

NC1V Circuit Protectors

IDEC's original spring-up, fingersafe terminals enhance reliability and safety.

- Integrated electric shock protection structure (IP20).
- Auxiliary/alarm contact terminals and voltage coil terminals on the relay trip types are equipped with terminal covers.
- Spring-up, fingersafe terminals reduce wiring time.
- Ring terminals can be installed. Captive terminal screws.
- Available with inertial delay
- Available with auxiliary or alarm contacts
- Rated short-circuit capacity: 2500A
- Slim, space-saving housing
 - 1-pole: 17.5mm wide
 - 2-pole: 35.0mm wide
 - 3-pole: 52.5mm wide
- Retractable actuator
- The trip-free mechanism maintains the circuit open even when the operator is turned on after tripping.



Applicable Standards	Mark	Certification Organization / File No.
UL1077		UL recognized File No. E68029
CSA C22.2 No. 235		CSA file No. LR83454
EN60934		TÜV SÜD
EN60947-2		European Commission's EU Low Voltage Directive
GB17701		CCC No. 2008010307265840
Electrical Appliance and Material Safety Law Technical Standard	Series Trip	
	Relay Trip	

Note: TÜV, CE, and CCC marks are applicable for series trip type only.

Specifications

Operator Style		Retractable actuator		
Internal Circuit		Series trip (current trip), Relay trip (voltage trip)		
Protection Method		Hydraulic magnetic tripping system, Magnetic tripping system (voltage trip)		
No. of Poles		1-pole	2-pole	3-pole
Rated Voltage (AC/DC) (Note 1)		250V AC 50/60Hz, 65V DC	250V AC 50/60Hz, 125V DC	250V AC, 50/60Hz
Series Trip (Current Trip)	Rated Short-circuit Capacity	250V AC, 2500A 65V DC, 2500A	250V AC, 2500A 125V DC, 2500A	250V AC, 2500A
	Rated Current	0.1A, 0.3A, 0.5A, 1A, 2A, 3A, 5A, 7A, 10A, 15A, 20A, 25A, 30A		
	Trip Characteristics (Note 2)	Time delay curve curve M (slow), curve A (medium), S (instantaneous) Curves M and A are available with inertial delay.		
Relay Trip (Voltage Trip) (Note 3)	Rated Current	30A		
	Trip Voltage	24 to 48V DC (at 25°C) Voltage application duration 10 sec maximum, tripping time 0.1 sec maximum (at rated voltage)		
Auxiliary Contact/ Alarm Contact	Contact Rating	125V AC 3A (resistive load), 30V DC 2A (resistive load)		
	Minimum Applicable Load	24V DC 1mA (resistive load, reference value)		
Insulation Resistance		100 MΩ minimum (500V DC megger)		
Dielectric Strength		2000V AC, 1 minute (between terminals when main contacts are open, between live parts of different poles, between live and dead parts) 600V AC (between terminals when auxiliary circuits are open)		
Vibration Resistance (with rated current applied)		Damage limits: 147 m/s ² (10 to 55 Hz) (1-pole, 2-pole), 78 m/s ² (3-pole) Operating extremes: 98 m/s ² (1-pole, 2-pole), 78 m/s ² (3-pole)		
Shock Resistance (S time delay curve: 80% rated current, A, M time delay curve: 100% rated current)		Damage limits: 490 m/s ² (1-pole, 2-pole), 297 m/s ² (3-pole) Operating extremes: 196 m/s ²		
Electrical Life		10,000 cycles minimum (at rated current), 10 operations per minute		
Reference Temperature		40°C		
Operating Temperature		-10 to +60°C (no freezing) Rated current is based on an ambient temperature of 40°C. When the operating temperature exceeds 40°C, derate the rated current by using the factors shown below.		
Storage Temperature		-40 to +60°C (no freezing)		
Operating Humidity		45 to 85% RH (no condensation)		
Storage Humidity		45 to 85% RH (no condensation)		
Terminal Style	Main Circuit Terminal	Spring-up, fingersafe terminal: M4 screw (up to 20A), M5 screw (25A and 30A)		
	Auxiliary/Alarm Contacts, Voltage Coil Terminal	M3.5 screw		
Weight (approx.)		1-pole: 90g, 2-pole: 170g, 3-pole: 260g		

Note 1: 3-pole type is for AC voltage only.

Note 2: For S (instantaneous) tripping curve, humming sound may be caused when used in an AC sinusoidal-wave current circuit around 80% of the rated current, however, the performance of the circuit protector will not be affected.
To avoid unnecessary tripping, do not use in circuits where inrush currents may be present.

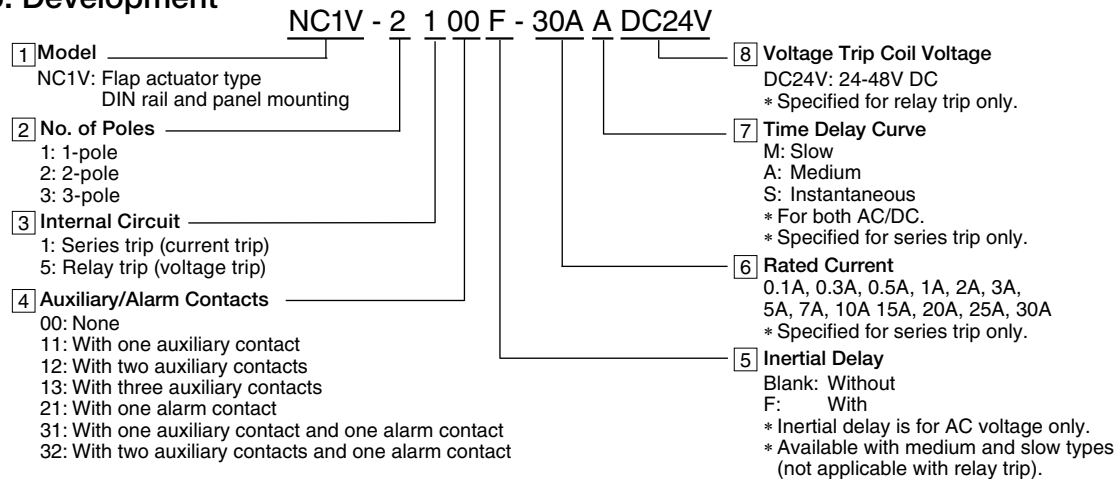
Note 3: Relay trip (voltage trip) type is not equipped with an overcurrent trip function.

Do not use the NC1V circuit protectors in environments where they are exposed to extreme temperature, humidity, dust, corrosive gases, vibration, shock, or in a circuit where inrush current may be present, otherwise unnecessary operations and damage may occur.

Operating Temp.	Derating Factor
50°C	0.9
55°C	0.8
60°C	0.7

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Part No. Development



Specify rated current, time delay curve, or voltage trip coil voltage in place of **6 7 8** in the Part No.

Internal Circuit	No. of Poles	Inertial Delay	Auxiliary Contact Alarm Contact	Part No.	Code		
					6 Rated Current	7 Time Delay Curve	8 Voltage Trip Coil Voltage
Series Trip (Current Trip)	1-pole	—	—	NC1V-1100-6 7	0.1A 0.3A 0.5A 1A 2A 3A 5A 7A 10A 15A 20A 25A 30A	M (slow) A (medium) S (instantaneous)	—
			One Auxiliary Contact	NC1V-1111-6 7			
			One Alarm Contact	NC1V-1121-6 7			
		With	—	NC1V-1100F-6 7			
			One Auxiliary Contact	NC1V-1111F-6 7			
			One Alarm Contact	NC1V-1121F-6 7			
	2-pole	—	—	NC1V-2100-6 7			
			One Auxiliary Contact	NC1V-2111-6 7			
			Two Auxiliary Contacts	NC1V-2112-6 7			
			One Alarm Contact	NC1V-2121-6 7			
			One Auxiliary Contact and One Alarm Contact	NC1V-2131-6 7			
		With	—	NC1V-2100F-6 7			
			One Auxiliary Contact	NC1V-2111F-6 7			
			Two Auxiliary Contacts	NC1V-2112F-6 7			
			One Alarm Contact	NC1V-2121F-6 7			
			One Auxiliary Contact and One Alarm Contact	NC1V-2131F-6 7			
	3-pole	—	—	NC1V-3100-6 7			
			One Auxiliary Contact	NC1V-3111-6 7			
			Two Auxiliary Contacts	NC1V-3112-6 7			
			Three Auxiliary Contacts	NC1V-3113-6 7			
			One Alarm Contact	NC1V-3121-6 7			
			One Auxiliary Contact and One Alarm Contact	NC1V-3131-6 7			
			Two Auxiliary Contacts and One Alarm Contact	NC1V-3132-6 7			
		With	—	NC1V-3100F-6 7			
			One Auxiliary Contact	NC1V-3111F-6 7			
			Two Auxiliary Contacts	NC1V-3112F-6 7			
			Three Auxiliary Contacts	NC1V-3113F-6 7			
			One Alarm Contact	NC1V-3121F-6 7			
			One Auxiliary Contact and One Alarm Contact	NC1V-3131F-6 7			
			Two Auxiliary Contacts and One Alarm Contact	NC1V-3132F-6 7			
Relay Trip (Voltage Trip)	1-pole	—	—	NC1V-1500-8	—	—	24V DC
	2-pole			NC1V-2500-8			
	3-pole			NC1V-3500-8			

Note: Inertial delay is for AC circuit. Also, time delay curve of S (instantaneous) is not available with inertial delay.

Internal Circuit

1-pole

NC1V-1100 (Without auxiliary/alarm contacts)	NC1V-1111 (With auxiliary contact)	NC1V-1121 (With alarm contact)	NC1V-1500 (Relay Trip)

2-pole

NC1V-2100 (Without auxiliary/alarm contacts)	NC1V-2111 (With auxiliary contact)	NC1V-2121 (With alarm contact)	NC1V-2500 (Relay Trip)

Note: Those with two auxiliary contacts and with one auxiliary contact and one alarm contact have been applied for UL and CCC.

3-pole

NC1V-3100 (Without auxiliary/alarm contacts)	NC1V-3111 (With auxiliary contact)	NC1V-3121 (With alarm contact)	NC1V-3500 (Relay Trip)

Note: Those with two or three auxiliary contacts, with one auxiliary contact and one alarm contact, and with two auxiliary contacts and one alarm contacts have been applied for UL and CCC.

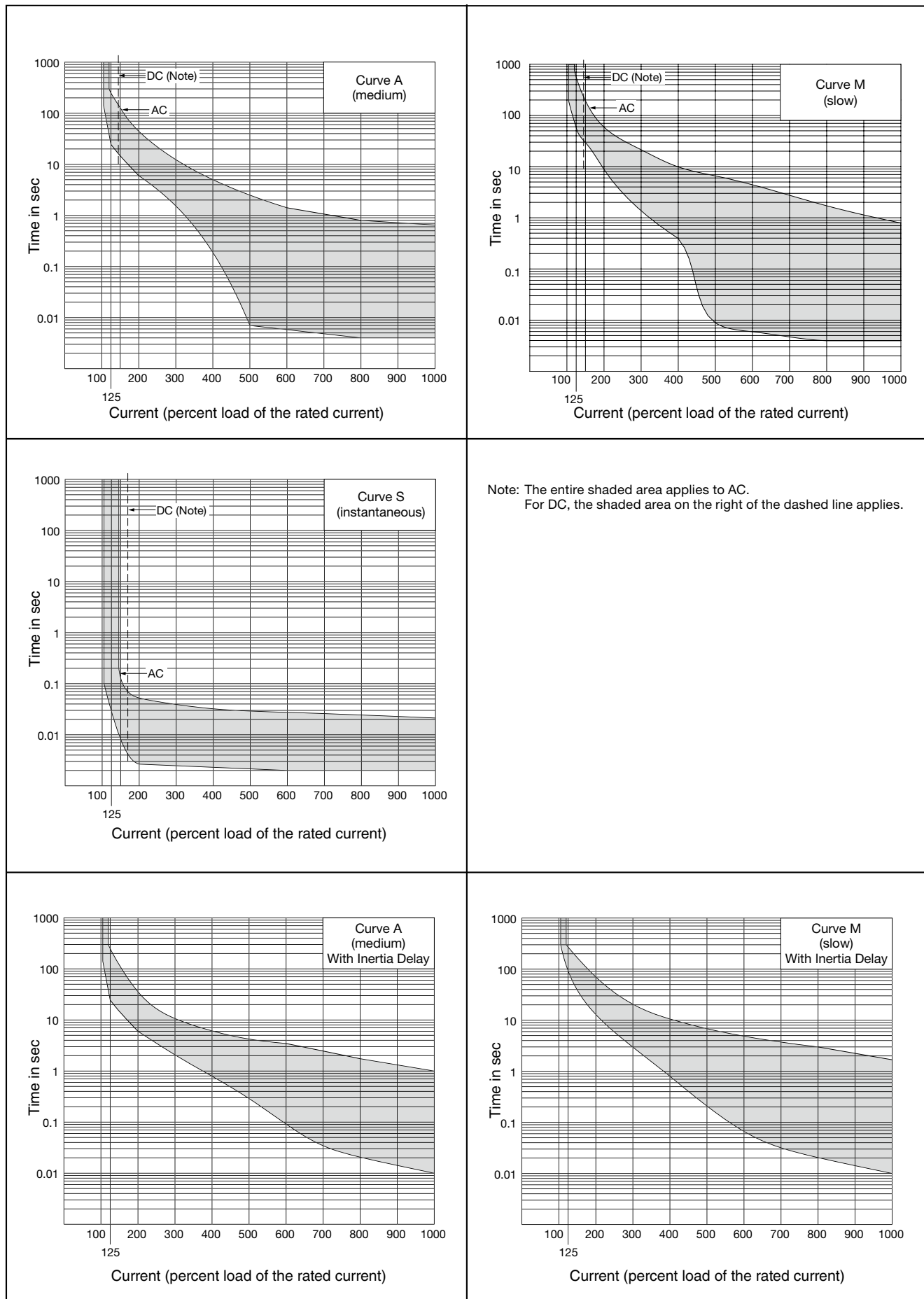
Overcurrent-Time Delay Characteristics (sec at 40°C) [vertical mounting]

Item	Time Delay Curve	Percent of Rated Current								
		100%	125%	150%	175%	200%	400%	600%	800%	1000%
AC (50/60 Hz)/DC	S (instantaneous)	NO TRIP	—	*0.005 to 0.1	0.003 to 0.06	0.0027 to 0.05	0.002 to 0.03	0.002 to 0.028	0.002 to 0.025	0.002 to 0.022
	A (medium)	NO TRIP	*25 to 240	16 to 140	—	6 to 32	0.4 to 4	0.0055 to 1.5	0.004 to 0.8	0.004 to 0.65
	M (slow)	NO TRIP	*60 to 600	30 to 200	—	9 to 60	0.4 to 10	0.006 to 4.5	0.004 to 1.8	0.004 to 0.8
AC (50/60 Hz)	With Inertial Delay A (medium)	NO TRIP	25 to 240	—	—	6 to 32	0.8 to 6	0.09 to 3.5	0.02 to 1.8	0.01 to 1.0
	With Inertial Delay M (slow)	NO TRIP	60 to 600	—	—	10 to 60	0.8 to 10	0.06 to 4.5	0.02 to 3	0.01 to 1.75

*: MAY TRIP on DC

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Time Delay Curves at 40°C

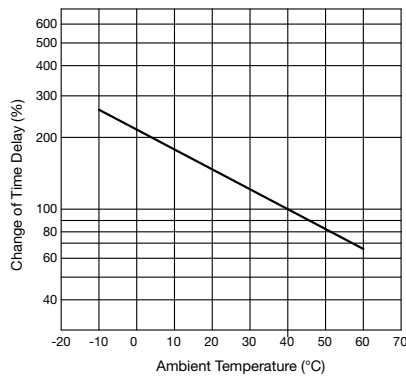


Time Delay Curve and Ambient Temperature

NC1V circuit protectors employ an electromagnetic tripping system, where the rated current (trip current) is not affected by ambient temperatures. But the time delay may vary with the oil viscosity in the oil dash pot. Lower oil viscosity at higher temperatures results in a shorter delay, whereas at lower temperatures the delay will be longer.

Temperature Correction Curve

The time delay curves on the preceding page are measured at 40°C. With reference to the following curves, time delays can be corrected according to ambient temperature.



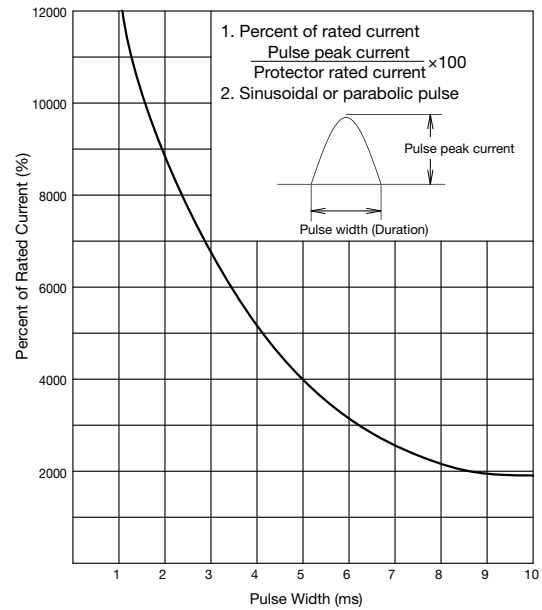
The time delay is based on an ambient temperature of 40°C. Time delays at other temperatures are corrected according to the temperature correction curve. The time delay of the instantaneous time delay curve (S) is not affected by the ambient temperature.

When operating temperature exceeds 40°C, derate the rated current by multiplying the derating factor shown on the right.

Operating Temp.	Derating Factor
50°C	0.9
55°C	0.8
60°C	0.7

Inertial Delay

Inertial delay is designed not to trip on a non-repeating single pulse of 20 times the rated current (peak value) for a duration of 8 ms. In addition, circuit protectors equipped with inertial delay do not respond to high inrush currents caused by transformer or lamp loads, but perform the specified interruption on the subsequent overcurrents. Inertial delay is available on AC circuits, and is not available with the series trip curve S (instantaneous).



Impedance and Coil Resistance

Series Trip (Current Trip) (initial value) at 25°C

Rated Current	For AC 50/60 Hz Impedance (Ω)		For DC Resistance (Ω)	
	Curve S	Curves A, M	Curve S	Curves A, M
0.1A	66.0	116.0	43.0	106.0
0.3A	6.6	11.0	4.1	10.0
0.5A	1.92	3.65	0.86	3.40
1A	0.50	0.93	0.25	0.90
2A	0.16	0.27	0.11	0.25
3A	0.07	0.12	0.050	0.11
5A	0.025	0.050	0.015	0.045
7A	0.014	0.027	0.011	0.025
10A	0.007	0.021	0.005	0.020
15A	0.006	0.010	0.005	0.009
20A	0.005	0.006	0.004	0.005
25A	0.004	0.005	0.004	0.005
30A	0.003	0.004	0.003	0.004

Tolerance: ±25% (up to 20A),
 ±50% (25A and 30A)

Relay Trip (Voltage Trip) at 25°C

Tripping Voltage	For DC Resistance (Ω)
24-48V	100.0

Tolerance: ±25%

Voltage Drop Due to Coil Resistance or Impedance

The internal resistance or impedance of a circuit protector tends to be larger for a smaller rated current. Therefore, when circuit protectors of a small rated current are used, voltage drop should be taken into consideration. Internal resistance also varies with time delay curves, which should also be considered during installation.

Main Contact - Auxiliary/Alarm Contact

[Auxiliary Contact]

Main Contact	NO ontact	NC Contact
ON	closed	open
Tripped	open	closed
OFF	open	closed

[Alarm Contact]

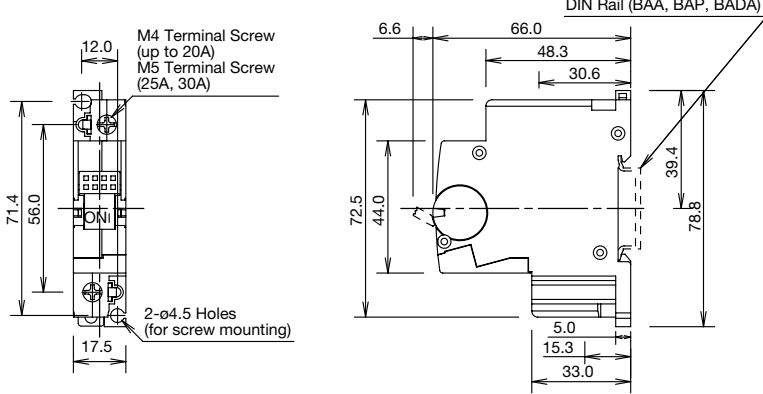
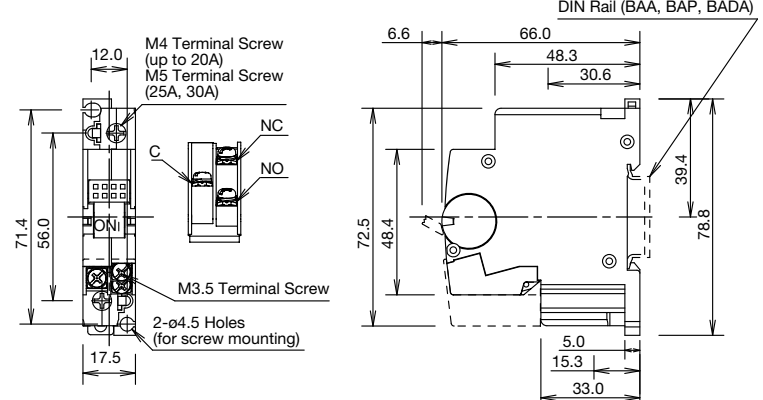
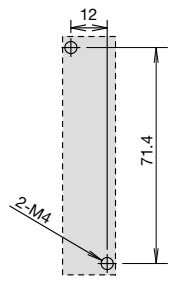
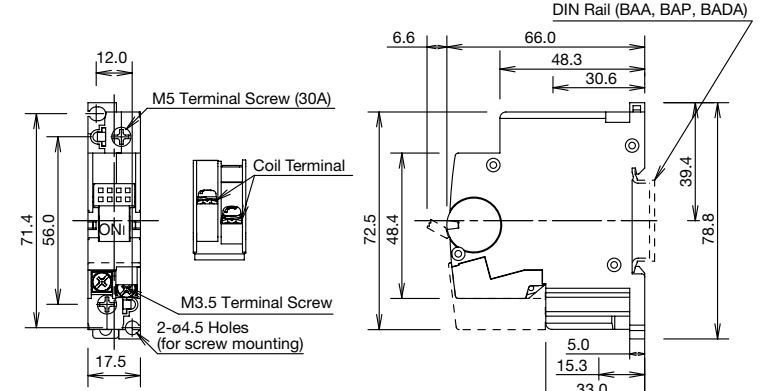
Main Contact	NO ontact	NC Contact
ON	open	closed
Tripped	closed	open
OFF	open	closed

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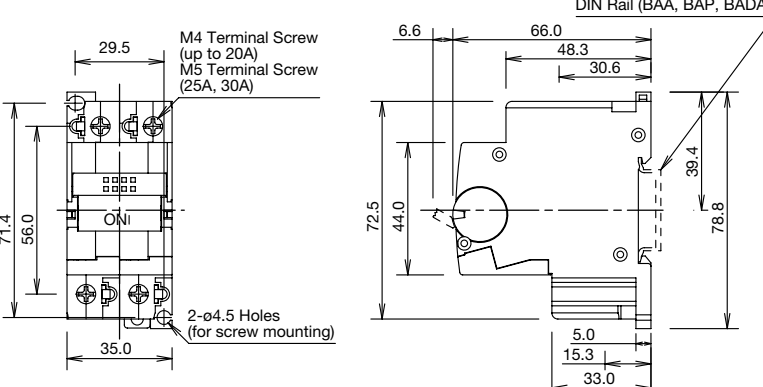
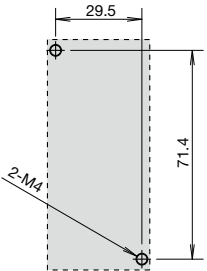
Dimensions

1-pole

All dimensions in mm.

NC1V-1100	 Technical drawing of the NC1V-1100 circuit protector. The front view shows a height of 71.4 mm and a width of 17.5 mm. It features an M4 terminal screw (up to 20A) and an M5 terminal screw (25A, 30A) at the top, and two Ø4.5 holes for screw mounting at the bottom. The side view shows a depth of 66.0 mm and a mounting hole offset of 39.4 mm from the bottom edge.	
NC1V-1111 (Auxiliary Contact) NC1V-1121 (Alarm Contact)	 Technical drawing of the NC1V-1111 (Auxiliary Contact) and NC1V-1121 (Alarm Contact) circuit protectors. The front view shows a height of 71.4 mm and a width of 17.5 mm. It features an M4 terminal screw (up to 20A) and an M5 terminal screw (25A, 30A) at the top, and two Ø4.5 holes for screw mounting at the bottom. The side view shows a depth of 66.0 mm and a mounting hole offset of 39.4 mm from the bottom edge. The auxiliary contact is labeled 'NC' and the alarm contact is labeled 'NO'.	Mounting Hole Layout (M4 Mounting Screws)  Diagram showing the mounting hole layout for M4 mounting screws. The hole is offset by 12 mm from the top edge and the overall height is 71.4 mm.
NC1V-1500 (Relay Trip)	 Technical drawing of the NC1V-1500 (Relay Trip) circuit protector. The front view shows a height of 71.4 mm and a width of 17.5 mm. It features an M5 terminal screw (30A) at the top and two Ø4.5 holes for screw mounting at the bottom. The side view shows a depth of 66.0 mm and a mounting hole offset of 39.4 mm from the bottom edge.	

2-pole

NC1V-2100	 Technical drawing of the NC1V-2100 circuit protector. The front view shows a height of 71.4 mm and a width of 35.0 mm. It features an M4 terminal screw (up to 20A) and an M5 terminal screw (25A, 30A) at the top, and two Ø4.5 holes for screw mounting at the bottom. The side view shows a depth of 66.0 mm and a mounting hole offset of 39.4 mm from the bottom edge.	Mounting Hole Layout (M4 Mounting Screws)  Diagram showing the mounting hole layout for M4 mounting screws. The hole is offset by 29.5 mm from the top edge and the overall height is 71.4 mm.
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NC1V Circuit Protectors

2-pole

NC1V-2111 (one auxiliary contact) NC1V-2112 (two auxiliary contacts) NC1V-2121 (one alarm contact) NC1V-2131 (one auxiliary contact and one alarm contact)	The dimensions are for NC1V-2111 and NC1V-2121.	Mounting Hole Layout (M4 Mounting Screws)
NC1V-2500 (Relay Trip)		Mounting Hole Layout (M4 Mounting Screws)

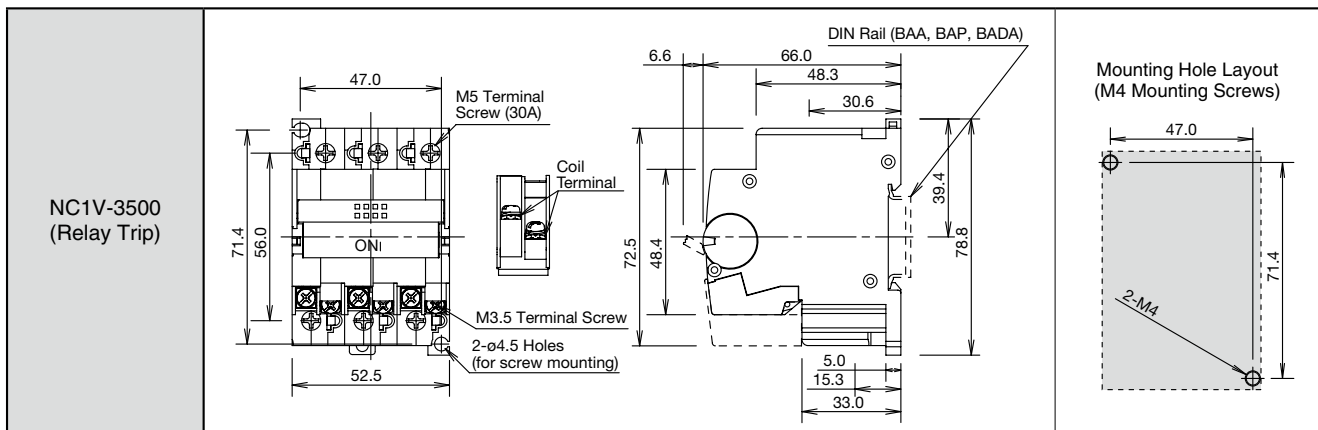
3-pole

NC1V-3100		Mounting Hole Layout (M4 Mounting Screws)
NC1V-3111 (one auxiliary contact) NC1V-3112 (two auxiliary contacts) NC1V-3113 (three auxiliary contacts) NC1V-3121 (one alarm Contact) NC1V-3131 (one auxiliary contact and one alarm contact) NC1V-3132 (two auxiliary contacts and one alarm contact)	The dimensions are for NC1V-3111 and NC1V-3121.	Mounting Hole Layout (M4 Mounting Screws)

NC1V Circuit Protectors (Accessories)

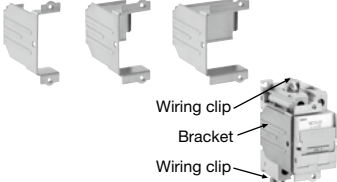
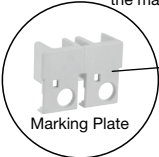
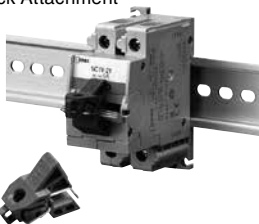
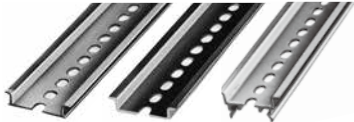
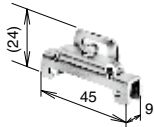
3-pole

All dimensions in mm.



Accessories

All dimensions in mm.

Shape		Material	Part No.	Ordering No.	Package Quantity	Remarks	
Panel Mounting Bracket (Note) 1-pole 2-pole 3-pole 		1-pole 2-pole 3-pole	Bracket: Steel Wiring clip: brass (terminal), steel (screw, washer)	NC9Z-MA11 NC9Z-MA21 NC9Z-MA31	NC9Z-MA11 NC9Z-MA21 NC9Z-MA31	1	- Used for mounting NC1V circuit protectors in a panel cut-out. - Supplied with two wiring clips for each pole, used for wiring from the rear. For 1-pole: 2 wiring clips For 2-pole: 4 wiring clips For 3-pole: 6 wiring clips
Marking Plate  Installation Example 		PBT	NC9Z-PW1	NC9Z-PW1PN10	10	- Available for 2-pole circuit only. For use on 1-pole circuit protectors, break the marking plate into two halves. - Label is supplied by the user.	
Padlock Attachment 		Polyamide body with stainless steel pin	NC9Z-LK1	NC9Z-LK1	1	- Locks the retractable actuator in the off position to prevent NC1V from being switched on inadvertently. - Can be used on 1-, 2-, and 3-pole.	
DIN Rail (35mm-wide)  BAA BAP BADA	Length: 1000mm Aluminum Steel Aluminum	BAA1000 BAP1000 BADA1000	BAA1000PN10 BAP1000PN10 BADA1000PN10	10	Weight: approx. 200g Weight: approx. 320g Weight: approx. 280g		
End Clip 		Steel (trivalent chromate)	BNL6	BNL6PN10	10	Applicable rail: BAA, BAP, BADA Weight: approx. 15g	

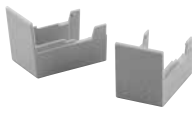
Note: Cannot be used with NC1V with auxiliary or alarm contact.

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NC1V Circuit Protectors Instructions

Replacement Parts

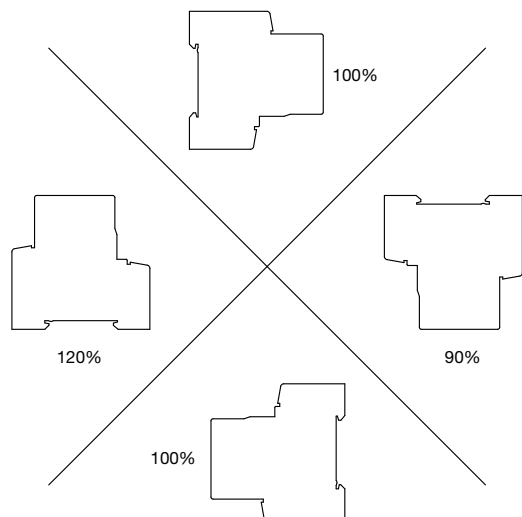
All dimensions in mm.

Shape	Material	Part No.	Ordering No.	Package Quantity	Remarks
	PA66	NC1V-AUX-CV	NC1V-AUX-CV	1	
Wiring Clip	Terminal: Brass Screw/washer: Steel	NC9Z-TA1	NC9Z-TA1PN10	10	

Instructions

Installation Angle

Tripping method is hydraulic magnetic. Minimum operating current varies with installation angle. Operating currents are influenced by the weight of movable iron core. With reference to the following figures, correct the rated current.



Minimum operating current is calculated from the following formula:

$$(\text{Minimum operating current}) = (\text{Rated current}) \times (\text{Correction factor by installation angle}) \times (\text{Reference minimum tripping current rate})$$

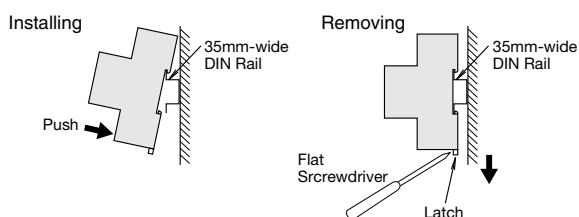
DIN Rails

[Installation on DIN Rail]

1. Fasten the DIN rail securely.
2. With the latch facing downward, install the NC1V circuit protector on the DIN rail as shown below.

[Removal from DIN Rail]

Using a flat screwdriver, pull the latch on the circuit protector to remove from the DIN rail.



Applicable Wire and Crimp Terminal

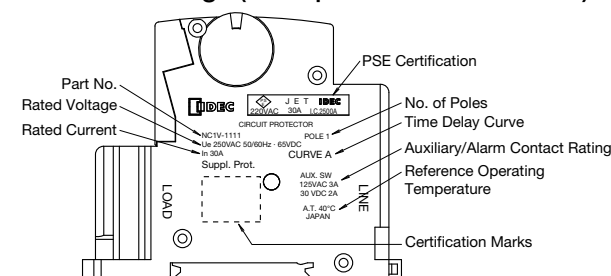
Terminal	Terminal Screw	Connectable Wire Size (mm ²)	Applicable Crimping Terminal	Tightening Torque (N·m)
Main Circuit Terminals	Spring-up, fingersafe, slotted Phillips screw with square washer (up to 20A)	0.25 to 1.65	R1.25-4	1 to 1.4
		1.04 to 2.63	R2-4	
		2.63 to 6.64	R5.5-4	
	Spring-up fingersafe terminal (25A and 30A)	0.25 to 1.65	R1.25-5	1.8 to 2.2
		1.04 to 2.63	R2-5	
		2.63 to 6.64	R5.5-5	
Auxiliary Contact Alarm Contact Voltage Coil Terminals	Slotted Phillips screw with square washer	0.25 to 1.65	R1.25-3.5	0.7 to 0.9
		1.04 to 2.63	R2-3.5	

- For wiring the main circuit terminal, use the applicable crimp terminals and tighten to the recommended tightening torque.
- When using the NC1V circuit protector as CSA-certified product, use with CSA-certified crimp terminal.
- When using the NC1V circuit protector as UL-listed product, use with UL-listed crimp terminal.

Panel Mounting Screw (not supplied)

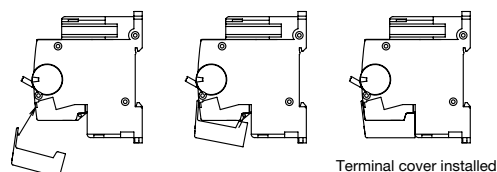
Screw Size	Tightening Torque	Shape
M4	0.8 to 1.0 N·m	

Product Markings (Example: NC1V-1111-30AA)



Installation of Auxiliary/Alarm Terminal Cover

After wiring the terminals, install the terminal cover by aligning the terminal cover with the circuit protector as shown below.



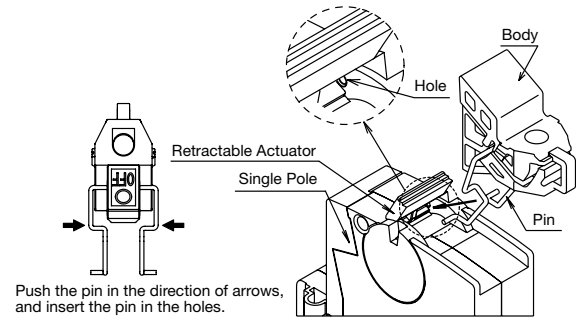
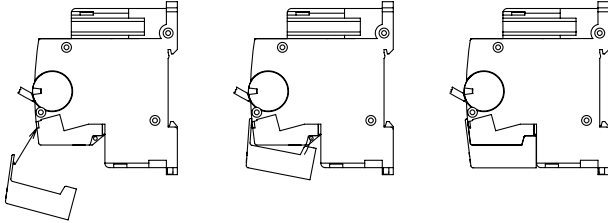
Instructions

Installing Auxiliary/Alarm Terminal Cover

Connect the terminal before installing the terminal cover.

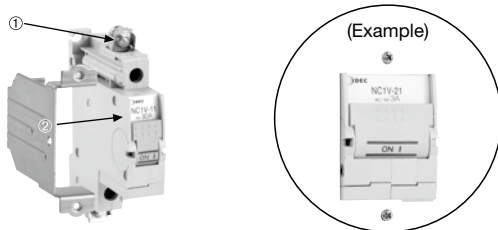
Installing

Attach the latch on TOP side and install the terminal cover as shown below.



Installing NC9Z-MA Panel Mounting Brackets

1. Insert the wiring clip into the terminal of the circuit protector, and tighten.
- Tightening torque to the main circuit terminal
20A max. (M4): 1 to 1.4 N·m
25A, 30A (M5): 1.8 to 2.2 N·m
2. Insert the panel mounting bracket to the circuit protector.
3. Install the rear of the panel mounting bracket into the DIN rail recess on the circuit protector and push in the clamp.

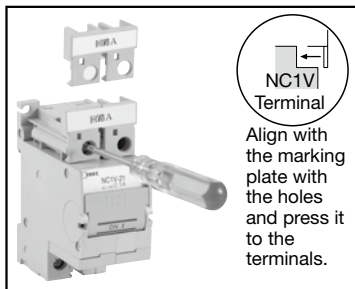


Note: NC1V circuit protectors with auxiliary/alarm contacts cannot be used with mounting brackets.

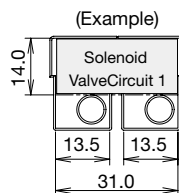
Installing the NC9Z-PW1 Marking Plate

Available for 2-pole circuit protectors only.

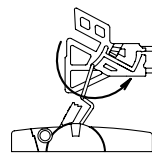
For use on 1-pole circuit protectors, break the marking plate into two halves.



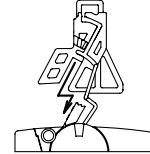
Marking Range



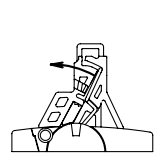
② Turn the body.



③ Install the body on the retractable actuator as shown below.



④ Slide the pin to the lock position.

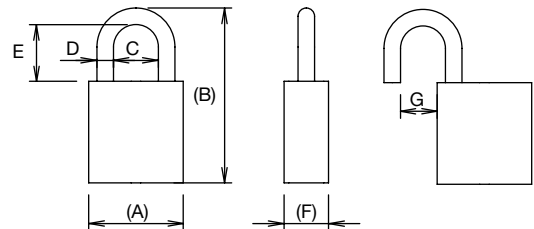


Padlock

- The padlock is not supplied with the padlock attachment and must be supplied by the user.
- The total weight of the padlock can be a maximum of 45g. Make sure the padlock weight does not exceed 45g, otherwise the NC1V circuit protector may be damaged.
- Applicable Padlock Size

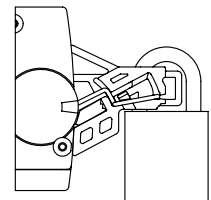
(A)	(B)	C	D	E	(F)	G
19 to 25	35 to 42	9 to 11.5	4 to 4.5	11 to 15	8 to 10	7.5 to 9.0

Note: (A) (B) (F) are for reference only.



Recommended Padlock

Manufacturer	Part No.
Alpha	1000-25
Master Lock	4120



Installing the NC9Z-LK1 Padlock Attachment

- ① Pull down the retractable actuator, and install the padlock attachment on the circuit protector.

1-pole: Insert the pin into the holes under the retractable actuator.

2- or 3-pole: Insert the pin into the holes in the center of the circuit protector.

Safety Precautions

- When using the padlock, do not use the NC1V circuit protector where it is subject to vibration or shock, otherwise failure or damage may result.
- Do not apply a force of more than 50N on the retractable actuator, otherwise the actuator will be damaged.
- When using three or more 1-pole NC1V circuit protectors adjacently, facilitate installing the padlock attachment by providing a clearance of 6mm minimum between the protectors, or by using the tweezers or flat screwdriver.