

## Achieve Safety Control through Programming.

- Compact Safety Controller.
- The NE1A-SCPU01-V1 provides 16 built-in safety inputs and 8 built-in safety outputs.  
The NE1A-SCPU02 provides 40 built-in safety inputs and 8 built-in safety outputs.
- Reduced wiring with safety networks. Connect up to 32 Safety Terminals.
- Monitor the safety system from Standard Controllers across the network.
- ISO13849-1 (PLe) and IEC 61508 SIL3 certification.



## Ordering Information

### List of Models

| Name                       | No. of I/O points |              |                | Model          | Unit version |
|----------------------------|-------------------|--------------|----------------|----------------|--------------|
|                            | Safety inputs     | Test outputs | Safety outputs |                |              |
| Safety Network Controllers | 16                | 4            | 8              | NE1A-SCPU01-V1 | 2.0          |
|                            | 40                | 8            | 8              | NE1A-SCPU02    | 2.0          |

**Note:** The standard NE1A Controllers are equipped with spring-cage terminal blocks, but other screw terminal blocks are available if desired, e.g., to replace previous terminals. Refer to CIP Safety on DeviceNet Accessories.

## Specifications

### Certified Standards

| Certification body | Standard                       |
|--------------------|--------------------------------|
| TÜV Rheinland      | NFPA 79-2012                   |
|                    | EN ISO13849-1: 2008            |
|                    | IEC61508 part 1-7: 2010        |
|                    | IEC61131-2: 2007               |
|                    | EN ISO13849-2: 2012            |
|                    | EN61000-6-4: 2007              |
|                    | EN61000-6-2: 2005              |
| UL                 | EN60204-1: 2006                |
|                    | EN ISO13850: 2006(EN418: 1992) |
|                    | ANSI RIA15.06-1999             |
|                    | ANSI B11.19-2010               |
|                    | UL508                          |
|                    | ANSI/ISA 12.12.01              |
|                    | UL1998                         |
| UL                 | NFPA79                         |
|                    | IEC61508                       |
|                    | CSA22.2 No.142                 |
|                    | CSA22.2 No.213                 |

### Specifications

| Item   | Model                                | NE1A-SCPU01-V1  | NE1A-SCPU02                              |
|--|--------------------------------------|---|--|
| <b>Communications power supply voltage</b>           |                                      | 11 to 25 VDC supplied via communications connector      |  |
| <b>Internal circuit power supply voltage (V0) *1</b> |                                      | 20.4 to 26.4 VDC (24 VDC -15%/+10%)                     |  |
| <b>I/O power supply voltage (V1, V2) *1</b>          |                                      | 20.4 to 26.4 VDC (24 VDC -15%/+10%)                     |  |
| <b>Current consumption</b>                           | <b>Communications power supply</b>   | 24 VDC, 15 mA   |  |
|  | <b>Internal circuit power supply</b> | 24 VDC, 230 mA  | 24 VDC, 280 mA                           |
|  | <b>I/O power supply *2</b>           | 24 VDC, 40 mA (Input)<br>120 mA (Output)                | 24 VDC, 80 mA (Input)<br>150 mA (Output) |
| <b>Overvoltage category</b>                          |                                      | II  |  |
| <b>Noise immunity</b>                                |                                      | Conforms to IEC61131-2.                                 |  |
| <b>Vibration resistance</b>                          |                                      | 10 to 57 Hz: 0.35 mm, 57 to 150 Hz: 50 m/s <sup>2</sup> |  |
| <b>Shock resistance</b>                              |                                      | 150 m/s <sup>2</sup> ; 11 ms                            |  |
| <b>Mounting method</b>                               |                                      | DIN Track (IEC 60715 TH35-7.5/TH35-15)                  |  |
| <b>Ambient operating temperature</b>                 |                                      | -10 to 55°C   |  |
| <b>Ambient operating humidity</b>                    |                                      | 10% to 95% (with no condensation)                       |  |
| <b>Ambient storage temperature</b>                   |                                      | -40 to 70°C   |  |
| <b>Degree of protection</b>                          |                                      | IP20  |  |
| <b>Serial interface</b>                              |                                      | USB version 1.1   |  |
| <b>Weight</b>  |                                      | 460 g max.  | 690 g max.                               |

\*1. V0-G0: Internal control circuit  
V1-G1 (G): For external input device, test output  
V2-G2 (G): For external output device  
The two ground terminals on the NE1A-SCPU02 are internally connected.

\*2. Not including power consumption for external devices.

## Safety Input Specifications

|                      |  |
|----------------------|--|
| <b>Input type</b>    | Sinking inputs (PNP)                         |
| <b>ON voltage</b>    | 11 VDC min. between each terminal and ground |
| <b>OFF voltage</b>   | 5 VDC min. between each terminal and ground  |
| <b>OFF current</b>   | 1 mA max.                                    |
| <b>Input current</b> | 4.5 mA                                       |

## Safety Output Specifications

|                             |  |
|-----------------------------|--|
| <b>Output type</b>          | Sourcing outputs (PNP)                         |
| <b>Rated output current</b> | 0.5 A max./output                              |
| <b>ON residual voltage</b>  | 1.2 V max. between each output terminal and V2 |
| <b>Leakage current</b>      | 0.1 mA max.                                    |

## Test Output Specifications

|                             |  |
|-----------------------------|--|
| <b>Output type</b>          | Sourcing outputs (PNP)                         |
| <b>Rated output current</b> | 0.7 A max./output *                            |
| <b>ON residual voltage</b>  | 1.2 V max. between each output terminal and V1 |
| <b>Leakage current</b>      | 0.1 mA max.                                    |

\*The maximum current for simultaneously ON outputs is 1.4 A.  
 (T0 to T3: NE1A-SCPU01-V1, T0 to T7: NE1A-SCPU02)  
 A 15 to 400-mA, 24-VDC external indicator can be connected to T3 and T7.

## DeviceNet Communications Specifications

| <b>Communications protocol</b>   | DeviceNet compliant   |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
|--|---|-------------------------|---------------------|---------------------|---------------------|----------|-------------------------|----------|-----------|----------|-------------------------|-----------|----------|-------------------------|------------|
| <b>Connection form</b>   | Multi-drop system and T-branch system can be combined (for trunk line and branch lines)   |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Communications speed</b>  | 500/250/125 kbps  |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Communications media</b>  | Special cable, 5 conductors (2 for communications, 2 for power supply, 1 for shielding)   |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Communications distance</b>   | <table border="1"> <thead> <tr> <th>Communications speed</th> <th>Max. network length</th> <th>Branch length</th> <th>Total branch length</th> </tr> </thead> <tbody> <tr> <td>500 kbps</td> <td>100 m max. (100 m max.)</td> <td rowspan="3">6 m max.</td> <td>39 m max.</td> </tr> <tr> <td>250 kbps</td> <td>250 m max. (100 m max.)</td> <td>78 m max.</td> </tr> <tr> <td>125 kbps</td> <td>500 m max. (100 m max.)</td> <td>156 m max.</td> </tr> </tbody> </table>       | Communications speed    | Max. network length | Branch length       | Total branch length | 500 kbps | 100 m max. (100 m max.) | 6 m max. | 39 m max. | 250 kbps | 250 m max. (100 m max.) | 78 m max. | 125 kbps | 500 m max. (100 m max.) | 156 m max. |
|  | Communications speed  | Max. network length     | Branch length       | Total branch length |                     |          |                         |          |           |          |                         |           |          |                         |            |
|  | 500 kbps  | 100 m max. (100 m max.) | 6 m max.            | 39 m max.           |                     |          |                         |          |           |          |                         |           |          |                         |            |
|  | 250 kbps  | 250 m max. (100 m max.) |                     | 78 m max.           |                     |          |                         |          |           |          |                         |           |          |                         |            |
| 125 kbps   | 500 m max. (100 m max.)   | 156 m max.              |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Note:</b> Figures in parentheses ( ) indicate values when a thin cable is used. |   |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Communications power supply</b>   | 11 to 25 VDC  |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>No. of connectable nodes</b>  | 63  |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Safety I/O communications (Pre-Ver. 1.0)</b>                                    | Safety Master function <ul style="list-style-type: none"> <li>• Max. no. of connections: 16</li> <li>• Max. data size: Input 16 bytes or output 16 bytes (per connection)</li> <li>• Connection type: Single-cast, multi-cast</li> </ul> Safety Slave function <ul style="list-style-type: none"> <li>• Max. no. of connections: 4</li> <li>• Max. data size: Input 16 bytes or output 16 bytes (per connection)</li> <li>• Connection type: Single-cast, multi-cast</li> </ul> |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Safety I/O communications (unit version 1.0 or later)</b>                       | Safety Master function <ul style="list-style-type: none"> <li>• Max. no. of connections: 32</li> <li>• Max. data size: Input 16 bytes or output 16 bytes (per connection)</li> <li>• Connection type: Single-cast, multi-cast</li> </ul> Safety Slave function <ul style="list-style-type: none"> <li>• Max. no. of connections: 4</li> <li>• Max. data size: Input 16 bytes or output 16 bytes (per connection)</li> <li>• Connection type: Single-cast, multi-cast</li> </ul> |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Standard I/O communications (all unit versions)</b>                             | Standard Slave function <ul style="list-style-type: none"> <li>• Max. no. of connections: 2</li> <li>• Max. data size: Input 16 bytes or output 16 bytes (per connection)</li> <li>• Connection type: Poll, bit-strobe, COS, cyclic</li> </ul>  |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |
| <b>Message communications</b>  | Max. message length: 552 bytes  |                         |                     |                     |                     |          |                         |          |           |          |                         |           |          |                         |            |

## Functions

### Function Blocks

NE1A-SCPU-series Controller support the following logic functions and function blocks. Support depends on the unit version.

#### Logic Functions

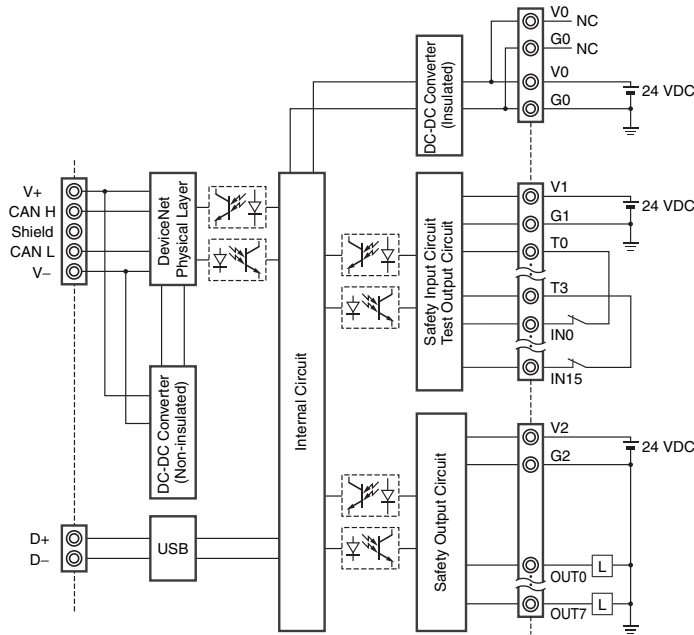
| Name          | Function list entry | Supporting unit versions |
|---------------|---------------------|--------------------------|
| NOT           | NOT                 | All                      |
| AND           | AND                 |                          |
| OR            | OR                  |                          |
| Exclusive OR  | EXOR                |                          |
| Exclusive NOR | EXNOR               |                          |
| RS Flip-flop  | RS-FF               | 1.0 or later             |
| Comparator    | Comparator          |                          |

#### Function Blocks

| Name                        | Function list entry      | Supporting unit versions |
|-----------------------------|--------------------------|--------------------------|
| Reset                       | Reset                    | All                      |
| Restart                     | Restart                  |                          |
| Emergency Stop Monitoring   | E-STOP                   |                          |
| Light Curtain Monitoring    | Light Curtain Monitoring |                          |
| Safety Gate Monitoring      | Safety Gate Monitoring   |                          |
| Two-hand Controller         | Two Hand Controller      |                          |
| Off-Delay Timer             | Off-Delay Timer          |                          |
| On-Delay Timer              | On-Delay Timer           |                          |
| User Mode Switch Monitoring | User Mode Switch         |                          |
| External Device Monitoring  | EDM                      |                          |
| Routing                     | Routing                  |                          |
| Muting                      | Muting                   |                          |
| Enable Switch Monitoring    | Enable Switch            |                          |
| Pulse Generator             | Pulse Generator          |                          |
| Counter                     | Counter                  |                          |
| Multiconnector              | Multi Connector          |                          |

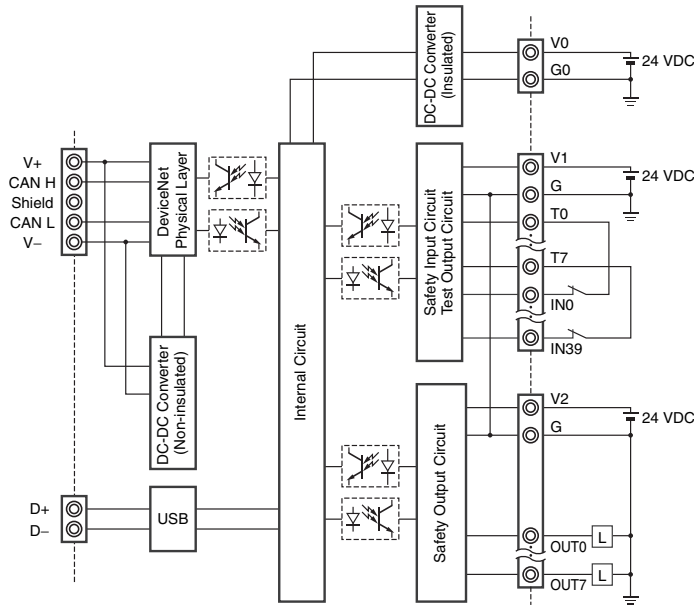
# Internal Circuit Diagrams

## NE1A-SCPU01-V1



| Terminal name | Description  |
|---------------|--|
| V0            | Power supply terminal for internal circuit<br>The two V0 terminals are internally connected.   |
| G0            | Power supply terminal for internal circuit<br>The two G0 terminals are internally connected.   |
| V1            | Power supply terminal for external input device and test output  |
| G1            | Power supply terminal for external input device and test output  |
| V2            | Power supply terminal for external output device   |
| G2            | Power supply terminal for external output device   |
| IN0 to IN15   | Safety input terminal  |
| T0 to T3      | Test output terminal<br>Connected to IN0 to IN15 safety inputs.<br>Each test output terminal outputs a different test pulse pattern.<br>Terminal T3 also supports a current monitoring function for the output signal.<br>Example: Muting lamp |
| OUT0 to OUT7  | Safety output terminals  |

## NE1A-SCPU02



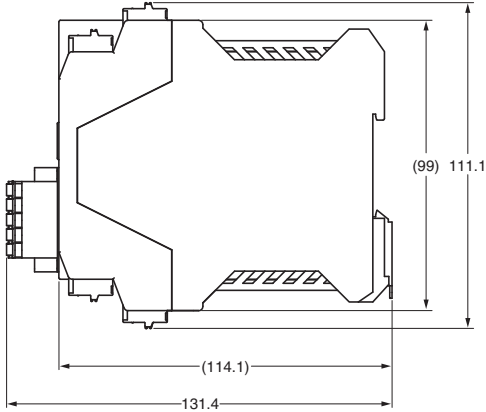
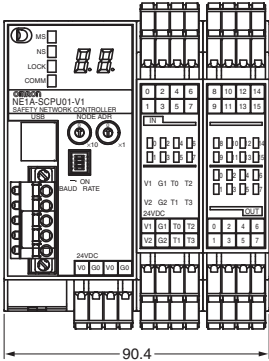
| Terminal name | Description   |
|---------------|---|
| V0            | Power supply terminal for internal circuit<br>The two V0 terminals are internally connected.  |
| G0            | Power supply terminal for internal circuit<br>The two G0 terminals are internally connected.  |
| V1            | Power supply terminal for external input device and test output   |
| G             | Power supply terminal for external input device and test output   |
| V2            | Power supply terminal for external output device  |
| G             | Power supply terminal for external output device  |
| IN0 to IN39   | Safety input terminal   |
| T0 to T3      | Test output terminal<br>Connected to IN0 to IN19 safety inputs.<br>Each test output terminal outputs a different test pulse pattern.<br>Terminal T3 also supports a current monitoring function for the output signal.<br>Example: Muting lamp  |
| T4 to T7      | Test output terminal<br>Connected to IN20 to IN39 safety inputs.<br>Each test output terminal outputs a different test pulse pattern.<br>Terminal T7 also supports a current monitoring function for the output signal.<br>Example: Muting lamp |
| OUT0 to OUT7  | Safety output terminals   |

Refer to the *CIP Safety on DeviceNet Safety Network Controllers Operation Manual* (Cat. No. Z906) for wiring examples.

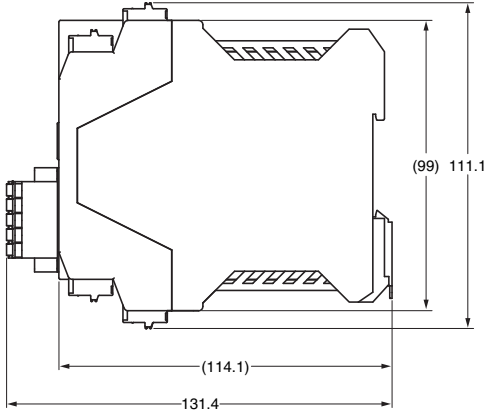
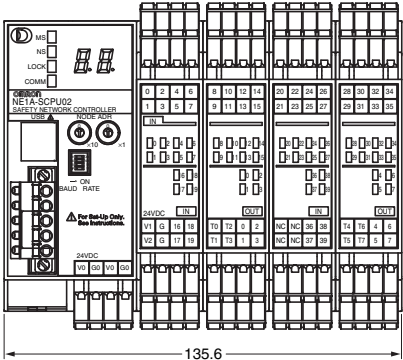
(Unit: mm)

Dimensions

NE1A-SCPU01-V1



NE1A-SCPU02



## Safety Precautions

Refer to the "Safety Precautions for All CIP Safety on DeviceNet Systems" for precautions.  
Be sure to read the following user's manual for other details required for correct use of the Safety Network Controller.

CIP Safety on DeviceNet Safety Network Controller User's Manual (Cat. No. Z916)

### Functions Supported According to Unit Version

○: Supported, ---: Not supported

| Model   | NE1ASCPU01   | NE1ASCPU01-V1                     | NE1ASCPU02                        |
|---|--------------|-----------------------------------|-----------------------------------|
| Unit version  | Pre-Ver. 1.0 | Unit version 1.0/2.0              | Unit version 1.0/2.0              |
| Logic processing functions  |              |                                   |                                   |
| Maximum program size (total number of function blocks)  | 128          | 254                               | 254                               |
| New Function Blocks<br>• RS flip-flop<br>• Multiconnector<br>• Muting<br>• Enable Switch Monitoring<br>• Pulse Generator<br>• Counter<br>• Comparator | ---          | ○                                 | ○                                 |
| Selecting a rising edge as the reset condition for Reset and Restart function blocks  | ---          | ○                                 | ○                                 |
| Using local I/O status in logic programming   | ---          | ○                                 | ○                                 |
| Using overall Unit status in logic programming  | ---          | ○                                 | ○                                 |
| Program execution wait functions  | ---          | ○<br>(Unit version 2.0 or higher) | ○<br>(Unit version 2.0 or higher) |
| I/O control functions   |              |                                   |                                   |
| Monitoring contact operation counter  | ---          | ○                                 | ○                                 |
| Mounting total ON time monitor  | ---          | ○                                 | ○                                 |
| DeviceNet communications functions  |              |                                   |                                   |
| Number of safety I/O connections for Safety Master  | 16           | 32                                | 32                                |
| Selecting operating mode for safety I/O communications when communications errors occur   | ---          | ○                                 | ○                                 |
| Attaching local output data to send data during slave operation   | ---          | ○                                 | ○                                 |
| Attaching local I/O monitor data to send data during slave operation  | ---          | ○                                 | ○                                 |
| Functions to communicate with devices existing on other networks (Off-Link connection)  | ---          | ○<br>(Unit version 2.0 or higher) | ○<br>(Unit version 2.0 or higher) |
| System startup and error recovery functions   |              |                                   |                                   |
| Storing log of nonfatal errors in nonvolatile memory  | ---          | ○                                 | ○                                 |
| Adding function block errors to error log   | ---          | ○                                 | ○                                 |
| Ethernet/IP communications functions  |              |                                   |                                   |
| I/O communications  | ---          | ---                               | ---                               |
| Message communications  | ---          | ---                               | ---                               |
| Read/write of target I/O area   | ---          | ---                               | ---                               |
| Routing between DeviceNet and EtherNet/IP   |              |                                   |                                   |
| I/O routing   | ---          | ---                               | ---                               |
| Message routing   | ---          | ---                               | ---                               |
| UDP/IP message communications functions   |              |                                   |                                   |
| Message communications by UDP/IP  | ---          | ---                               | ---                               |

## Unit Versions and Network Configurator Versions

Network Configurator version 2.0□ or higher must be used when using a NE1A-SCPU01-V1 or NE1A-SCPU02 Safety Logic Controller with unit version 2.0.

○ : Applicable, ×: Not applicable

| Model                              | Network Configurator |           |           |                |          |          |
|------------------------------------|----------------------|-----------|-----------|----------------|----------|----------|
|                                    | Ver. 1.3□            | Ver. 1.5□ | Ver. 1.6□ | Ver. 2.0□/2.1□ | Ver.2.2□ | Ver.3.3□ |
| NE1A-SCPU01<br>Pre-Ver. 1.0        | ○                    | ○         | ○         | ○              | ○        | ○        |
| NE1A-SCPU01-V1<br>Unit version 1.0 | ×                    | ×         | ○         | ○              | ○        | ○        |
| NE1A-SCPU02<br>Unit version 1.0    | ×                    | ×         | ○         | ○              | ○        | ○        |
| NE1A-SCPU01-V1<br>Unit version 2.0 | ×                    | ×         | ○(*1)     | ○              | ○        | ○        |
| NE1A-SCPU02<br>Unit version 2.0    | ×                    | ×         | ○(*1)     | ○              | ○        | ○        |

\*1: It can be used as unit version 1.0.

**Note: 1.** Users who use Network Configurator version 1.5□ or earlier can upgrade to version 1.6□ at no charge.

**2.** When using Network Configurator version 1.6□, there are no operational differences in the NE1A-SCPU01-V1 and NE1A-SCPU02.

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