Safety Network Controller

NE1A-SCPU Series

CSM_NE1A-SCPU_Series_DS_E_6_1

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 DeviceNet Safety Accessories.

Specifications

Certified Standards

Certification body	Standard
TÜV Rheinland	NFPA 79-2007 ISO13849-1: 1999 IEC61508 part1-7/12.98-05.00 IEC61131-2: 2007 ISO13849-1: 2006 EN ISO13849-2: 2008 EN61000-6-4: 2007 EN61000-6-2: 2005 EN60204-1: 2006 EN ISO13849: 2006 (EN418: 1992) ANSI RIA15.06-1999 ANSI B11.19-2003
UL	UL508 UL1604 UL1998 NFPA79 IEC61508 CSA22.2 No.142 CSA22.2 No.213

Specifications

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

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

Safety Output Specifications

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

Test Output Specifications

Output type	Sourcing outputs (PNP)
Rated output current	0.7 A max./output ✻
ON residual voltage	1.2 V max. between each output terminal and V1
Leakage current	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

Communications protocol	DeviceNet compliant
Connection form	Multi-drop system and T-branch system can be combined (for trunk line and branch lines)
Communications speed	500/250/125 kbps
Communications media	Special cable, 5 conductors (2 for communications, 2 for power supply, 1 for shielding)
Communications distance	See table below
Communications power supply	11 to 25 VDC
No. of connectable nodes	63
Safety I/O communications (Pre-Ver. 1.0)	Safety Master function • Max. no. of connections: 16 • Max. data size: Input 16 bytes or output 16 bytes (per connection) • Connection type: Single-cast, multi-cast Safety Slave function • Max. no. of connections: 4 • Max. data size: Input 16 bytes or output 16 bytes (per connection) • Connection type: Single-cast, multi-cast
Safety I/O communications (unit version 1.0 or later)	Safety Master function • Max. no. of connections: 32 • Max. data size: Input 16 bytes or output 16 bytes (per connection) • Connection type: Single-cast, multi-cast Safety Slave function • Max. no. of connections: 4 • Max. data size: Input 16 bytes or output 16 bytes (per connection) • Connection type: Single-cast, multi-cast
Standard I/O communications (all unit versions)	Standard Slave function • Max. no. of connections: 2 • Max. data size: Input 16 bytes or output 16 bytes (per connection) • Connection type: Poll, bit-strobe, COS, cyclic
Message communications	Max. message length: 552 bytes

Communications distance

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.

Note: Figures in parentheses ( ) indicate values when a thin cable is used.

Functions

Function Blocks

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

Logic Functions

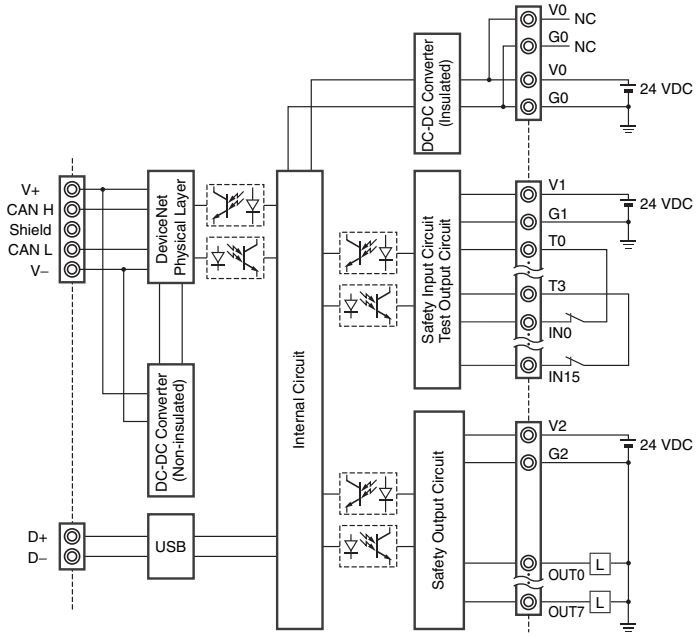
Name	Function list entry	Supporting unit versions
NOT	NOT	All
AND	AND	
OR	OR	
Exclusive OR	EXOR	
Exclusive NOR	EXNOR	
RS Flip-flop	RS-FF	1.0 or later
Comparator	Comparator	

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	1.0 or later
Enable Switch Monitoring	Enable Switch	
Pulse Generator	Pulse Generator	
Counter	Counter	
Multiconnector	Multi Connector	

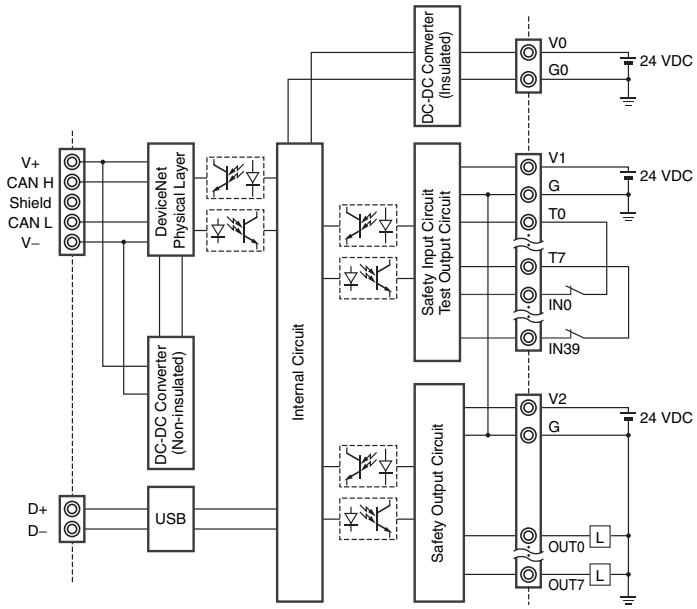
Internal Circuit Diagrams

NE1A-SCPU01-V1



Terminal name	Description
V0	Power supply terminal for internal circuit The two V0 terminals are internally connected.
G0	Power supply terminal for internal circuit 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 Connected to IN0 to IN15 safety inputs. Each test output terminal outputs a different test pulse pattern. Terminal T3 also supports a current monitoring function for the output signal. Example: Muting lamp
OUT0 to OUT7	Safety output terminals

NE1A-SCPU02



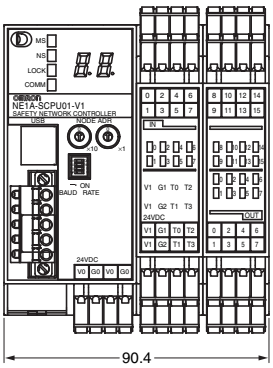
Terminal name	Description
V0	Power supply terminal for internal circuit The two V0 terminals are internally connected.
G0	Power supply terminal for internal circuit The two G0 terminals are internally connected.
V1	Power supply terminal for external input device and test output
G	Power supply terminal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

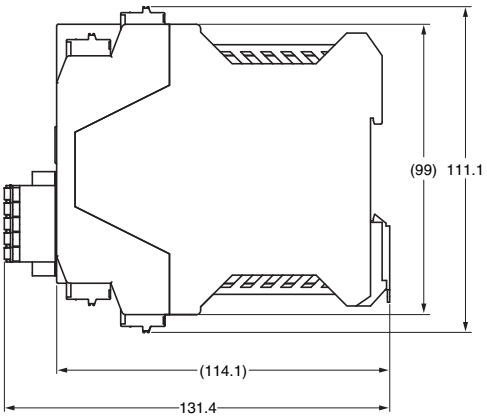
Refer to the *DeviceNet Safety Safety Network Controllers Operation Manual* (Cat. No. Z906) for wiring examples.

Dimensions

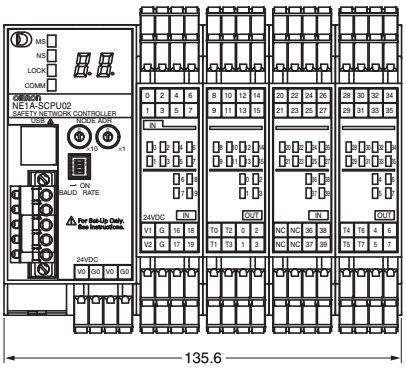
(Unit: mm)

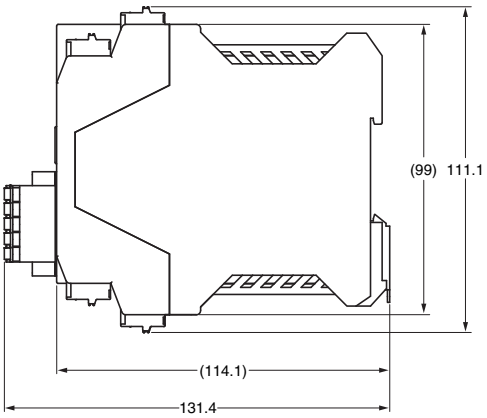
NE1A-SCPU01-V1





NE1A-SCPU02





Safety Precautions

Refer to the "Safety Precautions for All DeviceNet Safety Systems" for precautions.
Be sure to read the following user's manual for other details required for correct use of the Safety Network Controller.
DeviceNet Safety Safety Network Controller User's Manual (Cat. No. Z916)

Functions Supported According to Unit Version

❍: Supported, ---: Not supported

Model	NE1ASCPU01	NE1ASCPU01-V1	NE1ASCPU02
Function \ 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 • RS flip-flop • Multiconnector • Muting • Enable Switch Monitoring • Pulse Generator • Counter • 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	---	❍ (Unit version 2.0 or higher)	❍ (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)	---	❍ (Unit version 2.0 or higher)	❍ (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 Pre-Ver. 1.0	❍	❍	❍	❍	❍	❍
NE1A-SCPU01-V1 Unit version 1.0	×	×	❍	❍	❍	❍
NE1A-SCPU02 Unit version 1.0	×	×	❍	❍	❍	❍
NE1A-SCPU01-V1 Unit version 2.0	×	×	❍ (✻1)	❍	❍	❍
NE1A-SCPU02 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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