

# Programmable Controllers MICREX-SX series SPH Communication Module

## I/O Terminal: NR1 □ Series : NR2 □ Series

Compact type I/O terminal applicable to diverse field networks with a common frame size.

### ■ 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.

NR1 series

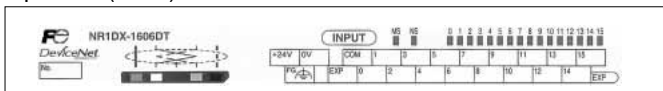


NR2 series

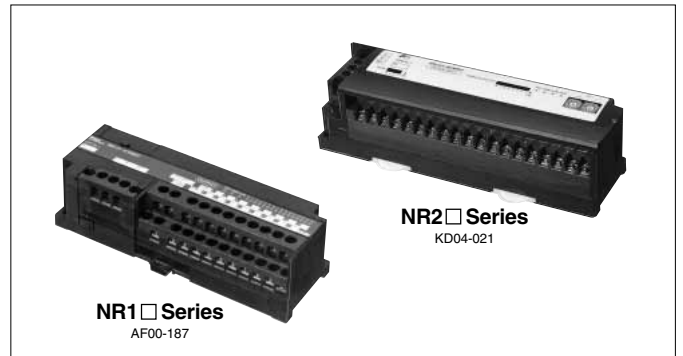
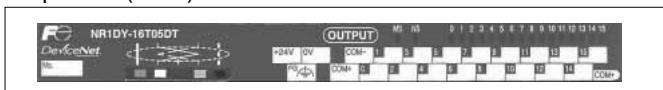


- Preventing mis-wiring  
Uses different colors for the surface sheets of the main unit: input (white), output (black), and I/O mixture (zebra). Applicable networks are also displayed, enabling determination of the unit type at a glance.

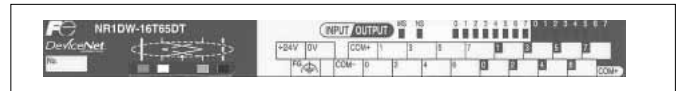
- NR1 series  
Input unit (white)



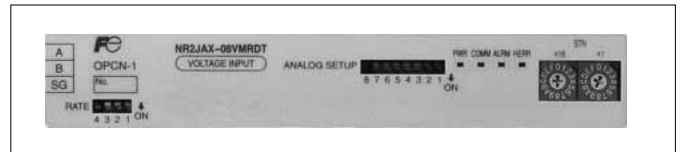
- Output unit (black)



I/O mixture unit (zebra)



- NR2 series  
Input unit (white)



Output unit (black)



- Enabling DIN rail attachment  
Not only usual screw attachment but also DIN rail attachment is possible.

### ■ Features of the NR1 Series

- 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)



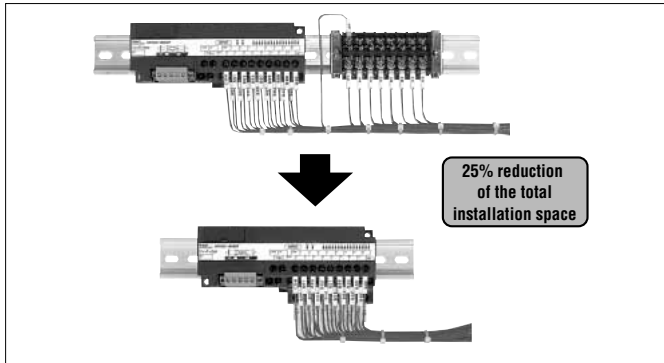
- Contributing to panel design standardization  
The unit frame is unified to a compact size of 148x50x40 (WxHxD: mm), allowing design standardization without worrying about external view modifications by I/O specifications and network specifications. Network modifications can be dealt only with unit replacement.

# Programmable Controllers

## MICREX-SX series SPH

### Communication Module

- 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%.

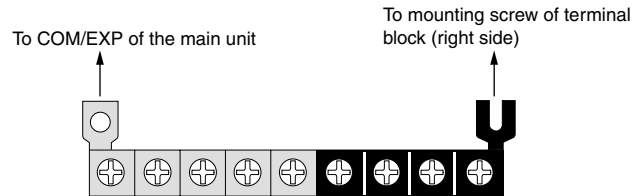


#### ■ Common extension bar

Used to extend the common terminal block that is mounted on the lower side of the main unit.

Type: **NR1XV-CB1**

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



#### ■ Models

##### NR1 □ series

Product name	Model (= Product code)	Specification
OPCN-1	NR1□X-1606DT	24V DC, 16-point bi-directional input, removable terminal block
SX bus	NR1□Y-08R07DT	240V AC/110V DC, 8-point Ry output, removable terminal block
T-link	NR1□Y-16T05DT	24V DC, 16-point Tr sink output, removable terminal block
DeviceNet *1	NR1□W-16T65DT	24V DC, 8-point source input, 12-24V DC, 8-point Tr sink output, removable terminal block
	NR1SF-HP4DT	Pulse train output comand, 250kHz, 4-axis (2 points / 1-axis)
LonWORKS	NR1LX-1606DT	24V DC, 16-point bi-directional input (4 points can be used as pulse inputs), removable terminal block
	NR1LY-08R07DT	240V AC/110V DC, 8-point Ry output, removable terminal block
	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)

\*3: Four-axis pulse train output is supported only by the SX bus.

##### NR2 □ series

Product name	Model (= Product code)	Specification
Digital input 32-points	NR2DX-3206DT	DeviceNet based on, digital input 32 points, removable terminal block
Digital Tr output 32-points	NR2DY-32T05DT	DeviceNet based on, digital transistor sink output 32 points, removable terminal block
Digital I/O 32-points	NR2DW-32T65DT	DeviceNet based on, digital input 16 points/transistor sink output 16 points, removable terminal block
Digital Ry output 16-points	NR2DY-16R07DT	DeviceNet based on, digital relay output 16 points, removable terminal block
Analogue 8-ch voltage input type	NR2JAX-08VMRDT	OPCN-1 based on, multi range input 8 ch, resolution 13 bits (voltage type), removable terminal block
Analogue 8-ch current input type	NR2JAX-08IMRDT	OPCN-1 based on, multi range input 8 ch, resolution 13 bits (current type), removable terminal block
Analogue 4-ch voltage output type	NR2JAY-04VMRDT	OPCN-1 based on, multi range output 4 ch, resolution 13 bits (voltage type), removable terminal block
Analogue 4-ch current output type	NR2JAY-04IMRDT	OPCN-1 based on, multi range output 4 ch, resolution 13 bits (current type), removable terminal block

#### ■ Specifications

##### ● General specifications

Item	Specification	
Applicable standards	IEC 61131-2/Ed2, EN 50081-2, 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/s <sup>2</sup> , 1.5 hours for each direction, 4.5 hours total
	Resistance to shock	Peak acceleration: 147m/s <sup>2</sup> , 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	Power supply: ± 2kV
	Conductive radio frequency interference	0.15 to 80MHz, 10Vrms
	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

\* Acquisition of UL508 is scheduled for the NR2 series.

● Power supply specifications

Item	Specification		
Unit type	NR1□□	NR2D□ (digital I/O)	NR2JA□ (analog I/O)
Power supply method	External power supply		DeviceNet communication cable
Rated input voltage	24V DC	24V DC	24V DC (Three phase full-wave rectification can not be used.)
Input voltage range	21.6 to 26.4V DC, (LonWorks-based product: 20.4 to 27.6V DC)	11 to 25V DC	20.4 to 26.4V DC
Dropout tolerance	1ms (at 21.6V), LonWorks-based product (at 20.4V)	1ms (at 20.4V)	1ms (at 20.4V)
Inrush current	5A, 1ms or less (LonWorks-based product: 3A, 5ms or less, 25A, 5ms or less for the NR1LY-08R07DT)	7A, 0.4ms or less	5A, 1ms or less
Dielectric strength	1500V AC, 1 minute (Between power supply input terminal and frame ground)	500V AC, 1 minute (Between power supply input terminal and I/O terminal)	500V AC, 1 minute (Between analog I/O terminal and frame ground)
Insulation resistance	10MΩ or more (500V DC megger) (Between input terminal and frame ground)	10MΩ or more (500V DC megger) (Between power supply input terminal and I/O terminal)	10MΩ or more (500V DC megger) (Between analog I/O terminal and frame ground)
Power consumption	OPCN-1 SX bus NR1□X-1606DT: 1.4W or less NR1□Y-08R07DT: 3W or less T-link NR1□X-16T05DT: 1.4W or less DeviceNet NR1□X-16T65DT: 1.4W or less NR1SF-HP4DT: 3.5W or less LonWorks NR1LX-1606DT: 1.6W or less NR1LY-08R07DT: 3W or less NR1LW-11R80DT: 1.6W or less	NR2DX-3206DT: 2.5W or less NR2DY-32T05DT: 2.5W or less NR2DW-32T65DT: 2.5W or less NR2DY-16R07DT: 4.5W or less	NR2JAX-08VMRDT: 4.8W or less NR2JAX-08IMRDT: 4.8W or less NR2JAX-04VMRDT: 5.6W or less NR2JAX-04IMRDT: 6.3W or less

● I/O specifications

(1) NR1 type: I/O specifications of OPCN-1/SX bus/T-link/  
DeviceNet-based products

● Input specifications

Item	Specification
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	OPCN-1, DeviceNet: 3ms/3ms
ON/OFF filtering time	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 frame ground)
Insulation resistance	10MΩ or more (500V DC megger) (Between input terminals and frame ground)

\* [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

● 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 output terminals and FG
Insulation resistance	10MΩ or more with a 500V DC megger Between output terminals and FG

(2) Four-axis pulse train output of SX bus compatible products  
SX bus compatible products can output four-axis pulse trains.  
A high-precision positioning system can be built by combining  
with the servo amplifier/motor of the pulse train command input  
type or the stepping motor driver.

● Specifications

Item	Specification	
Type	NR1SF-HP4DT	
No. of control axes	4 axes	
Speed command	Command signal	Pulse train command
	Max. command frequency	250kHz (Conditions: Shielding twist pair cable: 2m or less)
	Output type	Open collector, sink output
	Max. load current	50mA (24V DC)
	Insulation method	Photocoupler
Signal type	forward pulse (CW) + reverse pulse (CCW)	
Feedback pulse input	None	
External pulse input	None	
DI signal	No. of points	8 points (2 points / axis) Original point LS ( x 4 ch) timing signal / Z phase ( x 4 ch)
	Input type	Source input (Non voltage contactor input)
	Input model	DC (IEC 61131-2 type 2)
	Rated current	Approx. 4mA (24V DC)
	Input impedance	Approx. 5.6kΩ
	Insulation method	Photocoupler
Common configuration	2 points (Extension can be used to the Common extension bar)	
Occupied words	Up to 40 words in total (input: 16words / output: 24words)	

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### Communication Module

#### (3) 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 impedance	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	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	Relay output	Relay output or 24V DC voltage output
Delating condition	None	

#### (4) NR2 type: I/O specifications of the DeviceNet-based products

##### • Input specifications

Item	Specification
Rated input voltage	24V DC
Max. input voltage	26.4V DC
Ripple percentage	5% or less
Rated input current	5mA
Input type	No polarity
Input impedance	4.7kΩ
Operating voltage	ON voltage range: 15 to 26.4V OFF voltage range: 0 to 5V
Input delay time ON/OFF filtering time	3ms/3ms
No. of points per common	16 points/common (Mixture model: 8 points/common) x 2 circuits
Isolation	Photocoupler
Dielectric strength	1500V AC, 1 minute (Between input terminals and communication terminals)
Insulation resistance	10MΩ or more (500V DC megger) (Between input terminals and communication terminals)
Delating condition	0 to 40°C: None, 40 to 55°C: 75%

##### • 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), 2A/common
Max. load current	0.6A/point (30V DC), 2A/common
Output voltage drop	0.1V or less (at 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	4A, 10ms
Surge suppresser circuit	Zener diode
Common configuration	32 points/common (16 points/common only for mixture products)
Insulation method	Photocoupler insulation
Dielectric strength	1500V AC, 1 minute Between output terminals and communication terminals
Insulation resistance	10MΩ or more with a 500V DC megger Between output terminals and communication terminals

##### • Relay output specifications

Item	Specification
Rated output voltage	240V AC, 120V DC
Max. allowable output voltage	264V AC or less, 120V 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: 5ms 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
Dielectric strength	1500V AC, 1 minute Between output terminals and communication terminals
Insulation resistance	10MΩ or more with a 500V DC megger Between output terminals and communication terminals

(5) Analog I/O specification

• Analog voltage input type

Item	Specification
Type	<b>NR2JAX-08VMRDT</b>
No. of input points	8 points
Analog input range	0 to 5V    1 to 5V    0 to 10V    -10 to +10V
Input impedance	1M $\Omega$
Max. input voltage	$\pm 15V$
Input filter	Approx. 100 $\mu$ s or less (Hardware: Primary delay time constant)
Resolution	1.25mV    1.25mV    1.25mV    1.25mV
Digital value (INT type)	0 to 4000    0 to 8000    -8000 to 8000
Measurement accuracy	$\pm 0.1\%$ of F.S.R (Ta=23°C $\pm 5^\circ$ C) $\pm 0.3\%$ of F.S.R (Ta=0 to 55°C)
Sampling period	4ms or less / 8 points
Response time	4ms or less / 8 points + transmission periods (ms)
Occupied words	Input: 8 words
Isolation method	Between analog input terminals and FG: Isolation Between analog input terminals and communication terminals: Isolation Between analog input terminals and channels: Not isolation
Dielectric strength	500V AC, 1 minute, (Between analog input terminals and FG (Shorted current: 5mA))
Insulation resistance	10M $\Omega$ or more (500V DC megger) (Between analog input terminals and FG)
External connections	External power supply, analog input connection: Detachable screw terminals (M3) 38 poles Communication connection: Detachable screw terminals (M3) 3 poles

• Analog current input type

Item	Specification
Type	<b>NR2JAX-08IMRDT</b>
No. of input points	8 points
Analog input range	$\pm 20mA$ 0 to 20mA    4 to 20mA
Input impedance	250 $\Omega$
Max. input voltage	$\pm 30mA$
Input filter	Approx. 100 $\mu$ s or less (Hardware: Primary delay time constant)
Resolution	2.5 $\mu$ A
Digital value (INT type)	$\pm 8000$ 0 to 8000
Measurement accuracy	$\pm 0.1\%$ of F.S.R (Ta=23°C $\pm 5^\circ$ C) $\pm 0.4\%$ of F.S.R (Ta=0 to 55°C)
Sampling period	4ms or less / 8 points
Response time	4ms or less / 8 points + transmission periods (ms)
Occupied words	Input: 8 words
Isolation method	Between analog input terminals and FG: Isolation Between analog input terminals and communication terminals: Isolation Between analog input terminals and channels: Not isolation
Dielectric strength	500V AC, 1 minute, (Between analog input terminals and FG (Shorted current: 5mA))
Insulation resistance	10M $\Omega$ or more (500V DC megger) (Between analog input terminals and FG)
External connections	External power supply, analog input connection: Detachable screw terminals (M3) 38 poles Communication connection: Detachable screw terminals (M3) 3 poles

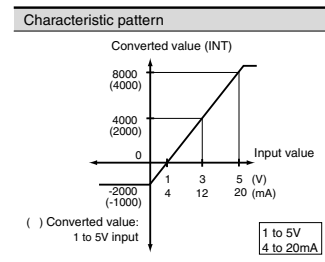
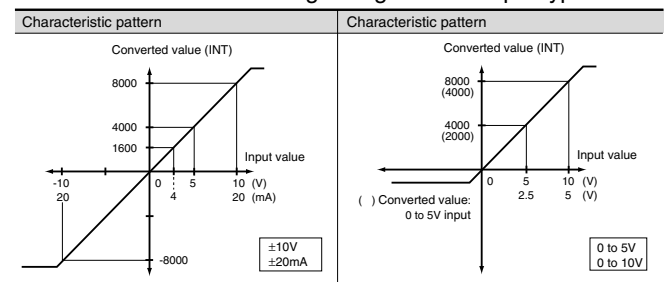
• Analog voltage output type

Item	Specification
Type	<b>NR2JAY-04VMRDT</b>
No. of input points	4 points
Analog output range	0 to 5V    1 to 5V    0 to 10V    -10 to +10V
Load impedance	1k $\Omega$ or more    1k $\Omega$ or more    2k $\Omega$ or more    2k $\Omega$ or more
Resolution	1.25mV    1.25mV    1.25mV    1.25mV
Digital value (INT type)	0 to 4000    0 to 8000    -8000 to 8000
Measurement accuracy	$\pm 0.1\%$ of F.S.R (Ta=23°C $\pm 5^\circ$ C) $\pm 0.3\%$ of F.S.R (Ta=0 to 55°C)
Sampling period	2ms or less / 4 points
Response time	2ms or less / 4 points + transmission periods (ms)
Load short protection	Provided
High frequency noise (100kHz or more)	150mVp-p or less
Output ripple	50mVp-p or less
Occupied words	Output: 4 words
Isolation method	Between analog input terminals and FG: Isolation Between analog input terminals and communication terminals: Isolation Between analog input terminals and channels: Not isolation
Dielectric strength	500V AC, 1 minute, (Between analog input terminals and FG (Shorted current: 5mA))
Insulation resistance	10M $\Omega$ or more (500V DC megger) (Between analog input terminals and FG)
External connections	External power supply, analog input connection: Detachable screw terminals (M3) 38 poles Communication connection: Detachable screw terminals (M3) 3 poles

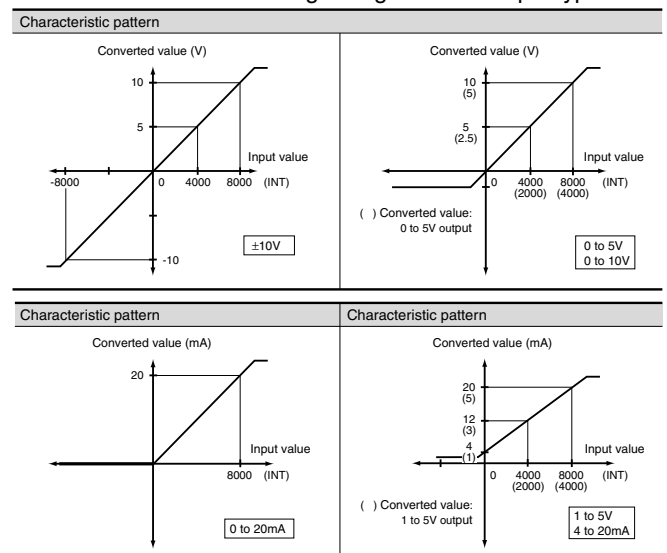
• Analog current output type

Item	Specification
Type	<b>NR2JAY-04IMRDT</b>
No. of input points	4 points
Analog output range	0 to 20mA    4 to 20mA
Load impedance	500 $\Omega$ or less
Resolution	2.5 $\mu$ A
Digital value (INT type)	0 to 8000
Measurement accuracy	$\pm 0.2\%$ of F.S.R (Ta=23°C $\pm 5^\circ$ C) $\pm 0.4\%$ of F.S.R (Ta=0 to 55°C)
Sampling period	2ms / 4 points
Response time	2ms or less / 4 points + transmission periods (ms)
High frequency noise (100kHz or more)	300 $\mu$ Ap-p or less
Output ripple	100 $\mu$ Ap-p or less
Occupied words	Output: 4 words
Isolation method	Between analog input terminals and FG: Isolation Between analog input terminals and communication terminals: Isolation Between analog input terminals and channels: Not isolation
Dielectric strength	500V AC, 1 minute, (Between analog input terminals and FG (Shorted current: 5mA))
Insulation resistance	10M $\Omega$ or more (500V DC megger) (Between analog input terminals and FG)
External connections	External power supply, analog input connection: Detachable screw terminals (M3) 38 poles Communication connection: Detachable screw terminals (M3) 3 poles

• Characteristic of the analog voltage/current input type



• Characteristic of the analog voltage/current output type



# Programmable Controllers

## MICREX-SX series SPH

### Communication Module

#### ● Communication specifications

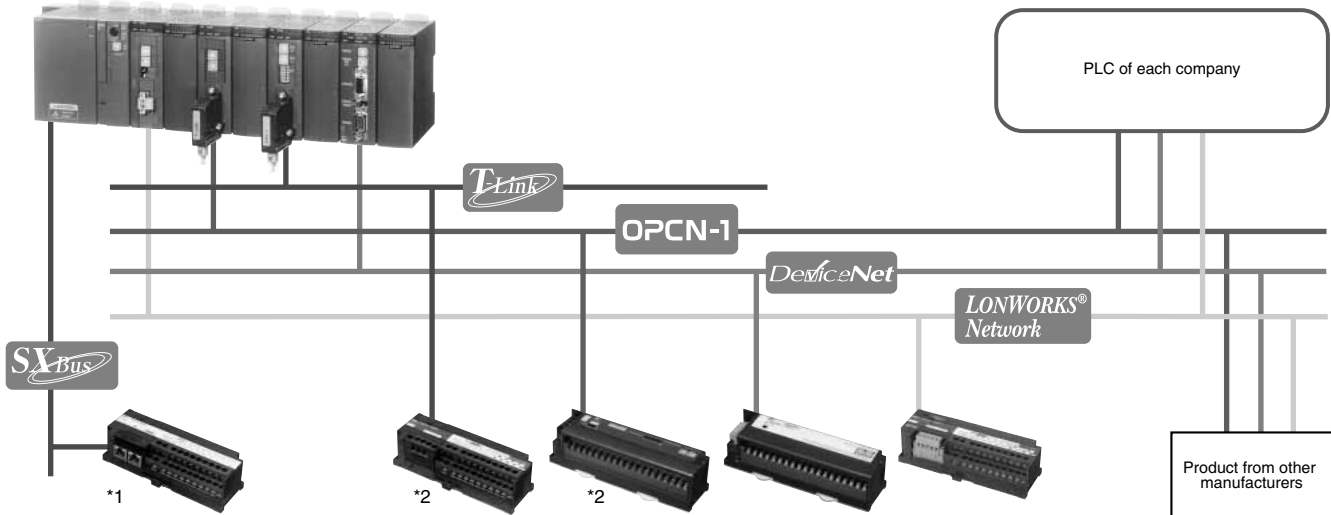
Item	Specification	DeviceNet	T-link	SX bus	LONWORKS
Transmission line format	OPCN-1 (multi-drop)	Bus configuration (multi-drop, T-branching)	Bus configuration (multi-drop)	Bus configuration (ring)	Free topology (bus-structure/star-structure)
Max. signal point	127 words (2032 /master)	127 words (2032 points)/master (When configurator is not used)	128 words (2048 points)	512 words (8192 points)	228 bytes
Transmission speed/distance	125kbps/1km 250kbps/800m 500kbps/480m 1Mbps/240m (Changes with the switch)	125kbps/500m 250kbps/250m 500kbps/100m (Changes with the switch)	500kbps/1km	25Mbps/25m	78kbps/500 to 2700m
No. of connected stations	31 stations	64 node	32 stations	254 stations (including CPU module) *2	64 units/segment
Electric characteristics	EIA RS-485	-	Pulse transfer method	EIA RS-422	-
Transmission line	Shielded twist pair cable	DeviceNet cable	Shielded twist pair cable	SX bus expansion cable	Twist pair (1P-S)
No. of occupied words *1	8 points: 1 word, 16 points: 1 word,	32 points: 2 word, 8/8 (Mixture): 2 words, 16/16 (Mixture): 2 words, analog input: 8 words, analog output: 4 words, NR1SF-HP4DT: 40 words			

\*1 When the master module of MICREX-SX series is used

\*2 The maximum number of the I/O terminal connections are 10 units per base. Up to 22 units can be connected by extending the number of base boards between I/O terminals.

#### ■ System configuration

<MICREX-SX: SPH>



\*1 The maximum number of the I/O terminal for the SX bus connections are 10 units per base. Up to 22 units can be connected by extending the number of base boards between I/O terminals.

\*2 Please mounting the terminating resistor with accessory of the master module (2 pieces provided on the SX), in case if the I/O terminals for OPCN-1 or for T-link are terminating station.