Fuji Integrated Controllers **MICREX-SX** Series

Programmable Controller SPF

Achieving Cost Efficiency and High Performance Processing

SPF

Achieves high cost performance
Flexibly supports machinery and systems

- **High processing performance corresponding to high-speed, high functioning**

- **Variety of extension units flexibly adapting to applications**

- **Realizing servo system with 4 axes of 200 kHz pulse output**

- **Conforming to the IEC61131-3 programming standards**

SPF

High-speed processing

The unit has impressive sequence processing performance for machine control operations, as well as enhanced data processing capabilities. Instruction execution time is as fast as 0.3 µs for basic instructions and 0.87 µs for data instructions, enabling the unit to achieve the highest performance of its class. This contributes to improving production capacity.

Positioning function

This function is compatible with a 200 kHz, 4-axis pulse output. It can be utilized for increasingly sophisticated and high-accuracy positioning.

Application example: Take-out robot

Display
MONITOUCH TS

SPF

Pulse signal

Servo systems
ALPHA5 Smart
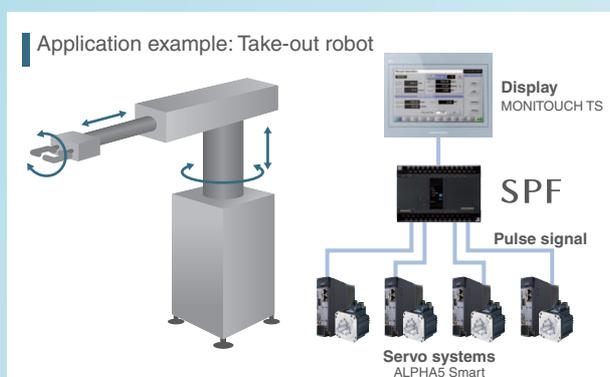
Two types of basic units for varying applications

SPF has two types of basic units: the high-functionality type basic unit (Type: NA0PA), which is suitable for positioning control while connected to a servo system; and the standard type basic unit (Type: NA0PB), which is suitable for the control of general equipment not supported by a servo system. It's possible to select a basic unit depending on applications.

Rich communication functions

RS-232C, RS-485 and Ethernet communication can be established by simply mounting a small board to the basic unit. Communication functions can also be achieved through use of an extension unit on the left side.

Programming tools based on application needs

Two types of programming tools can be selected depending on applications. There are two types of programming tools: Expert, which is compliant with the international standard IEC 61131-3 for PLCs; and Standard, which mainly consists of ladder logic. Function blocks (FB) can also be used corresponding to the control applications.

Internal large-capacity memory

With enhancements to the functional system and increased data processing, the unit comes with a large-capacity program and data memory.

Model	Memory capacity	
	Program	Data
14 points	8 k steps	20 k words
24 points	8 k steps	20 k words
32 points	20 k steps	40 k words
40 points	20 k steps	40 k words
60 points	20 k steps	40 k words

MONITOUCH connection function

SPF can be connected to the MONITOUCH via the loader port. It does not require any special communication equipment.

MONITOUCH TS

SPF

Display

Basic unit

Connection cable
(option)

Types: D9-FU-SPFCPU-□M
MJ-FU-SPFCPU-□M
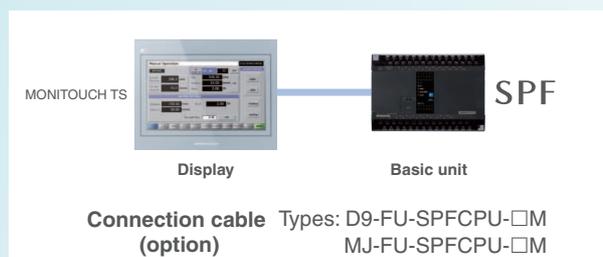
Load cell unit

We offer a unique lineup of modules compatible with load cells used for metering and weighing systems, tank scales, etc. They can be applied to wide range of applications such as cement plants.

Standard calendar function

A calendar function comes standard as an essential function for monitoring machinery and systems.

MODEL LINEUP

Basic unit (CPU unit)

14

14 points
Basic unit

NA0PA-14T-34C
Power supply voltage: 24 V DC
DI/O: input 8 points, output 6 points
Output type: Tr sink output
Detachable terminal block

NA0PB-14R-34C
Power supply voltage: 24 V DC
DI/O: input 8 points, output 6 points
Output type: Ry output

24 points
Basic unit

NA0PA-24T-☐C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 14 points, output 10 points
Output type: Tr sink output
Detachable terminal block

NA0PB-24R-34C
Power supply voltage: 24 V DC
DI/O: input 14 points, output 10 points
Output type: Ry output

32

32 points
Basic unit

NA0PA-32T-☐C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 20 points, output 12 points
Output type: Tr sink output
Detachable terminal block

NA0PB-32R-34C
Power supply voltage: 24 V DC
DI/O: input 20 points, output 12 points
Output type: Ry output

40

40 points
Basic unit

NA0PA-40T-☐C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 24 points, output 16 points
Output type: Tr sink output
Detachable terminal block
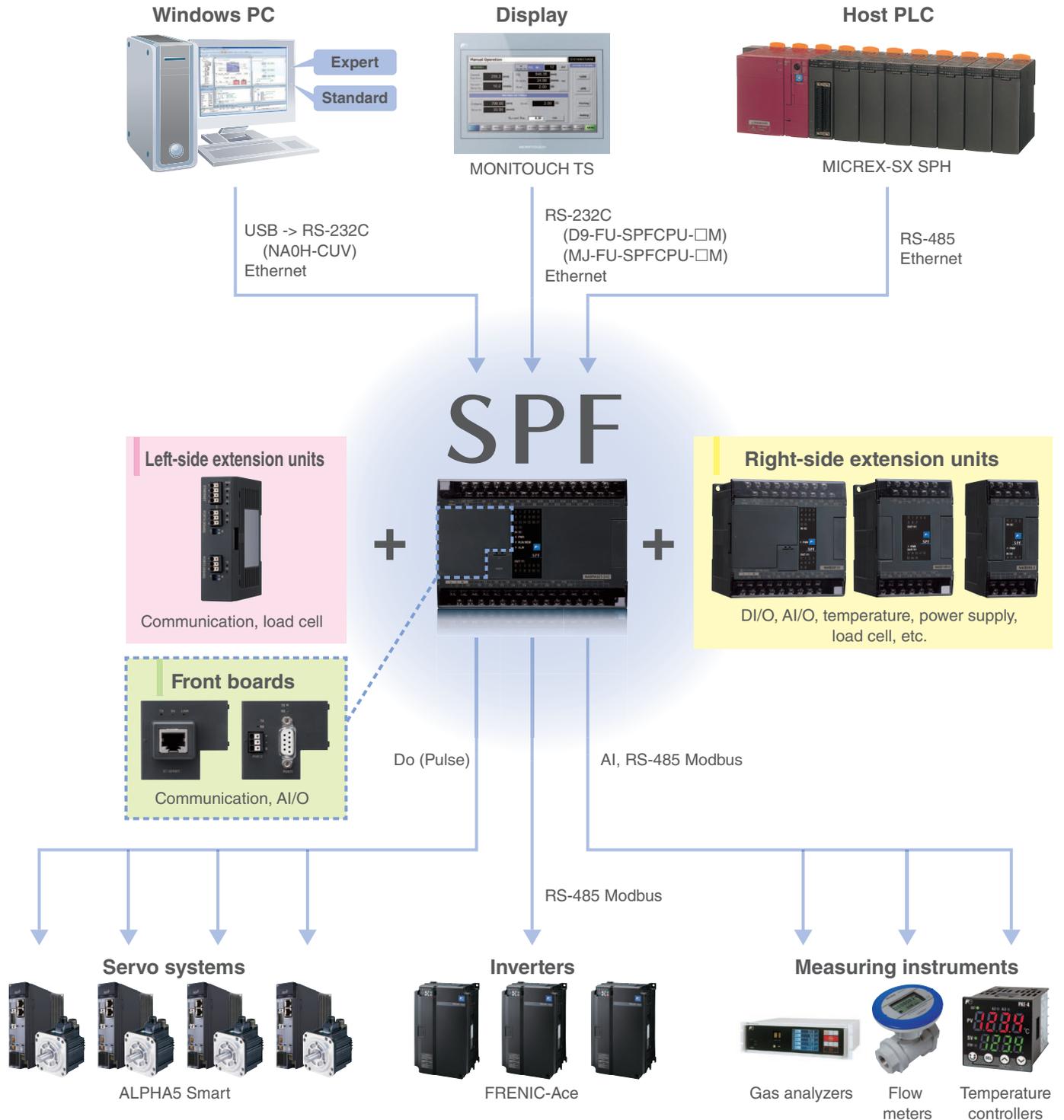
60

60 points
Basic unit

NA0PA-60T-☐C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 36 points, output 24 points
Output type: Tr sink output
Detachable terminal block

NA0PB-60R-34C
Power supply voltage: 24 V DC
DI/O: input 36 points, output 24 points
Output type: Ry output

Flexible system construction by using extension units

Windows PC

Expert

Standard

Display

MONITOUCH TS

Host PLC

MICREX-SX SPH

USB -> RS-232C
(NA0H-CUV)
Ethernet

RS-232C
(D9-FU-SPFCPU-□M)
(MJ-FU-SPFCPU-□M)
Ethernet

RS-485
Ethernet

SPF

Left-side extension units

Communication, load cell

Front boards

Communication, AI/O

+ SPF +

Right-side extension units

DI/O, AI/O, temperature, power supply,
load cell, etc.

Do (Pulse)

AI, RS-485 Modbus

RS-485 Modbus

Servo systems

ALPHA5 Smart

Inverters

FRENIC-Ace

Measuring instruments

Gas analyzers   Flow
meters

Temperature
controllers

Constructing optimal systems
using Fuji components
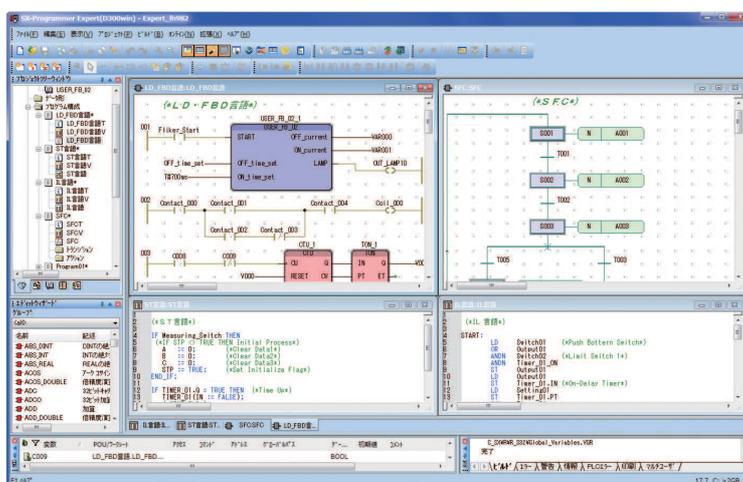
Improves Programming Development Efficiency

Two Types of Programming Support Tools in Accordance with Development Style

These are Windows-compatible programming support tools conforming to the IEC61131-3 International Standard.

SX-Programmer

Expert (D300win) Development Efficiency Oriented Support Tools

Usage

Improvement of software development efficiency

Programming in units of POU or worksheets allows the use of the structured design method by which a program is created by dividing it by functionality or process. This method enables multiple designers to divide the program design among them so that a substantial reduction in the program creation time can be achieved.

Programming of the same techniques as those of microcomputers and personal computers

The ST language is similar to the C language so that programs can be created using the same techniques as those of microcomputers and personal computers for complex calculations that are hard to implement using the Ladder language. Programs and circuits that are frequently used can easily be reused by making them FB (function blocks).

Features

Writing in multiple languages

● The Expert (D300win) completely supports five types of program representations specified by the standards.
● It allows the programmer to code the proper combination of representations 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 has been substantially improved. Not only can it print drawing numbers, dates, page, and drawing borders, but also company logos and comments.

Simulation function

● This tool enables program test runs using the simulation function built in Expert (D300win), without using the actual unit.

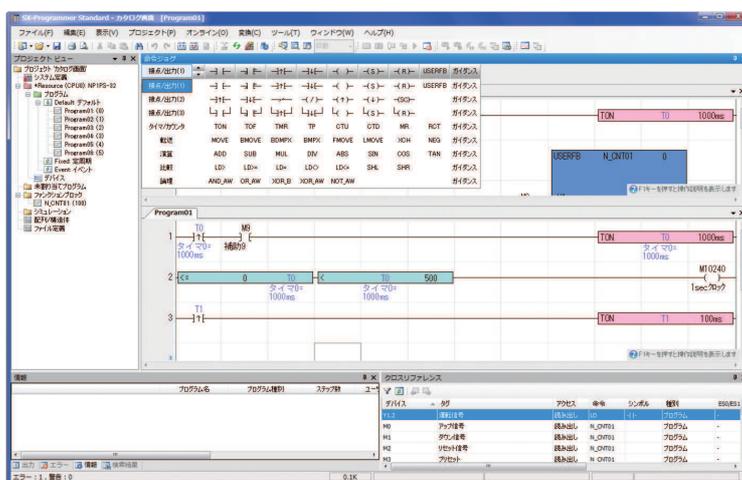### Function module support function/ POD cooperation function

● The Expert (D300win) has implemented function module support and POD cooperation support functions as common support tools.
● The function module support can be operated with the programming supporting tool connecting CPU module.

SPF

Standard Operability Oriented Support Tools

Usage

Ladder operation for on-site maintenance personnel

Supports the full keyboard operations useful for on-site maintenance personnel.
Editing and download can be performed immediately after activation.

Utilization of programming resources

Program and comment resources of the models MICREXF series and FLEX-PC series of Fuji Electric can be reused. Screens, operability, and programming can be handled as if you were using a personal computer loader with which you are already familiar.

Features

Multi-language support

● The SPH supports not only ladder diagrams but also ST and FBD.
● It allows the programmer to select the proper programming language for the control target.

Intuitive screen operation

● Through guidance display and a command word candidate narrowing-down function based on a keyword search, you can input data without referring to the manual.
● You can select the proper input mode according to the situation from functions such as mouse wheel + click input, keyword search input, and Intellisense function input.

Simulation function

● Provided with built-in Standard, the SPH is capable of testing the operation of programs without using an actual system.
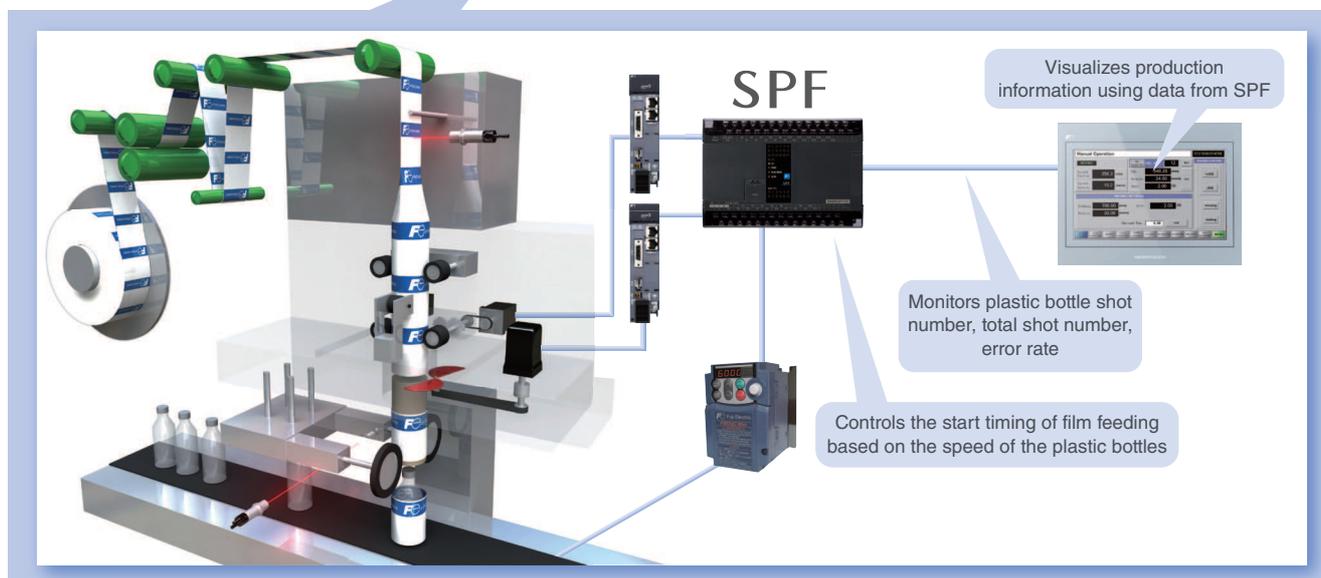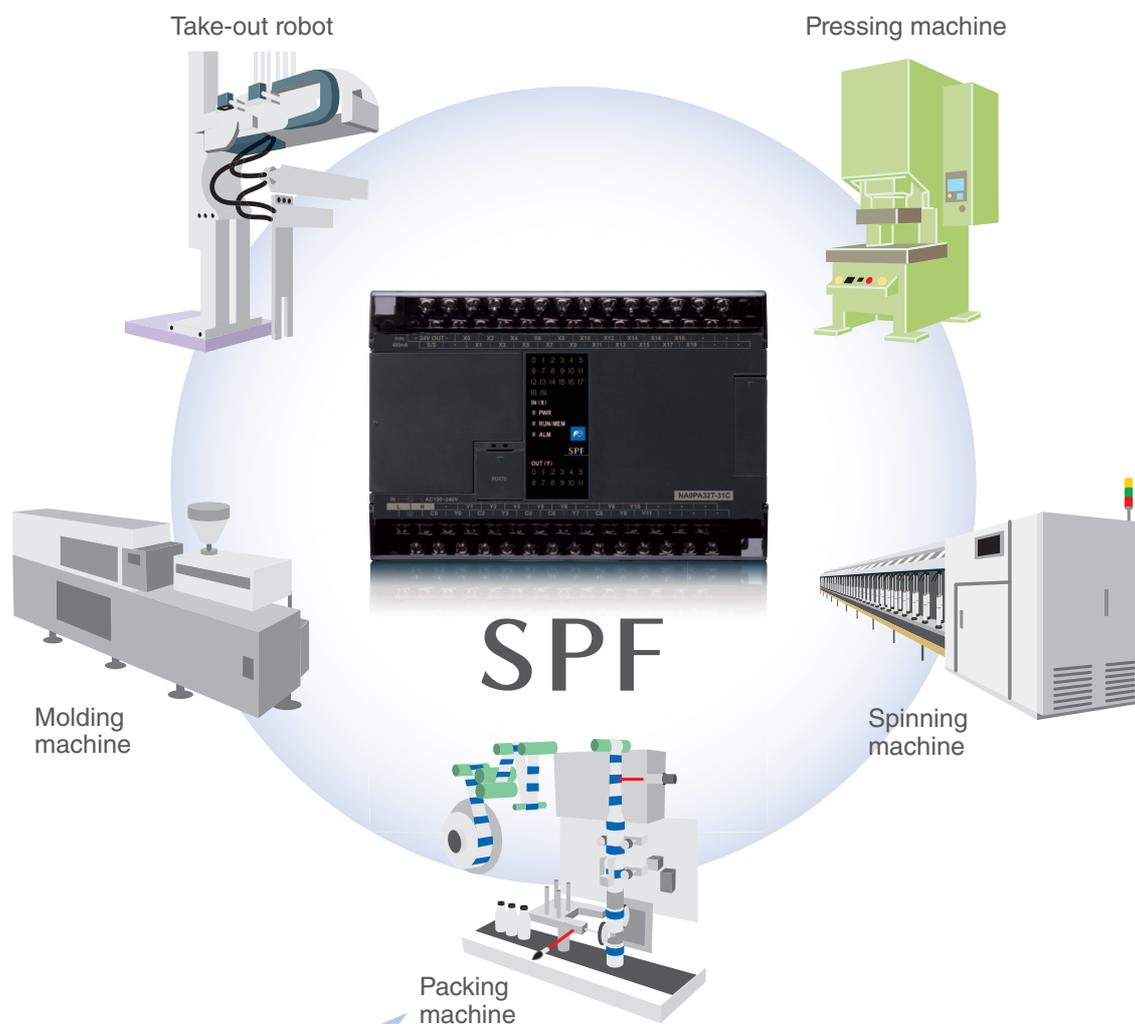
Resume function

● When the SPH starts to run, it automatically displays the position last edited or monitored.
● In online mode, the SPH displays the position last monitored and starts monitoring.
● In offline mode, the SPH displays the position last monitored and enters Edit mode.

Device editor and collation function

● Device information is displayed on a single screen, for example, in the form of a list of the operating states of devices, enabling you to save time in memory management.
● You can display details of different points on programs and edit by referring to collation results.

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Flexibly supports machinery and systems

Take-out robot

Pressing machine

SPF

Molding machine

Spinning machine

Packing machine

SPF

Visualizes production information using data from SPF

Monitors plastic bottle shot number, total shot number, error rate

Controls the start timing of film feeding based on the speed of the plastic bottles

Outline drawing

Unit: mm

	14 points	24 points	32 points	40 points	60 points
W	90	90	130	130	175
H	90	90	90	90	90
D	80	80	80	80	80

General specifications

	Item	Specifications
Physical environment	Operating ambient temperature	0 to +55°C
	Storage (transportation) temperature	-20 to +70°C
	Relative humidity	20 to 95% RH, No condensation
		(5 to 95% RH during transportation, No condensation)
	Pollution degree	Pollution degree 2 [Note 1]
	Corrosion resistance	No corrosive gas
		No adhesion of organic solvents
	Usage altitude	Altitude of 2000 m or less
		(Air pressure of 70 kPa or more during transportation)
Mechanical resistance	Vibration resistance	One-way amplitude: 0.15 mm, constant acceleration: 19.6 m/s^2
		2 hours in each direction, total of 6 hours [Note 2] [Note 3]
	Shock resistance	Peak acceleration: 98 m/s^2, 3 times in each direction
Electric working condition	Electrostatic discharge	±4 kV: Contact discharge method
		±8 kV: Aerial discharge method
	Radiated radio	80 to 1000 MHz, 10 V/m
	Frequency electromagnetic field	1.4 to 2.0 GHz, 3 V/m; 2.0 to 2.7 GHz, 1 V/m
	EFT burst wave	Power line, I/O signal line (AC non-shielded line): ±2 kV
		Communication line, I/O signal line (excluding AC non-shielded line): ±1 kV
	Lightening surge	AC power supply: Common mode ±2 kV, Normal mode ±1 kV
		DC power supply: Common mode ±0.5 kV, Normal mode ±0.5 kV
	Radio-frequency electromagnetic field conduction interference	150 kHz to 80 MHz, 10 V
	Power frequency magnetic field	50 Hz, 30 A/m
	Square wave impulse noise	±1.5 kV, rise time 1 ns; pulse width 1 µs, 50 Hz
Structure		Open type equipment (panel built-in type)
Cooling system		Natural air cooling

Note 1) Pollution degree 2: Normally, this is the state in which non-conductive pollution occurs. However, there are circumstances stipulated in which condensation may produce a state of temporary conductivity.

Note 2) This is a mounted state in which the unit is fixed to the control panel with fixing screws. Make sure there is no vibration or shock during DIN rail mounting.

Note 3) Make sure to implement vibration countermeasures for environments in which there is repeated or continuous vibration.

Power supply specifications

Item	NA0P□-31C (AC power supply type)	NA0P□-34C (DC power supply type)
Rated voltage	100 to 240 V AC	24 V DC
Voltage tolerance	85 to 264 V AC	20.4 to 28.8 V DC
Rated frequency	50/60 Hz	-
Frequency tolerance	47 to 63 Hz	-
Time allowed for instantaneous power failure	1 cycle or less	< 20 ms
Waveform distortion rate	5% or less	-
Wave ripple rate	-	-
Rated output voltage 1 (internal 5 V)	5 V DC ±5%	
Rated output voltage 2 (internal 24 V)	24 V DC ±10%	
Rated output voltage 3 (service 24 V)	24 V DC ±10%	
Leak current	0.25 mA or less	0.25 mA or less
Inrush current	40 Ao-p or less, 10 ms or less	150 Ao-p or less, 10 ms or less
Dielectric strength	2300 Vrms AC, 1 minute	510 Vrms AC, 1 minute
	Between power input terminals and ground	Between power input terminals and ground
Insulation type	Transformer insulation	
Insulation resistance	10 MΩ or more using 500 V DC megger	

SPECIFICATIONS

Performance specifications

Item			Specifications: Basic unit	
			14/24 points	**32/40/60 points**
Control system			Stored program and cyclic scanning system (default task), periodic task, event task	
I/O connection method			Direct I/O system: Local bus	
Direct I/O control method		Overall	Scan batch refresh method	
		Digital I/O	Task synchronization refresh method	
MPU			16-bit OS/Executing Processor (dual use)	
Memory type			Program memory, data memory, temporary memory	
Programming language <IEC61131-3 compliant>			IL language (Instruction List)	
			ST language (Structured Text)	
			LD language (Ladder Diagram)	
			FBD language (Function Block Diagram)	
			SFC elements (Sequential Function Chart)	
Instruction word length			Variable length (depending on the instruction) 1 step = 32-bit length	
Instruction execution time			LD instruction 0.30 µs	
Program memory capacity			8 k steps (1 step = 32 bits)	20 k steps (1 step = 32 bits)
I/O memory (I/Q)	%I, %Q	Fixed	512 words	
System memory (SM)	%M 10	Fixed	512 words	
Data memory capacity			20 k words	40 k words
High-speed standard memory (M)	%M 1	Fixed	4 k words	
Standard memory (M)	%M 1	Variable	0 k word	4 k words
Retained memory (RM)	%M 3	Variable	2 k words	4 k words
UserFB instance memory (FM)	%M 5	Variable	4 k words	8 k words
UserFB instance memory initial value setting area	-	Variable	4.5 k words	9 k words
SystemFB instance memory (SFM)	%M 8	Variable	5.5 k words	11 k words
Timer		Variable	256 points (2 k words)	512 points (4 k words)
Integrating timer		Variable	0 point (0 k word)	0 point (0 k word)
Counter		Variable	256 points (1 k words)	512 points (2 k words)
Edge detection		Variable	1024 points (2 k words)	2048 points (4 k words)
Other		Variable	0.5 k words	1 k words
FB instance information area (number of instances usable in UserFB)			1024 words (256 info.)	
ZIP file area			64 K bytes	
Data type			REAL: Real type	
			INT: Integer type	
			DINT: Double-precision integer type	
			UINT: Unsigned integer type	
			UDINT: Unsigned double-precision integer type	
			BOOL: 1-bit bit string type	
			WORD: 16-bit bit string type	
			DWORD: 32-bit bit string type	
			DT: Date and time type	
			DATE: Date type	
			TOD: Time type	
			TIME: Duration type	
			Array data type	
			Structure data type	
Number of tasks	Default task		1	
	Periodic task		15	
	Event task		(Total number of periodic and event tasks)	
POU	UserPG		64 / default task	
			8 / Interrupt task	
	UserFB		128	
	UserFCT		128	
	Number of nested UserFB/FCT calls		Total of 64 steps (UserFB/FCT calls from PG are also included)	
Diagnostic function			Program check, watchdog timer, etc.	
Security function			Password	
Calendar function			Supported	
Backup	Program memory		Flash memory	
	System definition		Flash memory	
	Zip file		Flash memory	
	Data memory		Battery: SRAM	
	Calendar		Battery: RTC	
Memory pack	External: Detachable		Storage content: Program	
			: System definition	
			: ZIP file	
			: Data	

Model List

Product name		Model	Specifications
Basic unit			
High-functionality type: Basic unit <NA0PA>		NA0PA14T-34C	24 V DC DI 8 points; Tr DO 6 points; RS-232C port; 24 V DC power supply
		NA0PA24T-34C	24 V DC DI 14 points; Tr DO 10 points; RS-232C port; 24 V DC power supply
		NA0PA32T-34C	24 V DC DI 20 points; Tr DO 12 points; RS-232C port; 24 V DC power supply
		NA0PA40T-34C	24 V DC DI 24 points; Tr DO 16 points; RS-232C port; 24 V DC power supply
		NA0PA60T-34C	24 V DC DI 36 points; Tr DO 24 points; RS-232C port; 24 V DC power supply
		NA0PA24T-31C	24 V DC DI 14 points; Tr DO 10 points; RS-232C port; 100 to 240 V AC power supply
		NA0PA32T-31C	24 V DC DI 20 points; Tr DO 12 points; RS-232C port; 100 to 240 V AC power supply
		NA0PA40T-31C	24 V DC DI 24 points; Tr DO 16 points; RS-232C port; 100 to 240 V AC power supply
		NA0PA60T-31C	24 V DC DI 36 points; Tr DO 24 points; RS-232C port; 100 to 240 V AC power supply
Standard type: Basic unit <NA0PB>		NA0PB14R-34C	24 V DC DI 8 points; Ry DO 6 points; RS-232C port; 24 V DC power supply
		NA0PB24R-34C	24 V DC DI 14 points; Ry DO 10 points; RS-232C port; 24 V DC power supply
		NA0PB32R-34C	24 V DC DI 20 points; Ry DO 12 points; RS-232C port; 24 V DC power supply
		NA0PB60R-34C	24 V DC DI 36 points; Ry DO 24 points; RS-232C port; 24 V DC power supply
Extension unit			
Power supply unit	Right	NA0S-2	5 V DC, 24 V DC output; 100 to 240 V AC input power supply
		NA0S-4	5 V DC, 24 V DC output; 24 V DC input power supply
DIO unit	Right	NA0E24R-34	24 V DC DI 14 points; Ry DO 10 points; 24 V DC power supply
		NA0E24T-31	24 V DC DI 14 points; Tr DO 10 points; 100 to 240 V AC power supply
		NA0E08R-3	24 V DC DI 4 points; Ry DO 4 points
		NA0E08T-3 *	24 V DC DI 4 points; Tr DO 4 points
		NA0E08T-0 *	Tr DO 8 points
		NA0E08X-3	24 V DC DI 8 points
		NA0E16R-0 *	Ry DO 16 points
		NA0E16T-0	Tr DO 16 points
AIO unit	Right	NA0AY02-MR	Output 2ch
		NA0AW06-MR	Input 4ch + output 2ch
		NA0AX06-MR	Input 6ch
AIO board	Front	NA3AY02-MR	Output 2ch
		NA3AW03-MR	Input 2ch + output 1ch
Temperature measuring unit	Right	NA0AX02-TC *	Thermocouple input 2ch, resolution 0.1˚C
		NA0AX06-TC	Thermocouple input 6ch, resolution 0.1˚C
		NA0AX16-TC *	Thermocouple input 16ch, resolution 0.1˚C
		NA0AX06-PT *	Resistance temperature sensor input 6ch, resolution 0.1˚C
AI + temperature measuring combo unit	Right	NA0AX06-MRTC *	Input 2ch + thermocouple input 4ch
Load cell unit	Right	NA0F-LC1	1ch, resolution 16 bits
High-precision load cell unit	Left	NA0FA-LC1 *	1ch, resolution 24 bits
Communication unit	Left	NA0LA-RS3 *	2 ports RS-232C (Port 3 + Port 4)
		NA0LA-RS5	2 ports RS-485 (Port 3 + Port 4)
		NA0LA-ETI *	1 port 10BASE-T/100BASE-TX Ethernet
Communication board	Front	NA3LA-RS1	1 port RS-232C (Port 1) + 1 port RS-485 (Port 2)
		NA3LA-ET1	1 port 10BASE-T/100BASE-TX Ethernet
		NA3LA-CA1 *	1 port CANopen
Related equipment			
PC loader		NP4H-SEDBV3	Programming support tool Expert (D300win) Version 3 (Japanese/English)
		NP4H-SWN	Programming support tool Standard (Japanese/English)
Loader connection cable		NA0H-CUV	USB (AM connector) /RS-232C (MD4M connector), 180 cm
Memory pack		NA8PMF-20	Program memory pack
Terminal connector		NA8P-HE	Extension unit falling-off detection

* Under development

⚠ Safety Considerations

- For safe operation, before using the product read the instruction manual or user manual that comes with the product carefully or consult the Fuji sales representative from which you purchased the product.
- Products introduced in this catalogue have not been designed or manufactured for such applications in a system or equipment that will affect human bodies or lives.
- Customers, who want to use the products introduced in this catalogue for special systems or devices such as for atomic-energy control, aerospace use, medical use, passenger vehicle, and traffic control, are requested to consult the Fuji sales division.
- Customers are requested to prepare safety measures when they apply the products introduced in this catalogue to such systems or facilities that will affect human lives or cause severe damage to property if the products become faulty.
- For safe operation, wiring should be conducted only by qualified engineers who have sufficient technical knowledge about electrical work or wiring.

● Appearance and specifications are subject to change without prior notice for the purpose of product improvement.

Materials covered in this document are subject to revision due to the modification of the product.　　　　　2016-11(K16/C16) PDF FOLS 22B1-E-0019a