

OMRON

TYPE NE1A-SCPU01-V1-SM

Safety Network Controller

English

INSTRUCTION MANUAL

Thank you for purchasing this NE1A-SCPU01-V1-SM. This manual primarily describes precautions required in installing and operating the NE1A-SCPU01-V1-SM.

- Only qualified person trained in professional electrical technique should be handle the NE1A.
- Before operating the NE1A-SCPU01-V1-SM, read this manual through to acquire sufficient knowledge of the NE1A-SCPU01-V1-SM.
- To ensure safe and correct use of the NE1A-SCPU01-V1-SM, also read the following manuals:
 - Safety Network Controller OPERATION MANUAL(Cat.No.Z906-E1)
 - SYSTEM CONFIGURATION MANUAL(Cat.No.Z905-E1)
 - DeviceNet OPERATION MANUAL (Cat. No. W267-E1)
- Keep this manual for future reference.

OMRON Corporation

EC Declaration of Conformity

OMRON declares that NE1A-SCPU01-V1-SM is in conformity with the requirements of the following EC Directives:

EMC Directive:2004/108/EC

Machinery Directive:2006/42/EC

Standards

NE1A-SCPU01-V1-SM is designed and manufactured in accordance with the following standards:

EN ISO13849-1:2008 Cat.4 PL e

EN ISO13849-2:2003

EN61000-6-2:2005

EN61000-6-4:2007

IEN ISO13850:2006 (EN418:1992)

EN60204-1:2006

IEC61508 parts 1-7:12.98-05.00 SIL3

NFPA 79-2007

EN954-1:1996 (ISO13849-1:1999) Cat.4

ANSI RIA 15.06-1999

EN61131-2:2007

ANSI B11.19-2003

UL508

CSA C22.2 No.142, No.213-M1987

UL1604

ANSI/UL1998

Precaution for Safe Use

● Meanings of Signal Words

The following signal words are used in this manual.

⚠

WARNING

Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

● Meaning of Alert Symbols

The following alert symbols are used in this manual.

⊘

Indicates prohibited actions

!

Indicates mandatory actions

● Alert Statements

⚠

WARNING

Serious injury may possibly occur due to loss of required safety functions. Do not use test outputs of the NE1A-SCPU01-V1-SM as any safety outputs.

⊘

Serious injury may possibly occur due to loss of required safety functions. Do not use DeviceNet standard I/O data or Explicit message data as any safety data.

⊘

Serious injury may possibly occur due to loss of required safety functions. Do not use LEDs on the NE1A-SCPU01-V1-SM for safety operations.

⊘

Serious injury may possibly occur due to breakdown of outputs. Do not connect loads beyond the rated value to the safety outputs and the test outputs.

!

Serious injury may possibly occur due to loss of required safety functions.Wire the NE1A-SCPU01-V1-SM properly so that 24VDC line do NOT touch the outputs accidentally or unintentionally.

!

Serious injury may possibly occur due to loss of required safety functions.Ground the 0V line of the power supply for external output devices so that the devices do Not turn ON when the safety output line or the test output line is grounded.

!

Serious injury may possibly occur due to loss of required safety functions. Use appropriate components or devices according to the requirements given in the following table.

Controlling Devices	Requirements
Emergency stop switch	Use approved devices with Direct Opening Mechanism complying with IEC/EN 60947-5-1.
Door interlocking switch Limit switch	Use approved devices with Direct Opening Mechanism complying with IEC/EN 60947-5-1 and capable of switching micro loads of 24VDC, 4mA.
Safety sensor	Use approved sensors complying with the relevant product standards, regulations, and rules in the country where it is used.
Relay with forcibly guided contacts	Use approved devices with forcibly guided contacts complying with EN 50205. For feedback purpose, use devices with contacts capable of switching micro loads of 24VDC, 4mA.
Contactors	Use contactors with forcibly guided mechanism and monitor its auxiliary NC contact to detect failures of contactor. For feedback purpose, use devices with contacts capable of switching micro loads of 24VDC, 4mA.
Other devices	Evaluate whether devices used are appropriate to satisfy the requirements of safety category level.

Precautions for Safe Use

● Handle with care

Do not drop the NE1A-SCPU01-V1-SM to the ground or excessive vibration or mechanical shocks. The NE1A-SCPU01-V1-SM may be damaged and may not function properly.

● Installation and storage environment

Do not use or store the NE1A-SCPU01-V1-SM in any of the following locations.

- Locations subject to direct sunlight.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to water, oil, or chemicals.
- Locations subject to shock or vibration.

Take appropriate and sufficient countermeasures when installing systems in the following locations. Inappropriate and insufficient measures may result in malfunction.

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

● Installation/ Mounting

- Use the NE1A-SCPU01-V1-SM within an enclosure with IP54 protection or higher of IEC/EN 60529.
- Use DIN rail (TH35-7.5 according to IEC60715) for placing the NE1A-SCPU01-V1-SM into the control board.
- Mount the NE1A-SCPU01-V1-SM to DIN rails with attachments (TYPE PFP-M, not incorporated to this product), not to drop out of rails by vibration etc.
- Spacing should be available around the NE1A-SCPU01-V1-SM at least 50mm from its top and bottom surfaces for ventilation and wiring.
- This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.

● Installation/ Wiring

- Use the following to wire external I/O devices to the NE1A-SCPU01-V1-SM.

Solid wire	0.2 to 2.5mm² AWG24 to 12
Standard (Flexible) wire	0.34 to 1.5mm² AWG22 to 16

- Disconnect the NE1A-SCPU01-V1-SM from power supply when wiring. Devices connected to NE1A-SCPU01-V1-SM may operate unexpectedly.
- Apply properly specified voltages to the NE1A-SCPU01-V1-SM inputs, Applying inappropriate DC voltage and any AC voltages cause the NE1A-SCPU01-V1-SM to fail.
- Be sure to separate the communication cable and the I/O cable from the high-voltage/current lines.
- Be cautious not to have your fingers caught when attaching connectors to the plugs on the NE1A-SCPU01-V1-SM.
- Mount screw of DeviceNet Connector and I/O Connector correctly. (0.25-0.3N·m)
- Incorrect wiring may lead to loss of safety function. Wire conductors correctly and verify the operation of the NE1A-SCPU01-V1-SM before commissioning the system in which NE1A-SCPU01-V1-SM is incorporated.
- After wiring is completed, be sure to remove label for wire clipping prevention on the NE1A-SCPU01-V1-SM to enable heat to escape for proper cooling.

● Power Supply Selection

Use DC power supply satisfying requirements below.

- Secondary circuits of DC power supply is isolated from its primary circuit by double insulations or reinforced insulations.
- DC power supply satisfies the requirement for class 2 circuits or limited voltage/current circuit stated in UL 508.
- 20ms or over of the output hold time.
- DC power supply that satisfies the requirements for SELV given in IEC/EN60950-1 or EN 50178.

● Periodical Inspection and Maintenance

- Disconnect the NE1A-SCPU01-V1-SM from power supply when replacing. Devices connected to the NE1A-SCPU01-V1-SM may operate unexpectedly.
- Do not dismantle, repair, or modify the NE1A-SCPU01-V1-SM. It may lead to loss of its safety functions.

● Disposal

- Be cautious not to have you injured when dismantling the NE1A-SCPU01-V1-SM.

The above-mentioned is a part of directions. Please use it after reading the operallon manual.

Additional Precautions According to UL1604

This equipment is suitable for use in Class I, Div. 2, Group A, B, C, D or Non-Hazardous Location Only.
WARNING - Explosion Hazard - Substitution of Components May Impair Suitability For Class I, Div. 2.
WARNING - Explosion Hazard - Do not Disconnect Equipment Unless Power Has Been Switched Off Or The Area Is Known To Be Non-Hazardous.
WARNING - Explosion Hazard - Do not connect USB Connector Unless Power Has Been Switched Off Or The Area Is Known To Be Non-Hazardous.

1. SPECIFICATIONS

● Environmental Specifications

Item	Specifications
DeviceNet supply voltage	11 to 25VDC (Supplied from communications power supply)
Device supply voltage V0, V1, V2 ¹⁾	20.4 to 26.4VDC (24VDC, -15% to +10%)
DeviceNet current consumption	15mA at 24VDC
Current consumption V0 (internal logic circuit)	230mA at 24VDC
EMC	Conform to IEC61131-2
Operating Temperature	-10 to +55deg.C
Storage Temperature	-40 to +70deg.C
Relative Humidity	10 to 95% non-condensing
Vibration resistance	0.35 mm at 10 to 57Hz, 50m/s² at 57 to 150Hz
Shock resistance	150m/s²: 11ms
Protection degree	IP20
Over Voltage Category	II (per IEC61131-2: 4.4.2)
Weight	460g

¹⁾ V0-G0: for internal logic circuit, V1-G1: for external input devices and test outputs
V2-G2: for external output devices

● Safety Input Specifications

Item	Specifications
Inputs type	Current sinking
ON voltage	11VDC min.
OFF voltage	5VDC max.
OFF current	1mA max.
Input current	4.5mA

● Test Output Specifications

Item	Specifications
Outputs type	Current sourcing
Rated output current	0.7A max. / channel ²⁾
Residual voltage	1.2V max.
Leakage current	0.1mA max.

²⁾ T0-T3 total current at the same time:1.4A

● Safety Output Specifications

Item	Specifications
Outputs type	Current sourcing
Rated output current	0.5A
Residual voltage	1.2V max.
Leakage current	0.1mA max.

In case that a safety output is configured as "Safety Pulse Test", while this output is in an ON state, the pulsed off signal(pulse width:580μs) is output continuously for fault diagnosis. Confirm response time of device connected to safety outputs so the device does not malfunction due to this off pulse.

● DeviceNet Connector

V+

CAN H

Drain

CAN L

V-

LEDs

MS:Module Status

NS:Network Status

LOCK:Configuration Lock

COMM:USB communication

Removable terminal (I/O)

7-Segment LED

Node Address Switch

USB Port

Baud Rate Switch

DeviceNet Connector

Input LED

Output LED

Removable terminal (Power,I/O)

90.4

114.1

131.4

111.1

2. NOMENCLATURE AND FUNCTION / DIMENSIONS

(Unit:mm)

LEDs

MS:Module Status

NS:Network Status

LOCK:Configuration Lock

COMM:USB communication

Removable terminal (I/O)

7-Segment LED

Node Address Switch

USB Port

Baud Rate Switch

DeviceNet Connector

Input LED

Output LED

Removable terminal (Power,I/O)

90.4

114.1

131.4

111.1

● Indicators

LED Designations	LED Color	Status	Description
MS (Module Status)	Green	Lit	In Executing
		Flashing	In Idle
	Red	Lit	In Critical fault
		Flashing	In Recoverable fault
	Green/Red	Flashing	In Self Testing, Waiting for TUNID, or Configuring
NS (Network Status)	Green	Not lit	No power
		Lit	Online connection established
	Red	Flashing	Online but connection not established
		Lit	Critical link failure
	Green/Red	Flashing	Connection time-out
LOCK (Configuration Lock)	Yellow	Flashing	In Waiting for TUNID
		Not lit	Not online / Not powered
	Yellow	Lit	Locked Valid Configuration
COMM (USB)	Yellow	Flashing	Unlocked Valid Configuration
		Not lit	Invalid Configuration
IN 0, 1, 2 ... 15 OUT 0, 1, 2 ... 7 (I/O status)	Yellow	Flashing	Communicating
		Not lit	Not communicating
	Yellow	Lit	Input / Output signal ON
		Not lit	Input / Output signal OFF
	Red	Lit	Failure detected in the Input / Output circuit Discrepancy error has occurred in I/O set for dual channel mode
	Red	Flashing	Failure detected in the associated I/O circuit in case of dual channel configuration

● 7 segment LEDs

- At normal state, 7-Segment LED displays the node address of the NE1A-SCPU01-V1-SM itself in decimal number (00-63). The node address, depending on the operational state of the NE1A-SCPU01-V1-SM, turns "ON" or "Flashing".
- If in fault status, error code and error occurrence node address are displayed alternately in the order of node address.
- In "standalone mode", "nd" is displayed in the normal condition.

● Rotary Switch

0

1

2

3

4

5

6

7

8

9

x10

0

1

2

3

4

5

6

7

8

9

x1

- Node Address is settable by 2 digit 10-position Rotary Switch.
- Node Address range is from 0 to 63.(Default:63)
- If set from 64 to 99,Node Address is settable by Configuration tool.

● Dip Switch

1

2

3

4

→ ON

Baud Rate	Switch			
125Kbit/s (default)	1	2	3	4
250Kbit/s	OFF	OFF	OFF	OFF
500Kbit/s	ON	OFF	OFF	OFF
Software setting	ON	ON	OFF	OFF
	OFF	OFF	ON	OFF
	ON	OFF	ON	OFF
	1	ON	ON	OFF
Auto Baud Rate Detection	ON	ON	ON	OFF
	X	X	X	ON

X : Don't care

Baud Rate	1	2	3	4
125Kbit/s (default)	OFF	OFF	OFF	OFF
250Kbit/s	ON	OFF	OFF	OFF
500Kbit/s	OFF	ON	OFF	OFF
Software setting	ON	ON	OFF	OFF
	OFF	OFF	ON	OFF
	ON	OFF	ON	OFF
	1	ON	ON	OFF
Auto Baud Rate Detection	ON	ON	ON	OFF
	X	X	X	ON

X : Don't care

3. INTERNAL CIRCUITRY AND WIRING

● Terminal Designations and functions

Terminal Designations	Descriptions
V0	Power terminal for internal circuit (Logic).
G0	Power terminal for internal circuit (Logic).
V1	Power terminal for external input devices and test outputs.
G1	Power terminal for external input devices and test outputs.
V2	Power terminal for external output devices e.g. safety outputs.
G2	Power terminal for external output devices e.g. safety outputs.
IN0 through IN15	Terminal for Safety input signals.
T0 through T3	Test output terminal for use in conjunction with IN0 through IN15 safety inputs. Each test output provides a unique set of test pulse patterns. T3 also supports current monitoring of the output signal for e.g. muting applications.
OUT0 through OUT7	Terminal for Safety outputs

● DeviceNet Connector

V+

CAN H

Drain

CAN L

V-

Color

Description

Red

V+

White

Signal(CAN H)

—

Drain

Blue

Signal(CAN L)

Black

V-

● I/O Wiring example: Emergency Stop (dual channel) with manual reset

Emergency Stop Switch (S1)

Contactor (KM1, KM2)

24VDC Power Source (E1, E2)

Emergency Stop Switch (S1)

Emergency Stop Switch (S1)

Contactor (KM1, KM2)

4. GROUNDING SHIELD WIRE OF DEVICENET COMMUNICATIONS

- Because of noise suppression, it is recommended that the shield wire of DeviceNet communications cable shouldn't be grounded or should be grounded in just one location of network. But if communication error is caused by noise, the shield wire should be grounded to the connector of node or near that. Refer to the following examples of wiring.
- The grounding of shield wire should be separated from the grounding of driving systems like inverters or servocontrollers. Otherwise the noise could be gotten from grounding line.

Ground near the noise source

Ground near the entrance of the control panel

Noise source

Noise source

Suitability for Use

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product. Take all necessary steps to determine the suitability of the product for the systems,machines,and equipment with which it will be used. Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

See also Product catalog for Warranty and Limitation of Liability.

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Note: Specifications subject to change without notice.