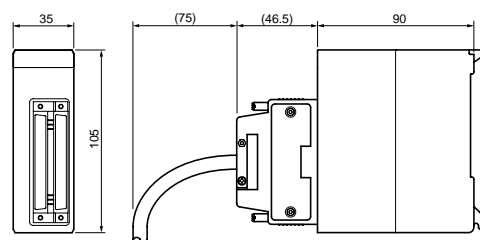1) High-speed counter modle **NP1F-HC2**,
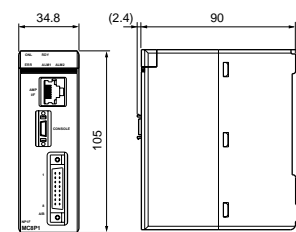Multi channel high-speed counter module **NP1F-HC8**



2) Signal converter **NP2F-LEV**



3) Positioning control module **NP1F-MA2**, **NP1F-MP2**,
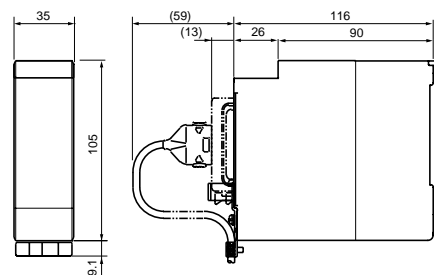**NP1F-HP2**

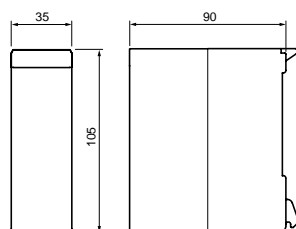

4) Motion control module **NP1F-MC8P1**
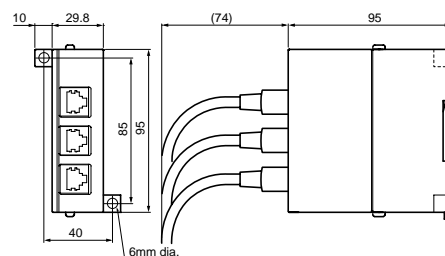


(9) Function module / Unit
1) Memory card interface module **NP1F-MM1**



2) Dummy module **NP1F-DMY**



3) SX bus T-branch unit **NP8B-TB**

## ■ Types/Odering codes

| Names | Types (Odering codes) | Specifications, Names | | | CE *2 | UL cUL | LR *3 | NK |
|---|---|---|---|---|---|---|---|---|
| CPU module SPH200/300 | NP1PS-32 | SPH300  Program memory capacity  32K steps<br>Max. No. of I/O points  8192 points | Accessories:<br>Data backup battery (Built-in)<br>SX bus terminating plug  2 pieces<br>CPU mode selection key switch<br>Screwdriver (for the CPU setting) | Basic instruction execution speeds 20ns or more | ○ | ○ | ○ | ○ |
| | NP1PS-74 | SPH300  Program memory capacity  74K steps<br>Max. No. of I/O points  8192 points | | | ○ | ○ | ○ | ○ |
| | NP1PS-117 | SPH300  program memory capacity  117K steps<br>Max. No. of I/O points  8192 points | | | ○ | ○ | △ | △ |
| | NP1PS-32R | SPH300  Program memory capacity  32K steps<br>User ROM/USB adapted, Max. No. of I/O points  8192 points | | | ○ | ○ | △ | △ |
| | NP1PS-74R | SPH300  Program memory capacity  74K steps<br>User ROM/USB adapted, Max. No. of I/O points  8192 points | | | ○ | ○ | △ | △ |
| | NP1PS-117R | SPH300  Program memory capacity  117K steps<br>User ROM/USB adapted, Max. No. of I/O points  8192 points | | | ○ | ○ | △ | △ |
| | NP1PH-08 | SPH200  Program memory capacity  8K steps<br>Max. No. of I/O points  8192 points | | Basic instruction execution speeds 70ns or more | ○ | ○ | ○ | ○ |
| | NP1PH-16 | SPH200  Program memory capacity  16K steps<br>Max. No. of I/O points  8192 points | | | ○ | ○ | ○ | ○ |
| Power supply module | NP1S-22 | 100/240V AC Input power supply, output capacity  35W,  Accessories: Connector for ALM contact, Voltage selection jumper plate | | | ○ | ○ | ○ | ○ |
| | NP1S-81 | 200V AC Input power supply  15W (1 slot) | | | | | | |
| | NP1S-91 | 100V AC Input power supply  15W (1 slot) | | | ○ | ○ | | |
| | NP1S-42 | 24V DC Input power supply, output capacity  35W,  Accessories: Connector for ALM contact | | | ○ | ○ | ○ | ○ |
| Base board | NP1BS-06 | For 6 slots  Processor buses 3 slots | Accessories:<br>Base board mounting bracket | | ○ | ○ | ○ | ○ |
| | NP1BS-08 | For 8 slots  Processor buses 3 slots | | | ○ | ○ | ○ | ○ |
| | NP1BS-11 | For 11 slots  Processor buses 3 slots | | | ○ | ○ | ○ | ○ |
| | NP1BS-13 | For 13 slots  Processor buses 3 slots | | | ○ | ○ | ○ | ○ |
| | NP1BP-13 | For 13 slots  Processor buses 10 slots (High speed type) | | | ○ | ○ | ○ | ○ |
| SX bus expansion cable | NP1C-P3 | 300mm cable | | | — | ○ | ○ | ○ |
| | NP1C-P6 | 600mm cable | | | — | ○ | ○ | ○ |
| | NP1C-P8 | 800mm cable | | | — | ○ | ○ | ○ |
| | NP1C-02 | 2000mm cable | | | — | ○ | ○ | ○ |
| | NP1C-05 | 5000mm cable | | | — | ○ | ○ | ○ |
| | NP1C-10 | 10000mm cable | | | — | ○ | ○ | ○ |
| | NP1C-25 | 25000mm cable | | | — | ○ | ○ | ○ |
| SX bus T-branch unit | NP8B-TB | SX bus T-branch connecting unit,  Accessories: SX bus terminating plug  1 piece | | | ○ | ○ | ○ | ○ |
| Digital input module *1 | NP1X1606-W | 24V DC, 16 points, 7mA  1 to 100ms variable | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1X3206-W | 24V DC, 32 points, 4mA  1 to 100ms variable,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1X3202-W | 5V/12V DC, 32 points, 3mA/9mA  1 to 100ms variable,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1X3206-A | 24V DC, 32 points, 4mA  0 to 100ms variable,<br>Pulse catch 20kHz,  Optional Connector | | Connector | ○ | ○ | | |
| | NP1X6406-W | 24V DC, 64 points, 4mA  1 to 100ms variable,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1X0810 | 100/120V AC, 8 points, 10mA  10ms | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1X1610 | 100/120V AC, 16 points, 10mA  10ms | | Screw terminal | | | ○ | ○ |
| | NP1X0811 | 200/240V AC, 8 points, 10mA  10ms | | Screw terminal | ○ | ○ | ○ | ○ |
| Digital output module *1 | NP1Y08T0902 | Tr sink, 12 to 24V DC, 8 points, 2.4A/point, 4A/common | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1Y16T09P6 | Tr sink, 12 to 24V DC, 16 points, 0.6A/point, 4A/common | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1Y32T09P1-A | Tr sink, 24V DC, 32 points, 0.12A/point, 3.2A/common,<br>Pulse train output 20kHz x 4ch (Built-in),  Optional Connector | | Connector | ○ | ○ | | |
| | NP1Y32T09P1 | Tr sink, 12 to 24V DC, 32 points, 0.12A/point, 3.2A/common,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1Y64T09P1 | Tr sink, 12 to 24V DC, 64 points, 0.12A/point, 3.2A/common,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1Y08U0902 | Tr source, 12 to 24V DC, 8 points, 2.4A/point, 4A/common | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1Y16U09P6 | Tr source, 12 to 24V DC, 16 points, 0.6A/point, 4A/common | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1Y32U09P1 | Tr source, 12 to 24V DC, 32 points, 0.12A/point, 3.2A/common,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1Y64U09P1 | Tr source, 12 to 24V DC, 64 points, 0.12A/point, 3.2A/common,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1Y06S | SSR, 100 to 240V AC, 6 points, 2.2A/point, 4.4A/common | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1Y08S | SSR, 100 to 240V AC, 8 points: all points are independent, 2.2A/points | | Screw terminal | | | ○ | ○ |
| | NP1Y08R-04 | Ry, 110V DC, 240V AC, 8 points, 30V DC/ 264V AC: 2.2A/point, 4A/common | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1Y16R-08 | Ry, 110V DC, 240V AC, 16 points, 30V DC/ 264V AC: 2.2A/point, 8A/common | | Screw terminal | | | ○ | ○ |
| Digital I/O mixed module *1 | NP1W1606T | 24V DC  8 points source input, 12 to 24V DC  8 points Tr sink output | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1W1606U | 24V DC  8 points sink input, 12 to 24V DC  8 points Tr source output | | Screw terminal | ○ | ○ | ○ | ○ |
| | NP1W3206T | 24V DC 16 points source input, 12 to 24V DC  Tr sink 16 points output,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| | NP1W3206U | 24V DC 16 points sink input, 12 to 24V DC Tr source 16 points output,  Optional Connector | | Connector | ○ | ○ | ○ | ○ |
| Terminal Relay | RS16E-DE04 | 24V DC  source input | | | | | | |
| | RS16-DE04 | 24V DC  sink output | | | ○ | ○ | | |
| | RS16-DE04P | 24V DC  source output | | | | ○ | | |
| | RS910M2-0104 | Terminal cable for MICREX-SX: 1m | | | | | | |
| | RS910M2-0204 | Terminal cable for MICREX-SX: 2m | | | | | | |
| | RS910M2-0304 | Terminal cable for MICREX-SX: 3m | | | | | | |

| Standards | ○ | Certificated | △ | Under planing | — | Exceptions |
|---|---|---|---|---|---|---|

*1 Connectors (solder type) for digital input, output, I/O-mixed, and positioning modules are separately available.
  Applicable connector type: Fujitsu FCN-361J040 (connector), FCN-360C040-B (cover),  Our Fuji's type: **NP8V-CN**.
*2 Conformance to CE marking is confirmed on individual SX Series models.  When exporting the final product with the SX Series built in to the EU, be sure to verify the standard conformance corresponding to the final product.
*3 For vibration countermeasures, the modules must be fixed in units of base board.  For further information, contact your Fuji sales representative.

| Names | Types (Odering codes) | Specifications, Names | CE *2 | UL cUL | LR *3 | NK |
|---|---|---|---|---|---|---|
| Analog I/O module | NP1AXH4-MR | High speed type multi-range input 4ch, resolution: 14 bits | ○ | ○ | ○ | ○ |
| | NP1AXH8V-MR | High speed type multi-range input 8ch, resolution: 14 bits (voltage type) | ○ | ○ | | |
| | NP1AXH8I-MR | High speed type multi-range input 8ch, resolution: 14 bits (current type) | ○ | ○ | | |
| | NP1AXH4-PT | Resistance thermometer element input (Pt100Ω/JPt100Ω) 8ch, resolution: 14 bits | ○ | ○ | | |
| | NP1AXH4-TC | Thermo-couple input module 4ch, resolution: 14 bits | ○ | ○ | | |
| | NP1AYH2-MR | High speed type multi-range output 2ch, resolution: 14 bits | ○ | ○ | ○ | ○ |
| | NP1AYH4V-MR | High speed type multi-range output 4ch, resolution: 14 bits (voltage type) | ○ | ○ | | |
| | NP1AYH4I-MR | High speed type multi-range output 4ch, resolution: 14 bits (current type) | ○ | ○ | | |
| | NP1AYH8V-MR | High speed type multi-range output 8ch, resolution: 14 bits (voltage type) | ○ | ○ | | |
| | NP1AYH8I-MR | High speed type multi-range output 8ch, resolution: 14 bits (current type) | ○ | ○ | | |
| | NP1AX04-MR | Standard type multi-range input 4ch, resolution: 10 bits | ○ | ○ | ○ | ○ |
| | NP1AX08-MR | Standard type multi-range input 8ch, resolution: 10 bits | ○ | ○ | | |
| | NP1AY02-MR | Standard type multi-range output 2ch, resolution: 10 bits | ○ | ○ | ○ | ○ |
| Communication module | NP1L-WE1 | Web module 10BASE-T/100BASE-TX   Web server function | ○ | ○ | | |
| | NP1L-ET1 | Ethernet interface module 10BASE-T/100BASE-TX | ○ | ○ | | |
| | NP1L-FL1 | FL-net module Ver. 1.0        Accessories: Power supply cable for the 10BASE5 | ○ | ○ | | |
| | NP1L-FL2 | FL-net module Ver. 2.0        Accessories: Power supply cable for the 10BASE5 | ○ | ○ | | |
| | NP1L-AD1 | ADS-net module   Self-directed distributed protocol (R3.0) support   Accessories: Power supply cable for the 10BASE5 | ○ | ○ | | |
| | NP1L-LW1 | LonWorks interface module   1ch (78kbps)   Accessories: Connector for cable connected | | ○ | | |
| | NP1L-PL1 | P-link module            Accessories: P/PE-link connector | | ○ | ○ | ○ |
| | NP1L-PE1 | PE-link module           Accessories: P/PE-link connector | | ○ | ○ | ○ |
| | NP1L-RS1 | General purpose communication module RS-232C (connector), RS-485 (connector)  each 1ch | ○ | ○ | ○ | ○ |
| | NP1L-RS2 | General purpose communication module RS-232C (connector)  1ch | ○ | ○ | ○ | ○ |
| | NP1L-RS4 | General purpose communication module RS-485 (connector)  1ch | ○ | ○ | ○ | ○ |
| | NP1L-JP1 | OPCN-1 master module     Accessories: OPCN-1 connector, Terminating resistor  2 pieces | ○ | ○ | ○ | ○ |
| | NP1L-JS1 | OPCN-1 slave module      Accessories: OPCN-1 connector | ○ | ○ | | |
| | NP1L-RJ1 | OPCN-1 interface module    Accessories: OPCN-1 connector, SX bus terminating plug  2 pieces | ○ | ○ | ○ | ○ |
| | NP1L-DN1 | DeviceNet master module   Accessories: Screw connector (for cable splicing) | ○ | ○ | | |
| | NP1L-RD1 | DeviceNet interface module   Accessories: Screw connector (for cable splicing), SX bus terminating plug  2 pieces | ○ | ○ | | |
| | NP1L-TL1 | T-link master module     Accessories: T-link connector, T-link terminating resistor  2 pieces | ○ | ○ | ○ | ○ |
| | NP1L-RT1 | T-link interface module    Accessories: T-link connector, SX bus terminating plug  2 pieces | ○ | ○ | ○ | ○ |
| | NP1L-TS1 | T-link slave module      Accessories: T-link connector | ○ | ○ | | |
| | NP1L-PD1 | PROFIBUS-DP master module     Communication standard (IEC 66158, EN 50171, DIN 19245) | ○ | ○ | | |
| | NP1L-AS2 | AS-i master module      Accessories: Screw connector (for cable splicing) | | | | |
| | NP1L-AS1 | AS-i master module      Accessories: Screw connector (for cable splicing) | ○ | ○ | | |
| | NP1L-SL1 | S-LINK master module 1ch    Accessories: Screw connector (for cable splicing) | | | | |
| | NP1L-OL1 | SX bus optical link module      Accessories: SX bus terminating plug | △ | ○ | | |
| | NP2L-OE1 | SX bus optical converter      Accessories: SX bus terminating plug | △ | ○ | | |
| Positioning module *1 | NP1F-HC2 | High speed counter module 500kHz x 2ch    Accessories: Optional Connector | ○ | ○ | | |
| | NP1F-HC8 | Multi-channel high speed counter module 50kHz x 8ch        Accessories: Optional Connector | ○ | ○ | | |
| | NP1F-HP2 | Pulse train output positioning control module  Pulse train command 250kHz x 2ch   Accessories: Optional Connector | ○ | ○ | | |
| | NP1F-MP2 | Pulse train positioning control combined module  Output pulse: 250kHz x 2ch, Feedback pulse: 500kHz,  Accessories: Optional Connector | ○ | ○ | | |
| | NP1F-MA2 | Analog command positioning control combined module  Feedback pulse: 500kHz x 2ch,  Accessories: Optional Connector | ○ | ○ | | |
| | NP2F-LEV | Signal converter  Converts signal level: 4ch, open collector to differential signal,  Accessories: I/O connector each 1 piece | ○ | ○ | | |
| | NP1F-MC8P1 | MC (Motion control) module   Table format PTP,  Accessories: SX bus terminating plug 1 piece | | | | |
| Function module | NP1F-MM1 | Memory card interface module   Memory card interface 1ch,   Accessories: Memory card mounting bracket, Dummy card | ○ | ○ | | |
| | NP1F-DMY | Dummy module | ○ | ○ | | |
| Extended FB software package (Japanese version) | NP4N-TRBFV3 | Fault diagnosis FB software package  Version 3 | — | — | — | — |
| | NP4N-PIDFV3 | PID FB software package  Version 3 | — | — | — | — |
| | NP4N-PTPFV3 | Positioning control FB software package  Version 3 | — | — | — | — |
| | NP4N-CAMFV3 | Electronic cam FB software package  Version 3 | — | — | — | — |
| | NP4N-COMFV3 | General purpose communication software package for Factory Automation machine  Version 3 | — | — | — | — |
| | NP4N-FSETV3 | Extension FB software package set  Version 3 | — | — | — | — |
| | NP4N-MDLW | SX communication middleware | — | — | — | — |
| | NP4N-LNDF | LonWorks module definition tool (ACSESS format) | — | — | — | — |
| Personal computer loader *4 | NP4H-SEDBV3 | Programming support tool based on IEC 61131-3    D300win software package Version 3 | — | — | — | — |
| | NP4H-SEDBV2 | Programming support tool based on IEC 61131-3    D300win software package Version 2 | — | — | — | — |
| | NP4H-SESV2 | Automatic programming generation tool for process step control,  SC matrix (Japanese version) *5 | — | — | — | — |
| | NP4H-MC1 | MC module programming support tool (Japanese version) | — | — | — | — |

| Standards | ○ | Certificated | △ | Under planing | — | Exceptions |
|---|---|---|---|---|---|---|

*1 Connectors (solder type) for digital input, output, I/O-mixed, and positioning modules are separately available.
   Applicable connector type: Fujitsu FCN-361J040 (connector), FCN-360C040-B (cover),  Our Fuji's type: **NP8V-CN**.
*2 Conformance to CE marking is confirmed on individual SX Series models.  When exporting the final product with the SX Series built in to the EU, be sure to verify the standard conformance corresponding to the final product.
*3 For vibration countermeasures, the modules must be fixed in units of base board.  For further information, contact your Fuji sales representative.
*4 The OS is not included.
*5 Can be used regardless of the D300win system version 2.

| Names | | Types (Odering codes) | Specifications, Names | | Standards | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | CE | UL cUL | LR | NK |
| Loader connecting cable | | NP4H-CB2 | Programming support tool connection cable for AT compatible personal computer (Necessary to the signal converter: **NW0H-CNV** ) | | — | — | — | — |
| | | NW0H-CNV | Programming support tool for AT compatible personal computer.  Signal converter for CPU module connecting (It used to with combined the loader connecting cable (**NP4H-CB2**, Optional). | | ○ | — | — | — |
| Simulative-input switch | | NP8X-SW | Simulative-input switch for DC input module (16 points) | | | | | |
| ROM cassette | | NP8PMF-16 | User ROM cassette for the SPH200 | | — | — | — | — |
| | | NP8PCF-16 | User ROM card compact flash memory for the SPH300,  Capacity: 16MB | | — | — | — | — |
| Online adapter and | | FOA-ALFA2 | Online adapter (Necessary for the **NP4H-CB2** on connection to personal computer) | | — | — | — | — |
| Relational software | | FOA-LOADER2-CD | Initial setting loader software for the online adapter | | — | — | — | — |
| (Japanese version) | | FOA-CENTER2-CD | Master station monitoring software for the online adapter | | — | — | — | — |
| Auxiliaries | | NP8P-BT | Data backup battery (Battery type: Lithium primary battery) | | — | — | — | — |
| | | NP8B-BP | SX bus terminating plug | | — | — | — | — |
| | | NP8B-ST | Base board mounting stud (DIN rail type) | | — | — | — | — |
| | | NP8V-CN | I/O, positioning control module connector (solder type) | | — | — | — | — |
| | | NP8P-KY | CPU mode selection key switch | | — | — | — | — |
| | | FTC120T | T link / OPCN-1 connector | | — | — | — | — |
| | | FTC120P | P/PE link connector | | — | — | — | — |
| | | FRT120A100 | T link / OPCN-1 terminating resistor | | — | — | — | — |
| | | FRT220A75 | P/PE link terminating resistor | | — | — | — | — |
| I/O terminals | OPCN-1 | NR1JX-1606DT | No polarity, input 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1JY-08R07DT | Ry output 240V AC / 110V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | | NR1JY-16T05DT | Tr sink output 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1JW-16T65DT | Source input 24V DC, 8 points, Tr sink output 24V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | DeviceNet | NR1DX-1606DT | No polarity, input 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1DY-08R07DT | Ry output 240V AC / 110V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | | NR1DY-16T05DT | Tr sink output 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1DW-16T65DT | Source input 24V DC, 8 points, Tr sink output 24V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | T-LINK | NR1TX-1606DT | No polarity, input 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1TY-08R07DT | Ry output 240V AC / 110V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | | NR1TY-16T05DT | Tr sink output 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1TW-16T65DT | Source input 24V DC, 8 points, Tr sink output 24V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | SX bus | NR1SX-1606DT | No polarity, input 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1SY-08R07DT | Ry output 240V AC / 110V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | | NR1SY-16T05DT | Tr sink output 24V DC, 16 points, detachable terminals | | ○ | ○ | | |
| | | NR1SW-16T65DT | Source input 24V DC, 8 points, Tr sink output 24V DC, 8 points, detachable terminals | | ○ | ○ | | |
| | LonWorks | NR1LX-1606DT | No polarity, input 24V DC, 16 points (included the 4 pulse input points), detachable terminals | Accessories: Neuron ID seal | | | | |
| | | NR1LY-08R07DT | Ry output 240V AC / 110V DC, 8 points, detachable terminals | | | | | |
| | | NR1LW-11R80DT | Source input 24V DC, 9 points (included the 4 pulse input points), Ry output 240V AC / 110V DC, 2 points, detachable terminals | | | | | |
| | Optional | NR1XV-CB1 | Common extension bar (9 pins) | | — | | | |

| Standards | ○ | Certificated | △ | Under planing | — | Exceptions |
|---|---|---|---|---|---|---|

| Names | | Types (Odering codes) | Standards | | | |
|---|---|---|---|---|---|---|
| | | | CE | UL cUL | LR | NK |
| PCI bus based SPH300 CPU board   Program memory capacity: 32K steps | Accessories: | NP3PS-SX1PCS32 | | | | |
| PCI bus based SPH300 CPU board   Program memory capacity: 74K steps | Driver (CD version), Data backup battery, SX bus terminating plug  2 pieces CPU mode selection key switch Name and use seal | NP3PS-SX1PCS74 | | | | |
| PCI bus based FL-net board   Ver. 1.0 | Accessories: | NP3L-FL1PCS | | | | |
| PCI bus based FL-net board   Ver. 2.0 | Driver (CD version), Name and use seal | NP3L-FL2PCS | | | | |

| Standards | ○ | Certificated | △ | Under planing | — | Exceptions |
|---|---|---|---|---|---|---|

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# Fuji Electric Co., Ltd.

## ED & C • Drive Systems Company

Gate City Ohsaki, East Tower
11-2, Osaki 1-chome, Shinagawa-ku, Tokyo, 141-0032, Japan

Phone:    +81-3-5435-7135~8
Fax:      +81-3-5435-7456~9