INSTRUCTION MANUAL

LonWorks INTERFACE MODULE
(analog I/O 16 points, discrete I/O 48 points)

MODEL **R3-NL1**

BEFORE USE ....

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Network interface module .....(1)
Neuron ID label.....(2)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

POINTS OF CAUTION

■ HOT SWAPPABLE MODULES

- The module can be replaced while the power is ON. Be sure to replace it when the module is not communicating with a host, as it may affect the system. Replacing multiple modules at once may greatly change line voltage levels. We highly recommend to replace them one by one.

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:
  100 – 120V AC rating: 85 – 132V, 47 – 66 Hz, approx. 20VA
  200 – 240V AC rating: 170 – 264V, 47 – 66 Hz, approx. 20VA
  24V DC rating: 24V ±10%, approx. 12W

■ GENERAL PRECAUTIONS

- DO NOT set the switches while the power is supplied. The switches are used only for maintenance without the power.

■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ AND ....

- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

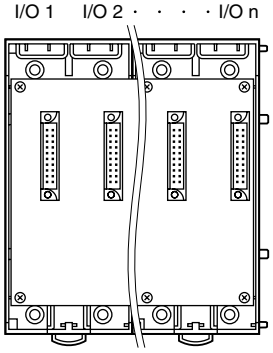
INSTALLATION

Use the Installation Base Model R3-BS, or Model R3-BSW for free I/O address capability.
Before mounting the Network Interface Module onto the base, be sure to configure the module as explained below.

■ DATA ALLOCATION

The setting determines the data area size assigned to each I/O module mounted on the base.

■ NETWORK SLOTS ON THE BASE

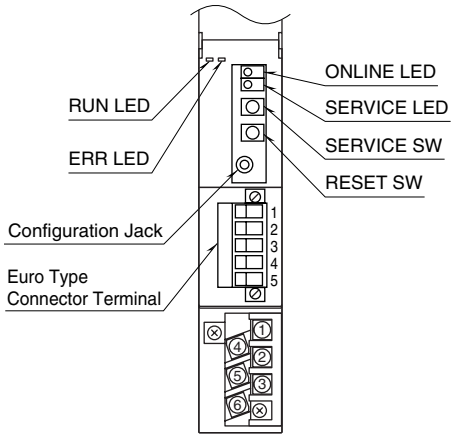


With Model R3-BS base, mount the I/O Modules from the left end (I/O 1) to the right in order that the Network Module assigns data areas from I/O 1.
Network Module(s) and Power Module are mounted basically at the right end though technically they could be mounted in any position.

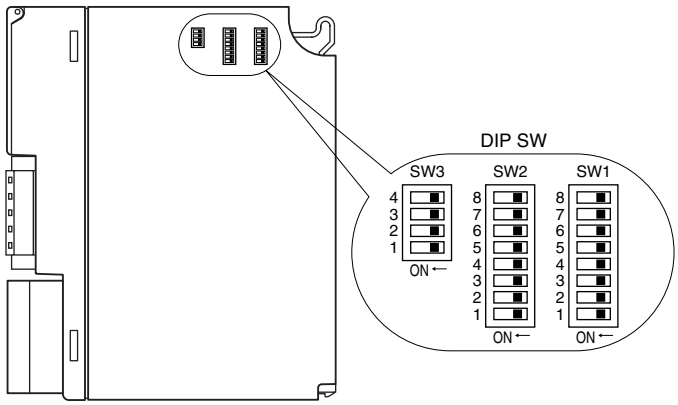
With Model R3-BSW base, there is no limitation in mounting positions as I/O address can be assigned freely to each module using rotary switches equipped on the base.

COMPONENT IDENTIFICATION

■ **FRONT VIEW**



■ **SIDE VIEW**



■ **ONLINE & SERVICE INDICATOR LED**

ONLINE indicator: Red LED

ON: Off-line or no network information (decommissioned)

Blinking in approx. 0.5 Hz: On-line (ready to communicate network variables)

Blinking in approx. 5 Hz for 12 sec.: Wink message received

SERVICE indicator: Green LED

OFF: Normal operations

Blinking in approx. 0.5 Hz: No network information

ON: Internal program error

■ **SERVICE SW**

Used to identify the node in LonWorks network configuration.

■ **RESET SW**

Used to reset the Neuron Chip. Press the switch to reset. Control functions are halted while completing resetting and restarting. Confirm no danger before conducting resetting.

■ **SIDE DIP SW**

(*) Factory setting.

• Data Allocation: SW1, SW2

Data Allocation Type* must be assigned to each I/O module position to specify how many data areas (four types) are to be occupied by each.

Two bits from SW1 and SW2 are assigned to each position, and data areas can be specified from the module No. 1 through 8. Setting for No. 9 and later modules is identical to No. 8.

SW ASSIGNMENT		MODULE NO.
SW1-1	SW1-2	1
SW1-3	SW1-4	2
SW1-5	SW1-6	3
SW1-7	SW1-8	4
SW2-1	SW2-2	5
SW2-3	SW2-4	6
SW2-5	SW2-6	7
SW2-7	SW2-8	8
SW SETTING		**DATA ALLOCATION**
OFF	OFF	1
ON	OFF	4
OFF	ON	8
ON	ON	16

*Refer to the specifications of the related series for the Data Allocation Type of I/O modules.

• Dual Communication: SW3-1

When two network modules are mounted, one must be 'Main' (OFF) network and the other must be 'Sub' (ON) network. For single communication, the network module must always be set to 'Main' (OFF).

SW	DUAL COMMUNICATION	
	MAIN (*)	SUB
SW3-1	OFF	ON

• Input Error Data: SW3-2

Hold: When the communication from an input module is lost due to the input module error, the network module holds the signal and stands by until the communication recovers.

Set to '0': When the communication from an input module is lost due to the input module error, the network module outputs '0.'

SW	INPUT ERROR DATA	
	HOLD (*)	SET '0'
SW3-2	OFF	ON

• LED Function: SW3-4

Functions assigned to the front RUN and ERR LEDs can be selected.

SW3-4	LED FUNCTION	
	RUN	ERR
OFF (*)	Green when normal	Green when abnormal
ON	Red when receiving	Red when transmitting

Note: Be sure to set unused SW3-3 to OFF.

PC CONFIGURATOR

With configurator software, settings shown below are available.
Refer to the software manual of R3CON for detailed operation.

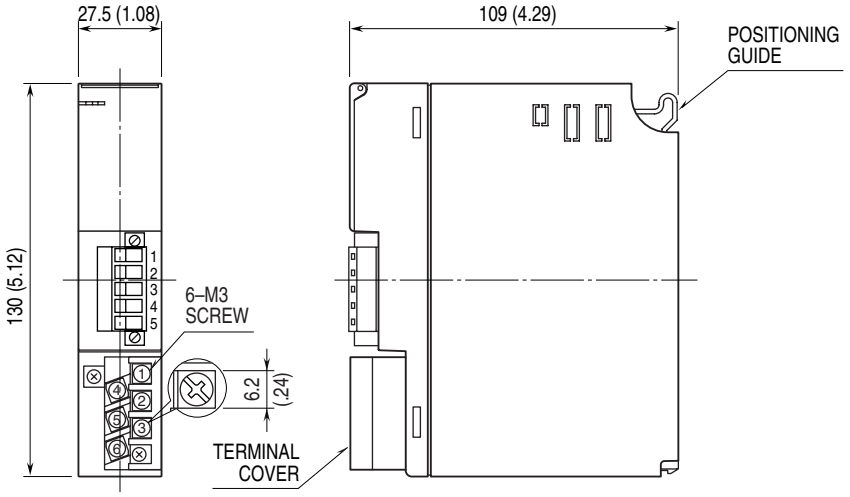
■ NETWORK MODULE SETTING

PARAMETER	AVAILABLE RANGE	DEFAULT SETTING
Time (no communication time)	3.0 – 3200.0 (sec.)	3.0 (sec.)

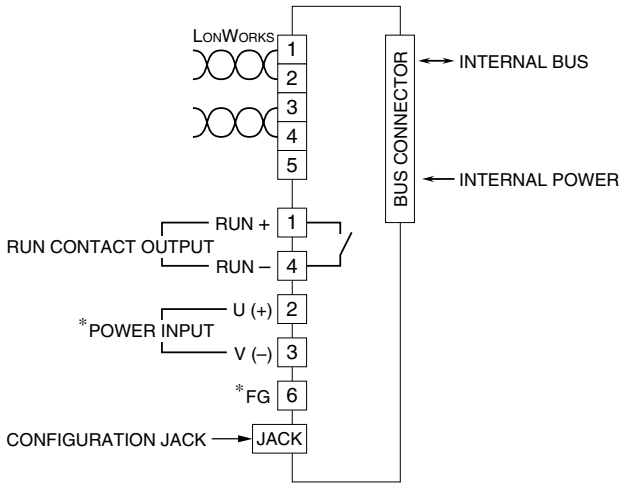
TERMINAL CONNECTIONS

Connect the unit as in the diagram below.

■ EXTERNAL DIMENSIONS unit: mm (inch)



■ CONNECTION DIAGRAM



* Not provided with 'No Power Supply' type module.
Caution: FG terminal is NOT a protective conductor terminal.

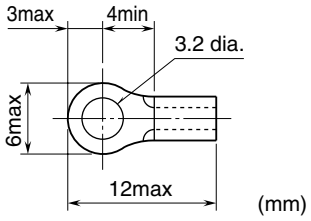
WIRING INSTRUCTIONS

■ M3 SCREW TERMINAL (power input, RUN contact output)

Torque: 0.5 N·m

■ SOLDERLESS TERMINAL

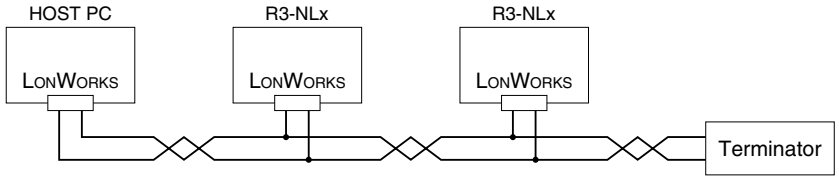
Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable. Solderless terminals with insulation sleeve do not fit.
Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,ltd
Applicable wire size: 0.75 to 1.25 mm^2



■ EURO TYPE CONNECTOR TERMINAL (LONWORKS)

Applicable wire size: 0.2 to 2.5 mm^2 (AWG24 to 12)
Stripped length: 7 mm

COMMUNICATION CABLE CONNECTIONS



I/O COMBINATIONS

A dedicated Device File for each I/O device depending upon I/O combinations is required to set up the R3-NL1 using an integration tool such as LonMaker.
On-line download is available for Device Image files at http://www.m-system.co.jp/.
Functional Blocks usable for respective files are not identical to all. Refer to the table below.

■ ANALOG INPUT / OUTPUT

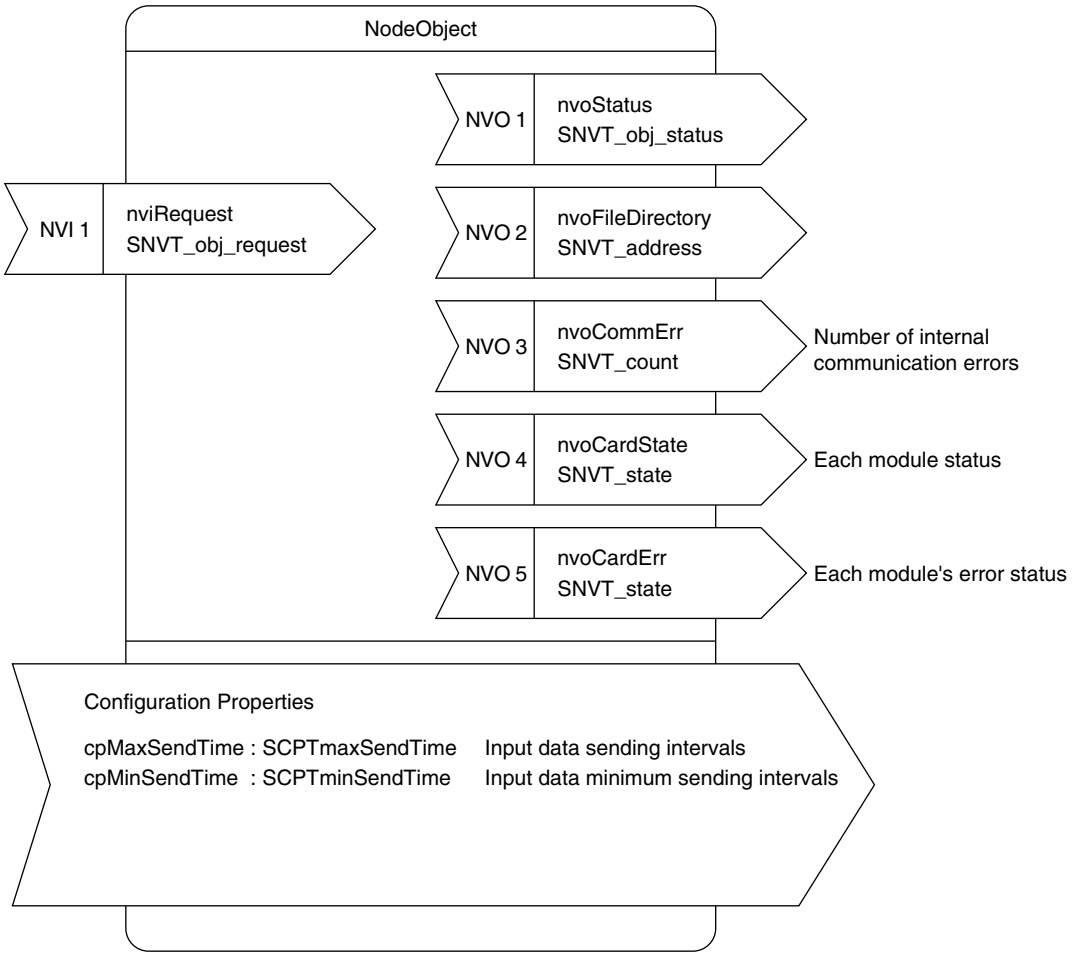
NO. of DATA		DEVICE IMAGE (APB FILE)	USABLE FUNCTIONAL BLOCKS
INPUT	OUTPUT		
16	0	R3NL1_1_101.APB	NodeObjet, GetValue [0 ... 15] (Can be defined from 0 to 15)
12	4	R3NL1_2_101.APB	NodeObjet, GetValue [0 ... 11], SetValue [0 ... 3]
8	8	R3NL1_3_101.APB	NodeObjet, GetValue [0 ... 7], SetValue [0 ... 7]
4	12	R3NL1_4_101.APB	NodeObjet, GetValue [0 ... 3], SetValue [0 ... 11]
0	16	R3NL1_5_101.APB	NodeObjet, SetValue [0 ... 15]

■ DISCRETE INPUT / OUTPUT

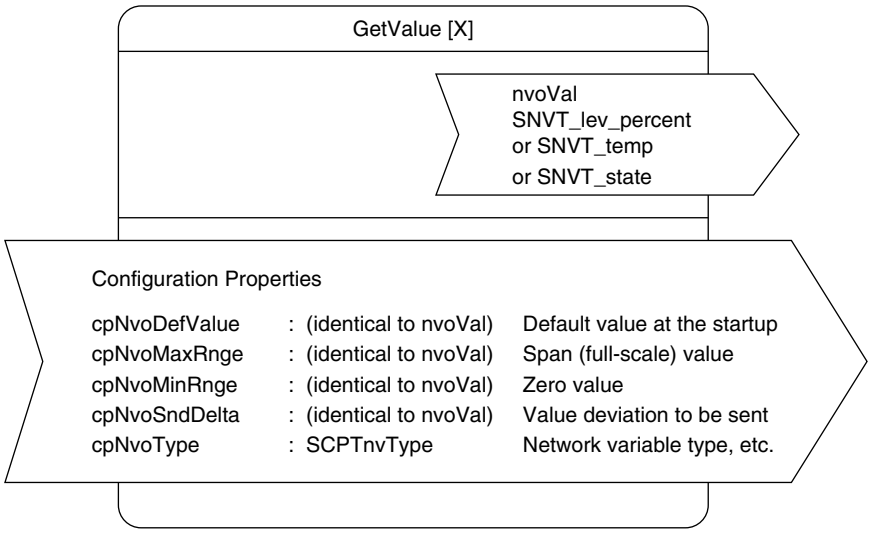
NO. of DATA		DEVICE IMAGE (APB FILE)	USABLE FUNCTIONAL BLOCKS
INPUT	OUTPUT		
0	48	R3NL1_6_101.APB	NodeObjet, R3Do [0 ... 2] (One (1) block can handle 16 contacts.)
48	0	R3NL1_7_101.APB	NodeObjet, R3Di [0 ... 2]

FUNCTIONAL BLOCKS

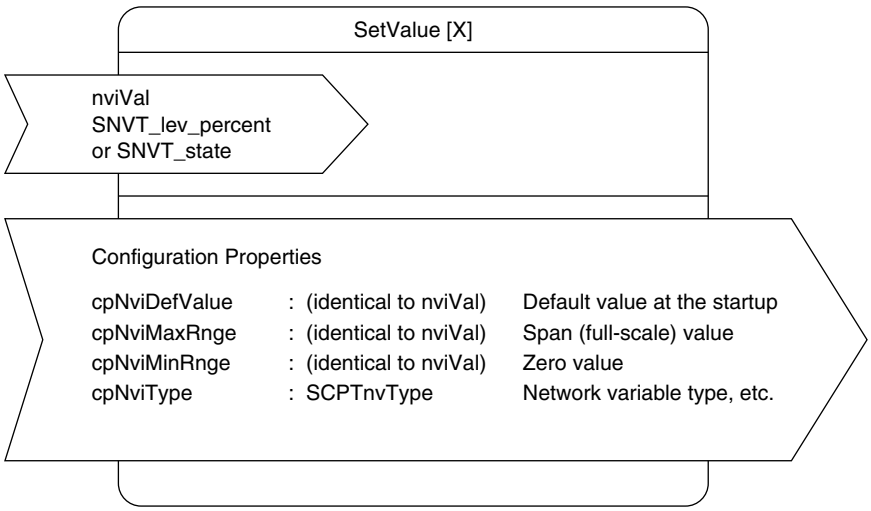
■ NODE OBJECT



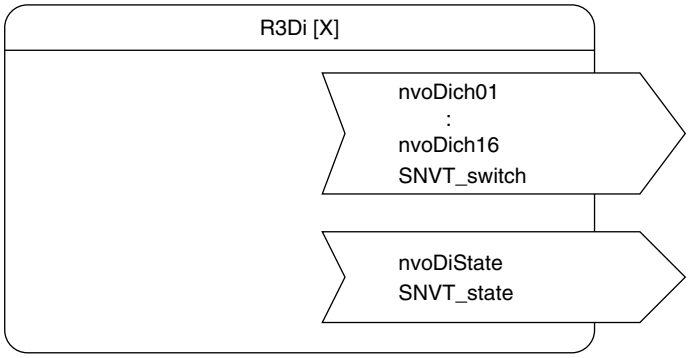
■ ANALOG INPUT FUNCTIONAL BLOCKS (GetValue [0] through [15])



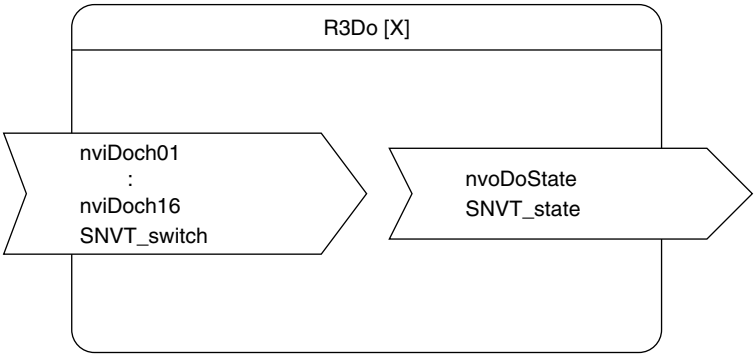
■ ANALOG OUTPUT FUNCTIONAL BLOCKS (SetValue [0] through [15])



■ DISCRETE INPUT FUNCTIONAL BLOCKS (R3Di [0] through [2])



■ DISCRETE OUTPUT FUNCTIONAL BLOCKS (R3Do [0] through [2])



■ **NodeObject FUNCTIONAL BLOCKS**

NETWORK VARIABLE	TYPE {Range} {Default}	EXPLANATIONS
nviRequest	SNVT_obj_request {Usable RQ RQ_NORMAL RQ_REPORT_MASK RQ_UPDATE_STATUS}	Used for integration tools such as LonMaker.
nvoStatus		Used for integration tools such as LonMaker. • nviRequest RQ_NORMAL 0 is set at nvoStatus. • nviRequest RQ_REPORT_MASK report_mask bit is set at nvoStatus. • nviRequest RQ_UPDATE_STATUE 0 is set at nvoStatus. • 1 is set at invalid_id when any value other than the above three types is set at nviRequest.
nvoFileDirectory	SNVT_address	Used for integration tools such as LonMaker.
nvoCommErr	SNVT_count {0 through 65535} {0}	Counted in internal communication errors. Reset to 0 after the count has reached 65535.
nvoCardStatus	SNVT_state {0 or 1} {0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0}	Indicates that I/O modules are mounted in each slot. Bit 0 through bit 15 are applied for slot 1 through 16. 0: Not mounted 1: Mounted
nvoCardErr	SNVT_state {0 or 1} {0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0}	Indicates error status for each module/slot. Bit 0 through bit 15 are applied for slot 1 through 16. 0: Normal 1: Error

CONFIGURATION PROPERTY	TYPE {Range} {Default}	EXPLANATIONS
cpMaxSendTime	SCPTmaxSendTime {0.0 through 6653.4} {10.0}	Sending time intervals of nvoVal [0 – 15] Network variables are sent out in this time intervals even when there is no change in input signals.
cpMinSendTime	SCPTminSendTime {0.0 through 6653.4} {0.0}	Minimum sending time intervals of nvoVal [0 – 15] This minimum time intervals is maintained even when the input signals changes faster than it.

■ **GetValue [x] FUNCTIONAL BLOCKS**

NETWORK VARIABLE	TYPE {Range} {Default}	EXPLANATIONS
nvoVal	SNVT_lev_percent {-163.840 through 163.830} {Depends on cpNvoDefValue}	• Data acquired from assigned channels. • Set SNVT_lev_percent for the input types other than discrete or temperature. Change the network variable type according to the input type if necessary. • Configuration Property value must be re-read after the network variable type is changed. Use "ResyncCP" on the LonMaker. • For discrete inputs, change the network variable type to SNVT_ state using integration tools such as LonMaker. Bit 0 through bit 15 of nvoVal are applied for ch. 1 through ch. 16. • For temperature inputs, change the network variable type to SNVT_temp using integration tools such as LonMaker.
	SNVT_state {0 OFF (input open) 1 ON (input shorted)}	
	SNVT_temp {-274.0 through 3002.7}	

CONFIGURATION PROPERTY	TYPE {Range} {Default}	EXPLANATIONS
cpNvoType	SCPTnvType {SNVT_lev_percent SNVT_state SNVT_temp} {SNVT_lev_percent}	nvoVal type (Use integration tools such as LonMaker to change types.)
cpNvoMaxRnge	Identical to nvoVal { (Identical to nvoVal) } {100.0}	nvoVal value at 100% input Invalid when nvoVal type is either SNVT_state or SNVT_temp.
cpNvoMinRnge	Identical to nvoVal { (Identical to nvoVal) } {0.0}	nvoVal value at 0% input Invalid when nvoVal type is either SNVT_state or SNVT_temp.
cpSendDelta	Identical to nvoVal { (Identical to nvoVal) } {0.0}	Network variables are sent out when its deviation exceeds the set value. Invalid when nvoVal type is SNVT_state.

■ **SetValue [x] FUNCTIONAL BLOCKS**

NETWORK VARIABLE	TYPE {Range} {Default}	EXPLANATIONS
nviVal	SNVT_lev_percent {-163.840 through 163.830} {0}	• Outputs data set to assigned channels. • Set SNVT_lev_percent for the input types other than discrete. Change the network variable type according to the output type if necessary. • Configuration Property value must be re-read after the network variable type is changed. Use "ResyncCP" on the LonMaker. • For discrete outputs, change the network variable type to SNVT_ state using integration tools such as LonMaker. Bit 0 through bit 15 of nviVal are applied for ch. 1 through ch. 16.
	SNVT_state {0 OFF (output open) 1 ON (output shorted)}	

CONFIGURATION PROPERTY	TYPE {Range} {Default}	EXPLANATIONS
cpNviType	SCPTnvType {SNVT_lev_percent SNVT_state} {SNVT_lev_percent}	nviVal type (Use integration tools such as LonMaker to change types.)
cpNviMaxRnge	Identical to nviVal { (Identical to nviVal) } {100.0}	nviVal value at 100% output Invalid when nviVal type is SNVT_state.
cpNviMinRnge	Identical to nviVal { (Identical to nviVal) } {0.0}	nviVal value at 0% output Invalid when nviVal type is SNVT_state.

■ R3Di [X] FUNCTIONAL BLOCKS

NETWORK VARIABLE	TYPE {Range} {Default}	EXPLANATIONS
nvoDich01 through nvoDich16	SNVT_switch {0 or 1} {0}	Data acquired from discrete input channels. nvoDich01 through nvoDich16 are assigned respectively to channels 1 through 16.
nvoDiState	SNVT_state {0 or 1} {0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0}	Indicates contact status for each module/slot. Bit 0 through bit 15 are applied for channels 1 through 16.

■ R3Do [X] FUNCTIONAL BLOCKS

CONFIGURATION PROPERTY	TYPE {Range} {Default}	EXPLANATIONS
nviDoch01 through nviDoch16	SNVT_switch {0 or 1} {0}	Outputs data set to discrete output channels. nviDoch01 through nviDoch16 are assigned respectively to channels 1 through 16.
nvoDoState	SNVT_state {0 or 1} {0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0}	Indicates contact status for each module/slot. Bit 0 through bit 15 are applied for channels 1 through 16.

TRANSMISSION DATA ASSIGNMENTS

The DIP SW located at the side of the module specifies each I/O module's data allocation (occupied data area).

Data are assigned in turn from Slot 1, in order of Functional Blocks (Input or GetValue/R3Di first, followed by Output or SetValue/R3Do).
The 1st output must be the 1st transmitted data in the slot next to the one with the last input data.

[Example 1]

	Data Area	
Module 1	4	GetValue [0 – 3]
Module 2	4	GetValue [4 – 7]
Module 3	4	SetValue [0]
Module 4	1	SetValue [1]
Module 5	1	SetValue [2]
Module 6	1	SetValue [3]
Module 7	1	SetValue [4]
Module 8	1	SetValue [5]
Module 9	1	SetValue [6]
Module 10	1	SetValue [7]

[Example 2]

	Data Area		
Module 1	1	GetValue [0]	
Module 2	4	GetValue [1 – 4]	
Module 3	4	GetValue [5 – 7]	The 4th data, Slot 3 is invalid.
Module 4	1	SetValue [0]	
Module 5	4	SetValue [1 – 4]	
Module 6	4	SetValue [5 – 7]	The 4th data, Slot 6 is invalid.

When the data consist of only inputs or outputs, data for the total of 16 Functional Blocks (GetValue [0 – 15] or R3Di [0 – 2], or SetValue [0 – 15] or R3Do [0 – 2]) are assigned to each module position from Slot 1.