



OMRON

TYPE NE1A-SCPU01L

Safety Controller

English

INSTRUCTION MANUAL

Thank you for purchasing this NE1A-SCPU01L.  
This manual primarily describes precautions required in installing and operating the NE1A-SCPU01L.

- Only qualified person trained in professional electrical technique should be handle the NE1A-SCPU01L.
- Before operating the NE1A-SCPU01L, read this manual through to acquire sufficient knowledge of the NE1A-SCPU01L
- Safety Network Controller OPERATION MANUAL(Cat.No.Z906-E1)

To ensure safe and correct use of the NE1A-SCPU01L, also read the following manuals.  
The NE1A-SCPU01L doesn't have safety IO communication function. Therefore, please note that "4-4 Safety Master Function" and "4-5 Safety Slave Function" are excluded in Type NE1A-SCPU01L in the above-mentioned manual.

Also read the following manuals.

- 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-SCPU01L is in conformity with the requirements of the following EC Directives:

EMC Directive:2004/108/EC                      Machinery Directive:2006/42/EC

Standards

NE1A-SCPU01L 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.

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 mandatory actions

Indicates prohibited actions

● Alert Statements

Serious injury may possibly occur due to loss of required safety functions. Do not use test outputs of the NE1A-SCPU01L 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-SCPU01L 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-SCPU01L 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<br>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.<br>For feedback purpose, use devices with contacts capable of switching micro loads of 24VDC, 4mA.                                         |
| Contactor                                | Use contactors with forcibly guided mechanism and monitor its auxiliary NC contact to detect failures of contactor.<br>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-SCPU01L to the ground or excessive vibration or mechanical shocks. The NE1A-SCPU01L may be damaged and may not function properly.
- Installation and storage environment  
Do not use or store the NE1A-SCPU01L 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-SCPU01L 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-SCPU01L into the control board.
- Mount the NE1A-SCPU01L to DIN rails with attachments (TYPE PFF-M, not incorporated to this product), not to drop out of rails by vibration etc.
- Spacing should be available around the NE1A-SCPU01L 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-SCPU01L.

|                          |                            |
|--------------------------|----------------------------|
| Solid wire               | 0.2 to 2.5mm² AWG24 to 12  |
| Standard (Flexible) wire | 0.34 to 1.5mm² AWG22 to 16 |
- Disconnect the NE1A-SCPU01L from power supply when wiring. Devices connected to NE1A-SCPU01L may operate unexpectedly.
- Apply properly specified voltages to the NE1A-SCPU01L inputs. Applying inappropriate DC voltage and any AC voltages cause the NE1A-SCPU01L 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-SCPU01L.
- 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-SCPU01L before commissioning the system in which NE1A-SCPU01L is incorporated.
- After wiring is completed, be sure to remove label for wire clipping prevention on the NE1A-SCPU01L 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-SCPU01L from power supply when replacing. Devices connected to the NE1A-SCPU01L may operate unexpectedly.
  - Do not dismantle, repair, or modify the NE1A-SCPU01L. It may lead to loss of its safety functions.

● Disposal

- Be cautious not to have you injured when dismantling the NE1A-SCPU01L.
- The above-mentioned is a part of directions. Please use it after reading the operation 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 <sup>1)</sup>  | 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                                                    |

<sup>1)</sup> 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           |

● Safety Output Specifications

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

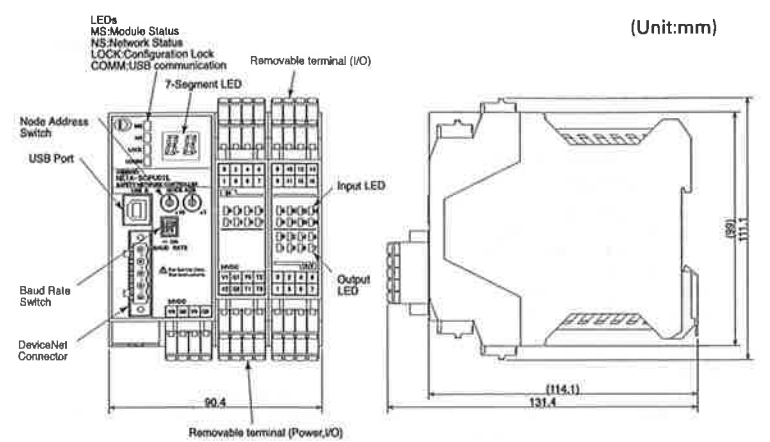
In case that a safety output is configured as "Safety Pulse Test", while this output is in an ON state, the pulsed off signal(pulse width:580μs) is output continuously for fault diagnosis. Confirm response time of device connected to safety outputs so the device does not malfunction due to this off pulse.

● Test Output Specifications

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

<sup>2)</sup> T0-T3 total current at the same time:1.4A

2. NOMENCLATURE AND FUNCTION / DIMENSIONS



● Indicators

| LED Designations                                       | LED Color | Status   | Description                                                                                                    |
|--------------------------------------------------------|-----------|----------|----------------------------------------------------------------------------------------------------------------|
| MS<br>(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<br>(Network Status)                                 | Green     | Lit      | Online connection established                                                                                  |
|                                                        |           | Flashing | Online but connection not established                                                                          |
|                                                        | Red       | Lit      | Critical link failure                                                                                          |
|                                                        |           | Flashing | Connection time-out                                                                                            |
|                                                        | Green/Red | Flashing | In Waiting for TUNID                                                                                           |
| LOCK<br>(Configuration Lock)                           | Yellow    | Lit      | Not online / Not powered                                                                                       |
|                                                        |           | Flashing | Locked Valid Configuration                                                                                     |
|                                                        |           | Not lit  | Unlocked Valid Configuration                                                                                   |
| COMM<br>(USB)                                          | Yellow    | Flashing | Communicating                                                                                                  |
|                                                        |           | Not lit  | Not communicating                                                                                              |
| IN 0, 1, 2 ... 15<br>OUT 0, 1, 2 ... 7<br>(I/O status) | 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 |
|                                                        |           | Flashing | Failure detected in the associated I/O circuit in case of dual channel configuration                           |
|                                                        |           | Not lit  |                                                                                                                |

● 7 segment LEDs

- At normal state, 7-Segment LED displays the node address of the NE1A-SCPU01L itself in decimal number (00-63). The node address, depending on the operational state of the NE1A-SCPU01L, 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

- 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

| Baud Rate                | Switch |     |     |     |
|--------------------------|--------|-----|-----|-----|
| 125Kbit/s (default)      | 1      | 2   | 3   | 4   |
| 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  |

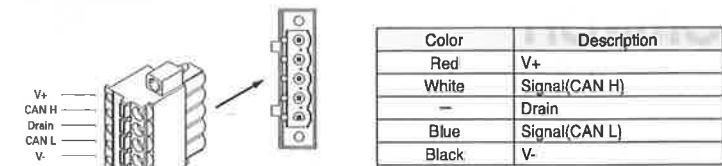
X : Don't care

3. INTERNAL CIRCUITRY AND WIRING

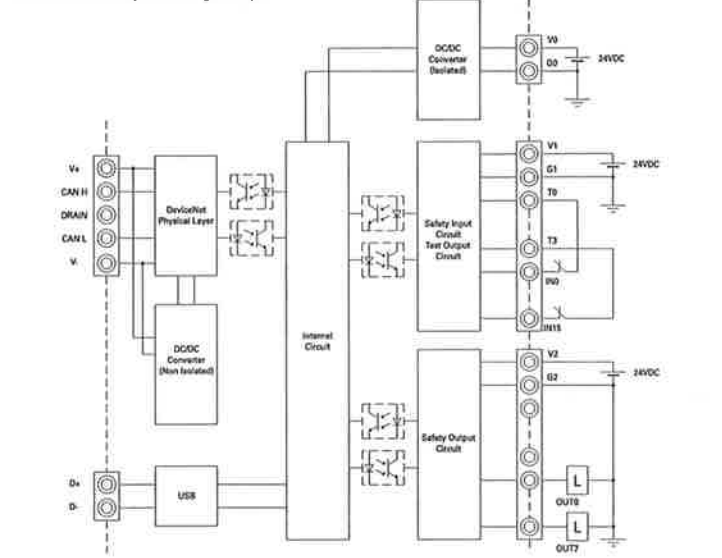
● Terminal Designations and functions

| 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                                                                                                                                                                                                            |

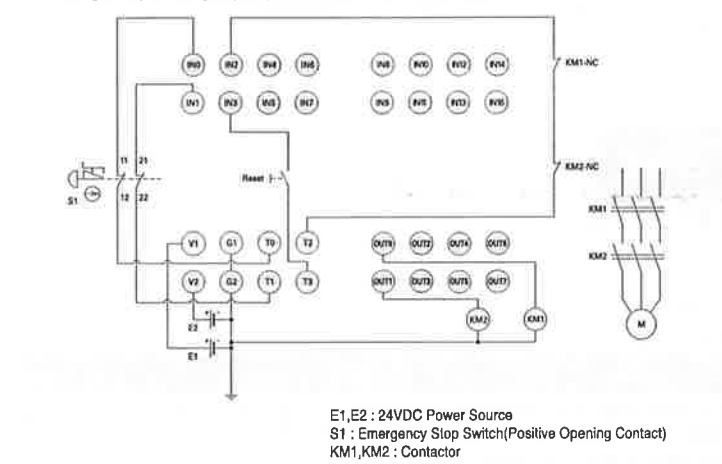
● DeviceNet Connector



● Internal Circuitry and wiring example



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



E1,E2 : 24VDC Power Source  
S1 : Emergency Stop Switch(Positive Opening Contact)  
KM1,KM2 : Contactor

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.